



**The Economic and Environmental Impacts of Agricultural Subsidies:
An Assessment of the 2002 US Farm Bill & Doha Round**

Draft Paper

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List of Acronyms

AMS:	Aggregate Measurement of Support
AMTA:	Agricultural Market Transition Act
CBO:	Congressional Budget Office
CCC:	Commodity Credit Corporation
CCP:	Counter-cyclical Payments
CRP:	Conservation Reserve Program
CSE:	Consumer Support Estimate
EEP:	Export Enhancement Program
EQIP:	Environmental Quality Incentives Program
EU:	European Union
FAIR Act:	Federal Agriculture Improvement and Reform
FAPRI:	Food and Agricultural Policy Research Institute (University of Missouri)
mmt:	Million metric tons
mt:	Metric tons
OECD:	Organization of Economic Co-operation and Development
PSE:	Producer Support Estimate
S&D:	Special and Differentiated Treatment
URAA:	Uruguay Round Agreement on Agriculture
WTO:	World Trade Organization

Executive Summary

International trade policies and government intervention through subsidies and indirect forms of support influence agricultural production choices such as type of crop or livestock, mode (technology and inputs), and quantity. Such trends can result in global effects in trade level, industry structure, and production location, which in turn may affect the state of the environment. Recently, the adoption of the U.S. Farm Bill and the launch of negotiations on agriculture in the Doha Round have brought the issue of agricultural subsidies to the forefront of trade policy discussions.

Agricultural trade liberalization is one of the most sensitive of all trade issues since agriculture has been integrated in the multilateral trade regime during the Uruguay Round negotiations. The Uruguay Round agreement on Agriculture (URAA)¹ brought world agricultural production and trade under a rules-based regime that not only governs market access, but also domestic support and export subsidies in the form of subsidies in the agricultural sector. This new regime has resulted in a reengineering of domestic support systems in the 1990s. As a new round of negotiations is opening at the World Trade Organization (WTO), negotiations on agriculture are once again addressing the issue of domestic support in agriculture.

The purpose of this study is to assess the environmental impacts of agricultural subsidies, using wheat as an illustrative example. This is done through an analysis of the economic impacts generated by the quantitative and qualitative shifts in domestic support policies induced by the 2002 US Farm Bill and the Doha Round. This is completed by an analysis of the environmental impacts associated with various forms of agricultural subsidies. By contrasting the potential economic and environmental impacts of the Farm Bill and Doha Round, this study highlights some of the most important impacts of agricultural subsidies, and to derive some policy implications.

The first section of this study provides some important definitions and classifications for subsidies, based on the work conducted by the Organization for Economic Co-operation and Development (OECD) and on the categories of domestic support established pursuant to the URAA. Section II assesses the economic impacts of the 2002 US Farm Bill on US and World agricultural production and trade. This section concludes that the 2002 Farm Bill provides incentives for increased agricultural output through an intensification of production. The Bill also reduces cropping flexibility by giving incentives to increase the total cultivated area for such crops as soybean, wheat or corn. The magnitude of this support, combined with the reintroduction or extension of programs or payments that are coupled to output or price are likely to lead to an increase in US agricultural production over the levels that would normally characterize free markets. This production surplus will in turn flow on world markets with the support of export credit and food aid programs, thus depressing commodities price and distorting agricultural trade flows.

¹ *The Agriculture Agreement Contained in the Final Act of the 1986-1994 Uruguay Round of Trade Negotiations, Annex 1A – Multilateral Agreements on Trade in Goods.*

The third section replicates the same analysis, but this time in the context of the potential outcomes of the Doha Round. This section concludes that the reduction or elimination of domestic support and export subsidies – and combined market access liberalization – as a result of the Doha Round would increase world prices for agricultural products and increase agricultural trade. In addition, it can be expected that such liberalization would lead to a relocation of world production, resulting in increased production in developing countries and some OECD countries. This relocation of production resulting from the new interplay of comparative advantages would be small on the aggregate, but could be more important for some commodities such as wheat. Developing countries should benefit from this new competitive environment and capture an increasing share of world trade.

This section also analyses the impacts of the URAA on agricultural subsidies, in order to provide a benchmark for anticipating the impacts of the Doha Round. This analysis leads to the conclusion that the Doha Round is likely to result in a reengineering of domestic support policies in OECD countries, away from trade distorting Amber Box support towards Green Box support. This has major implications for both trade and environment policy as the results of the Doha Round will condition the transformation of domestic support policies in the next fifteen years. This is also important because it will certainly lead OECD countries to reassess their domestic support system in light of the new context.

The last section analyses the environmental impacts of agricultural subsidies. Some theoretical challenges are presented along with the analysis of the scale, product, technology, structure and equity effects of agricultural domestic support, as well as a classification of subsidies according to their environmental impacts. Based on an analysis of current subsidies in OECD countries, it is suggested that there would be considerable environmental benefits in redirecting domestic support away from the most environmentally harmful subsidies towards more environmentally neutral support measures, which also happen to be less trade distorting and more equitable. Some policy implications are derived from this analysis, including an analysis of the potential for developing agro-environmental programs in the context of a reengineering of agricultural domestic support.

Three major conclusions can be derived from this study. First, higher subsidies such as provided for in the 2002 US Farm Bill lead to an intensification of agricultural production in OECD countries which can generally be considered detrimental to the environment in terms of exposure to pesticides and fertilizers, habitat destruction and land degradation, to mention just a few. In addition, subsidies have a technology “lock-in” effect which might impede the shift to less environmentally harmful policies. They also lead to increased specialization and reduced agro-biodiversity. A decrease in domestic support would favor diversification of production, thereby improving agro-biodiversity.

Second, the phasing out of Amber Box policies as a result of the Doha Round would benefit both trade liberalization and environmental protection. Indeed, decoupling subsidies from production levels and price reduces incentives to intensify or extend production, thereby reducing environmental pressures. In addition, OECD’s work shows that the replacement of production-based support with direct income payments can improve the efficiency of agricultural support, thus freeing resources that could be redirected towards agro-environmental programs. In addition, it would improve the performance of agro-environmental programs by removing

counter-incentives.

Third, OECD agricultural support remains largely concentrated in market price support and output/input-based payments, which are the most environmentally harmful categories of subsidies, while agro-environmental programs still represent less than 5 percent of OECD Green Box support. This highlights the challenge in conducting an environmental reform of domestic support programs. Provided that they are well designed, efficient, and consistent with WTO provisions, agro-environmental programs hold the promise of a more sustainable and economically sound agriculture. Eco-conditionality also appears to be a promising approach in that regard.

The Doha Round opens the door for a major reengineering of agricultural support programs to generate optimal trade and environmental outcomes. This constitutes an opportunity to initiate such a multilateral reengineering through the phasing out of Amber Box policies and the tightening of criteria for complying with Green Box support requirements. This opportunity should be seized by initiating a multilateral sustainability assessment of domestic support programs in OECD countries. The conclusions of this process could orient the redeployment of agricultural domestic support in OECD countries, and ultimately help changing the mix of OECD domestic support measures.

In addition, a cooperation program should be designed to help developing countries face the additional environmental pressures that will be generated by the extensification/ intensification of their agricultural production in the wake of the Doha Round. Such cooperation would not only ensure better environmental management in developing countries, but also ensure long-term sustainability of world food supplies, but also prevent transboundary environmental spillovers.

This outlines an ambitious agenda for reform in the field of agricultural domestic support. It is clear, though, that the Doha Round will induce new reforms in the design, magnitude and delivery of subsidies. This constitutes a unique opportunity to orient the next generation of agricultural policies to promote a more efficient, less trade distorting, and environmentally sustainable agriculture. Ultimately, the goal of agricultural policies should be to internalize the environmental costs associated with agricultural production. Agricultural subsidies have an important potential to support such a transition.

Introduction

International trade policies and government intervention through subsidies and indirect forms of support influence agricultural production choices such as type of crop or livestock, mode (technology and inputs), and quantity. Such trends can result in global effects in trade level, industry structure, and production location, which in turn may affect the state of the environment. Recently, the adoption of the U.S. Farm Bill and the launch of negotiations on agriculture in the Doha Round have brought the issue of agricultural subsidies to the forefront of trade policy discussions.

Agriculture is one of the economic sectors where subsidies are the most important. As mentioned by Pearce: “*The economic sectors with the largest share of global subsidies -agriculture/ fisheries, transport and energy, accounting for 81% of world subsidies - affect 66% of world trade. If manufacturing is added, 87% of world subsidies affect 97% of world trade.*”² The importance of subsidies therefore has profound implications on production and trade in the agricultural sector. Given the importance of domestic support in the wheat market, this commodity is used as an illustrative example at various stages of this study.³

Agricultural trade liberalization is one of the most sensitive of all trade issues since agriculture has been integrated in the multilateral trade regime during the Uruguay Round negotiations. The Uruguay Round agreement on Agriculture (URAA)⁴ brought world agricultural production and trade under a rules-based regime that not only governs market access, but also domestic support in the form of subsidies in the agricultural sector. This new regime has resulted in a reengineering of domestic support systems in the 1990s. As a new round of negotiations is opening at the World Trade Organization (WTO), negotiations on agriculture are once again addressing the issue of domestic support in agriculture.

This new round of agricultural negotiations opens in the context of high levels of agricultural support in the Organization for Economic Co-operation and Development’s (OECD) countries, a situation which contributes to production and trade distortions. This high level of support is also assumed to be detrimental to developing countries agricultural producers, which cannot compete with subsidized exports from OECD countries. It is in that context that the 2002 US Farm Bill has been introduced, significantly increasing the level of domestic support provided by the US government to its domestic agricultural producers.

The purpose of this study is to assess the environmental impacts of agricultural subsidies, using wheat as an illustrative example. This is done through an analysis of the economic impacts generated by the quantitative and qualitative shifts in domestic support policies induced by the 2002 US Farm Bill and the Doha Round. This is completed with an analysis of the environmental impacts associated with various forms of agricultural subsidies. By contrasting the potential economic and environmental impacts of the Farm Bill and Doha Round, this study highlights some of the most important impacts of agricultural subsidies, and to derive some policy implications.

² PEARCE, David (2002), *Environmentally Harmful Subsidies: Barriers to Sustainable Development*, Paper presented at the OECD workshop on environmentally harmful subsidies, Paris, 7-8 November 2002. p.9.

³ Annex 1 provides basic figures and information on the world wheat market.

⁴ *The Agriculture Agreement Contained in the Final Act of the 1986-1994 Uruguay Round of Trade Negotiations, Annex 1A – Multilateral Agreements on Trade in Goods.*

The first section of this study provides some important definitions and classifications for subsidies, based on the work conducted by the OECD and on the categories of domestic support of the URAA. Section II assesses the economic impacts of the 2002 US Farm Bill on US and World agricultural production and trade. The third section replicates the same analysis, but this time in the context of the potential outcomes of the Doha Round. This section also analyses the impacts of the URAA on agricultural subsidies, in order to provide a benchmark for anticipating the impacts of the Doha Round.

The last section analyses the environmental impacts of agricultural subsidies. Some theoretical challenges are presented along with the analysis of the scale, product, technology, structure and equity effects of agricultural domestic support. Some policy implications are derived from this analysis, including an analysis of the potential for developing agro-environmental programs. The conclusion assembles the various policy implications of the last three sections, making the case for a sustainability assessment of domestic support policies in OECD countries.

Definitions and Categories of Agricultural Subsidies

Subsidies include a broad range of government economic interventions and policies. This vast segment of public agricultural policy needs to be defined, circumscribed and classified in order to be best analyzed and understood. This section presents some of the most important definitions and classifications that will be used in this paper, as well as basic figures to understand the scope and magnitude of agricultural support in OECD countries.

The OECD Classification and Measures for Subsidies

The literature offers several definitions and classification schemes of subsidies. This study does not intend to give an exhaustive review of literature in this area, but to establish some baselines for the analysis of the economic and environmental impacts of the 2002 US Farm Bill and Doha Round negotiations. The general foundations of this research are the definitions, classification, and measures used by the OECD.

Portugal (OECD) defines subsidies as *“a benefit provided to individuals or businesses as a result of government policy that raises their revenues or reduces their costs and thus affects production, consumption, trade, income, and the environment. The benefit generated by policy may take different forms such as an increase in output-price, a reduction in input-price, a tax rebate, an interest rate concession, or a direct budgetary transfer.”*⁵ The OECD has used this definition as the foundation to develop a classification and measures of subsidies.

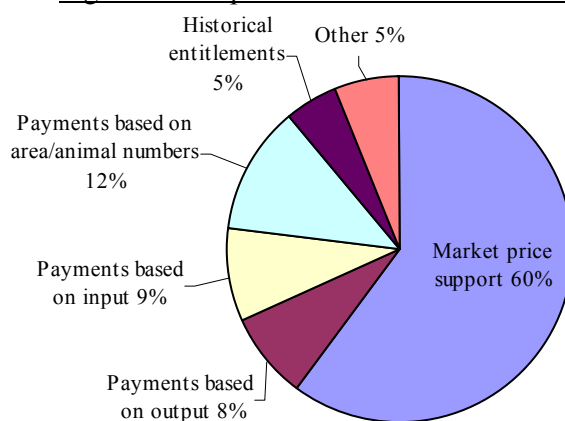
The OECD has designed measures to quantify subsidy levels across countries and goods. The measures are the Consumer Support Estimate (CSE) and the Producer Support Estimate (PSE). The PSE, of interest for this research, is defined as *“an indicator of the annual monetary value of gross transfers from consumers and taxpayers to agricultural producers, measured at the farm-gate level, arising from policy measures that support agriculture, regardless of their*

⁵ PORTUGAL, Luis (2002), *OECD Work on Defining and Measuring Subsidies in Agriculture*, paper presented at the OECD Workshop on Environmentally Harmful Subsidies, Paris, OECD, 7-9 November 2002. p.3.

nature, objectives or impacts on farm production or income. It includes market price support and budgetary payments, i.e. gross transfers from taxpayers to agricultural producers arising from policy measures based on: current output, area planted/animal numbers, historical entitlements, input use, input constraints, and overall farming income.”⁶ This classification is used in this study.

According to the OECD, support to agriculture, as measured by the PSE, amounted to US\$230 billion in 2001. More than 75 percent of this support was generated through market price support, output and input payments, which are considered to be trade and production distorting. Support to agriculture accounted for 31 percent of total farm receipts in the OECD in 2001, compared with 38 percent in the 1986-88 period, which is an important baseline in the URAA.⁷

Figure 1: Composition of PSE in OECD countries (2001)



Market price support and output payments that are coupled to price and production levels remained the dominant forms of support, representing 69 percent of the PSE in 2001.⁸ Market price support, output payments and input payments are generally considered the most production and trade distorting forms of domestic support.⁹

The shape and magnitude of agricultural support varies between countries. Table 1 shows the differences between Canada, Mexico, the United States and the European Union, compared to the OECD average. The PSE, measured as a percentage of farm receipts, constitutes the only measure allowing a comparison of the level of support between countries and between commodities. This is because nominal figures need to be interpreted in relation with the size of production in a country or for specific commodities. Table 1 shows for example, that the level of support given by the European Union to its agricultural producers represents twice as much the one offered by Canada.¹⁰

Table 1: PSE by country in 2001¹¹

	US\$ million	% of Farm Receipts
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⁶ OECD (2002d), *Methodology for Measurement of Support and Use in Policy Evaluation.*, Paris, [online] <<http://www.OECD.org/agr/policy>>.

⁷ OECD (2002a), *Agricultural Policies in OECD Countries: Monitoring and Evaluation*, Paris, p.24.

⁸ Ibid. p.9.

⁹ Ibid. p.29. For a detailed description of the environmental impacts associated with these categories of support, see Annex 4.

¹⁰ OECD (2002e), *How Green is Farm Support?*, Paris.

¹¹ OECD (2002a) op.cit. p.158.

Canada	\$3,928	17%
Mexico	\$6,537	19%
United States	\$49,001	21%
European Union	\$93,083	35%
OECD	\$230,744	31%

The level of domestic support also varies between commodities. For example, the PSE represented 40 percent of gross farm receipts for wheat in the 1999-2001 period.¹² The PSE for wheat has decreased from US\$18.7 billion in (48 percent of farm receipts) in 1986-88 to US\$14.3 billion (37 percent) in 2001.¹³ Table 2 shows differences between countries for the 1999-2001 period.

Table 2: PSE for wheat in OECD countries (1999-2001)¹⁴

	Total Average	% of Farm Receipts
OECD	US\$17,331 million	41%
Canada	C\$642 million	18%
European Union	€9,163 million	44%
United States	US\$3,722 million	40%

The Uruguay Round Classification of Domestic Support

The Uruguay Round Agreement on Agriculture established criteria and categories to bring agricultural trade under a rules-based regime. The agreement divides governmental interventions into three pillars: market access, domestic support and export subsidies. This study focuses on domestic support and export subsidies, which are the two categories most directly related to the issue of agricultural subsidies.

The URAA distinguishes domestic support into categories according to their level of trade distortion. This classification has been used to differentiate between supports which are exempt and non-exempt from control under the Agreement. The classification categories are labeled “Amber Box”, “Blue Box”, and “Green Box” policies. The subsidies included in the Amber Box are coupled to output and price and consequently are considered as trade distorting. Amber Box subsidies are scheduled to be reduced under the Agreement. The reduction commitments are expressed as the total Aggregate Measurement of Support (AMS).¹⁵ The Total AMS is “*the sum of expenditures on non-exempted domestic support, aggregated across all commodities and policies*”.¹⁶

Blue Box support includes subsidies that are considered less trade distorting because they contain production limiting measures. No reduction commitments were made for Blue Box support. Finally, Green Box policies include forms of domestic support which are considered to have minimal impact on production and trade and are not subject to reduction under the Agreement. In order to be included in the Green Box, “*the support shall be provided through a*

¹² Ibid. p.31.

¹³ PORTUGAL, Louis. *OECD Methodology for the Measurement of Support and Use in Policy Evaluation*, Paris.

¹⁴ Ibid. p.162.

¹⁵ The URAA commitments are presented in more detail in annex 2.

¹⁶ ELAMIN, N.Hag. 2000. Agreement on Agriculture, Domestic Support Measures. Multilateral Trade Negotiations on Agriculture: A Resource Manual II., FAO.

*publicly-funded government programme not involving transfers from consumers [and] shall not have the effect of providing price support to producers”.*¹⁷ Examples of Green Box Policies are general services, food security stocks, domestic food aid, direct payments to producers, decoupled income support, income insurance and safety-net, natural disaster relief and environmental programs.¹⁸

The Economic Impact of Subsidies

Subsidies can potentially generate both direct and indirect economic effects. In agriculture, direct effects include the influence on growth and location pattern, investment, and international trade. Agricultural subsidies are usually considered to artificially increase output, depress world prices, disrupt international markets, and reduce economic efficiency. Many of these impacts are analyzed in more detail in further sections of this study.

Agricultural subsidies can also lead to indirect effects on both on the upstream and downstream industries, such as the input (e.g. agro-chemicals) and transformation (e.g. processed food) industries. It is worthwhile noting that a comprehensive assessment of the impact of subsidies would include not only the direct, but also the indirect effects. In return, direct subsidies to the upstream and downstream industries can also impact producers’ decision making. As an example, Beers and Bergh point out the high level of subsidies in the transport sector.¹⁹ This sector is closely linked with agriculture through the transportation of commodities. Taking into account transport subsidies would increase the aggregate impact of subsidies on agricultural trade.

Specific categories of subsidies generate different economic impacts, depending on their point of impact and inherent dynamics. Young et al. draw on the literature from the OECD and the URAA to develop a classification of governmental interventions that is useful in assessing the economic impacts of various forms of domestic support.²⁰ The resulting classification is composed of five categories: market price support, output and input subsidies, supply and payment limits and farm based payments.

¹⁷ WTO. The Uruguay Round Final Act. Agreement on Agriculture, pp.43-71.
<[Http://www.wto.org/english/docs_e/legal_e/final_e.htm](http://www.wto.org/english/docs_e/legal_e/final_e.htm)>

¹⁸ WTO. The Uruguay Round Final Act. Agreement on Agriculture, pp.43-71.
<[Http://www.wto.org/english/docs_e/legal_e/final_e.htm](http://www.wto.org/english/docs_e/legal_e/final_e.htm)>

¹⁹ BEERS VAN CEES, Jeroen C.J.M. VAN DEN BERGH, (2001), *Perseverance of perverse subsidies and their impact on trade and environment*, Ecological Economics 36, pp. 475-486.

²⁰ YOUNG, E. M. BURFISHER, F.NELSON, and L. MITCHEL, (2002), USDA ERS, *Domestic Support and the WTO: Comparison of Support Among OECD Countries*, pp.1-13.

Market Price Support

Market price support provides producers with a price that is higher than the world market price. Examples are import restrictions (e.g. tariffs), administered prices (e.g. storage programs) and export subsidies. This definition includes both the market access and export subsidies categories of the URAA. The objective of these forms of intervention is to support producer income. As a direct, but secondary effect, it may encourage production, therefore resulting in an increase of produced quantity at the domestic level. Moreover, market price support also has an important impact at the international level. Namely, the domestic increase in production can result in lower level of imports and higher level of exports to sell excess production. There is a potential of leakage of this form of support to the upstream (input) industry. In the short run, an increase in production may result in an increase of input demand, which can translate in an increase of the input price. In the long run this price increase can result in a shift of inputs used (toward more cost effective inputs) or lead to the adoption of other production technology.²¹

Output and Input Subsidies

Output Subsidies are defined as “*direct payment programs linked to commodity production*” and input subsidies as subsidies on the inputs used in the production process (e.g. technology and resources). These types of subsidies are often coupled to production and/or prices. In the Agreement on Agriculture of the Uruguay Round, output and input subsidies are classified under Domestic Support and are generally considered “Amber Box Policy”. Output subsidies directly encourage higher levels of production. This has the effect of decreasing the level of imports and potentially increasing the level of exports. Like in the case of market price support, output subsidies can leak to the upstream industry.²² On the other hand, input subsidies reduce the cost of production. Their effects are twofold: by influencing “*the mix of inputs used for production and [the] changes in the mix of final products produced.*”²³

Supply and Payments Limits

Supply and payments limits restrict for instance the total payment amount to large producers and the number of hectares eligible to direct payments. This type of intervention is included in the Blue Box and is not disciplined under the WTO.

Farm Based Payments.

Farm based payments “*are a class of direct payments that are based on historical production or on farm enterprise characteristics.*” In the Agreement on Agriculture of the Uruguay Round, farm based payments are generally classified under Domestic Support and often as “Green Box Policies”. Most of those payments are considered as decoupled from the production and are not expected to trigger significant production incentives. This type of payments tends to have a low

²¹ Organisation for Economic Co-operation and Development, (1998), *Improving the Environment through Reducing Subsidies*, Paris, OECD.

²² OECD (1998) Op.cit.

²³ YOUNG, E. M. BURFISHER, F.NELSON, and L. MITCHEL, (2002), USDA ERS. *Domestic Support and the WTO: Comparison of Support Among OECD Countries*, pp.1-13.

level of upstream and downstream leakages.²⁴ It is important to note, however, that the increase in wealth resulting from farm based payments can lead to an increased level of activity (production and consumption) and might also alter the perception of risk linked to production. However, farm based payments which are linked to current price but are decoupled from production can be considered as partially coupled. An example is the counter-cyclical payments presented in more detail in the section addressing the 2002 US Farm Bill. This has the potential to result in a classification as Amber Box policies under the WTO.

This brief summary of the categories of subsidies and various related impacts will serve as a benchmark for this study. These concepts will serve as reference points in the following sections analyzing the 2002 US Farm Bill and the Doha Round negotiations on agriculture. The section analyzing the environmental impacts of agricultural subsidies will also refer to these concepts, along with other useful ones provided by the WTO and OECD.

The Economic Impacts of the 2002 US Farm Bill

In May 2002, the Farm Security and Rural Investment Act of 2002 (2002 US Farm Bill)²⁵ was approved by US administration in replacement of the Federal Agriculture Improvement and Reform (1996 FAIR Act). This new US Farm Bill will be in effect for a six year period, from 2002 to 2007.

The 2002 US Farm Bill is composed of 10 titles, among which the following three are of most interest to this research:

- Title I - Commodities
- Title II- Conservation
- Title III- Agricultural Trade and Aid.

The Farm Bill budgetary costs are estimated at US\$180 billion²⁶ over a ten-year period (based on April 2001 baseline).²⁷ The actual cost of the Farm Bill depends on several factors such as the actual price of commodities and quantities produced. In comparison to the 1996 FAIR act, the budget is increased by an estimated US\$73.5 billion – or 78 percent²⁸ - over a ten year period²⁹. Much of this increase comes from the institutionalization of ad hoc emergency assistance payments provided each year since 1998.³⁰ The cost of these payments was approximately

²⁴ OECD (1998) Op.cit.

²⁵ U.S. Department of Agriculture, 2002. US Farm Bill. <<http://www.usda.gov/farmbill/>>

²⁶ CBO now forecasts that the farm bill will cost US\$190 billion (US\$9.3 billion more than the 2001 baseline). This increase is due from a different assumption in commodities prices between 2001 and 2002.

²⁷ International Centre for Trade and Sustainable Development (2002b), “Us Trade Policy Developments Cast a Pall on WTO Trade Talks”, in *Bridges between Trade and Sustainable Development*, Year 6, No.4, May 2002. p.14.

²⁸ Organisation for Economic Co-operation and Development (2002f), *OECD Agricultural Outlook 2002-2007*, Paris, OECD, p.38.

²⁹ The US Congressional Budget Office (CBO) expenditures projections are over a ten-year period rather than six-year, the length of the farm bill

³⁰ Ibid. p.18.

US\$20 billion³¹. The 2002 US Farm Bill formally integrates these payments under the Commodities title in the form of counter-cyclical payments.

The estimated budgetary increase over ten years for Commodities programs is estimated at US\$47.8 billion (65 percent of the total Farm Bill budgetary increase)³² with a total projected spending of US\$124.8 billion. The projected budget increase for Conservation programs is US\$17.1 billion (23 percent of the total Farm Bill budgetary increase)³³ for a total of \$38.5 billion. The budget increase for Agricultural Trade and Aid is US\$1.1 billion (1.5 percent of the total budgetary increase)³⁴ for a total spending of US\$3.8 billion³⁵. However, when taking into account the activities funded by the Commodity Credit Corporation (CCC), the Agricultural Trade and Aid level of activities approached US\$33.5 billion under the 1996 FAIR Act and are projected at US\$6.6 billion annually under the 2002 Farm Bill. The main activities funded under the CCC are the Export Credit program (which is guaranteed at US\$5.5 billion annually), exports subsidies and some food aid programs.³⁶

The 2002 US Farm Bill: An Overview of Impacts

Overall, the Farm Bill is expected to have important impacts on US agricultural production and world markets. First, it has been estimated that the US Farm Bill could lead US Amber Box subsidies to exceed US\$19.1 billion, which is the maximum allowed for this country under the URAA.³⁷ This would mean higher levels of distortion in agricultural markets. In addition, given the scope and magnitude of the new support, it is very likely that even the Green Box elements of the Farm Bill will distort production decisions. According to the OECD: *“the nature and magnitude of the support contemplated – even if provided or implemented in a way that is less directly coupled to current production – is expected to have significant consequences for the outlook for agricultural production and trade. At the least, by reducing risk it can be expected to encourage more investment in US agriculture, possibly higher output in low price years (based on recent experience) and an expansion in overall production potential. This tendency could be further reinforced by the provision allowing farmers to update their yields and acreage base and hence giving them an incentive to expand output”*.³⁸

These impacts are likely to hurt developing countries as they will lead to an increased flow of subsidized exports on world markets and, as a result, to lower world prices for commodities. In fact, *“poor African and Asian countries are likely to be more profoundly affected by the Bill than NAFTA members or the EU. First, its contribution to continuing and perhaps worsening agricultural terms of trade will prevent their farmers from getting a fair price for their export products [...] Second, the countercyclical and loan deficiency payments will make US exports*

³¹ BECKER, Geoffrey S. and Jasper WOMACH, (2002), *Farm “Counter-Cyclical Assistance”*, Congressional Research Service, Report for Congress, May 31, 5 p.

³² Ibid. p.41.

³³ Ibid.

³⁴ Ibid.

³⁵ BECKER, Geoffrey S. and Jasper WOMACH, (2002), *The 2002 Farm Bill: Overview and Status*, Congressional Research Service, Report for Congress, July 3, p.38.

³⁶ HANRAHAN, Charles E., (2002), *Agricultural Export and Food Aid Programs*, Congressional Research Service, June, p.14

³⁷ International Centre for Trade and Sustainable Development (2002a), *New Us Farm Bill Upsets WTO Partners, Could Hurt Developing Countries* in *Bridges Weekly Trade News Digest*, Vol.6, no.18, 15 May 2002. p.4.

³⁸ OECD (2002f), op.cit. p.18.

extremely competitive and capable of flooding developing country markets with cheap subsidised imports."³⁹ These impacts are important since the role of developing countries in world agricultural markets is expected to be a central theme of the Doha Round.

The following section analyses the specific impacts of the Farm Bill titles which are relevant to this study. This analysis is necessary to understand the impacts of US domestic support on agricultural production and on world markets. By comparing these impacts to the potential impacts of the Doha Round, it will be possible to derive some of the important effects of subsidies in world agricultural markets.

Title I – Commodities

In the 2002 Farm Bill, agricultural domestic support for Commodities is presented in three types of payments: direct payments, counter-cyclical payments and marketing loans. The 2002 US Farm Bill introduces coverage of soybeans and oilseeds under the direct and counter-cyclical programs. Also, marketing loans are expanded to pulses, i.e. small chickpeas, lentils and dry peas. But the Bill does not cover dry beans, the leading pulse in terms of production in the U.S. According to the US Congressional Budget Office (CBO), the Commodity budget increase is US\$9.9 billion for direct payments, US\$29.4 billion for counter-cyclical payments and US\$2.2 billion for marketing loans payments.⁴⁰

Table 3: US Farm Bill Rates and Prices per Commodities

Commodities	\$/Unit	Loan Rates			Direct Rates		Target Prices		
		2002	2002-03	2004-07	2002 AMTA	Farm Bill	1995	2002-03	2004-07
Wheat	\$/mt	94.67	102.76	100.93	16.88	19.08	146.8	141.66	143.86
Corn	\$/mt	74.26	77.79	76.62	10.22	11.00	108.08	102.18	103.36
Sorghum	\$/mt	75.24	87.12	85.8	13.64	15.40	114.84	111.76	113.08
Barley	\$/mt	75.62	86.16	84.79	8.71	11.00	108.16	101.28	102.66
Oats	\$/mt	83.19	92.81	91.44	1.38	1.65	99.69	96.25	99.00
Cotton	\$/kg	1.142	1.144	1.144	0.122	0.146	1.604	1.593	1.593
Rice	\$/cwt	6.5	6.5	6.5	2.05	2.35	10.71	10.5	10.5
Soybeans	\$/mt	193.04	183.5	183.5	None	16.15	None	212.86	212.86
Minor Oilseeds	\$/kg	0.205	0.211	2.046	None	0.018	None	0.216	2.422

Direct Payments

Direct payments are a continuity of the production flexibility contract – i.e. the AMTA payments (Agricultural Market Transition Act) of the FAIR Act. As shown in Table 3 direct payments rates are higher than those attributed during the last year covered by the 1996 FAIR Act for all crops. In contrast to the 1996 FAIR Act, direct payments have fixed rates which do not decrease over the years.⁴¹ Also, the program covers more commodities, as it is expanded to soybean and minor oilseeds production. The payment is annual and calculated based on “*fixed direct payment*”

³⁹ International Centre for Trade and Sustainable Development (2002b), *US Trade Policy Developments Cast a Pall on WTO Trade Talks*, in *Bridges between Trade and Sustainable Development*, Year 6, No.4, May 2002. p.14.

⁴⁰ OECD (2002), *OECD Agricultural Outlook 2002-2007*, Paris.

⁴¹ FAPRI, (2002), Primer to the 2002 Farm Bill, Supplement to meeting series held at Missouri locations, September.

rate, the base acres times 0.85, and the payment yield” of a reference period.⁴²

These payments are based on historical rather than current production and are therefore considered decoupled from production. In the 2002 Farm Bill, the direct payment rate for wheat is increased by 13 percent when compared to last year of AMTA, from US\$16.88 (AMTA 2002) to \$19.08 per metric tons. The 2002 Farm Bill provides producers the option to keep the current reference period with the possibility of adjusting for oilseeds (newly covered by direct and counter-cyclical payments), or to update the reference period to a four year average of 1998-2001. However, update of the yield reference period (1981-1985) is not allowed under the direct payments program.⁴³

Counter-cyclical Payments (CCP)

Counter-cyclical payments took the form of *ad hoc* emergency packages (loss assistance payments) between 1998 and 2001 and were not an integral part of the 1996 FAIR Act. The CCP guarantees the availability of these emergency payments to producers. Calculation of the payments is based on historical production, but linked to current market price. The CCP is provided whenever the effective price is less than a certain level referred to as the target price. Compared with 1996 target prices, the 2002 US Farm Bill target prices are lower for all crops.

As for direct payment, producers have the option to update their base hectares reference to 1998-2001. Where they opt to do so, producers can elect to keep the current yield reference, update the reference partially, or entirely to 1998-2001 program yield. Producers are not provided the possibility to customize for each crop the update of base hectares and program yield. The chosen approach and reference year are applied to all crops.⁴⁴

Implications on Producers' Decisions

The direct and counter-cyclical payments fall into the “farm direct payment” category described in section I. In comparison to marketing loans, the impacts of direct and counter-cyclical payments on production are considered less distorting because the payments are based on historical rather than current production. This characteristic often results in a classification of direct and counter-cyclical payments as decoupled. This is an important qualifier as under the URAA, decoupled payments are exempt from reduction commitments and fall within the Green Box policies category.

However, some analysts question whether counter-cyclical payments can be qualified as decoupled payments. Decoupled payments can be defined as “*government program payments to farmers that are not linked to the current levels of production, prices, or resource use. When payments are decoupled, farmers make production decisions based on expected market returns rather than expected government payments*”.⁴⁵ The counter-cyclical payments are based on

⁴² Economic Research Service, U.S. Department of Agriculture, (2002), ERS analysis, direct payments.

⁴³ FAPRI, (2002), Primer to the 2002 Farm Bill, Supplement to meeting series held at Missouri locations, September.

⁴⁴ GRAY, Allan W., (2002), *2002 Farm Bill: Impacts on Decisions at the Farm*, Department of Agricultural Economics, Purdue University, May, CES

⁴⁵ Economic Research Service, USDA, (2002), *Farm and commodity policy: glossary of policy terms*.

historical production and on current prices. This conflicts with the URAA⁴⁶ part of the definition of decoupled income support (Annex 2, paragraph 6.c.): “*The amount of such payments in any given year shall not be related to, or based on, the prices, domestic, or international, applying to any production undertaken in any year after the base period.*” As the CCP is tied to current prices, the producers are assured that compensation will be provided in times of low prices. This would distort production and trade and potentially qualify as Amber Box support.

The debate is also growing as to whether some decoupled payments’ level of distortion is minimal enough to be classified as Green Box payments. The classification of decoupled payments as “Green Box policies” is established under the assumption that those payments “*have no, or at most minimal trade-distorting effects or effects on production*”.⁴⁷ The principal argument pertains to the effects of an increased wealth on risk averse producers. The increased wealth provided by the decoupled payments may alter risk averse producers’ perception of production risks. This change in risk perception may lead to an increased level of activity; production and consumption. It can impact decisions such as type and quantity of inputs and farm investments. The increased wealth also augments producers’ eligibility to obtain bank loans which in turn further amplifies the wealth effect. A study conducted by Rude⁴⁸ adds to the argument by presenting three instances in which risk neutral producers’ decisions may be affected by decoupled payments.⁴⁹

Many argue that producers’ decisions may be distorted by expected direct and counter-cyclical payments. For instance, one of the concerns is the influence on producers’ planting decisions that could result from the opportunity to update the base hectares and yields for direct and counter-cyclical payments under the 2002 US Farm Bill.⁵⁰ This option for producers could create expectations that future updates will be allowed and therefore payments would be linked to recent planting decisions, thereby creating an incentive to increase production. Also, a potential source of influence on decisions is linked to the level of planting flexibility offered by direct and counter-cyclical payments. The planting flexibility being limited to commodities, producers who diversify their production with fruits and vegetables are not eligible to direct and counter-cyclical payments. This restriction also applied to the previous farm bill, but will now also affect soybean producers through the newly introduced direct and counter-cyclical payments for oilseeds.⁵¹

⁴⁶ WTO. The Uruguay Round Final Act. Agreement on Agriculture, pp.43-71.

<[Http://www.wto.org/english/docs_e/legal_e/final_e.htm](http://www.wto.org/english/docs_e/legal_e/final_e.htm)>

⁴⁷ Agreement on Agriculture, Annex 2, paragraph 1

⁴⁸ RUDE, James, Agriculture and Agri-Food Canada, (1998), *Green Box Criteria: A Theoretical Assessment*, CATRN, P.26.

⁴⁹ The examples are in the contexts of increasing returns to scale with institutional constraints, of behavioural theories of the firm which describes “satisficing” behaviour rather than profit maximization and of debt constraints. Rude (1998) notes that the two first examples are only applicable in the case of “large scale multiple enterprise farms if they are applicable to agriculture at all”, but that the influence in the context of debt constraint is well applicable to agriculture.

⁵⁰ European Union, (2002), *Questions & Answers - US Farm Bill*, Brussels, 15 May, P.12.

⁵¹ GRAY, Allan W., (2002), *2002 Farm Bill: Impacts on Decisions at the Farm*, Department of Agricultural Economics, Purdue University, May, CES-342.

In addition, the Farm Bill provides an incentive to increase yield, since the payments are provided on a per bushel basis.⁵² Interestingly, the direct and counter-cyclical payments are the lowest per hectares for soybeans (followed by wheat and corn). This means also that soybean producers need to plant on many more hectares to attain the maximum direct and counter-cyclical payments. For counter-cyclical payments, close to 6,800 hectares are needed to reach the maximum payment for soybean, versus only approximately 2,200 hectares for wheat. For direct payments the maximum is reached at 3,400 hectares for soybean and 1,400 hectares for wheat⁵³. Payment per bushel in this instance creates an incentive to have the largest number of hectares possible planted for soybean.

Through financial support, the overall incentives created by the direct and counter-cyclical payments are to increase the level of activities (production and consumption), to increase yields and to limit the level of production diversification to commodities (no fruits and vegetables). On a large scale, this can have significant environmental effects which are presented below in another section.

Marketing Loans

Marketing loans programs have existed under various forms since the 1930's and have been the primary source of domestic support to U.S. producers.⁵⁴ The marketing loan function is to provide producers with the flexibility of selling the crop throughout the year. With the loan, producers can afford to store their harvest instead of having to sell the crops immediately. The loan allows producers to sell the crop at a strategic time, i.e., when prices are high. In comparison to the 1996 FAIR Act the marketing loan rates are higher for all commodities except soybeans. The wheat marketing loan rate increases from \$94.69 per metric ton (current 2002) to \$102.76/mt in 2002-2003 and to \$100.93/mt in 2004-2007. Also the marketing loans are extended to pulses (chickpeas, lentils, and dry peas), peanuts, wool, mohair and honey.⁵⁵

Marketing loans can be obtained after harvest for a period of nine months usually. Where the marketing loan rates (which are fixed) are higher than market rates, the difference will result in subsidies to producers. The marketing loan rates therefore act as a guaranteed fixed price floor. Producers have the option to obtain the benefits of the subsidy without having to take and pay the loan. This option is called "loan deficiency payments" (LDP). In order to maximize the benefits from the marketing loan programs, several producers undertake a two-step process involving government payment when market price is low, and selling at a later time when prices have increased.⁵⁶

⁵² MAYER, H., L.MARTIN and a. STACIWA, (2002), *The 2002 US Farm Bill's Implications for Commodity Markets and Canada's Agri-food Sector*, George Morris Center, July.

⁵³ ANDERSON, John D., (2002), *Agricultural Economic & Policy Perspectives*, Mississippi State University's Department of Agricultural Economics, Volume 1, number 2, P.5.

⁵⁴ Canadian Wheat Board, (2002), *World trade, US Farm bill*.
<http://www.cbw.ca/en/topics/world_trade/farm_bill.jsp?pm=1>

⁵⁵ Economic Research Service, U.S. Department of Agriculture, (2002), *Marketing assistance loans and LDPs*.

⁵⁶ WESTCOTT, P.C. and J.M.PRICE, Economic Research Service, USDA, (2001), *Analysis of the U.S. Commodity Loan Program with Marketing Loan Provisions*, ERS Agricultural Economic Report No.801, April, 26 p.

Implications on Producers' Decisions

Most of the effects of the direct and counter-cyclical payments on producers' decisions can also be attributed to marketing loan payments. In addition, marketing loans have a direct influence on crop selection and quantity produced because the payments are linked to the current production area and yield, and because the loan rates are known for the next six years. In Title I of the U.S. Farm bill, marketing loan payments are pointed to as the most production distorting since they are directly tied to current production. In reference to the subsidies categories presented in section I, the marketing loans classify as output subsidies. Under this income support program, producers' planting decisions are based on marketing loans expected returns rather than market signals (prices) as the loan rates are known in advance.

Among the commodity support measures of the 2002 U.S. Farm Bill, marketing loans are expected to have the greatest influence on production decisions. The consequences of a marketing loan program range from a shift in production of competing crops, over an increased level of planted area, to lower prices as an outcome of increased supplies.⁵⁷ In turn, resulting low prices lead to higher governmental payments to producers, creating a reinforcing effect. The decrease in commodity prices in the late 1990s has led to a considerable increase in subsidies payments; from US\$200 million in 1997 to US\$8 billion for 1999 crops. This price decrease can also be considered as a form of subsidy to the downstream industry, such as livestock, and in the case of wheat the bread and pasta industry. Marketing loan incentives to produce a crop rather than another and to increase production may have consequential environmental impacts

Title I Impacts on World Agricultural Markets

Domestic support for commodities can have significant implications on world markets. Indeed, incentives to produce certain crops over others lead to overproduction of favored crops in comparison to production levels based on market signals. This increase in production puts downward pressure on prices of the favored crops. This creates a surplus which is available for exportation at a low price.⁵⁸ The producers sell internationally at low prices but are subsidized domestically for their production, thus causing a leakage from domestic subsidies to export subsidies.

Also, such high levels of subsidized production and low prices create a barrier to entry for other countries. This holds true mainly for developing countries for which governmental subsidies or technology may not be as easily available. It is generally accepted that domestic support in OECD countries hinders the theoretical comparative advantage of developing countries in this industry.

Title II – Conservation

Conservation programs provide producers with financial and technical assistance regarding “*soil erosion, wetlands, wildlife habitat, and farmland protection.*”⁵⁹ Participation in the programs is

⁵⁷ Ibid

⁵⁸ VERBRUGGEN, H. And F. OOSTERHUIS, (1999), *Competitiveness and Reduction of Support Measures to Industry: the Prisoners' Dilemma*, OECD, pp. 241-270.

⁵⁹ ERS, USDA, (2002), *Farm Bill 2002*, Conservation Provisions Overview, 3 p.

voluntary. Under the 2002 Farm Bill, financial support is increased for almost all existing programs⁶⁰ and two new programs are created; the Conservation Security Program⁶¹ and the Grassland Reserve Program. This is coherent with the trend toward the development of agro-environmental programs in OECD countries. This issue is discussed in more detail in the section on the environmental impacts of subsidies.

The 1996 US FAIR Act efforts were concentrated in the development of land retirement solutions. In contrast, the emphasis of the 2002 Farm Bill is placed on environmental solutions to land in production. Working lands conservation programs will receive 60 percent of the new spending of the 2002 Farm Bill but accounted for only 15 percent of the budget in the past 15 years.⁶² As discussed in the section on environmental impacts of subsidies, this approach is generally considered as less trade distorting than land set-aside programs.

Increased assistance toward working land extends to new types of environmental cases and increases the number of producers who may have access to support under the Conservation title of the Farm Bill. Improved environmental practices in agricultural production may result from this new direction. However, the environmental success of this approach may depend on the nature of projects which will receive financial support, i.e., whether financing is directed toward adopting production practices which reduce or eliminate environmentally damaging output or toward handling the environmentally damaging factors which are being created. In the context of the Farm Bill, it is likely that the Conservation programs' financial support will be directed toward handling the environmental damages created by incentives for high production and limited diversification included in other sections of the Farm Bill. This context will reduce the effectiveness of the conservation programs since other titles of the Farm Bill are producing counter incentives to conservations.

Current agricultural production practices result in environmental externalities, i.e. environmental costs of production are not entirely included in the pricing as producers do not face the full costs of their production's environmental impacts. Subsidizing producers for the environmental costs of their production diminishes environmental damages, raises producers' awareness of their environmental impacts and generally favors environmental-friendly practices. However, it leaves environmental externalities as externalities. Therefore, with subsidies, prices will not reflect the environmental costs of production and consumers will not face the true cost of their consumption. Internalizing those costs through regulations and market-based instruments would encourage producers to adopt production practices which would diminish the environmental costs and increase overall economic efficiency.

⁶⁰ *The Environmental Quality Incentive Program (EQIP), Wetlands Reserve Program (WRP), Wildlife Habitat Incentive Program (WHIP), Water Conservation Program and Farmland Protection Program (FPP) are all re-authorized through to 2007.* Source: Organisation for Economic Co-operation and Development (2002f), *OECD Agricultural Outlook 2002-2007*, Paris, OECD. p.42.

⁶¹ At the time of writing (January 2003), USDA is contemplating the possibility of modifying the CSP from an entitlement program, with no limits on spending, to one capped at \$2 billion over the next decade. Source: LOOKER, Dan, *Bush wants to cap new conservation program at \$2 billion*, in @griculture Online [online] http://www.agriculture.com/default.sph/AgNews.class?FNC=sideBarMore__ANewsindex_html__49316, consulted on Feb. 3, 2003.

⁶² Economic Research Service USDA, (2002), *Working Land Conservation*, pp.1-3
<<http://www.ers.usda.gov/Features/farmland/analysis/workingland.htm>>

The Conservation Reserve Program (CRP)

The CRP is a land retirement program which was created to diminish land erosion. Under this program, land is set aside for “*permanent conserving uses for 10 to 15 years.*” The budget for this program is approximately US\$1.5 billion over ten years. Under the 2002 Farm Bill, the CRP cap is increased by over one million hectares to reach 15.7 million hectares. However, participation in this program is voluntary and the current area covered by the program stands at 13.6 million hectares which is below the previous cap.⁶³ Thus, the CRP has a total of 2.6 million hectares available for enrolment. This represents only 2 percent of harvested cropland. The potential effects of this program on prices and supply is therefore small. The current CRP enrolments are located mostly in the Great Plains (60 percent). If future enrolment continues to be concentrated in this region, it is likely that effects on supply and price will be felt on the dominant production of the region, i.e., wheat.⁶⁴ Approximately 40 percent of the lands converted were previously used to grow wheat or corn.⁶⁵

The Environmental Quality Incentives Program (EQIP)

The Environmental Quality Incentives Program provides financial and technical assistance to producers to implement environmental practices. In the 2002 Farm Bill, EQIP’s purpose is redefined and its budget is significantly increased. The new budget of EQIP is US\$9 billion over 10 years. EQIP spending may receive more international attention as a result of the increased budget. The new budget is distributed 60 percent/40 percent between livestock and crop producers. Available assistance to livestock producers may be used to comply with the upcoming new animal waste regulations to be adopted pursuant to the Clean Water Act.⁶⁶ Such payments under environmental programs are not subject to reduction commitments under the URAA.⁶⁷ Environmental programs provide financial support to producers to comply with environmental regulations. Other countries with similar environmental regulations, but who do not provide financial support, may find their producers at a competitive disadvantage. This may impact countries such as Canada.⁶⁸

Title III – Agricultural Trade and Aid

The objective of Title III of the Farm Bill is to assist US producers in developing and expanding international market opportunities for their commodities and to provide food aid to developing countries. The Farm Bill reinforces some existing agricultural export assistance programs and introduces new ones. It comprises four types of programs: “*direct subsidies, market promotion,*

⁶³ Canadian Wheat Board, (2002), *World trade*, US Farm bill.

<http://www.cbw.ca/en/topics/world_trade/farm_bill.jsp?pm=1>

⁶⁴ Economic Research Service USDA, (2002), Land Retirement Programs, p.2.

<<http://www.ers.usda.gov/Features/farmbill/analysis/landretirement.htm>>

⁶⁵ Economic Research Service USDA, (1999), Price Determination Factors for Corn and Wheat, TB-1878, pp.3-10.

⁶⁶ Economic Research Service USDA, (2002), *Working Land Conservation*, p.3.

<<http://www.ers.usda.gov/Features/farmbill/analysis/workingland.htm>>

⁶⁷ WTO, The Uruguay Round Final Act, Agreement on Agriculture, pp.43-71.

<[Http://www.wto.org/english/docs_e/legal_e/final_e.htm](http://www.wto.org/english/docs_e/legal_e/final_e.htm)>

⁶⁸ Canadian Wheat Board, (2002), *World trade*, US Farm bill.

<http://www.cbw.ca/en/topics/world_trade/farm_bill.jsp?pm=1>

export credit guarantees, and foreign food aid”⁶⁹. While some programs such as the Market Access Program can impact the market for commodities such as wheat, this study’s attention is directed to those programs which are most likely to impact commodities markets.

Export Enhancement Program (EEP)

The purpose of the Export Enhancement Program is “[...] *to provide bonuses to make U.S. commodities more competitive, offsetting adverse effects of unfair trade practices or subsidies.*”⁷⁰ The EEP falls into the “direct export subsidy” category subject to reduction commitments under the URAA. The Farm Bill renews the maximum funding for this program at US\$428 million per year until 2007. Only US\$17 millions were spent under the EEP between 1996 and 2001, despite an authorized budget of US\$478 millions/year. During this period the US government decided not to use EEP as it could have further decreased commodity prices, and because it helped the U.S. negotiations position against the European Union at the WTO regarding export subsidies reduction. In the last significant year of activity (1995), US\$339 millions were spent under the program, of which 75 percent were related to wheat. Several studies have shown that the elimination of the EEP could result in a decrease of wheat exports in certain years.

The Farm Bill also expands the definition of unfair practices in three areas: trade distorting subsidies; trade barriers (e.g. certain labeling and sanitary/phytosanitary requirements) and state trading enterprises which “*are not consistent with sound commercial practices conducted in the ordinary course of trade*”.⁷¹ While this opportunity of the EEP has not been exercised in the past years, the new definition of unfair trade practice may resuscitate its activities. With regard to wheat specifically, the expansion of the definition to cover state enterprises could be used against the Canadian Wheat Board and result in an increase of subsidies toward wheat exports to Canada.

Export Credit Guarantee Program

The Export Credit Guarantee Program provides a guarantee of repayment to U.S. banks for credits extended to foreign banks for the purchase of U.S. commodities. The yearly minimum commitment is US\$5.5 billion until 2007. A minimum of 35 percent of these credits must be directed toward value-added agricultural products. The main exported commodities which have historically been covered by this program are wheat, wheat flour, oilseeds, feed grains, and cotton.⁷² Export credits are currently not subject to discipline under the URAA. However, as discussed in the next section, several countries, among which the EU, have suggested that exports credits should be subject to reduction commitments under the URAA.

⁶⁹ HANRAHAN, Charles E., (2002), *Agricultural Export and Food Aid Programs*, Congressional Research Service, June, p.14

⁷⁰ U.S. Department on Agriculture, (2002), *Farm Bill 2002, Title III, Agricultural Trade and Aid*.
<<http://www.fas.usda.gov/info/factsheets/fb2002/trade.html>>

⁷¹ Economic Research Service USDA, (2002), *Farm policy*, Title III Trade, p.9.
<<http://www.ers.usda.gov/Features/farmbill/titles/titleIIItrade.htm>>

⁷² HANRAHAN, Charles E., (2002), *Agricultural Export and Food Aid Programs*, Congressional Research Service, June, P.14.

Food Aid Programs

Under the 2002 US Farm Bill, the following legislations and programs are authorized for food aid delivery: the Food for Peace Program, Section 416 b. of the Agricultural Act of 1949⁷³ (permanently authorized), the Food for Progress Program, the Bill Emerson Humanitarian Trust and the McGovern-Dole International School Feeding and Child Nutrition Program. Several U.S. trading partners, such as the EU, have expressed concerns regarding these food aid programs, suggesting that the food aid programs are a way to subsidize US producers without having to comply with Uruguay Round disciplinary rules.

In 2001, total spending on food aid was approximately US\$2.3 billion and the forecast for 2002 is US\$2.0 billion. Wheat channels an important portion of funds in some of those programs. Under section 416 b. of the Agricultural Act of 1949, 5.3 millions metric tons of wheat and wheat flour were donated in 1999 and 3 millions metric tons in 2000. This represents approximately 5 percent of the yearly U.S. production. At the World Food Summit, in June 2002, an announcement was made that 275,000 tons of wheat would be provided as food aid from the Bill Emerson Humanitarian Trust. This Trust is a commodity reserve currently used in times of low domestic supplies and provides food aid which is then managed by the Food for Peace Program.⁷⁴ Food aid is currently not subject to discipline under the URAA.

Economic Impacts of the 2002 Farm Bill

FAPRI has published a preliminary analysis of the forecasted quantitative impacts of the commodity and conservation titles of the 2002 Farm Bill.⁷⁵ The income effect on producers is estimated at US\$3.8 billion per year for the commodity program and US\$0.7 billion per year for the conservation program. This forecast shows a slight increase in area planted of grain and cotton, and a reduction of soybean. Corn has the largest increase in area planted, followed by wheat. The area planted for wheat is forecasted to increase by 0.48 million hectares in 2002, and by 200,000 hectares/year on average between 2002 and 2010. This change in production levels is also expected to cause a slight decrease in prices for grain and cotton and an increase for soybean. The forecasted price decrease for wheat is -\$1.47/mt. in 2002, with an average annual decrease of -\$1.10/mt. between 2002 and 2010. Over a ten year period, gross crop returns would be the highest for soybean with an average of \$10.28/mt, followed by wheat at \$9.54/mt. However, for the first four years of the program, the highest returns would be for wheat (\$17.62/mt. in 2002). Lastly, FAPRI estimates that there is a 19.3 percent probability that the Farm Bill will bring the support level above the permitted Amber Box ceilings agreed upon in the URAA.⁷⁶

Mayer et al. used a different approach by examining the overall influence of the 2002 US Farm

⁷³ Agricultural Act of 1949, P.L. 89-439

⁷⁴ HANRAHAN, Charles E., (2002), *Agricultural Export and Food Aid Programs*, Congressional Research Service, June, p.14.

⁷⁵ FAPRI, (2002), *Farm Security and Rural Investment Act of 2002: Preliminary FAPRI Analysis*, May 6, p.4.

⁷⁶ FAPRI cautions that at the time of publishing this analysis the actual prices were lower than the ones used as baseline in this forecast. Also, this study does not appear to be taking into account the net outlay of the emergency payments between 1998 and 2001. FAPRI forecast reflects the changes brought by the Farm Bill relative to a March 2001 baseline. It would be interesting to find the forecasted results with different baselines within the lifetime of the 1996 Act.

Bill, independently of the changes it brings in comparison to the 1996 FAIR Act.⁷⁷ As expected, their conclusions are significantly different; indicating that the farm bill production incentive based on highest loan rate margins is for “soybeans for most regions, and a combination of soy-corn or soy-cotton in all regions.” This study also highlights incentives to grow wheat but to a lesser extent than soybeans and corn.⁷⁸ These conclusions are in line with the past years’ trends, of increase oilseeds production at the expense of wheat (due to favorable marketing loans and increased production flexibility brought by the 1996 FAIR Act).

Although they seem contradictory, the findings of FAPRI and Mayer et al. are essentially looking at the same situation from two different perspectives. The 2002 Farm Bill may provide the strongest incentives to grow soybeans (highest contribution margin), but when compared to the 1996 FAIR Act, the incentives to increase soybeans production is attenuated through an increase of the support levels to corn and wheat.

Summary of Expected Impacts

The overall impacts of the 2002 US Farm Bill on US agricultural production and world agricultural markets are likely to be significant, although the fact that an important share of new budgetary commitments are devoted to conservation programs is likely to attenuate the production and trade distorting impacts. However, much of the 2002 Farm Bill support is still considered as Amber Box support, and the magnitude of Farm Bill Green Box support suggests that its impacts on production and trade will not be neutral.

In summary, the 2002 Farm Bill provides incentives for increased agricultural output through an intensification of production. It also reduces cropping flexibility by giving incentives to increase the total cultivated area for such crops as soybean, wheat or corn, although these flexibility limitations already existed for wheat and corn under the 1996 FAIR Act. The magnitude of this support, combined with the reintroduction or extension of programs or payments that are coupled to output or price are likely to lead to increased US agricultural production over the levels that would normally characterize free markets. This production surplus will in turn flow on world markets with the support of export credit and food aid programs, thus depressing world prices for commodities and distorting agricultural trade flows.

The increase in support for conservation programs is an encouraging sign from the environmental perspective. However, recent indications that the US Congress is contemplating budget cuts to these programs attenuate the anticipated positive impacts. Moreover, and as discussed in the section on environmental impacts of agricultural subsidies, these agro-environmental programs are likely to be less effective as a result of interference created by the Commodities Program environmentally damaging subsidies. In this event, the net environmental effect could be negative.

⁷⁷ MAYER, H., L.Martin and a.STACIWA, (2002), *The 2002 US Farm Bill's Implications for Commodity Markets and Canada's Agri-food Sector*, George Morris Center, July.

⁷⁸ These findings are based on the calculations of the marketing loan rates contribution margin attributed to the different crops. It is based solely on the marketing loan payments as they are expected to be the most influential in producers planting decisions. The contribution margin represents government guaranteed income (loan rates) minus the payments of variables costs associated with the production.

The Economic Impacts of the Doha Round

This section first addresses the economic impacts of the URAA in order to better understand and assess the potential impacts of further agricultural liberalization commitments that may result from the Doha Round. By bringing agricultural trade into the multilateral trade regime, the URAA induced significant transformations in the delivery of agricultural domestic support and export subsidies. For the first time, the URAA contained binding commitments to reduce trade distorting domestic support as well as export subsidies⁷⁹. However, these commitments turned out to be modest given the policy reforms that took place in the first half of the 1990s, before the entry into force of the URAA.

The Impacts of the URAA on Agricultural Production and Trade

It is difficult to isolate the impacts of the URAA on world agricultural trade from larger macro-economic and natural events that conditioned price and demand for commodities in the 1995-2000 period. Agricultural trade increased by US\$100 billion between 1993 and 1998, with the share of agricultural world trade represented by developing countries rising from 40.1 percent to 42.4 percent.⁸⁰ But after having experienced a 16.6 percent growth rate in 1995 (18.5 percent for North America), agricultural trade peaked at US\$424 billion in 1997, and experienced a negative growth rate of -7.1 percent in 1998 (-9.5 percent in North America), as a result of the combined impacts of depressed world prices and adverse climatic conditions in some regions of the world.⁸¹ According to the OECD, Canada and the United States' shares of world agricultural trade in the post URAA period increased compared with the pre-URAA situation, while the EU saw its share decrease.⁸²

In the words of Porter: "*The extremely limited character of the agricultural trade liberalisation achieved at the global level thus far is indicated by the fact that the value of agricultural commodity exports since the Uruguay Round Agricultural Agreement (URAA) have sharply declined, contrary to the general view that trade liberalisation should raise global commodity prices*".⁸³ This observation is confirmed by other indicators. For example, export performance, measured as the share of the agricultural volume of exports in percentage of agricultural output, improved for several commodities in the wake of the URAA but declined for wheat.⁸⁴ This is due in part because world prices for wheat fell by 50 percent between 1996 and 2000⁸⁵, while domestic production was still relatively insulated through various forms of domestic support.

⁷⁹ A summary of URAA commitments is presented in annex 2.

⁸⁰ World Trade Organization (2002a), *WTO Agriculture Negotiations: The Issues, and Where we are Now*, Geneva, WTO, 21 October 2002, p.22, [online] http://www.wto.org/english/tratop_e/agric_e/agnegs_bkgnd_e.pdf.

⁸¹ WTO (2001a), op. cit. p.60.

⁸² OECD (2001a), op.cit. p.94.

⁸³ Executive Secretary of the CBD, 2002, as cited in PORTER, Gareth, *Subsidies and the Environment: An Overview of the State of Knowledge*, paper presented in Session 2.1 at the OECD Workshop on Environmentally Harmful Subsidies, Paris, OECD, 7-9 November 2002.

⁸⁴ OECD (2002a), *Agricultural Policies in OECD Countries: Monitoring and Evaluation*, Paris, p.41.

⁸⁵ Ibid. p.43.

The URAA Impacts on Domestic Support

Overall, the URAA did not result in a significant reduction in PSE⁸⁶ support levels and export subsidies in OECD countries, but introduced rules to discipline the use of domestic support measures and export subsidies. The following table shows the evolution of the PSE for OECD countries from 1986-88 to 1995-99.

Table 4: Evolution of the PSE in OECD countries (1986-1999)⁸⁷

	Total Average (US\$ billion)	% of Gross Farm Product
1986-1988	\$246	40%
1990-1994	\$283	39%
1995-1999	\$270	35%

As table 4 demonstrates, the total PSE for OECD countries increased in nominal terms between 1986-88 and 1990-94, and fell slightly in the post URAA period. The PSE expressed as a percentage of gross farm product fell from 40 percent to 35 percent during that decade, showing a declining trend in domestic support. However, and as noted by the OECD, this figure was back to its pre-URAA level of 40 percent in 1999.⁸⁸ In contrast, the Canadian PSE is at about half the OECD average and producer prices for most commodities are aligned on world prices.⁸⁹

The OECD identifies four reasons to explain why PSE levels are still high among OECD countries. First, a number of OECD countries have reoriented their agricultural support from market price support towards less distorting budget payments, while maintaining the same overall level of support. Secondly, the base years chosen for reduction commitments (1986-88) constituted a historic high for distorting domestic support. Thirdly, AMS reduction commitments were made on the aggregate level for all commodities, thereby offering the possibility for countries to reduce support for some commodities while maintaining or increasing the level of distorting support for others. That allowed countries to switch between domestic support boxes and commodities. Lastly, Blue Box, Green Box, and *de minimis* support are exempted from reduction commitments, giving countries significant flexibility in maintaining their overall PSE levels.⁹⁰

In the case of wheat, the PSE as a percentage of gross farm product decreased between 1986-88 and 2001. However, this percentage remains high in the OECD at 41 percent, and more specifically in the United States and European Union where it reaches 40 and 44 percent respectively. (see table 5).

⁸⁶ As defined in a previous section, the PSE is an aggregate measure of all forms of governmental support in agriculture. It should not be mistaken for the AMS, which in the URAA refers only to the portion of domestic support on which governments have made reduction commitments.

⁸⁷ OECD (2001a), op. cit. p.92.

⁸⁸ Ibid.

⁸⁹ OECD, (2002a), op. cit. p.83.

⁹⁰ Ibid. p.47.

Table 5: Evolution of the PSE for wheat in OECD countries (1986-2001)⁹¹

	Total Average	% of Gross Farm Product
OECD 1986-1988	US\$18,699 million	48%
OECD 1999-2001	US\$17,331 million	41%
Canada 1999-2001	C\$642 million	18%
European Union 1999-2001	€9,163 million	44%
United States 1999-2001	US\$3,722 million	40%

On the positive side, another measure of support – the producer nominal protection coefficient⁹² declined by 65 percent for wheat falling to 22 percent over world price in the 1995-99 period.⁹³ This shows a decreasing trend in distortions between world price and domestic prices for this commodity.

A major impact of the URAA on domestic support policies has been “the “reinstrumentation” of domestic support programs, away from the most trade restrictive measures towards the less trade restrictive ones.”⁹⁴ Indeed, there was a significant shift from Amber to Green Box support in OECD countries between the base period (1986-88) and the URAA early implementation period (1995-98). This has led to a de-coupling between AMS reductions and overall support levels as measured with the PSE. That is, while the AMS levels are constantly decreasing, the PSE remains stable since abandoned AMS support is “reinstrumented” in the form of Green Box support.

The table below shows the breakdown of domestic support in the OECD, Canada, the United States, Mexico and the European Union for the 1995-98 period.

Table 6: Breakdown of Domestic Support (1995-98) (%)⁹⁵

	Amber Box	Green Box	Blue Box	de minimis	S&D
Canada	18	50	0	32	n.a.
Mexico	31	57	0	0	12
United States	10	84	4	2	n.a.
European Union	55	21	23	1	n.a.
OECD	42	44	11	2	n.a.

n.a.: not applicable

Overall, Green Box support doubled in value between 1986-88 and 1995-98 to reach 44 percent of OECD total domestic support in 1995-98.⁹⁶ It is interesting to note that Green Box support represented 84 percent of US domestic support for the 1995-98 period, while the majority of EU support (55 percent) was still concentrated in Amber Box policies. The United States alone accounted for more than 40 percent of Green Box expenditures in the OECD for the period.

OECD countries’ total AMS for the period averaged US\$108 billion, approximately 65 percent

⁹¹ Ibid. p.162.

⁹² The producer nominal protection coefficient is an indicator of the nominal rate of protection for producers measuring the ratio between the average price received by producers (at farm gate), including payments per tonne of current output, and the border price (measured at farm gate level). Source: OECD (2002a), op. cit. p.59.

⁹³ OECD (2001a) op. cit. p.92.

⁹⁴ WTO (2001a) op. cit. pp. 59-60.

⁹⁵ S&D: Special and differential treatment. Source: OECD (2001a), op. cit. p.55.

⁹⁶ Thirteen countries used Green Box support during this period, and all of them notified an increase in absolute terms, with the EU, the USA and Japan accounting for most of the increase. Source: OECD (2001a), op. cit. p.57.

of the allowed AMS levels.⁹⁷ Currently the total allowed AMS is US\$60 billion for the European Union, US\$30 billion for Japan and US\$19 billion for the United States.⁹⁸ In North America, the United States, Mexico and Canada respectively used 50 percent, 14 percent and 17 percent of their total allowed AMS commitments in 1998.⁹⁹ In the case of wheat, Canada and the United States notified US\$36 million and US\$515 million in Amber Box domestic support in 1998 respectively.¹⁰⁰ The United States also tripled its non-product specific AMS between 1995 and 1998.

In the post URAA world agricultural market, over 60 percent of current domestic support in OECD countries is still exempted from domestic support reduction commitments. Consequently, “*despite the reduction in the current total AMS, the level of agricultural support as measured by the PSE remains quite high. [...] Many policies which may cause significant trade distortions are exempt from the domestic reduction commitments.*”¹⁰¹

The URAA Impacts on Export Subsidies

The use of export subsidies in the post Uruguay Round period is much lower than it used to be in the pre-1994 era. However, several countries continue to use export subsidies and this form of support impacts an important portion of world trade of a number of commodities, including wheat and dairy products.¹⁰² Over the 1995-98 period, 42 percent of the budgetary outlays and 64 percent of the volumes allowed by the URAA were used by WTO members.¹⁰³ The EU currently accounts for 90 percent of all export subsidies in OECD countries.¹⁰⁴ In 2000, the European Union spent US\$2 billion and the USA US\$20 million in export subsidies.¹⁰⁵ Despite overall compliance, the increasing use by WTO members of strategies to circumvent the export subsidies provisions of the URAA, such as subsidized export credits, certain types of food aid, and certain practices of state trading enterprises, mitigates the success of this part of the URAA.¹⁰⁶

While the use of export subsidies fell in recent years, the use of export credits increased from US\$5.5 billion in 1995 to US\$7.9 billion in 1998. The United States alone accounted for 46 percent of world export credits during that period, and the EU for another 16 percent.¹⁰⁷ It is estimated that 5.2 percent of world agricultural trade was facilitated by export credits in 1998.

⁹⁷ Ibid. p.59.

⁹⁸ United States Department of Agriculture – Foreign Agricultural Service, *U.S. Proposal for Global Agricultural Trade Reform – The U.S. WTO Agriculture Proposal*, [online] FASonline, <<http://www.fas.usda.gov/itp/wto/proposal.htm>, consulted on 9 January 2003>.

⁹⁹ World Trade Organization (2002b) – Committee on Agriculture – Special Session, *Domestic Support – Background Paper by the Secretariat*, 20 March 2002, TN/AG/S/4, pp. 2 & 5.

¹⁰⁰ It should be noted that the United States had notified USD \$36 million for wheat in 1997. The 1998 amount therefore represented a significant increase in US domestic support for wheat. Source: WTO (2002b) op. cit., pp. 60 & 89. As of January 2003, data for the 1999-2001 period was not available.

¹⁰¹ OECD (2001a), op. cit. p.15.

¹⁰² Data source: WTO (2001a), op. cit., p. 64.

¹⁰³ OECD (2001a), op. cit. p.15.

¹⁰⁴ Ibid.

¹⁰⁵ United States Department of Agriculture – Foreign Agricultural Service, *U.S. Proposal for Global Agricultural Trade Reform – The U.S. WTO Agriculture Proposal*, [online] FASonline, <<http://www.fas.usda.gov/itp/wto/proposal.htm>, consulted on 9 January 2003>.

¹⁰⁶ OECD (2001a), op. cit. p.15.

¹⁰⁷ Ibid., p.85.

For the 1995-98 period, this share was 5.4 percent for Canada, 5.2 percent for the United States, and 1.9 percent for the European Union.¹⁰⁸

For the 1995-2000 period, subsidized exports of wheat averaged approximately 12 mmt, decreasing to 10.2 mmt in 2000, out of a URAA allowed maximum of 16.6 mmt.¹⁰⁹ This represented approximately 9 percent of the total volume of wheat exports (116,926,336 metric tons)¹¹⁰ for that year. The total value of wheat export subsidies in 1998 was US\$561 million, representing 8.5 percent of total OECD export subsidies that year.¹¹¹ Export subsidy rates for the 1995-97 period averaged 15 percent of world price for wheat.¹¹²

The URAA therefore resulted in a small decrease in domestic support as measured by the PSE in OECD countries, and in a global shift from Amber to Green Box subsidies. Significant differences remain, though, in the mix of domestic support used by various countries, especially between the EU and the USA. These differences are setting the stage for the next Round of WTO negotiations.

The Potential Impacts of the Doha Round on Agricultural Production and Trade

Recognizing that agricultural trade liberalization was a long term and ongoing process, Article 20 of the URAA provided for the initiation of a new round of negotiations on agricultural liberalization by 2000.¹¹³ The Doha Declaration officially initiated this new round by including a negotiation mandate on agriculture committing WTO members to substantial reductions for forms of support that distort trade, and the reduction of, with a view to phasing out, all forms of export subsidies.¹¹⁴ Negotiations will therefore concentrate on the reduction or elimination of Amber Box, Blue Box and *de minimis* agricultural support.¹¹⁵

In addition, a debate is emerging on the status that should be given to Green Box support. While individual Green Box measures can be considered minimally distorting, their cumulative impact, combined with the sheer magnitude of such support in OECD countries are suspected to have a significant trade-distorting impact. In addition, although Green Box are considered by definition as minimally distorting, there are concerns that many measures included in Green Box support may not be production or trade neutral.¹¹⁶ Consequently, the Doha Round will address the issues of whether or not certain direct payments should be subjected to reduction commitments, whether or not new types of programs should be included in it, whether or not certain provisions and criteria warrant further clarification, and whether or not a global ceiling should be

¹⁰⁸ Organisation for Economic Co-operation and Development (2002b), *Agriculture and Trade Liberalisation – Extending the Uruguay Round Agreement*, Paris, OECD, p. 109.

¹⁰⁹ World Trade Organization (2002c) – Committee on Agriculture – Special Session, *Export Subsidies – Background Paper by the Secretariat*, 9 April 2002, TN/AG/S/8, p.5.

¹¹⁰ Source: FAOSTAT, <<http://apps.fao.org/>>.

¹¹¹ OECD (2001a), op. cit. p. 75.

¹¹² Ibid., p. 83.

¹¹³ Article 20, URAA, Op.cit.

¹¹⁴ World Trade Organization, *Doha Ministerial Declaration*, November 2001, par. 13. [online] <http://www.wto.org/english/thewto_e/minist_e/min01_e/mindecl_e.htm>.

¹¹⁵ The negotiating positions of the United States, the Cairns Group, and the European Commission paper on agricultural trade policy reform are briefly summarised in annex 3.

¹¹⁶ OECD (2001a), op. cit. p.15.

established for Green Box domestic support.¹¹⁷

Closely linked to this debate is the issue surrounding environmental programs. Expenditure on environmental programs remained marginal in OECD countries during the 1995-98 period, accounting for less than 5 percent of Green Box support, but this proportion rapidly increased over time to reach 16 percent of Green Box support in Australia (1996), 19 percent in the EU (1996) and 28 percent in Switzerland (1998).¹¹⁸

One important question is whether environmental concerns are best handled through comprehensive liberalization and targeted, transparent and minimally distorting Green Box support, or if it needs to be supported with trade-distorting, Amber Box subsidies. In other words: is the Green Box flexible enough to cover non-trade concerns? The following section will propose an analysis of this issue.¹¹⁹

In order to provide greater contrast between the baseline and US Farm Bill scenarios, this study assumes that the Doha Round would lead to significant reductions in domestic support and export subsidies. This would translate into a complete phasing out of Amber and Blue Box policies, an elimination of the *de minimis* clause, and quantitative limitations and tighter compliance criteria for Green Box domestic support. With regard to export competition, the scenario assumes an elimination of export subsidies, combined with new disciplines to limit the distorting impact of export credits, food aid and certain practices associated with state trading enterprises.

Assessing the Economic Impacts of the Doha Round: Theoretical Considerations

As a result of trade liberalization, including improvements to market access provisions, one should expect an attenuation of differences between domestic and world prices that would trigger a restructuring of world agricultural production according to competitive advantages. This would in turn increase agricultural trade and modify trade patterns for most commodities, including wheat. In theory, agricultural trade liberalization should lead to increased agricultural production in developing countries and to a decrease in production in some OECD countries. One should also expect a restructuring of domestic support policies in most OECD countries.

An analysis published by the OECD gives an indication of the impact of agricultural policy reform on the price of commodities: “*Agricultural market price support policies tend to increase domestic production and contract domestic consumption. They would therefore tend to reduce import demand or increase exportable supplies, thereby exerting downward pressure on world commodity prices*”.¹²⁰ In fact, domestic support policies insulate domestic markets from variations in world price, and distort world markets through low price supply which tends to fluctuate according to domestic support policies and domestic supply in some countries. This would suggest that “*the removal of trade-distorting measures by developed and developing countries would significantly reduce price variability in world markets for agricultural*

¹¹⁷ World Trade Organization (2002d) – Committee on Agriculture, Special Session, *Negotiations on Agriculture – Overview*, Geneva, WTO, 18 December 2002, TN/AG/6, p.10.

¹¹⁸ OECD (2001a), op. cit. p. 57.

¹¹⁹ WTO (2002a), op. cit., p.33.

¹²⁰ OECD (2001a), op. cit., pp. 94-95.

commodities.”¹²¹

An analysis conducted by the Commission for Environmental Cooperation (CEC) goes further in describing the dynamics induced by agricultural policy reform: “*First, if production has been subsidised more than is efficient, removing these subsidies would reduce production in the country. If this country is a net exporter, the world price that was previously depressed by this oversupply would subsequently increase, and exports would decrease. If all countries removed their support programs, foreign demand would also increase (if other countries were also overproducing), and world prices would further increase. At that new world price, production would increase. [...]The approaches described above assume that subsidies for inputs (such as water prices and fertilizers) were also removed and that the agricultural sector does not produce environmental externalities.*”¹²²

Recent Estimates of the Impacts of Agricultural Trade Liberalization

According to an analysis conducted by Anderson & Strutt, the impacts of a complete elimination of domestic support policies on world food production would be “[...]negligible, and the relocation of production minor, e.g., grain and meat production would have been 5 to 6 per cent lower in industrialised countries and 3 to 8 per cent higher in developing countries”¹²³. Japan and the European Union would experience decreases in production of 15-50 percent, while other regions would increase their production by 5-20 percent.¹²⁴

Another analysis, this time conducted by USDA, suggests that complete agricultural trade liberalization (including market access provisions) would raise world agricultural prices by about 12 percent. USDA estimates that domestic subsidies account for 31 percent of agricultural world price distortions, export subsidies for 13 percent, and tariffs and tariff rate quotas accounting for 52 percent of market price distortions.¹²⁵ In that context, the full elimination of domestic support would result in 3.6 percent higher agricultural world prices, and the complete phasing out of export subsidies would increase agricultural world prices by 1.5 percent. Taken together, the removal of export subsidies and domestic support measures would generate a 5.1 percent increase in agricultural world prices.¹²⁶

¹²¹ Ibid., p. 95.

¹²² CARPENTIER, Chantal Line, (2001), *Trade Liberalisation Impacts on Agriculture: Predicted vs. Realised*, Montreal, Commission for Environmental Cooperation, Environment, Economy and Trade Program, December 2001, p.19.

¹²³ ANDERSON, Kym and Anna STRUTT, “On Measuring the Environmental Impact of Agricultural Trade Liberalization.” in *Agriculture, Trade and the Environment: Discovering and Measuring the Critical Linkages* (M. Bredahl, N. Ballenger, J. Dunmore, and T.Roe ed's.) Boulder: Westview Press. as cited in ERVIN, David, *Agriculture, Trade and the Environment: Anticipating the Policy Challenges*, Paris, OECD, 1997. p.10.

¹²⁴ ERVIN, David, *Agriculture, Trade and the Environment: Anticipating the Policy Challenges*, Paris, OECD, 1997. p.10.

¹²⁵ BURFISHER, Mary E. (ed.), (2001), *Agricultural Policy Reform in the WTO – The Road Ahead*, Agricultural Economic Report No. 802, Market and Trade Economics Division, Economic Research Service, U.S. Department of Agriculture, May 2001. p.iii.

¹²⁶ Ibid., p.6.

The price impact of a removal of domestic support and export subsidies programs would be of all commodities the most significant for wheat. As shown in table 7, the complete removal of domestic support and export subsidies for wheat would increase its world price by 14 percent and stimulate world production and trade.

Table 7: Price Effect on wheat of Agricultural Policies Removal¹²⁷

	Price Effect
Tariffs removal	+3.4%
Domestic support removal	+12%
Export subsidies removal	+2%
Total elimination – all policies	+18.1%

Overall, USDA estimates that a complete liberalization of agricultural trade would increase the value of world wheat trade by 38 percent, which is considerable.¹²⁸ USDA also estimates that a 20 percent reduction in URAA AMS ceilings would increase US wheat exports by US\$140 million, of which 55.8 percent would be exported to Europe, and another 15 percent to Japan.¹²⁹

Other studies reach different conclusions and suggest that agricultural trade liberalization and agricultural policy reform in the EU would tend to favor wheat production in Europe and consequently increase European wheat exports on world markets.¹³⁰ It is expected that out of the 17.1 million tons of wheat traded by the EU in the 2001-2005 period, 14.3 million tons (84 percent) will be subsidized.¹³¹ However, Europe's dependence on export subsidies for wheat is expected to decrease during the 2002-2007 period as a consequence of internal agricultural policy reforms, rising world prices and a weaker Euro. This would suggest that EU's exports of wheat could increase, even in the absence export subsidies.¹³²

Currently, high level of domestic support and trade protection in OECD markets still prevent developing countries from occupying a larger share of world agricultural markets. Globally, 75 percent of agricultural trade occurs within OECD countries, even though some progress has been made in south-south agricultural trade flows.¹³³ Analytical evidence from various studies shows that global agricultural trade liberalization would generate annual benefits of about US\$50-60 billion in developing countries.¹³⁴ It can therefore be expected that developing countries, especially Argentina and Brazil, will capture an increasing share of world wheat trade.

In summary, the reduction or elimination of domestic support and export subsidies, as well as combined market access liberalization resulting from the Doha Round would increase world prices for agricultural products and increase agricultural trade. In addition, it can be expected that such liberalization would lead to a relocation of world production, resulting in increased

¹²⁷ Ibid, p.8.

¹²⁸ Ibid., p.32.

¹²⁹ Ibid., p.18.

¹³⁰ Ibid., p.20. The difference between these analyses and the one conducted by USDA can be explained by the fact that it incorporates the domestic impacts of agricultural reform in the EU and its effect on wheat production, while the USDA study is not considering the EU internal reform process that could favour wheat production.

¹³¹ OECD (2002b) op. cit., p.88.

¹³² Ibid.

¹³³ OECD (2002a), op. cit., p. 41.

¹³⁴ VON BRAUN, Joachim, WOBST, Peter & GROTE, Ulrike, "New Development aspects of Agricultural World Trade", in *Bridges Between Trade and Sustainable Development*, Year 6, No.5, June 2002. p.7.

production in developing countries and some OECD countries. This relocation of production resulting from the new interplay of comparative advantages would be small on the aggregate, but could be more important for some commodities such as wheat. Developing countries should benefit from this new competitive environment and capture an increasing share of world trade.

The impact of such liberalization on wheat production and exports are more difficult to anticipate for North America. It is generally assumed that Canada and the United States are competitive players on the world market, but production forecasts also need to take into account the comparative advantages and profitability of other crops in the new context to anticipate possible substitution effects. Other factors, such as exchange rates, price fluctuations and the new agricultural policy context also need to be factored in. In the end, one lesson learned from the URAA is that agricultural markets do not always evolve in accordance with trade theory.

One last observation based on the URAA experience is that the Doha Round is likely to result in another “reinstrumentation” of domestic support policies in OECD countries. This has major implications for both trade and environment policy as the results of the Doha Round will condition the transformation of domestic support policies for the next fifteen years. This is also important because it will certainly lead OECD countries to reassess their domestic support system in light of the new context. This issue will be discussed in more detail in the following section.

An Analysis of Environmental Impacts Associated with Agricultural Subsidies

Agricultural production sustains an intense relationship with the environment and accounts for a significant portion of land use and water consumption in most OECD countries.¹³⁵ Consequently, agricultural trade liberalization and ensuing reforms in domestic support programs may have important environmental impacts – both positive and negative – that need to be assessed and addressed. This section looks at the state of knowledge on the relationship between agricultural subsidies and the environment, and attempts to derive implications of the two policy change scenarios described in the previous sections on the trade and environment policy agenda.

One may conclude from the analysis conducted thus far that the US Farm Bill and the Doha agricultural negotiations will induce a mix of economic impacts on agricultural trade and production that will in turn generate direct and indirect environmental impacts. Given the complexity of the subsidies/environment relationship and the similar dynamics at play in the two scenarios, the current section addresses the environmental impacts of both scenarios simultaneously rather than separately. This approach simplifies the analysis and allows drawing some similarities and differences in the impacts that could be associated with both scenarios.

The Broader Context: Agricultural Trade Liberalization

¹³⁵ A summary of environmental impacts associated with agricultural production is presented in annex 4. In addition some North American agro-environmental indicators are presented in annex 5.

The analysis of the environmental impacts of agricultural subsidies cannot be dissociated from the broader context of agricultural trade liberalization. Therefore, while an effort is made in this study to isolate the impacts of subsidies in the agricultural sector, reference is made to the broader trade liberalization process considering its profound implications for agriculture, in terms of production concentration, market consolidation, and specialization.¹³⁶

The trade/environment relationship in the agricultural sector can be summarized as follows: *“Provided that governments implement effective environmental policies, trade liberalisation can have positive impacts on the environment by improving the efficiency of resource allocation, promoting economic growth, and mobilising resources for environmental improvements. But if all significant environmental costs are not internalised through appropriate policies, the increased economic activity from trade liberalisation might contribute to environmental problems.”*¹³⁷ This points to the complementary relationship between trade liberalization and environmental management programs in the agricultural sector.¹³⁸

This has important implications for the current analysis. In fact, as mentioned in an OECD report: *“not all agricultural producers have appropriate incentives to take all the environmental costs and benefits of their activities into account when making production decisions, if there is an absence of an appropriate regulatory framework, inadequate information, or insufficient financial resources. Farmers do not always fully internalise the social costs they impose on the environment, such as causing pesticide and nutrient run-offs into the groundwater, nor do individual revenues always cover the costs of providing agri-environmental amenities, such as contributing to biodiversity and shaping rural landscapes. In such cases, the outcome in terms of agri-environmental performance can be economically sub-optimal.”*¹³⁹

In that context, trade liberalization may not only contribute to environmental problems, but also lead to sub-optimal economic outcomes by generating new externalities. This is why there is a need to assess the capacity of the regulatory framework to internalize these externalities, but also to understand how agricultural subsidies contribute to increase or decrease these externalities, and more generally how subsidies impact positively or negatively the effectiveness of the regulatory framework. This need is especially clear in light of the significant impacts of the Farm Bill and Doha Round on agricultural domestic support.

Assessing the Environmental Impacts of Agricultural Subsidies: From Theory to Practice

Theoretical approaches provide an essential conceptual framework for assessing the environmental impacts of agricultural subsidies. However, it is important to understand the limits of current approaches, especially the tensions between theoretical models which tend to oversimplify the subsidy/environment relationship and empirical evidence, which is usually far

¹³⁶ VAUGHAN, Scott & Zachary PATTERSON (2002), *Changing Biodiversity, Changing Markets – Links Between Agricultural Trade, Markets and Biodiversity*, Note by the CEC Secretariat, paper presented at the Commission for Environmental Cooperation meeting “Assessing the Environmental Effects of Trade”, Montreal, Canada, 17-18 January 2002. p.5.

¹³⁷ Organisation for Economic Co-operation and Development (2000a), *Domestic and International Environmental Impacts of Agricultural Trade Liberalisation*, Paris, OECD. p. 7.

¹³⁸ See VASADA, Utpal & Wesley NIMON (1999), *Environmental Effects of Further Trade Liberalisation in Agriculture*, USDA. p.13.

¹³⁹ OECD (2000a), op.cit. p. 8.

more complex.

Some Theoretical Challenges

A growing body of literature addresses the theoretical and empirical relationships between agricultural subsidies and the environment. Most studies try to establish a direct correlation between domestic support levels, agricultural intensification/extensification, and the level of environmental harm. Pearce suggests that focusing on direct environmental impacts is not sufficient. In his view, the impacts of subsidies on equity/poverty, on technological change and on human and social capital formation also need to be addressed.¹⁴⁰ This poses important theoretical challenges because it considerably increases the complexity of the assessment.

Another important theoretical challenge is the difficulty to isolate the impacts of agricultural subsidies from the broader policy and economic context. In the words of Porter: *“We know that subsidies do create incentives for environmentally damaging activities, but it is often difficult to isolate the effects of the subsidies from other drivers, including perverse economic incentives from lack of property rights.”*¹⁴¹ Pieters adds that: *“The effects of subsidy removal on producers’ and consumers’ decisions crucially depend on the overall policy setting of the subsidy (including environmental policy measures), on its conditionality (i.e. how (much) the various categories of costs and revenues that are impacted by the subsidy); the availability of alternatives and the nature of competition on factor and product markets.”*¹⁴² This makes any assessment of the environmental impacts of agricultural subsidies vulnerable to changes in a series of policy and economic variables.

While evidence tends to prove a correlation between increased agricultural subsidies, increased production and related environmental impacts, it is more difficult to measure empirically the nature and magnitude of this relationship. As Carpentier notes: *“The most commonly used approach has been to assume a functional relationship between the outputs of particular activities and environmental externalities, using information from ecological or biological systems modeling to link output changes to environmental impacts.”*¹⁴³ The challenge comes from the fact that environmental analysis requires regional or local data, while data on subsidies is extremely aggregate.¹⁴⁴ As a result, combining the two sets of data poses a considerable challenge. In addition, theoretical models are generally ineffective in incorporating local environmental indicators to quantify the magnitude of expected environmental impacts.

These two sets of theoretical challenges make assessing environmental impacts of agricultural subsidies a difficult exercise that requires an understanding of these basic methodological limitations. In this context, theoretical models can identify correlations and predict the direction of environmental change, but cannot quantify with a satisfactory degree of precision the

¹⁴⁰ PEARCE, David (2002), *Environmentally Harmful Subsidies: Barriers to Sustainable Development*, Paper presented at the OECD workshop on environmentally harmful subsidies, Paris, 7-8 November 2002. p.15.

¹⁴¹ PORTER (2002), op.cit. p.4.

¹⁴² PIETERS, Jan. (2002). *When Removing Subsidies Benefits the Environment: Developing a Checklist Based on the Conditionality of Subsidies*, Paper presented at the OECD workshop on environmentally harmful subsidies, Paris, 7-8 November 2002. p.3.

¹⁴³ CARPENTIER (2001), op. cit., p.27.

¹⁴⁴ STEENBLICK, Ron (2002), *Subsidy Measurement and Classification: Developing a Common Framework*, Paper presented at the OECD workshop on environmentally harmful subsidies, Paris, 7-8 November 2002.

magnitude of this environmental change.

Intensification and Extensification of Agricultural Production

Generally speaking, agricultural subsidies are thought to provide incentives for the intensification of agricultural production in OECD countries. They do so by increasing farmers' revenues and providing incentives to increase output through more intensive use of inputs, such as fertilizers and pesticides. Intensification of agricultural production can generate environmental impacts such as water pollution, land degradation, and biodiversity loss.

Not surprisingly, some studies have shown a correlation between the average PSE and the average level of fertilizers and pesticides use in several countries over a number of years.¹⁴⁵ Other studies have found a correlation between the decline in domestic support and the application of agricultural chemicals, with a 50 percent reduction in agricultural subsidies resulting in a 17 percent reduction in pesticide use and a 14 percent decrease in fertilizer use. The same study cited by Vaughan and Patterson also concludes that the complete removal of agricultural domestic support would result in a 35 percent reduction in total chemical use per hectare, and a 29 percent reduction in fertilizer use per hectare.¹⁴⁶

Interestingly, Pieters argues on the contrary that the removal of agricultural subsidies may not reverse the trend towards intensification of agricultural production: "*Apparently, neither changing subsidy regimes nor abolishing subsidies altogether automatically will reverse the incentive towards intensification that has resulted from agricultural policies that included the subsidies.*"¹⁴⁷ This would suggest that while there is a direct correlation between PSE support and intensification, the reverse correlation would not be automatic.

Another interesting observation is that an increase/decrease in the use of agricultural inputs such as pesticides and fertilizers do not directly translate into proportional environmental impacts. As mentioned in an OECD report: "*environmental harm from fertiliser and pesticide run-offs into the groundwater is not necessarily proportional to application rates, and the eco-efficiency of intensive production systems in terms of emissions per unit of output can in some cases be higher than that of extensive ones.*"¹⁴⁸

This last observation introduces the debate pertaining to the relative environmental costs/benefits of agricultural intensification/extensification. Intensification and extensification of agricultural production generate different environmental impacts. For example, environmental impacts associated with extensification of agricultural production include encroachment on marginal land and deforestation, while intensification involves increased pesticide and fertilizer use. The debate revolves around the identification of the optimal environmental outcomes when trying to balance the environmental impacts of agricultural production intensification and extensification.

More empirical and theoretical work is needed to understand the socio-economic and environmental conditions that can ensure that a shift from intensification to extensification of production (or vice-versa) releases pressure on the environment instead of generating higher

¹⁴⁵ PORTER (2002), op.cit. p.8.

¹⁴⁶ VAUGHAN & PATTERSON (2002), op.cit. p.22.

¹⁴⁷ PIETERS(2002), op.cit. p.34

¹⁴⁸ OECD (2000a), op.cit. p.32.

environmental costs.¹⁴⁹ Once again, it seems that any conclusive evidence on the relative environmental efficiency and opportunity costs associated with intensification/extensification would have to be derived by taking into account local environmental conditions and socio-economic contexts.

The North-South Dimension

The net environmental impact of a shift in agricultural production from OECD countries to developing countries is another element lying at the core of analysis of the environmental impacts of agricultural trade liberalization. For example, following agricultural trade liberalization and a removal of domestic support programs, the OECD predicts a shift in the production of wheat, coarse grains and rice from eight OECD countries to developing countries, resulting in increased production (and pollution) in countries with lower agro-chemical pollution indices, and decreased production (and pollution) in high intensity countries.¹⁵⁰

In theory, developing countries would be able to cope with the additional production by increasing the intensity of their production without causing substantial environmental harm, thus generating a net global environmental gain, since it is expected that the environmental benefits of a decrease in production intensity in developed countries would be higher than the costs of intensification in developing countries.

This is questionable since the vast majority of developing countries have not adopted adequate environmental policies to prevent environmental damage resulting from agricultural intensification/ extensification.¹⁵¹ Any complete analysis of the potential environmental impacts of an increase in production intensity in developing countries would therefore need to take into account their regulatory and socio-economic context, as well as their agricultural practices and inputs. It can be safely argued that developing countries' regulatory frameworks are weaker than their OECD counterparts. In addition, developing countries produce with low financial and technological resources, drawing from already stressed environments, in terms of water quality and quantity and land degradation. From that perspective, it could be argued that environmental costs are likely to be greater in developing countries than the benefits in OECD countries.

In addition, the OECD has estimated the impact of an extension of the URAA on land use to be marginal (0 to 0.4 percent increase) in Canada, the United States, Mexico and the European Union.¹⁵² The same study predicts an increase in agricultural land-use in developing countries, with the conversion of non-agricultural land to agricultural production. Thus developing countries would not only face an intensification of their agricultural production, but also further extensification. This could generate a series of major environmental impacts, such as deforestation, encroachment on fragile ecosystems, water stress, and land degradation, to mention just a few.¹⁵³ The environmental risks involved with such expansion are significant and should be addressed through appropriate cooperative mechanisms in the wake of the Doha Round.

¹⁴⁹ CARPENTIER (2001), op. cit., p.27.

¹⁵⁰ PORTER (2002) op.cit. p.9.

¹⁵¹ See ERVIN (1997) op.cit. p.12.

¹⁵² OECD (2000a), op.cit. p.31.

¹⁵³ Ibid., p.32.

Short Term and Long Term Effects

Another important factor to consider in assessing the environmental impacts of a removal of environmental subsidies is the difference in its short and long term effects. According to Ervin, short term economic analyses often underestimate the responsiveness of agricultural systems, as they do not integrate such factors as input substitution and technological innovation, for example.¹⁵⁴ Carpentier also supports this argument: *“In the short run, relative prices affect fertilizers, pesticides, and irrigation use. In the long run, adjustments affect land use and production technologies through price and income changes.”*¹⁵⁵

This phenomenon is well illustrated by the case of New Zealand where output price assistance and input subsidies were eliminated in the early ‘80s. As a result of this radical policy change, the PSE dropped in that country from 17-18 percent in 1980 to 3 percent in the mid 90s. The immediate short term impact was an important reduction in fertilizers and pesticide use. However, starting in the early ‘90s, favorable prices triggered an increased use in agro-chemicals, which is now higher than in the ‘80s. Overall, removal of agricultural subsidies has generated mixed environmental outcomes in New Zealand.¹⁵⁶

Using the OECD Methodology to Assess the Environmental Impacts of Agricultural Subsidies

The OECD has developed a methodology to assess the environmental impacts of trade liberalization. This methodology is summarized as follows for the agricultural sector: *“A reduction of trade barriers will influence the overall scale of agricultural activities, the structure of agricultural production in different countries, the mix of inputs and outputs, the production technology, and the regulatory framework. These adjustments, in turn, will impact on the international and domestic environment by increasing or reducing environmental harm and creating or destroying environmental amenities.”*¹⁵⁷ While this methodology has been applied to trade liberalization, it is also useful in assessing the dynamic and indirect impact of an increase/decrease in domestic support. In addition to these impacts, changes in the location and intensity or extensiveness of production need to be taken into consideration, as well as the equity impacts of agricultural domestic support.¹⁵⁸

¹⁵⁴ See ERVIN (1997) op.cit. p.11.

¹⁵⁵ CARPENTIER (2001), op. cit., p.24.

¹⁵⁶ See ERVIN (1997) op.cit. p.11.

¹⁵⁷ OECD (2000a), op.cit., p.5.

¹⁵⁸ CARPENTIER (2001), op. cit., p.24.

The Scale Effect

It is generally considered that environmental impacts of agricultural pollution change in the same direction as agricultural output.¹⁵⁹ As described earlier, agricultural subsidies, especially Amber Box policies that are coupled to price or output, have a direct impact on the scale of production.¹⁶⁰ In addition, domestic support policies tend to favor the intensification and extensification of agricultural production. This combined input-output impact suggests that Amber Box policies have important scale effects that translate into higher and more intensive production levels, which in turn affect the environment.

In that context, it can be expected that the removal of domestic support policies would generate positive environmental impacts. As Vaughan and Patterson mention: *“Analysis generally suggests that a reduction in subsidies applied for the most part in developed countries lowers incentives for the over-application of pesticides and fertilizers, lower pressures on the conversion of vulnerable or ecologically significant lands into arable production, and lowers other kinds of production pressures, including irrigation withdrawals.”*¹⁶¹ In addition, one could add that such a removal would also reduce the rates of erosion and land degradation. Ervin goes further by arguing that the reduction, decoupling or elimination of agricultural subsidies generally reduces the intensification/extensification pressures on the environment.¹⁶² The elimination of Amber Box subsidies as a result of the Doha Round would therefore constitute a positive outcome for both trade liberalization and the environment. Blue Box policies can be considered less environmentally damaging since they contain production-limiting provisions.

The Product Effect

As described in the section of this paper analyzing the US Farm Bill, agricultural subsidies have a direct product effect through the relative support differentials between commodities. The increase/reduction in subsidies affects the relative prices and production costs associated to commodities, thereby generating an output substitution and output price and input substitution impacts.¹⁶³ As we have seen, the US Farm Bill provides an incentive for soybean, and the EU Common Agricultural Policy provides higher support to coarse grains, at the detriment of wheat. One way to measure the environmental impacts of these input/output substitutions is to assess the relative pollution intensity of each crop or input.

In addition, domestic support tends to reduce the flexibility of producers in the choice of their crops. As mentioned in an OECD report: *“In some countries, support to agriculture has traditionally been highly unequal across commodities, so that farmers have concentrated on the production of only a few, highly supported crops (Runge, 1993). Further agricultural trade liberalisation and the reduction of differentials in commodity support might lead to more diverse cropping patterns with possibly positive effects on biodiversity and landscape appearance.”*¹⁶⁴ The reduced cropping flexibility as a result of domestic support, combined with an increased

¹⁵⁹ Organisation for Economic Co-operation and Development (2001b), *Policy Brief – Towards More Liberal Agricultural Trade*, Paris, OECD, November 2001, p.6.

¹⁶⁰ PEARCE (2002), op.cit. p.4.

¹⁶¹ VAUGHAN & PATTERSON (2002), op.cit. p.14.

¹⁶² ERVIN (1997). op.cit., p.11.

¹⁶³ CARPENTIER (2001), op. cit., p.26.

¹⁶⁴ OECD (2000a), op.cit.p.32.

specialization, tend to decrease biological and genetic diversity in agricultural lands, thereby increasing the vulnerability of agro-ecosystems to pests, weeds or climatic variations.¹⁶⁵

Lastly, trade liberalization combined with the reduction or removal of domestic support is likely to favor specialization at various levels of the product chain.¹⁶⁶ Countries with high levels of support would move towards higher value output as a result of the decrease in production of some commodities.¹⁶⁷ In this context, it would be necessary to assess the pollution intensities of previous and current crops. For example, in New Zealand, specialization in horticultural products led to increased levels of pesticides use.

The Technology Effect

Agricultural subsidies can have significant technology effects. As argued by Pieters, agricultural subsidies tend to have a technology “lock-in” effect, which means that they can prevent technological changes by supporting specific inputs or technologies.¹⁶⁸ Removing some forms of domestic support, especially input subsidies, would help removing this technological “lock-in” effect, and also decrease input use – and related environmental impacts – by raising their cost.¹⁶⁹

On the other side, environmental subsidies could promote the adoption of new technologies that are less environmentally harmful, such as drip-irrigation systems designed to reduce irrigation water use, or similar technologies. The “positive” technology effect created by such subsidies could potentially offset some negative environmental externalities related to increased agricultural production and trade. It could also improve the competitiveness of agricultural producers on world markets. These observations highlight the importance of technology choices and incentives attached to domestic support measures.

The Structural Effect

Domestic support measures and trade liberalization both have an impact on the structure of agricultural production, influencing the size of production units, the vertical integration of production, and market consolidation, domestically and across countries. As we have seen in the section pertaining to the economic impacts of the US Farm Bill, agricultural subsidies are thought to favor large industrial agriculture. The same can be said of agricultural trade liberalization: according to Vaughan and Patterson: “[...] *agricultural trade liberalization [is] changing patterns of agricultural production and distribution. This pattern is generally away from more traditional, small-scale and self sufficient production, to larger-scale production requiring a shift towards greater amounts of external sourcing of increasingly homogenized farm components. A corollary of the shift towards larger scale, more interconnected agricultural production is the concentration of agricultural production in general into the hands of fewer and fewer players*”¹⁷⁰. In addition, these authors argue that trade liberalization and domestic support

¹⁶⁵ VAUGHAN & PATTERSON (2002), op.cit. p.1.

¹⁶⁶ Ibid. p.9.

¹⁶⁷ Ibid. p.14.

¹⁶⁸ PIETERS (2002), op.cit. p.11.

¹⁶⁹ Ibid. p.11.

¹⁷⁰ VAUGHAN & PATTERSON (2002), op.cit. p.1.

lead to increasing simplification and specialization of farm-gate production.¹⁷¹

The Equity Effect

While equity issues are not incorporated in the OECD methodology for assessing the environmental impacts of trade liberalization, it seems necessary to address the distributive impacts of agricultural subsidies when considering their overall impact on the structure of production and on the environment. Indeed, a recent OECD study concludes that a large share of farm subsidies end up supporting land owners and input suppliers, and tend to benefit larger producers and impoverish or drive out of business smaller ones. The study estimates that only 25 percent of the funding ends up as a net income gain for the farmers and concludes that the flow of subsidies is biased in favor of large agri-business.¹⁷² In addition, it should be mentioned that agricultural subsidies, by decreasing the cost of commodities, act as an implicit subsidy to the agri-food industry.¹⁷³ The impacts of subsidies removal should therefore also be assessed in terms of their effects on upstream food industries.

Also important in the agricultural sector, water subsidies – which total US\$45 billion/year in the world¹⁷⁴ – have frequently been found to be regressive in addition to being environmentally harmful and trade distorting.¹⁷⁵ For example, in the United States, irrigation subsidies amount to US\$2-2.5 billion a year, contributing to cropping decisions that would not take place in a purely competitive market.¹⁷⁶ In addition, subsidized irrigation tends to be extremely inefficient and encourage overexploitation of water resources, as a result of the low cost paid by producers for water.

Classifying Agricultural Subsidies According to their Environmental Impacts

Based on an understanding of the various impacts of agricultural subsidies on the environment, it is possible to rank different kinds of domestic support according to their negative/positive impacts on the environment. Portugal describes the theoretical approach behind such a classification: *“In general, the more a policy measure is production linked, i.e. provides an incentive to increase production of specific agricultural commodities — the greater is the incentive for monoculture, intensification (using more inputs to produce higher yields), or to bring more (environmental sensitive) land into production — and the higher is the pressure on the environment. On the other hand, with non production linked measures, the higher the level of support of non environmentally targeted measures — the greater is the incentive for keeping environmental sensitive land under production and the pressure on the environment.”*¹⁷⁷ This not only confirms the environmental benefits of phasing out Amber Box policies, but also in

¹⁷¹ Ibid. p.5.

¹⁷² Organisation for Economic Co-operation and Development (2002e), *Farm Household Income Issues in OECD Countries: A Synthesis Report*, Paris, OECD. AGR/CA/APM(2002)11/FINAL

¹⁷³ PIETERS (2002), op.cit. p.19.

¹⁷⁴ PEARCE (2002), op.cit. p.10.

¹⁷⁵ SUR, Mona, Dina UMALI-DEININGER and Ariel DINAR (2002), *Water-Related Subsidies in Agriculture: Environmental and Equity Consequences*, Paper presented at the OECD workshop on environmentally harmful subsidies, Paris, 7-8 November 2002. p.4.

¹⁷⁶ PEARCE (2002), op.cit. p.10.

¹⁷⁷ PORTUGAL, Luis (2002), *OECD Work on Defining and Measuring Subsidies in Agriculture*, paper presented at the OECD Workshop on Environmentally Harmful Subsidies, Paris, OECD, 7-9 November 2002. p.14.

redirecting Green Box support towards environmentally targeted measures.

In another attempt to classify subsidies according to their environmental impacts, Pieters has developed a checklist of environmentally harmful subsidies. According to this checklist, the more obtaining a subsidy is contingent on:

- 1) the attainment of certain levels of input or output;
- 2) the deployment of a particular technology; or
- 3) the use of a particular environmentally relevant input,

the more direct are the environmental impacts of the subsidy.¹⁷⁸ Thus, removing those subsidies would tend to generate greater environmental benefits. On the other side, subsidies that are decoupled from production and price generate indirect environmental impacts only, and their removal would be less environmentally beneficial. According to Pieters: “*Subsidy removal has a larger impact if: the subsidies have been implemented for a long time; they have been targeted at environmentally relevant variable costs; they have had (upstream) effects on industries that are relatively polluting or resource intensive by themselves and have been applied to existing production capacity, not just new additions.*”¹⁷⁹

The OECD developed a ranking of the main categories of PSE measures according to their *relative* impacts on the environment.¹⁸⁰ Market price support, output payments and input subsidies are considered the most environmentally damaging subsidies.¹⁸¹ These subsidies represented 91 percent of total domestic support in OECD countries in the mid ‘80s. This proportion had decreased to 78 percent by the late 1990s.¹⁸² The following table summarizes the OECD classification and shows the amounts invested by OECD countries in each category in 2001.

¹⁷⁸ PIETERS (2002), op.cit. p.3.

¹⁷⁹ Ibid. p.19.

¹⁸⁰ OECD (2002a), op.cit.

¹⁸¹ A summary of the environmental impacts associated with different types of subsidies is reproduced in annex 4.

¹⁸² HONKATUKIA, Outi (2002), *A Stocktaking of OECD Work on Subsidies*, Paper presented at the OECD workshop on environmentally harmful subsidies, Paris, 7-8 November 2002. p.9.

Table 8: PSE Classification According to Environmental Impacts¹⁸³

	Types of subsidies	OECD (US\$ million)	% of Domestic Support
Most harmful	Market price support and payment based on output	\$159,471	69.1%
	Payment based on input use	\$19,505	8.5%
More neutral	Payment based on area planted/animal numbers	\$29,057	12.6%
	Payment based on historical entitlements & payment based on overall farming income	\$15,689	6.8%
Generally positive	Payment based on input constraints	\$6,586	2.9%
Total:		\$230,744	100%

Table 8 shows that a very large proportion of PSE support (77.6 percent) remains concentrated in the most environmentally harmful categories, while only 2.9 percent of PSE support goes to the category that generally has positive environmental impacts. This shows that the AMS reduction commitments under the URAA were very limited and that distorting forms of support remain dominant in OECD countries. This suggests that there would be considerable environmental benefits in redirecting domestic support away from the most environmentally harmful subsidies towards more environmentally neutral support measures, which also happen to be less trade distorting and more equitable. In addition, one can argue that there is an important potential for developing agro-environmental support measures in OECD countries.

The Potential of Agro-environmental Programs

As seen in the first section of this paper, the URAA Green Box provides ample flexibility in the deployment of domestic support and therefore offers opportunities to couple trade and domestic support reform with environmental reform in the agricultural sector.¹⁸⁴ Agro-environmental programs constituted less than 5 percent of total Green Box expenditures in OECD countries for the 1995-98 period, although expenditure on such programs increased rapidly in most OECD countries during the 1990s.¹⁸⁵ North America lagged behind based on this indicator: agro-environmental programs accounted for 0.5 percent of the PSE in the United States in 1997¹⁸⁶ and 0.8 percent in Canada in 1996.¹⁸⁷ There is a need to better understand how agro-environmental programs interact with trade and the domestic regulatory framework, and how eventual tensions between trade liberalization and environmental domestic support measures can be avoided.

The Trade and Regulatory Connections

¹⁸³ Based on OECD (2002a), op.cit. Figures for 2001 are provisional.

¹⁸⁴ VASADA (1999), op.cit. p.14.

¹⁸⁵ World Trade Organization (2000a) – Committee on Agriculture – Special Session, *Green Box Measures – Background Paper by the Secretariat*, 19 April 2000, G/AG/NG/S/2, p.4.

¹⁸⁶ Ibid. p.220.

¹⁸⁷ Ibid. p.175.

Several studies have pointed to the importance of accompanying trade liberalization with environmental policies in order to maximize economic and environmental benefits, and to avoid significant environmental externalities. As Vaughan and Patterson mention: *“While trade policy reform is capable of correcting some government failures that undermine agro-environmental management and conservation objectives, it cannot be seen as substituting for conservation policies. Given the magnitude of market failures in the farm sector, coupled with the severity of biological diversity loss that requires more robust public policy leadership, trade liberalization is seen as an important, but insufficient, step towards strengthening some environmental policies, mainly by virtue of eliminating offsetting effects of trade distortions.”*¹⁸⁸

A recent report by the OECD confirms the possibility of a double trade/environment benefit when redirecting agricultural support towards agro-environmental programs: *“By lowering output price support and input subsidies, shifting to policies that are less linked to production, and implementing agri-environmental measures, policy reforms have in many cases generated a double benefit: they have resulted in a more efficient allocation of resources, and they have reduced pressure on the environment. They have also increased transparency as to the remaining environmental pressures, which has the potential to be addressed through targeted environmental measures. The economic gains resulting from a better resource allocation could be used to support such targeted measures.”*¹⁸⁹

Another objective of a shift towards agro-environmental programs would be to ensure coherence and efficiency in the concurrent deployment of domestic support and regulatory measures. The reduction of environmentally harmful and trade distorting agricultural subsidies would raise the effectiveness of current environmental policies.¹⁹⁰ To the opposite, maintaining environmentally harmful agricultural subsidies directly raises the cost of achieving environmental objectives.¹⁹¹ By redirecting Amber Box type domestic support towards agro-environmental programs, OECD countries generate a double environmental dividend: not only does domestic support stop conflicting with environmental policies; it also directly supports their implementation. Accordingly, the OECD recommends that: *“The combination of agricultural and environmental policy measures [...] be carefully designed and implemented to ensure coherence so that they improve environmental quality in the most cost-effective and transparent way, with least distortion to production and trade.”*¹⁹²

Designing Effective, Transparent and Trade Neutral Agro-environmental Programs

Environmental programs in OECD countries mainly take the form of payments to farmers that are conditional on the choice of certain production techniques or on the reduction, replacement or withdrawal of targeted inputs in order to reduce environmental damage, or to remunerate the provision of environmental services. Several studies have addressed the relative effectiveness of various agro-environmental programs. According to the OECD: *“Agri-environmental measures*

¹⁸⁸ VAUGHAN & PATTERSON (2002), op.cit. pp.14-15.

¹⁸⁹ Organisation for Economic Co-operation and Development (2002c), *Agricultural Policies in OECD Countries: A Positive Reform Agenda*, Paris, OECD. COM/AGR/TD/WP(2002)19/FINAL. p.19.

¹⁹⁰ VAUGHAN & PATTERSON (2002), op.cit. p.14.

¹⁹¹ OECD (2002a), op. cit.. p.32.

¹⁹² Organisation for Economic Co-operation and Development (2001c), *Improving the Environmental Performance of Agriculture: Policy Options and Market Approaches*, Paris, OECD. p.6.

*appear to have been effective when the environmental objectives are clearly specified and the actions required by farmers are closely targeted to the objectives. [...] Agri-environmental measures may have also been effective when farmer compliance is closely monitored and the effects on farming practices and the environment are continuously assessed against the stated goals; and training and advice are provided to ensure that farmers are sufficiently informed about the measures and the best ways to implement them.*¹⁹³

The design of agro-environmental programs not only has a profound implication on their effectiveness, but also on their potential production and trade distorting effect¹⁹⁴. Land set-aside programs appear to be the most production and trade-distorting agro-environmental programs since they remove land from production, thereby directly affecting output.¹⁹⁵ As a result, the compatibility of some agro-environmental programs with WTO provisions could be questioned.

Ervin has proposed guidelines to ensure that agro-environmental programs are consistent with WTO provisions. These guidelines take the form of a “Code of Good Process.” In addition to the least trade-distorting criteria, it includes:

- 1) specifying clear environmental objectives for the programs;
- 2) clarifying property rights in environmental resources to establish the applicability of payments, charges, and subsidies;
- 3) establishing scientific linkage between the environmental objective and the policy instrument;
- 4) implementing monitoring and evaluation programs to document policy/ program efficacy;
- 5) applying equal treatment for domestic products and imports; and,
- 6) ensuring the transparency of agro-environmental measures.¹⁹⁶

It is unclear, though, how these guidelines could be incorporated into WTO practice.

In summary, agricultural subsidies generate a series of trade-distorting/environmentally damaging impacts, as well as important equity issues. On the other side, there is a large potential for reversing this situation by gradually shifting agricultural domestic support towards agro-environmental programs. The WTO Green Box provides enough flexibility to implement such a shift, but only a few countries have seized the opportunity thus far.

¹⁹³ OECD (2001c), op. cit. p.23.

¹⁹⁴ For a detailed discussion of the trade impacts of agro-environmental programs, see: Organisation for Economic Co-operation and Development (2000b), *Production Effects of Agri-Environmental Policy Measures: Reconciling Trade and Environmental Objectives*, Paris, OECD. COM/AGR/ENV(2000)133/FINAL

¹⁹⁵ ERVIN (1997) op.cit., p.22.

¹⁹⁶ ERVIN, David. (1999). “Toward GATT-Proofing Environmental Programmes for Agriculture.” in *Journal of World Trade* 33: 63-82. Cited in OECD (2000b), op.cit. p.20.

Conclusion and Policy Recommendations

The analysis of the potential impacts of the US Farm Bill and the Doha Round developed in this study shows that the reform of agricultural domestic support policies can generate significant economic and environmental impacts. While the overall level of subsidies has significant impacts on the price of commodities, farm revenues, production and trade, the form that agricultural support takes is even more significant when determining the economic and environmental impacts of domestic support. For these reasons, this paper's conclusions and policy recommendations focus more on the qualitative aspect of subsidies rather than on their quantitative aspects.

First, higher subsidies such as provided for in the 2002 US Farm Bill lead to an intensification of agricultural production in OECD countries which can generally be considered detrimental to the environment in terms of exposure to pesticides and fertilizers and habitat destruction, to mention just a few. In addition, some forms of subsidies may have a technology "lock-in" effect that might impede the shift to less environmentally harmful practices. They also lead to increased specialization and reduced agro-biodiversity. A reduction in domestic support would force farmers to diversify production to reduce risk, thereby improving agro-biodiversity.

Second, the phasing out of Amber Box policies as a result of the Doha Round would benefit both trade liberalization and environmental protection. Indeed, decoupling subsidies from production levels and price *"is a first step to removing incentives to overapply chemicals, overplant supported crops, convert environmentally sensitive lands into production, excessively withdraw irrigation water, or exert other environmental stress."*¹⁹⁷ In addition, OECD's work shows that if *"current production-based supports were replaced with direct income payments, efficiency costs could be halved without reducing the incomes of farm households."*¹⁹⁸ The removal of Amber Box subsidies would therefore free resources that could be redirected towards agro-environmental programs. In addition, it would improve the performance of agro-environmental programs by removing counter-incentives.

Third, as mentioned in this report, OECD PSE support remains largely concentrated in market price support and output/input-based payments, which are the most environmentally harmful categories of subsidies, while agro-environmental programs still constitute less than 5 percent of OECD Green Box support. This highlights the challenge in conducting an environmental reform of domestic support programs. Provided that they are well designed, efficient, and consistent with WTO provisions, agro-environmental programs hold the promise of a more sustainable and economically sound agriculture. Eco-conditionality appears to be a promising approach in that regard.

The Need for a Sustainability Assessment of Domestic Support Policies

The analysis of agricultural domestic support reform cannot be conducted without considering the broader context of agricultural trade liberalization. As an OECD report mentions: *"Like many other policy changes, agricultural trade policy reform will have both positive and negative*

¹⁹⁷ ERVIN (1997), op.cit. p.28.

¹⁹⁸ Organisation for Economic Co-operation and Development (2002c), *Agricultural Policies in OECD Countries: A Positive Reform Agenda*, Paris, OECD. COM/AGR/TD/WP(2002)19/FINAL. p.34.

*impacts on the environment. The direction and magnitude of the effects will depend on the state of the environment and on the production impacts of further agricultural trade liberalisation, as well as on the environmental regulations in place.*¹⁹⁹ Therefore it is clear that trade liberalization will not lead to win-win outcomes unless it is accompanied by environmental policies designed to address the social and environmental impacts induced by its economic impacts.²⁰⁰

This highlights the importance of developing appropriate policies to internalize environmental costs and address distributive issues that are related to trade liberalization. Indeed, if environmental externalities are internalized through environmental policies, freer trade will improve global welfare, but without internalizing externalities, liberalized agricultural trade will unambiguously generate negative impacts on the environment and on welfare.²⁰¹

Another important conclusion of this study is that the most economically efficient and environmentally effective policies to deal with market failures and distributive issues tend to be also the less trade-distorting ones. In addition, the Doha Round opens the door for a major reengineering of agricultural support programs to generate optimal trade and environmental outcomes. This presents an opportunity to initiate such a multilateral reengineering through the phasing out of Amber Box policies and the tightening of criteria for complying with Green Box support requirements.

This opportunity should be seized by initiating a multilateral sustainability assessment of domestic support programs in OECD countries. This could be developed as part of a cooperative reform process under the auspices of the OECD. This review would allow for the identification of the most efficient, less trade distorting and most environment-friendly domestic support policies, and allow for the diffusion of best practices within and outside the OECD. The review would also be useful in clarifying the trade and production-distorting impacts of certain agro-environmental policies. The conclusions of this process could orient the redeployment of agricultural domestic support in OECD countries, and ultimately help change the mix of OECD domestic support measures.

In addition, a cooperation program should be designed to help developing countries to face the additional environmental pressures that will be generated by the extensification/intensification of their agricultural production in the wake of the Doha Round. As mentioned in an OECD report: *“As far as transboundary effects on the environment are concerned, international co-operation, for example in the form of international environmental agreements, might be necessary to overcome the free-rider problem.”*²⁰² Such cooperation would not only ensure long-term sustainability of world food supplies, but also prevent transboundary environmental spillovers.

This outlines an ambitious agenda for reform in the field of agricultural domestic support. It is clear, though, that the Doha Round will induce new reforms in the design, magnitude and delivery of subsidies. This presents a unique opportunity to orient the next generation of agricultural policies towards a more efficient, less trade distorting, and environmentally sustainable agriculture. Ultimately, the goal of agricultural policies should be to internalize the environmental costs associated with agricultural production. Agricultural subsidies can play an

¹⁹⁹ Organisation for Economic Co-operation and Development (2000a), *Domestic and International Environmental Impacts of Agricultural Trade Liberalisation*, Paris, OECD. p.34

²⁰⁰ CARPENTIER (2001), op. cit., p.29.

²⁰¹ See CARPENTIER (2001), op. cit., p.25.

²⁰² OECD (2000a), p.6.

important role in that regard.

Annex 1: An Economic Overview of the Wheat Aggregate Market

In order to better illustrate the impacts of the new U.S. Farm Bill and the Doha Round, this annex provides the reader with a succinct economic overview of the global wheat market from a North American perspective. Accordingly, it first lays out the basis of wheat trade through the analysis of the product itself and the description of the world production, and consumption, stocks, and price mechanism. It then provides a picture of global wheat trade and discusses the industry outlook for 2002-2007.

Production

World

Taking only production into account, there are a very large number of producers competing for a share of the world market. According to the Foreign Agricultural Service of the U.S. Department of Agriculture, global production of wheat averaged 571.3 million metric tons (mmt) annually over the past decade²⁰³. During the international trade year 2001/2002²⁰⁴, 578.6 mmt of wheat were grown on a total area of 219.4 millions hectares²⁰⁵, an area roughly the equivalent of three times the size of the state of Texas. For that same year, the top eight producing countries²⁰⁶ provided 73 percent of world production. Over the past twenty-five years, the harvested area remained similar (with an increase in the 70s and a decrease in the 80s and 90s) but new technological methods and new breeds of crop have boosted production significantly (377.8 mmt in 1977/1978); yield increasing by almost 70 percent over that same period.

North America

Ninety-five percent of wheat produced in the North America originates from Canada and the United States. Since the entry into force of NAFTA in 1994, total production of wheat within the member countries has steadily decreased from 90.5 mmt (36.7 million hectares) to reach 77.9²⁰⁷ mmt in 2001 (31.3 million hectares). This decrease in production may be also attributed to U.S. farmers switching from producing wheat to oilseeds.

The United States, the world's fourth largest producer of wheat after, China, the European Union, and India, produced 53.3 mmt²⁰⁸ of wheat in 2001, down from 60.1 mmt a year before. Production was stimulated between 1994 and 1998 but a severe drought²⁰⁹ affected the harvests of 1995 and 1996. Overall production decreased since then by almost 20 percent when it peaked at 69.3 mmt in 1999 for the reasons mentioned above.

Although Canada ranked 8th in the world in 2001/2002 for total wheat production, it is by no

²⁰³ For the 1992/1993 – 2001/2002 period, Production, Supply and Distribution (PS&D) Online Database, FAS, USDA, <www.fas.usda.gov/psd/>

²⁰⁴ July 2001/June 2002

²⁰⁵ 1 hectare = 100 m² = 0.01 km²

²⁰⁶ China (93,870); European Union (91,725); India (68,763); United States (53,262); Russian Federation (46,900); Australia (24,000); Ukraine (21,300); and Canada (20,568); Production, Supply and Distribution (PS&D) Online Database, FAS, USDA, www.fas.usda.gov/psd/

²⁰⁷ FAOSTAT Database, FAO, <<http://apps1.fao.org/>>

²⁰⁸ FAOSTAT Database, FAO, <<http://apps1.fao.org/>>

²⁰⁹ In 1995, a severe drought developed in portions of western Texas and New Mexico. The drought carried over into 1996 in these states and expanded into Arizona, central and eastern Texas, and parts of California, Nevada, Utah, Colorado, Oklahoma, and Kansas.

mean considered among the largest producing countries. In fact, Canada's 2001/2002's production of 20.6 mmt²¹⁰ roughly corresponds to a quarter of the total wheat production of China or of the European Union, or a third of India's. This figure, however, hides difficult growing conditions²¹¹ that should persist and affect 2002/2003 results. Past harvests, notably the 1994/1995 - 2000/2001 period averaging 25.7 mmt, are probably better indicators to reflect the Canadian production capacity and short-term outlook.

Mexico on the other hand, must deal with arable land and water scarcity. Furthermore, low use of modern technology restricts its production capacity. Consequently, Mexico is not a major player in the world's wheat arena with production averaging 3.5 mmt²¹² between 1994 and 2001.

Consumption

World

75 percent of world wheat is consumed without being transformed, 15 percent is consumed indirectly in the form of animal products, and 10 percent is used for seed and industrial uses²¹³. The global consumption of wheat doubled in the last 30 years to reach 587.9 mmt²¹⁴ in 2001/2002. Of significance, five of the top eight countries in terms of consumption (accounting for over 65 percent of global consumption) are also among the top eight producers²¹⁵.

North America

The United States are the world's fifth largest consumer of wheat with consumption of 32,722 mmt in 2001/2002. Canada ranked 13th with 7,538 mmt. Consumption of wheat in the United States decreased by more than 10 percent in the past few years while Canadian consumption remained steady since the 90s.

Trade

Import/Export

In 2001/2002, 108.6 mmt, almost 20 percent of global wheat production, was traded on the world market²¹⁶. The top five wheat exporting countries represented 75 percent of global wheat trade and included the United States (26,139 mmt), Canada (16,758 mmt), Australia (16,494 mmt), Argentina (11,477 mmt), and the European Union (10,500 mmt). Since the early-80s, world trade volume of wheat remained fairly stable around and above 100 mmt annually. The top wheat

²¹⁰ Production, Supply and Distribution (PS&D) Online Database, FAS, USDA, <www.fas.usda.gov/psd/>

²¹¹ There was a lack of growing season rainfall in Western Canada in 2000 and 2001. The fall of 2001 was extremely dry with most of the Prairie region receiving less than 50 per cent of normal precipitation. The dry conditions persisted into the winter months of 2002.

²¹² FAOSTAT Database, FAO, <<http://apps1.fao.org/>>

²¹³ EKBOIR Javier (ed.), (2002), *CIMMYT 2000-2001 World Wheat Overview and Outlook: Developing. No-till Packages for Small-Scale Farmers*, CIMMYT, Mexico. Current and Future Trends in the Global Wheat Market, Chapter 3. <www.cimmyt.org/Research/Economics/map/facts_trends/wheat00-01/pdf/wheat00-01_part3.pdf>

²¹⁴ Production, Supply and Distribution (PS&D) Online Database, FAS, USDA, <www.fas.usda.gov/psd/>

²¹⁵ China (112,600); European Union (91,933); India (661,295); Russian Federation (38,078); United States (32,722); Pakistan (19,800); Turkey (16,501); and Iran (15,000); Production, Supply and Distribution (PS&D) Online Database, FAS, USDA, <www.fas.usda.gov/psd/>

²¹⁶ Production, Supply and Distribution (PS&D) Online Database, FAS, USDA, <www.fas.usda.gov/psd/>

importing countries in 2001/2002 include: the European Union (9,000 mmt); Brazil & Egypt (7,000 mmt); Iran (6,000 mmt); Japan (5,836 mmt); Algeria & Indonesia (4,000 mmt); and, the Republic of Korea (3,979 mmt).

European Union

The European Union is both a top exporter and a top importer of wheat. However, its domestic consumption has caught up with its production in the last decade; domestic consumption has increased by more than a third since 1992/1993 to reach 91.9 mmt ten years later while its production increased by a mere 10 percent over the same period to close at 91.7 mmt in 2001/2002. The European Union had to resort to its stock in order not to become a net importer last year.

China

China is the world largest producer and consumer of wheat and was, until 1995/1996, a net importer of wheat. Over the following five years, it has enjoyed extraordinary high levels of production that enabled it to cumulate considerable stocks that, in turn, have helped China to cope with steadily increasing demand and decreasing production. Because the size of China's grain reserves is a state secret, it is one of the most significant unknown variables in the world wheat trade equation²¹⁷. According to FAO and USDA's estimates, China's stocks of wheat have depleted by half over the past two years (from 71.4 mmt in 1999/2000 to 37,3 mmt in 2001/2002) and are expected to decrease by another half over the coming year. As a result, China could in the very short run return to the position of largest wheat importer in the global market.

Canada

Canada is the world's second largest exporter of wheat. In 2001/2002, wheat exports represented 1 percent of Canada total exports and 80 percent²¹⁸ of its total wheat production. Its main trading partners include Iran, the United States, Japan, Mexico, Algeria, the Philippines and Morocco. The domestic demand remained fairly stable for the past ten years and as result, export capacity is directly affected by growing conditions.

United States

Similar to the European Union, the United States is both exporter and importer of wheat. As the world's largest wheat exporter, it exported almost 50 percent²¹⁹ of its total 2001/2002 production. Those exports represented 0.5 percent of total exports that year. Its major trading partners include Japan, Egypt, Mexico, The Philippines, Nigeria, South Korea, and Taiwan. For many reasons, but mainly due to many of its urban centers located within cheaper shipping distances to Canadian sources and wheat differentiation, the United States also import wheat. In 2001, 98 percent²²⁰ of their wheat imports originated from Canada.

North America

Intra-NAFTA wheat trade can be summarized as follows: the United States export wheat to

²¹⁷ EKBOIR Javier (ed.), (2002), *CIMMYT 2000-2001 World Wheat Overview and Outlook: Developing. No-till Packages for Small-Scale Farmers*, CIMMYT, Mexico. Current and Future Trends in the Global Wheat Market, Chapter 3. <www.cimmyt.org/Research/Economics/map/facts_trends/wheat00-01/pdf/wheat00-01_part3.pdf>

²¹⁸ Production, Supply and Distribution (PS&D) Online Database, FAS, USDA, <www.fas.usda.gov/psd/>

²¹⁹ Production, Supply and Distribution (PS&D) Online Database, FAS, USDA, <www.fas.usda.gov/psd/>

²²⁰ Industry Canada, Trade Data Online, *Canadian and U.S. Trade by Product and Canadian Trade by Industry* <http://strategis.ic.gc.ca/sc_mrkti/tdst/engdoc/tr_homep.html>

Mexico while Canada exports to both countries; Mexico does not export wheat to neither country. Canadian total sales of wheat to the United States have increased by a third between 1993 and 2001 to reach US\$300 million while sales to Mexico increased by a factor of two over the same period ending at US\$149 million in 2001. United States sales of wheat to Mexico were US\$135 million in 1993 and doubled to US\$280 million in 2001.

Outlook

According to the OECD World Agricultural Outlook 2002-2007²²¹, world wheat production is expected to increase by 11 percent when compared to the average for 1996-2001, with 70 percent of the increased production coming from non-OECD countries. Overall, OECD countries will see their production increase by 9 percent. Most of the gains are expected to come from higher yields. Wheat consumption worldwide is expected to increase by 12 percent, with 70 percent of the new demand coming from non-OECD countries. Between 2002 and 2007, world wheat stocks are expected to decrease by 1 percent, to end 12 percent below the 1996-2000 average. Net wheat exports are expected to rise by 13 mmt, or 21 percent, compared to the 1996-2000 average. The OECD Outlook also predicts that the world indicator price for wheat will increase by 3 percent by 2007, against the 1996-2000 average. These forecasts assume constant agricultural policies and do not account for the impacts of the Doha Round or US Farm Bill.

²²¹ OECD (2002f) op. cit. p.43.

Annex 2: URAA Commitments on Domestic Support and Export Subsidies

The URAA divides domestic support into three categories (Amber, Blue and Green Boxes) according to their respective trade and production distorting impact. The Amber Box contains domestic support measures considered to distort production and trade, including all forms of support that are directly related (or coupled) to prices or production quantities, including input subsidies. Minimal (*de minimis*) support equivalent to 5 percent of agricultural production (10 percent for developing countries) is allowed on an aggregate basis. Over that level, countries must commit to reductions in Amber Box subsidies. These commitments are expressed in terms of Total Aggregate Measurement of Support (AMS). As of March 2002, 34 WTO members have committed to total AMS reductions – by 20 percent for developed countries and 13 percent for developing countries based on the 1986-88 baseline period. Canada, the United States and Mexico committed to AMS reductions in the URAA.

In order to be included in the Blue Box, a domestic support measure must be subject to production limitation conditions. No limits are set on the level of support that can be included in this category. The European Union accounted for more than 90 percent of Blue Box support in the OECD during the first phase of URAA implementation (1995-98).²²² With one exception for the United States in 1996, NAFTA members did not use Blue Box support measures after the conclusion of the Uruguay Round.

The Green Box contains measures that are considered not to directly distort production or trade.²²³ In order to be included in the Green Box, a domestic support measure must not distort trade, or at least be minimally distorting, be government funded (not involving transfers from consumers), and not involve price support. Green Box support includes various government services programs (including agro-environmental programs) and direct payments to producers which are not linked to production decisions. It is therefore considered de-coupled from production and price. No reduction commitments or maximum levels were included for the Green Box in the URAA.²²⁴

Export Subsidies

The URAA also establishes limits to the use of export subsidies. WTO members are allowed to subsidize exports, but only for products for which they have committed to a reduction of subsidies. The URAA restricts the right to use export subsidies to specific situations and contains

²²² Organisation for Economic Co-operation and Development (2001a), *The Uruguay Round Agreement on Agriculture: An Evaluation of its Implementation in OECD Countries*, Paris, OECD. p. 55.

²²³ Included in the Green Box are the following policies: research, pest and disease control, training, extension, inspection, marketing and promotion, infrastructure; food security stocks, domestic food aid, income insurance and income safety-net schemes, disaster payments, structural adjustment assistance provided through producer and resource retirement programs, and through investment aids, environmental programs; decoupled income support and regional programs). Source: OECD (2001a) op. cit. p. 51.

²²⁴ This summary of URAA domestic support boxes is based on: World Trade Organization, *Domestic Support on Agriculture: The Boxes*, [online], <http://www.wto.org/english/tratop_e/agric_e/agboxes_e.htm>, (consulted on 1 October, 2002), - World Trade organization, *Agriculture: Explanation – Domestic Support*, [online], <http://www.wto.org/english/tratop_e/agri_e/ag_intro03/domestic_e.htm> (consulted on 11 November, 2002), and World Trade organization, *The agreements – Agriculture: Fairer Markets for Farmers*, [online] <http://www.wto.org/english/thewto_e/whatis_e/tif_e/agrm3_e.htm> (consulted on 11 November, 2002).

commitments from 25 WTO members to reduce their export subsidies by 36 percent (24 percent for developing countries) in terms of value and 21 percent (14 percent for developing countries) in terms of volume. Reduction commitments are made on a product-specific basis. In the case of wheat, around 92 percent of the total volume reduction commitment by OECD countries is accounted for by the European Union (34 percent), the United States (34 percent) and Canada (23 percent).²²⁵ The final post URAA budgetary outlays for total world export subsidies is USD \$12 733,4 million, of which the USA, Canada and Mexico account for US\$594.4 million, US\$307.9 million, and US\$553.1 million respectively.²²⁶ It should be noted that the URAA also sets criteria to determine if food aid constitutes a disguised export subsidy.²²⁷

²²⁵ OECD (2001a), op. cit. p. 75.

²²⁶ World Trade organization (2001a), *Special Studies 6 – Market Access: Unfinished Business – Post Uruguay Round Inventory and Issues*, Geneva, WTO, p.61.

²²⁷ World Trade organization, *Agriculture: Explanation – Export Competition/subsidies*, [online] (consulted on 11 November, 2002). [online], <http://www.wto.org/english/tratop_e/agri_e/ag_intro04_export_e.htm> (consulted on 11 November, 2002)

Annex 3: Current Proposals for Agricultural Trade Liberalization

Highlights of the *U.S. Proposal for Global Agricultural Trade Reform*²²⁸ include eliminating the Blue Box and limiting the AMS to 5 percent of the value of agricultural production. The proposal maintains *de minimis* support at 5 percent of production. It also maintains the basic criteria for compliance with the Green Box, and sets no limits to such support. The US also proposes the elimination of export subsidies within three years with a 50 percent down payment. It also favors an elimination of state trading enterprises such as the Canadian Wheat Board, as well as the establishment of rules governing export credit activities.²²⁹ Lastly, the US proposal favors initiatives that would go beyond these commitments in some sectors, and support special and differential treatment for developing countries. The proposal gives developed countries a five-year timeframe to comply with these commitments.

The 18 members Cairns Group²³⁰ supports the US proposal but goes further in certain respects. The Cairns Group proposal argues that “*continued high levels of domestic support since the end of the Uruguay Round reflect the failure of the Agreement on Agriculture to alter attitudes at the heart of agricultural trade policy making. [...] Real cuts to distorting support along with improved disciplines on domestic support will be fundamental to agricultural trade liberalisation and a successful Doha Round outcome.*”²³¹ The Cairns Group favors a complete elimination of Blue Box and Amber Box policies within five years, with a 50 percent down payment in the first year, as well as reduction of *de minimis* support under 5 percent. The Cairns Group also proposes further restrictions to Green Box compliance criteria, and a rules-based approach to regulate export credits.

The European Commission (EC) paper²³² suggests a 55 percent reduction in AMS levels, as well as maintaining the Blue Box as it is. It also proposes to abolish the *de minimis* clause, thereby modifying the structure by which domestic support is calculated. The EC paper proposes to reduce export subsidies by 45 percent on average, and to completely eliminate export subsidies for certain commodities, including wheat. In addition, it wishes to discipline export credits and state trading enterprises, and clarify rules on food aid.

Overall, the EC proposal would reduce the EU’s Amber Box support limit from US\$60 to US\$33 billion, and the US’s limit from US\$19 to US\$10.45 billion. The US proposal would reduce EU’s Amber Box support limit to \$11 billion, and the US’s limit to \$10 billion.

In addition, the US wishes to maintain the *de minimis* clause (allowing US\$20 billion in US distorting subsidies), while EU wants to eliminate it.²³³

²²⁸ United States Department of Agriculture – Foreign Agricultural Service, *U.S. Proposal for Global Agricultural Trade Reform – The U.S. WTO Agriculture Proposal*, [online] FASonline, <<http://www.fas.usda.gov/itp/wto/proposal.htm>>, consulted on 9 January 2003.

²²⁹ WTO, (2002a), op. cit., p.27.

²³⁰ The members of the Cairns Group are: Argentina, Australia, Bolivia, Brazil, Canada, Chile, Colombia, Costa Rica, Guatemala, Indonesia, Malaysia, New Zealand, Paraguay, Philippines, South Africa, Thailand, and Uruguay. Canada has expressed slightly different positions on certain issues.

²³¹ World Trade organization (2002e) – Committee on Agriculture, Special Session, *Domestic Support – Specific Input: Cairns Group Negotiating Proposal*, Geneva, WTO, 27 September 2002, p.1.

²³² As of January 2003, the European Union had not submitted a formal proposal for WTO negotiations, although it has given some indications of its position through a European Commission paper and proposed Common Agricultural Policy reforms.

²³³ Source: “European Commission AG Proposal Shows Strategic Move on WTO Talks”, in *Inside US Trade*, December 20, 2002.

Annex 4: Summary of Environmental Impacts of Agricultural Trade

Agricultural production generates a series of environmental impacts through land use changes, agro-chemical use, water use and intensive cultivation. As one OECD study mentions: *“The quality of the environment appears to be especially sensitive to changes in agricultural production, as agriculture is an activity that requires large amounts of land and water, influences natural habitats and biodiversity, and shapes large parts of the rural countryside.”*²³⁴ Agricultural trade liberalization and changes in the nature of domestic support measures, through their impacts on production decisions, on the scale and structure of production, as well as on the choice of technologies and inputs, impact on the agriculture-environment relationship. These impacts can be either positive or negative, according to the specific policy context and natural conditions.

The domestic environmental impacts associated with agricultural production include ground and surface water pollution from fertilizer and pesticide run-offs, and changes in land-use that affect landscape appearance, flood protection, soil quality, and biodiversity.²³⁵ In the context of international trade, it is also essential to consider transboundary environmental spillovers, such as greenhouse gas emissions, changes in international transport flows, and the potential introduction of non-native species, pests and diseases alongside agricultural products.²³⁶ Box 1 summarizes the environmental impacts associated with agricultural production.

Box 1: Environmental Impacts of Agricultural Production²³⁷

- Soil quality (erosion, nutrient supply, moisture balance, salinity).
- Land quantity (area of ecological management of agricultural land).
- Water quality (nutrient, pesticide and sediment runoff and leaching, salinity).
- Water quantity (irrigation consumption, use efficiency, water retention capacity, flood prevention).
- Air quality (emissions of dust, odors, ammonia and greenhouse gas, absorption of carbon dioxide).
- Bio-diversity (farm and indigenous animal and plant diversity).
- Wildlife and semi-natural habitats (diversity of animal and plant habitats associated with farming).
- Rural landscape (environmental features of areas shaped by farming, including those associated with historic buildings and landmarks).

²³⁴ OECD (2000a), op.cit. p. 7.

²³⁵ Ibid. p. 5. It is interesting to note that agricultural production is closely associated with the two most important causes of biodiversity loss in the world: habitat loss/fragmentation and the introduction of invasive species. In addition, the FAO warns that intensive industrial agriculture increases genetic vulnerability as it tends to reduce genetic diversity in agricultural lands. Source: VAUGHAN & PATTERSON (2002), op.cit. p.11.

²³⁶ 50-75 percent of major weeds in the United States are non-indigenous, as well as 40 percent of insect pests in the country. OECD (2000a), op.cit. pp. 5-19.

²³⁷ OECD (2002c), op.cit., p.11.

Annex 5: Some North American Agro-environmental Indicators²³⁸

Land Use

- Agricultural land use in Mexico increased by over 6 percent from 1985 to 1997, while it decreased in most OECD countries, including Canada and the United States.

Land degradation

- In Canada, 5 million hectares (7 percent of agricultural land) of marginal prairie land continues to be cultivated at high risk of soil degradation. In the United States, 1/3 of total agricultural land is subject to erosion rates that could impair future production. In Mexico, 15-40 percent of agricultural land is either totally or severely eroded.

Water Use

- Agricultural water use increased by 15 percent in Canada, 37.5 percent in Mexico, and decreased by 3.7 percent in the United States between 1985-87 and 1995-97.

Water Pollution

- In the United States, Agriculture is a major source of water pollution, accounting for most of siltation, more than 80 percent of nitrogen and phosphates in surface water, and pesticides are detected in more than 80 percent of sampled rivers and fish in agricultural areas.

Nitrogen Balance

- Canada's nitrogen balance has more than doubled between 1985-87 and 1995-97, while it increased by 24 percent in the United States. Mexico's nitrogen balance decreased by 29 percent over the same period.

Pesticides Use

- Pesticides use has been slightly declining in Canada (-17 percent) and the United States (-1 percent) between 1985-87 and 1995-97, as a result of improved farm practices.

Greenhouse gas emissions

- Greenhouse gas emissions from Canadian and US agriculture, over the period 1990 to 1997, increased by over 7 percent between 1990 and 1997, compared to an OECD average of 1 percent over the same period. However, agriculture still only contributes about 7 percent and 10 percent of total Canadian and US GHG emissions, respectively.

Biodiversity

- In 1995, US agriculture was estimated to affect 380 of over 660 wild species listed as threatened or endangered. The main threats to wild species from agriculture originate from habitat destruction and exposure to farm chemical.

²³⁸ Source: PARRIS, (2002). Op.cit. p.6.

Annex 6: Relative Potential Impacts of Producer Support Measures on the Environment²³⁹

All other things being equal, the main categories of PSE measures can be ranked according to their relative impacts on the environment as follows:

Market Price Support and Payments based on output both increase the price received by producers for a specific commodity such that the more the commodity is produced, the higher will be the support. Thus, the higher these forms of support, the greater is the incentive for monoculture, for increasing the use of inputs (such as chemicals), and/or for using environmentally sensitive land, and the higher is the pressure on the environment. Moreover, these payments have the lowest effectiveness in achieving environmental goals, as they are sector-wide payments that can not be targeted to any environmental goal or situation that are generally local.

Payments based on input use reduce the cost of inputs used by producers such that the more the input is used the higher will be the support. Thus, the higher the payments, the greater the incentive to use the input, and the greater the impact on production and the environment. The more the payment is specific to a variable input (*e.g.* fertilizer, pesticide) the greater the incentive for production intensification, and the pressure on the environment. For example, the environmental impact of a credit subsidy for purchasing fertilizers or pesticides is potentially higher than a credit subsidy for acquiring farm land or extending farm buildings. Therefore, these payments may have a higher, the same, or a lower effect on production and the environment than an output payment depending on the type of input on which the payment is based.

Payments based on area planted/animal numbers reduce the cost of land/livestock for current plantings/ animal numbers. As producers have to plant a specific crop or own specific animals, these payments may be an incentive for keeping environmental sensitive land producing commodities non-environmentally-friendly in such land. Although these payments may be targeted to a specific environmental goal or situation, they provide an incentive to bring additional land or animals into specific production and encourage monoculture in the same way as the payments based on output. However, as producers are not encouraged to increase yields and to produce as intensively as they are with the forms of support outlined above, the environmental impact of these payments is potentially lower.

Payments based on historical entitlements (i.e. past support, area, animal numbers, production, or income) and **Payments based on overall farming income** (paid on the condition that the overall farmers' income is below a pre-defined level) also have the potential for retaining environmentally sensitive areas under production. However, as to receive these payments producers are not obliged to plant, own animals, or produce any particular commodities, they allow for individual choices on environmentally friendly production techniques, and do not encourage production intensification and/or monoculture. Therefore, the impacts of these payments on the environment are relatively benign or lower than the previous forms of support.

²³⁹ Source: OECD (2002a).

Payments based on input constraints are paid on the condition that farmers respect certain constraints (reduction, replacement or withdrawal) on the use of inputs often for environmental purposes. These payments may be targeted to specific environmental situations to address specific environmental issues associated with agriculture. They may contribute to offset the reduction on a positive environmental impact or the increase on a negative environmental impact of farming activities often benefiting from one or more of the previous forms of support. These mainly through input constraints that reduce production intensity, encourage production diversification, or put environmentally sensitive land aside from production relatively to which otherwise would occur. The environmental impacts of these payments depend on the type of constraint, but they have the potential for reducing environmental pressure and for being the most environmentally effective PSE measures.

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