Rethinking the Role of Domestic Support in Distorting Trade

Introduction

Until the Uruguay Round Agreement (URAA) domestic support received less attention and it was URAA explicitly addressed the trade distortions arising out of domestic support policies in agriculture. The theories on trade distortions however claim the supremacy of border measures in distorting trade. A number of empirical studies also hold the same line of view. There are a number of reasons for this. The definitions used by the WTO for addressing domestic support issues have serious limitations. For instance some developed countries, mainly the United States have strategically used the *de minimis* exemption to deflate their support figures substantially in order to remain within Aggregate Measure of Support (AMS) limits, even though total support has exceeded these limits. In addition to this the WTO framework itself enabled the developed countries with enormity of domestic support, to restructure their support in a way that they require no reduction commitments. Therefore, the major reason for the strife between developed and developing countries are related to the nature and identification of domestic support into various boxes. The paper therefore, gives more emphasis on domestic support by analysing the impact of crop specific support provided by the US, the major player in the world market, in distorting domestic prices. The paper also tries to capture the extent of dumping into the world market by US and their likely implications on the trade prosperity of developing countries.

The paper is classified as follows; first section discusses the theoretical arguments of trade distortions, section 2 gives a brief survey of literature which empirically shows tariffs are more trade distorting, section 3 discusses the real nature domestic support in US. The 4th section brings out the impact of Producer Support Estimate (PSE) on the prices of major selected crops. Fifth section describes the extent of dumping into the world market by US and their likely implications on the trade prosperity of developing countries. Fifth section concludes.

Theoretical arguments

There are two kinds of market distortions, i.e. the distortions resulting from market imperfections and distortions which are induced by policies. The distortions are present both in the product market and factor market. The principal forms of product market distortions are trade policies in

the form of import protection and export subsidies (taxes), exchange rate policies, and price control, all of which affect relative product prices. In turn, factor market distortions may result from social policies, financial policies, and tax policies, which affect the relative prices of labour and capital. However the distortions in the product markets will also have an impact on the factor market and vice versa. Product market distortions will give rise to distortions in factor market through their effects on factor prices while factor market distortions will cause distortions in product markets through their effects on cost of production. Though the product market distortions and factor market distortions are not easy to be seen in isolation, the following sections gives much emphasis on the product market distortions.

The distortions in the product market arise due to two reasons. First, is due to the presence of monopoly or oligopoly in the production of the commodity, which have effect of raising the price to consumers above the marginal cost of production. Second, is due to the presence of external economies or diseconomies which make the marginal cost to producers higher than marginal social cost. The former is policy induced distortions, while the later is due to the market imperfections. The distortions originating in imperfectly competitive market due to the monopoly or oligopoly practices are generally intimately interrelated with commercial policy, and there is reason to believe that producers often collude to exploit the profit opportunities created by protection. Therefore, an attempt to offset monopolistic distortions by protective interventions in trade (taxes or subsidies on trade) may well be offset by increased distortions and the intervention creates consumption loss with out countervailing production gain. The same reason could render nugatory the attempt to employ optimal intervention in the form of production taxes or subsidies.

The distortions due to the market imperfections, however, can offset by a carefully adopted trade or domestic policies or the combination of the both and thereby to stimulate economic development, especially in underdeveloped countries. Writers in the economic development have laid considerable emphasis on the traditional ‘external economies’ and ‘infant industry’ arguments for protection. In addition to this there is one more argument for protection based on the fact that in underdeveloped countries wages in manufacturing exceed the opportunity cost of

labour in the economy-the marginal productivity of labour in the agricultural sector (Johnson, 2001). However, as per his argument the only valid argument for protection as a means of maximising economic welfare is 'optimum tariff argument', a point which will discuss later in detail. All other arguments for protection are in principle are arguments for some form of government intervention in the domestic economy. According to Johnson, the government intervention in the domestic market in the form of a tax or subsidy or the combination of both is required only when the externalities are present in an economy. For example, when externalities in consumption make social marginal rates of substitution diverge from private, taxes or subsidies on consumption are required; when externalities in production exist, or where monopolistic influences raise prices above marginal costs, marginal subsidies on production are required; and when external diseconomies are present, marginal taxes on production are required; and when the price of a factor in one particular occupation exceeds by more than what it can be accounted, a subsidy on the factor is required. The major point of this argument is that the correction of domestic distortion requires a tax or subsidy on either production or consumption or on factor use and not on international trade. As per the advocates of the above theory the only valid argument for imposing tax or subsidy on international trade is the principle of 'optimum tariff'.

The theory of the 'optimum tariffs' rests on the proposition that if a country possess monopolistic or monopsonistic power in world market, world market price for its exports and imports will not correspond to the marginal revenue from exports or marginal cost of its imports, and it asserts that by appropriately chosen trade policy-taxes on trade-the country can equate the relative prices of goods to domestic producers and consumers with their relative opportunity cost in international trade. In other words, the theory of optimum tariff premised on the possible existence of world market distortions. Therefore, an optimum level of tariff is recommended as a means to offset this distortion. Then imposition of any tax or subsidy on international trade, excluding that indicated by the optimum tariff, for the purpose of correcting a domestic distortion, itself introduces an inequality between either the marginal rate of substitution in domestic consumption or the marginal rate of substitution in domestic production and the marginal rate of substitution in foreign trade. Therefore, this violates Pareto optimality.

The proposition that taxes or subsidies on international trade designed to offset domestic distortions will not necessarily increase economic welfare compared to the free trade situation is a direct application of the theory of second best developed by Meade (1955), Lipsey and Lancaster (1956-57), and others. The theory of second best developed by Richard Lipsey and Kelvin Lancaster (1956-57) is the theoretical underpinnings of the trade policies that improve welfare of an economy. According to the theory, any type of taxation or subsidisation by government may reduce economic efficiency and national welfare. However, every market is characterised by numerous distortions and imperfections. Therefore, there is only one solution to the problem, a second best policy. The second best equilibrium model is characterised by market imperfections and distortions.

There are numerous examples of applications of second best theory in the economic literature. For example, the theory of customs unions provides an important case study in the application of the general theory of second best. The theory of customs union was based on the assumption that any reduction in tariffs would necessarily lead to an improvement in world productive efficiency and welfare. However, Viner's work on the theory of customs union showed that removal of tariffs from some imports may cause a decrease in the efficiency of world production. The reason for this is a shift in the location of production followed by the creation of customs union. For example, there will be commodities which one of the members of the customs union will now newly import from the other, whereas before the customs union it imported them from a third country, because that was the cheapest possible source of supply even after payment of the duty. The shift in the locus of production is now not between the two member countries but between a low-cost third country and the other, high-cost member country (Viner, J 1950, p.43). Another application of second best theory is in theory of tariffs developed by Ozga (1955, p.489). According to him a non preferential reduction of tariffs by a single country may lead away from free trade position. In other words, the adoption of a free trade policy by one country, in a multi country tariff ridden world, may actually lower the real income of that country and of the world.

The second best equilibrium itself is often difficult to achieve. Therefore there are a number of optimal options like first best policy, second best policy etc. In 1971 Jagadish Bhagawati published a paper titled "A General Theory of Domestic Distortions and Welfare" to provide a

frame work for understanding the welfare implications of trade policies in the presence of market distortions. According to him trade policy is only a second best policy for those countries having less or insignificant influence on the world market (small countries). Therefore for such countries the domestic policies are the first best policy. On the other hand trade policies are the first best policy for the countries having a greater influence on the world market (large countries). The reason for this argument could be drawn out from the discussion of Bhagawati and Ramaswami (1963).

Theory of 'optimum tariff' holds valid for large countries and theory of 'optimum subsidy (tax-cum)' is valid for the small countries. The Paretian equilibrium condition is met when the DRS=DRT=FRT.[1] If the country has a monopoly power in trade, a competitive free trade solution will be characterised by DRS=DRT≠FRT. A subsidy (tax) on the domestic production of importables (exportables) could equalise DRT and FRT but would destroy the quality of DRS with DRT. Hence it is clear that a tax-cum-subsidy on domestic production is necessarily inferior to an 'optimum tariff' for large countries. In addition to this, Bhagawati and Ramaswami (1963) argues, it may be impossible in any given empirical situation to devise a tax-cum-subsidy that would yield a solution superior to that arrived at under free trade.

But in the case of countries with no monopoly power in world market, the case of domestic distortion can write as DRS=FRT≠DRT under free trade. A suitable tariff can equalise FRT and DRT but would destroy the equality between DRS and FRT. Therefore it shows that no tariff is superior to free trade. A suitable-tax –cum-subsidy on domestic production, however would enable the policy maker to secure DRS=FRT=DRT and hence is necessarily the optimum solution. Hence a tariff policy is also necessarily inferior to an optimum tax-cum-subsidy policy.

Therefore, the a tariff is not necessarily superior to free trade, a tariff is not necessarily superior to an export (import) subsidy and a policy pertaining to the attainment of maximum welfare involves a tax-cum-subsidy on domestic production. Briefly an 'optimum tariff policy' is

[1] Domestic Rate of Substitution in Consumption is equal to Domestic rate of Transformation in Production is equal to Foreign rate of Transformation.

suitable, when there is a divergence between foreign prices and FRT, and optimum subsidy (or tax-cum-subsidy), is suitable when there is a diveregence between domestic prices and DRT.

Tariffs, Subsidies and Distortions

In the preceding sections, the discussion of the theoretical literature on trade distortion implicitly points out that the tariffs are more trade distorting. This is obvious from the argument of "optimum tariff". As per the theory any level of subsidy or tax on trade beyond the optimum level of tariff will lead to more distortion and violates the paretian optimum condition. . Therefore, the only valid argument for protection is 'optimum tariff' argument and all other arguments for protection are in principle are arguments for some form of government intervention in the domestic economy. However, the theories do not deny the fact that there is an optimum level of intervention in the domestic market as well. 'Optimum tariff' is a suitable policy for the countries with greater influence on world market and 'optimum subsidy' is a suitable policy for the countries with less influence in the world market. However, in reality, the world is characterised by multiplicity of support measures, and the countries rarely follow the optimum level of intervention. This is paved way for greater trade distortions.

The new paradigm of trade liberalisation in agriculture is premised on this issue, i.e. the distortions due to the government interventions. Therefore, the new liberalised regime aimed reduction in government intervention, and thereby correcting the trade distortions in world agriculture. It has been argued that the interventionist policies had distorted the world prices as well as the cropping pattern. The main rationale for the liberalisation programme, therefore, was to "set prices right". Getting the prices right, it is argued, will create an appropriate incentive structure for the farmers and will trigger agricultural growth.

As per the theory, tariffs are considered to be as more trade distorting than domestic subsidy as they have direct impact on production and consumption (Corden, 1974). Considering the elasticity between leisure and work as zero, a subsidy financed by income tax (an increase in income tax), is treated as non-distorting. On the other hand, a tariff is a tax on consumption, which finances a subsidy to producers as well as allowing some reduction in income tax and an income tax that finances the same level of subsidy in production. Therefore as per Corden's

argument a tariff creates a by-product distortion (the consumption cost of protection) while the subsidy (that is finance through an increase in income tax) does not (Corden, 1985). He further argues if it is desired to achieve a target out put level of one particular product the optimal policy is to subsidise production and then to finance the subsidy by a minimum distortion tax. If the subsidy is financed by a minimum distortion tax (here it is assumed that an income tax is imposed on all kinds of income), a subsidy is still better than a tariff. If the minimum distortion tax is imposed only on one product, (i.e. tax on consumption of only one product through the imposition of tariff), in which case tariff and subsidy would have the same effect. Briefly, the crux of the argument is that a tariff is a tax on consumption of that particular product where the tariff is imposed and a subsidy for the production of a particular product is financed through a minimum distortion tax that involves all products and all levels of income.

However, Bhagawati explicitly argue that the tariffs are the first kind of distortion in international trade (Bhagawti, 1971).He enumerates four kinds of distortions: FRT≠MRT=MRS, MRT≠MRS=FRT, MRS≠MRT=FRT and finally non-operation on the efficient production possibility curve. The first kind of distortion may arise when a country with monopoly in trade imposing a zero or non-optimal tariff or a country with no monopoly in trade but imposing tariff. The tariff raises the domestic prices of the importables, which, in turn tend to boost the domestic production and curb the domestic consumption level of the importable good, and thus the trade shrinks. Briefly, as per Bhagawati's point of view the optimal policy intervention in the presence of distortions, involves a tax-cum-subsidy policy addressed directly to offsetting the source of the distortions, when the causes are endogenous or autonomous, policy induced.

Empirical Arguments

The studies on trade distortions give undue importance to tariffs and underrate the enormity of domestic support in distorting trade. The argument is that the major source of gains for developing countries would arise from removal of tariffs, rather than subsidies in developed countries (Hoekman et al, 2002, 2004). Also the agricultural support policies hurt developed countries relatively more than they hurt developing countries. The second argument is that the subsidies provided by many developed countries actually benefit some poor, developing countries. The studies place high importance to market access as compared to other two pillars of

the AoA. They argue that the potential income gains from abolishing domestic support and export subsidy are much smaller than those from eliminating tariffs (Anderson, et al, 2005). As per the World Bank research over 90 percent of the cost of global agricultural distortions is due to tariffs (World Bank, 2005). They cite six reasons for this. Firstly, they argue, the widely cited $280 billion of OECD agricultural support in 2004 is derived primarily from tariffs and export subsidies. And therefore the resulting market price support accounts for $168 billion, or 60 percent of total. Another argument related to this view is the OECD estimates refer only to support to farmers, and there is a great deal of support to food processing covered under the AoA-virtually all of which is provided by tariffs. Third, trade measures are more costly and distorting both production and consumption and thereby potentially is double than the cost per dollar of support to producers. Fourth, almost all of the agricultural support outside the OECD is provided through border measures. Fifth, the rates of protection provided by tariffs tend to vary more than those provided by subsides. Sixth, the costs of domestic support are reduced to some degree by decoupling from production. Even without taking decoupling into account, the World Bank research finds that domestic support accounted for only 5 percent of the global welfare cost of agricultural distortions in 2001. Briefly, the studies argue that market access barriers are more important than domestic subsidies because the amount of support provided through market access barriers in developed countries are much more than support provided through domestic support. As per their argument market access distorts both production and consumption whereas domestic support distorts only the domestic production. Another study points out that around 40 percent of the costs of protection of market access barriers to developing countries arise from barriers to market access in industrial countries, and 60 percent from barriers in developing countries themselves.

Even though one can not undermine the role of tariffs, the significance of domestic support in distorting trade needs to be examined in detail. Before doing so, one point needs to be added at this juncture. The studies place importance to tariffs and not non tariffs barriers, which are supposed be more trade distorting owing to its non accountable nature. Therefore, the Uruguay Round proposal for reduction in tariffs is not as simple as it seems. There are several reasons for this. First, the complexity and lack of transparency in tariff structure in various countries. Countries levy tariffs in various ways. Mostly tariffs are expressed in ‘ad valorem’(AVE) terms

or as percentage of value of imported goods. However, a significant portion is expressed in specific or other non-ad valorem (NAV) terms. They are called specific or non advalorem (NAV) duties. Also there is a combination of both AVE and NAV duties known as compound tariffs. The second set of difficulty is associated with the conversion of Non Ad valorem Tariffs (hereafter NAV tariffs) into Ad valorem Tariffs (AVE). Several countries have submitted proposals calling for a common methodology for the process of tariffication. The conversion of NAV duties to AVEs would allow all tariffs to be included in the tariff reduction formula proposed in the context of discussions on tariff reduction modalities. Also note that the incidence of NAV duties is highest for agricultural products and in developed countries. [2] The advantages of NAV tariffs imposing countries are first; the increased level of protection against large drops in import prices, second the lack of transparency associated with these rates, which helps to conceal the level of protection being provided. The third set of challenge is related to reduction in average tariff computing un weighted average tariff and the harmonization of the tariff lines across the countries. It has been observed that many products of export interest to developing countries continue to face as the AoA commitments required reduction of an un weighted average tariff for each countries agricultural products, thereby maintaining high level of tariffs on some products by making substantial reduction on less sensitive tariff lines in which there is no or minimal trade (15/AG/NG/W/102 dated 15 January 2001). In addition to this even the harmonization of the tariff lines gives enough flexibility to the countries having high number of tariff lines in their tariff structure. A greater number of tariff lines result in less average tariff.

Therefore, the real nature of market access barriers is not captured in the above studies. Similarly, the real magnitude of domestic support is also not properly understood. Even after the introduction of WTO commitments, the domestic support in many countries either increased or maintained by using the method of restructuring. Restructuring of domestic support has, in fact, been a key feature of the implementation of the commitments that these countries have made in the AoA. This has become evident from the manner in which a number of countries have extended this form of support to their domestic agricultural sector. Also, the argument that the developed countries use to justify their domestic support is decoupling. However, the decoupled

[2]For example around 19 percent of total agricultural tariff lines are NAV tariffs compared to 4 per cent for manufactured products. Switzerland has the most NAV tariffs (1,940), followed by the EU (1,010), the United States (761), Norway (722), and Bulgaria (550).

income support, contrary to what many studies pointed out, is likely to affect the production and prices.

The 'real' Magnitude of US Domestic support

As per the AoA, the WTO members had agreed to limit expenditures on domestic agricultural subsidies with certain exemptions[3]. In effect the framework itself gave considerable scope for developed countries to continue with their support. For instance, the US had shifted much of its support to green-box compliant Producer Flexibility Contract (PFC) Payments, which is exempted from the reduction commitments.

According to the data obtained from the notifications on domestic support to the WTO Committee on Agriculture, the US had increased its spending under green box support, quite considerably during the first two years of implementation, and as a result, green box spending accounted for around 88 per cent of its domestic support. In the subsequent years, however, the share of green box spending came down to about of third in the total domestic support. The absolute amount of green box support, however, increased from $ 46033 million to 450672 million during 1995 to 2001. The total Amber box subsidies granted by the government during the same period increased from $7697.2 million to $ 21455.8 million. Note that even the amber box, the market distorting support was increasing. As a result the total subsidies granted by the government have increased from $60760.60 million to $ 72127.80 million. The total domestic support for all other countries during the same period was declining. Nonetheless, the blue box support experienced a drastic fall and it remained to be as zero since 1995.

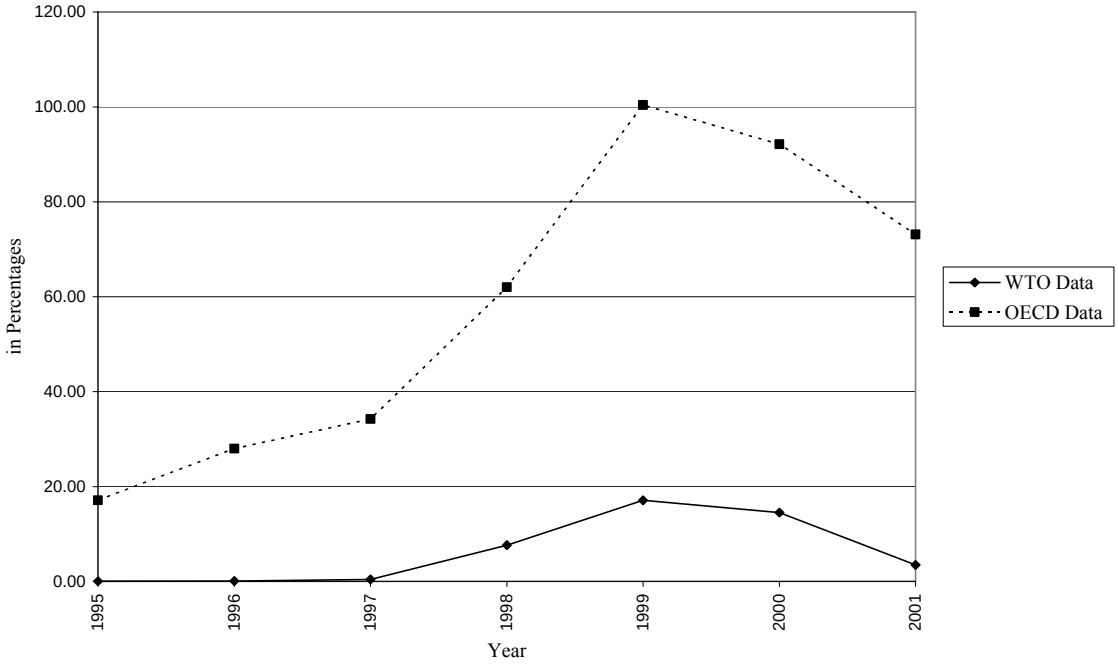
[3] The AOA exempted from disciplines those support polices that are supposed to have no or minimal impact on production and trade (Green box and Blue box). In addition the WTO agreement allowed exemptions for subsidies under *de minimis* provision when they were less than 5 per cent of the value of production of a specific commodity to which the subsidy applied (Commodity specific *de minimis*) or of the aggregated value of agricultural production (not commodity specific). The items that have direct impact on production or trade distorting were under the head called "Amber Box".

Both product specific (PSE) and non-product specific support leading to amber box support, given by US government increased from $ 6311.2 million to $ 14627.6 million and $1386 million to $ 6828.20 million during the period of 1995 to 2001. The product specific support reached the peak level in 1999 but since 1999 declined slightly. The non-product specific support also shows the same trend but compared to product specific support the increase in non-product specific support was sharp during 1995 to 1999. The largest proportionate increase in domestic support was witnessed in case of wheat, a commodity in which the United States is the second largest producer having a 25 per cent share of global trade. The domestic support for wheat however declined drastically in 2001. Support for wheat increased from just less than US$ 5 million in 1995 to nearly US$ 974 million in 1999 and further declined to 189. 4 million in 2001. The product specific support granted to rice, a commodity in which United States has started emerging as an exporter, went up from US $ 11.6 million in 1995 by a massive US $ 762 million in seven years.

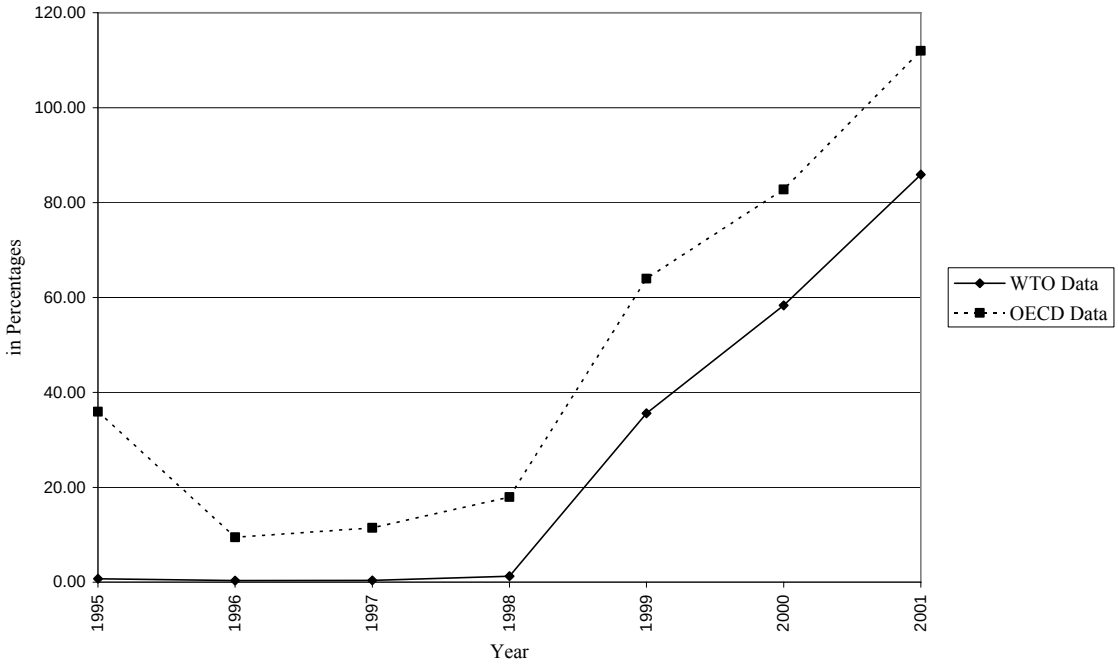
At this juncture it would be of interest to discuss the difference between the data on PSE provided by WTO and OECD. There is a huge difference between the PSE data given by WTO and OECD. The percentages calculated using OECD data of product specific support as a percentage of production is many times higher than WTO figures.[4] The difference is very high in the case of wheat. Also note that the difference is increasing towards the end of the period (see following figures). However, the difference in the data obtained from WTO and OECD is due to the different methods in calculating the market price support (Gopinath, etal 2004).The market price support is calculated by taking the gap between a fixed external price and the domestic price. The OECD use farm gate price as the domestic price and the WTO notifications use the applied administered price.

[4] As per the AoA the developed counties shall not provide a producer support of more than 5 per cent of the value of production.

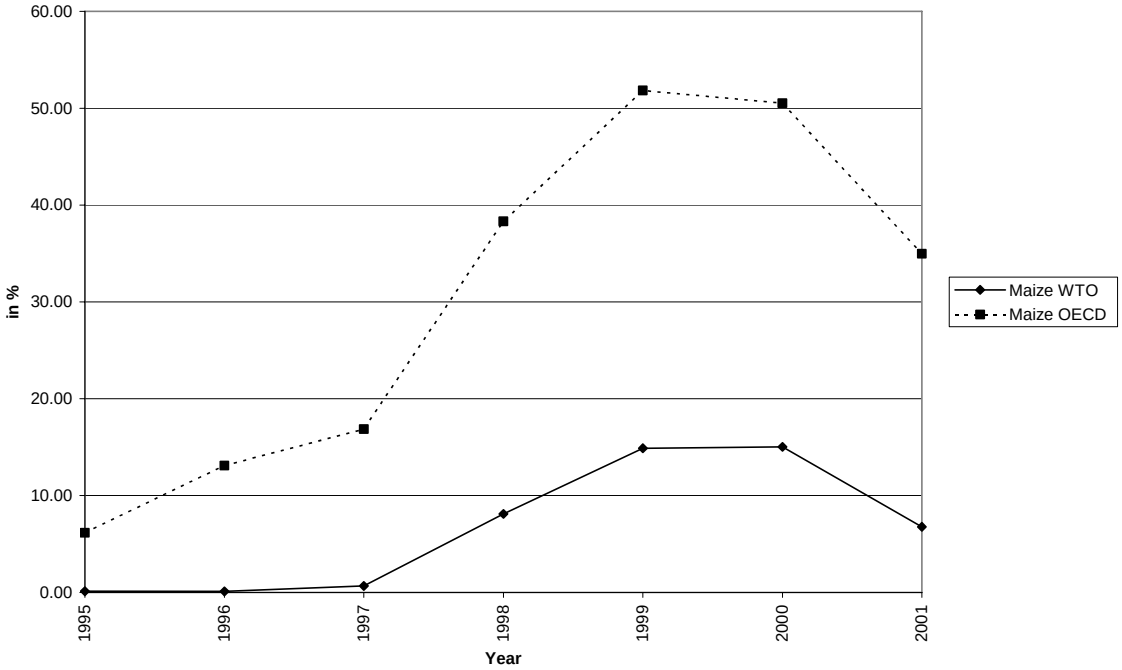
Product Specific Support for Wheat as a percentage of Value of Production



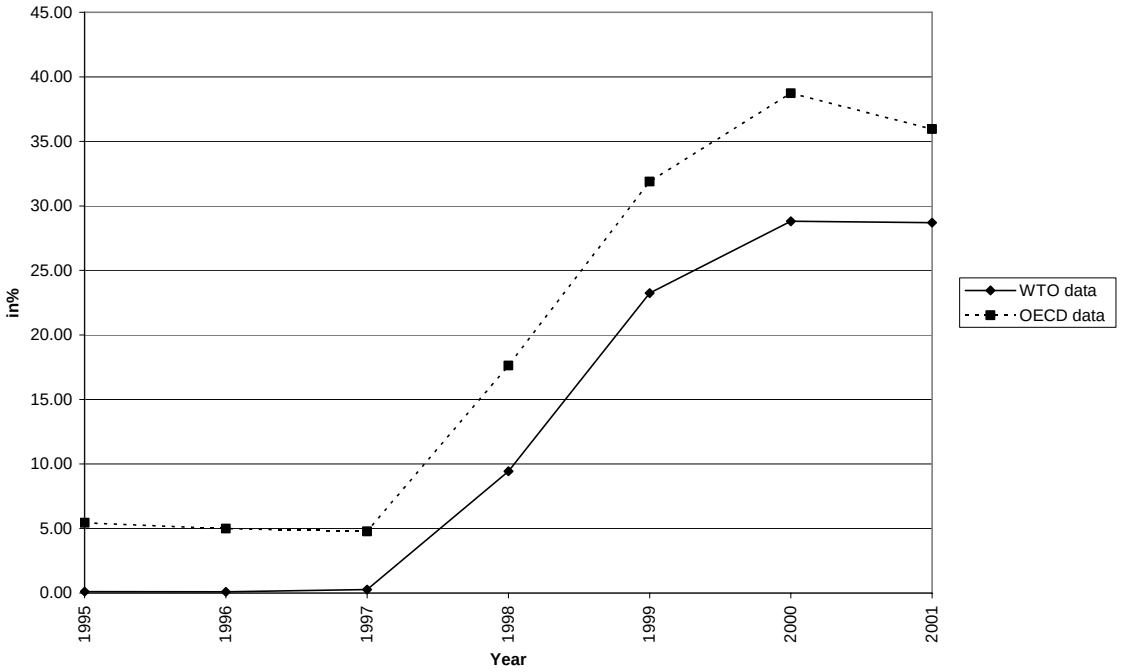
Product Specific support of for Rice as a percentage of total value of production



The Product Specific Support for Maize as a Percentage of value of production



The Product Specific Support as a percentage of vale of production for Soybean



Identification and Placement of Subsidies into various 'boxes'

The framework of AoA is imbalanced in its provisions on market access, tariffs, domestic subsidies and export competition. The real nature of the trade distortions is beyond the scope of the framework. The framework has been fashioned in such a way that the developed countries are able to continue their high levels of protection, whilst many developing countries have liberalized and their framers are facing damaging competition due to the dumping of low priced commodities in the world market.

Therefore, the preeminence of domestic support in distorting the trade is able to explain with the help of a scenario where the "boxes" are redefined and re measured. The identification and placement of subsidies in various boxes has been the most contentious issue in the current pace of negotiations. The placement of subsides into trade distorting as well as non trade distorting categories gave enormous flexibility in restructuring the domestic support in developed countries. For instance, the AoA allowed the countries to continue to increase their subsidies by shifting their subsidies targets out of the trade-distorting category (Amber Box) to trade-neutral categories (Blue and Green Boxes). Note that the decoupled income support is placed in the Green Box claiming they are no or minimal trade distorting as they are de linked from current production and prices. Similarly, the counter cyclical payment, which is partially coupled, [5] is placed under the Blue Box category.

On the other hand developing countries can not use or increase subsidies except in very limited ways. In addition to this, the developing countries do not have the resources to subsidise agriculture in any degree comparable to the developed countries.

The analytical framework

The crops selected for analysis are wheat, maize, soybean and rice. These are major crops cultivated in US and traded in the world market.[6] The principal forms of product market distortions are trade policies in the form of import protection and export subsidies (taxes),

[5] Partially coupled due to they are linked with price.
[6] Cotton is also one among the major five crops produced and exported but cotton is excluded from analysis as the OECD data on PSE is not available for cotton.

exchange rate policies, and price control, all of which affect relative product prices. Therefore, the end result of any type of distortion is seen through prices. The analysis therefore is intended to see how the PSE are affecting the relative prices of crops.

Regarding data, the data on PSE is taken from the website of OECD. There are two reasons for this; first, the data on PSE provided by OECD is more truthful method as the market price is calculated using the farm harvest price. Secondly, the data on PSE from WTO notifications is available only from 1995 onwards and this makes the time series analysis of the data meaningless. The data on cost of production and prices are available in the website of Economic Research Service/US Department of Agriculture (ERUSDA) since 1975 but taken since 1986. There is a discontinuity in the classification of data since 1996. For the earlier period the cost data is classified under two headings i.e operating cost and allocated overhead. However the total cost in the later period and the total economic cost in the former period are comparable. So the analysis is made use of both economic costs and total costs for the calculation of unit cost. Price provided by the USDA is harvest period price (or farm harvest price). The data on production, export and import are taken since 1986 from the website of Food and Agriculture Organisation (FAO).

Regarding methodology the time series analysis of price as a function of a set of variables viz; cost of production, production, PSE, export and import is undertaken to see how the domestic prices are getting affected by these variables. For measuring the methodology on dumping, the methodology developed by Dhar and Varma (2006) is taken into consideration.[7]

The model can be explained as follows;

[7] The methodology of IATP is used for this purpose but with some differences in calculating the variables. For instance instead of taking specific market prices the US average marketing year price for the individual crops is taken for calculating the transportation cost. The unit PSE is calculated using the value of production. The data for average marketing year price for the individual crops is obtained from various issues of Agricultural Statistics published annually by the National Agricultural Statistics Service (NASS) of the US Department of Agriculture (USDA). The difference between the average marketing year price and the export price is taken as the proxy for transportation and handling cost of the crop. The full cost of production thus obtained by adding unit cost, unit PSE and transportation and handling cost. For measuring the dumping percentage we used the following formula;

(Full Cost of Production- Export Price)/(Full Cost of Production)=% of Export dumping

$Lnp=\alpha+\beta_1 lnQ+ \beta_2 lnc+ \beta_3 lnx+ \beta_4 lnm$

$\beta_1=(\Delta P/P)/(\Delta Q/Q)$, $\beta_2= (\Delta P/P)/(\Delta C/C)$, $\beta_3= (\Delta P/P)/(\Delta X/X)$, $\beta_4= (\Delta P/P)/(\Delta M/M)$

The result of the analysis shows that prices of all the crops except wheat are affected by PSE. The relationship between the prices and the PSE were significant and negative. In the case of wheat, production, cost of production and export had a significant and positive impact on price. Contrary to our notion, production and cost of production had significant and positive impact on the prices of wheat. In the case of rice there is an inverse relationship between the PSE and prices and the relationship between the two variables were significant. The only other variable which was significant but positive was cost of production. In the case of maize and soybean only the variable PSE was significant in affecting the prices and the relationship between the two was negative. The analysis therefore indicates the prices in the domestic market are distorted due to high levels of PSE. The high levels of PSE pushed down the prices for crops. Also note that the prices for almost all the crops in US were well below their cost of production (Dhar and Varma, 2006). Therefore the prices below the cost of production due to high levels of support can affect the world market in the form of dumping. The percentages calculated points out this fact. (see table 1).

Table: 1 Percentage of US Dumping into World Market

Year	Wheat	Maize	Soybeans	Rice
1991	41	15	6	15
1992	29	14	0	20
1993	33	20	6	14
1994	27	7	-2	16
1995	16	-11	-6	13
1996	25	3	-15	6
1997	31	15	-10	9
1998	36	30	14	15
1999	48	38	28	27
2000	48	38	28	20
2001	48	25	30	27
2002	44	12	17	29

The table shows that the dumping percentages were respectively 40 for wheat, 30 for maize, 25 for soybean and 25 for rice. Note that the percentage of dumping was all time high for wheat. The percentage of dumping of wheat increased from 41 to 44 during 1991 to 2002. The dumping

of rice increased from 15 percentage to 29 percentage. Similarly the dumping of soybean also increased from 6 percentage to 17 percentage.

The US share of export of all the crops mentioned above was significant. As far as wheat, soybean, maize US is the largest exporter. In the case of rice Thailand is the largest exporter and followed by US. From this exercise it is obvious that the export of agricultural products at a cheaper price to the world market has a detrimental effect in pulling down the prices (Dhar and Varma, 2006).

Concluding Observations

Though the theories and empirical studies place more importance to tariffs in distorting trade one can not underestimate the role that huge amount of domestic support play in distorting trade. The additional gain in market access therefore depends not only on the removal of tariffs but also from the substantial reduction in domestic subsidies. The argument that US administration has used to justify their agricultural policy shift is 'Decoupled Income support', .i.e. the support which is de linked from the current production and prices.[8] However, the decoupled income payment can also have an indirect impact on production and prices through a reduction in the level of cost of production. Note that the simple correlation between the cost of production and the decoupled payments are significant and negative for all the crops. Therefore, the huge amount of support provided by the US to their producers pushed down the prices well below the cost of production. Since US is a major exporter of agricultural products, especially the crops selected for study, products are dumped into the world market. The monopoly power of US in the world market in effecting the prices must have resulted in depressing the world market prices. The dumping therefore, create unfair trading advantage because they depress world prices and narrow or even eliminate the market opportunities for producers in the developing countries. Note that the cost of production is favorable for many developing countries owing to their low cost technological production. But their price competitiveness in the world market is adversely affected by the artificial depressing of the world prices.

[8] The US introduced decoupled payments into the system through Federal Agriculture Improvement Act (1996). From 1996-2002, the decoupled payments named as Production Flexibility Contract Payments (PFC) and since the Farm Security and Rural Investment Act of 2002 the PFC is modified and renamed as Direct Payments.

References

Anderson, Kym, Will Martin and Valenzuela Ernesto (2005), 'Why Market Access is the Most Important of Agriculture's Three Pillars in the Doha Negotiations, Trade Note, The World bank. Source: www.worldbank.org

Anderson Kym, Betina Dimaranan, Francois Joe, Tom Hertel, Hoekman Bernard and Will Martin (2001), 'The Cost of Rich (Poor) Country Protection to Developing Countries', Discussion Paper No. 0136, Centre for International Economic Studies, Adelaide University, Australia Source: are.berkeley.edu/courses/EEP131/CostofProtection.pdf

Bhagawati and Ramaswami (1961), 'Domestic Distortions, Tariffs and Theory of Optimum Subsidy', *The Journal of Political Economy*, 71(1): 44-50.

Bhagwati, Jagdish N., 1971, 'The Generalized Theory of Distortions and Welfare, Pp. 69-90 in Jagdish Bhagwati, Ronald Jones, Robert Mundell and Jaroslav Vanek, editors, *Trade, Balance of Payments and Growth*, North Holland, Amsterdam.

Corden, W. M (1974), *Trade Policy and Economic Welfare*, Oxford, Clarendon Press.

Corden, W.M (1985) *Protection, Growth and Trade: Essays in International Economics*. Oxford: Basil Blackwell

Dhar, Biswajith and Poornima Varma (2006), 'The Issues of market Access and US Dumping', Mimeo, Centre For WTO Studies, Indian, Institute of Foreign Trade, New Delhi.

Gopinath, M, Kathleen Mullen and Gulati, A. (2004), 'Domestci Support to Agriculture in the European Union and the United States: Policy Development Since 1996', Markets, Trade and Institutions Division, Discussion Paper No.75, International Food Policy Research Institute (IFPRI).

Hoekman Bernard, Francis Ng and Olarreaga Marcelo (2002), 'Reducing Agricutural Tarifsf Versus Domestic Support: Whats' more Important for Developing Countries?' World Bank Policy Research Working paper 2918, Source: www.worldbank.org

Hoekman Bernard, Francis Ng and Olarreaga Marcelo (2004) Agricultural Tariffs or Subsidies: Which Are More Important for Developing Economies? *The World Bank Economic Review*, 18(2), 175-204.

Johnson,H.G. (2001), 'Optimal Trade Intervention in the Presence of Domestic Distortions' in Jagadish Bhagawati (Ed) *Selected Readings, International Trade,* The MIT Press.

World Trade Organisation (WTO) (2001), 'Negotiations on WTO Agreement on Agriculture, Committee on Agriculture Special Session', G/AG/NG/W/102, 15 January 2001. http;//www.wto.org

Annex

1. Regression Tables

Wheat

Source	SS df	MS		Number of obs =	18
	F(7, 10)	= 8.91			
Model	.596110576	7 .085158654		Prob > F	= 0.0013
Residual	.095539353	10 .009553935		R-squared	= 0.8619
	Adj R-squared	= 0.7652			
Total	.691649929	17 .04068529		Root MSE	= .09774
lnprice	Coef.	Std. Err.	t	P>t [95% Conf.	Interval]
lnpse	-.0942062	.0635703	-1.48	0.169 -.2358497	.0474374
lncostofpdn	1.080224	.268403	4.02	0.002 .482185	1.678263
lnproduction	.5032323	.2386152	2.11	0.061 -.0284355	1.0349
lnexport	.5387542	.2281026	2.36	0.040 .0305099	1.046999

lnimport	.0235708	.0650918	0.36	0.725 -.1214627	.1686044
dumyyear	.0224487	.0105108	2.14	0.058 -.0009708	.0458682
year	-.0351328	.018522	-1.90	0.087 -.0764023	.0061366
_cons	51.23907	37.00747	1.38	0.196 -31.2187	133.6968

Dickey-Fuller test for unit root Number of obs = 17
---------- Interpolated Dickey-Fuller ---------
Test 1% Critical 5% Critical 10% Critical
Statistic Value Value Value
Z(t) -3.353 -3.750 -3.000 -2.630
* MacKinnon approximate p-value for Z(t) = 0.0127
D.res Coef. Std. Err. t P>t [95% Conf. Interval]
res
L1 -.9301524 .2774147 -3.35 0.004 -1.521448 -.3388569
_cons -.0009485 .0193424 -0.05 0.962 -.0421758 .0402789

Durbin-Watson	d-statistic(	2,	17)	=	1.870175

Rice

Source	SS	df MS	Number of obs	= 18
		F(7, 10)	= 10.48	
Model	1.22022996	7 .174318566	Prob > F	= 0.0007
Residual	.16626416	10 .016626416	R-squared	= 0.8801
		Adj R-squared	= 0.7961	

Total	1.38649412	17 .081558478		Root MSE	= .12894	
lnprice	Coef.	Std. Err.	t	P>t	[95% Conf.	Interval]
lnpse	-.3494543	.1187929	-2.94	0.015	-.6141415	-.0847672
lncostofpdn	.8543557	.431012	1.98	0.076	-.1059988	1.81471
lnproduction	.6248055	.7024198	0.89	0.395	-.9402833	2.189894
lnexport	.0709177	.3156818	0.22	0.827	-.6324651	.7743005
lnimport	-.2591687	.4688016	-0.55	0.593	-1.303724	.7853864
dummyyear	-.0197773	.0149819	-1.32	0.216	-.053159	.0136044
year	.0253792	.0526067	0.48	0.640	-.0918358	.1425942
_cons	-55.64097	98.84224	-0.56	0.586	-275.8752	164.5933

Dickey-Fuller test for unit root Number of obs = 17
---------- Interpolated Dickey-Fuller ---------
Test 1% Critical 5% Critical 10% Critical
Statistic Value Value Value
Z(t) -1.570 -3.750 -3.000 -2.630
* MacKinnon approximate p-value for Z(t) = 0.4970
D.res Coef. Std. Err. t P>t [95% Conf. Interval]
res
L1 -.2293376 .146113 -1.57 0.137 -.54077 .0820948
_cons 1.122392 .7098985 1.58 0.135 -.390721 2.635505

Maize

Source	SS df	MS		Number of obs =	18
	F(7, 10)	= 1.76			
Model	1.71804736	7 .245435338		Prob > F	= 0.2009
Residual	1.39306375	10 .139306375		R-squared	= 0.5522
				Adj R-squared	= 0.2388
Total	3.11111111	17 .183006536		Root MSE	= .37324
lnprice	Coef.	Std. Err.	t	P>t [95% Conf.	Interval]
lpse	-.3623096	.1760677	-2.06	0.067 -.7546128	.0299937
lncostofpr~n	.0923598	.236296	0.39	0.704 -.4341405	.6188601
lnproduction	-.28467	.5097028	-0.56	0.589 -1.420359	.8510187
lnimport	.1431222	.1880085	0.76	0.464 -.2757868	.5620312
lnexport	.2686407	.3274893	0.82	0.431 -.4610509	.9983322
dummy year	.0680052	.0369049	1.84	0.095 -.0142241	.1502344
year	-.1121462	.0556569	-2.01	0.072 -.2361574	.011865
_cons	228.9311	108.5028	2.11	0.061 -12.82818	470.6903

Dickey-Fuller test for unit root Number of obs = 17
---------- Interpolated Dickey-Fuller ---------
Test 1% Critical 5% Critical 10% Critical
Statistic Value Value Value
Z(t) -4.067 -3.750 -3.000 -2.630
* MacKinnon approximate p-value for Z(t) = 0.0011
D.res Coef. Std. Err. t P>t [95% Conf. Interval]

res
L1 -1.034565 .2543615 -4.07 0.001 -1.576724 -.4924067
_cons .0113523 .0728136 0.16 0.878 -.1438461 .1665508

Durbin-Watson	d-statistic(	2,	17)	=	2.055137

Soybean

Source	SS df	MS		Number of obs =	18
	F(7, 10)	= 9.72			
Model	.374379744	7 .053482821		Prob > F	= 0.0009
Residual	.054997904	10 .00549979		R-squared	= 0.8719
	Adj R-squared	= 0.7823			
Total	.429377649	17 .025257509		Root MSE	= .07416
lnprice	Coef.	Std. Err.	t	P>t [95% Conf.	Interval]
lnpse	-.2029472	.0481866	-4.21	0.002 -.3103136	-.0955809
lncost	.8957283	.4734664	1.89	0.088 -.1592207	1.950677
lnpdn	-.326521	.4126735	-0.79	0.447 -1.246015	.5929729
lnexp	.1202523	.2041189	0.59	0.569 -.3345529	.5750576
lnimp	.0719386	.0505117	1.42	0.185 -.0406085	.1844857
dyear	.0110333	.0087401	1.26	0.235 -.008441	.0305075
year	-.0096814	.0186703	-0.52	0.615 -.0512814	.0319186
_cons	24.17242	30.66548	0.79	0.449 -44.15453	92.49937

Dickey-Fuller test for unit root Number of obs = 17

---------- Interpolated Dickey-Fuller ---------
Test 1% Critical 5% Critical 10% Critical
Statistic Value Value Value
Z(t) -2.565 -3.750 -3.000 -2.630
* MacKinnon approximate p-value for Z(t) = 0.1005
D.res Coef. Std. Err. t P>t [95% Conf. Interval]
res
L1 -.5778521 .2253227 -2.56 0.022 -1.058116 -.0975882
_cons 3.069823 1.195012 2.57 0.021 .5227155 5.61693

Durbin-Watson	d-statistic(	2,	17)	=	2.021752

Percentage of Dumping Calculation

Annex Table: 1 Percentage of US Export Dumping: Wheat

	Unit cost	Unit PSE	Transportation Cost	Full Cost	Export Price	
year	$ per bushel		$ per bushel	$ per bushel	$ per bushel	% of Dumping
1991	4.7	0.7	0.5	6.0	3.5	41.3
1992	4.5	0.4	0.9	5.8	4.1	28.5
1993	4.6	0.6	0.6	5.8	3.8	33.4
1994	4.6	0.4	0.6	5.6	4.1	27.5
1995	5.3	0.2	0.3	5.8	4.8	16.4

1996	5.9	0.3	1.3	7.6	5.6	25.5
1997	5.0	0.3	1.0	6.3	4.4	31.3
1998	4.0	0.6	0.8	5.4	3.4	36.3
1999	4.3	1.0	0.6	5.9	3.0	48.2
2000	4.6	0.9	0.6	6.1	3.2	48.0
2001	5.3	0.7	0.7	6.8	3.5	48.3
2002	6.3	0.4	0.5	7.3	4.1	43.6

Annex Table: 2 Percentage of US Export Dumping: Maize

	Unit cost	Unit PSE	Transportation Cost	Full Cost	Export Price	
	$ per bushel		$ per bushel	$ per bushel	$ per bushel	% of Dumping
1991	2.7	0.2	0.4	3.2	2.8	14.7
1992	2.3	0.3	0.6	3.1	2.7	14.2
1993	2.9	0.2	0.1	3.3	2.6	19.7
1994	2.2	0.2	0.5	2.9	2.7	6.5
1995	2.9	0.1	-0.1	2.8	3.1	-10.6
1996	2.7	0.1	1.5	4.3	4.2	2.8
1997	2.8	0.2	0.6	3.5	3.0	14.6
1998	2.6	0.4	0.6	3.7	2.6	29.6
1999	2.7	0.5	0.5	3.7	2.3	37.5
2000	2.7	0.5	0.4	3.6	2.2	38.0
2001	2.4	0.3	0.3	3.0	2.3	25.2
2002	2.5	0.2	0.4	3.0	2.7	11.5

Annex Table: 3 Percentage of US Export Dumping: Soybeans

	Unit cost	Unit PSE	Transportation Cost	Full Cost	Export Price	
	$ per bushel	$ per bushel	$ per bushel	$ per bushel	$ per bushel	% of Dumping
1991	5.9	0.1	0.5	6.4	6.1	5.7

1992	5.5	0.1	0.5	6.0	6.0	0.1
1993	6.7	0.1	0.1	6.9	6.5	6.0
1994	5.3	0.1	1.0	6.4	6.5	-2.0
1995	6.3	0.1	-0.2	6.1	6.5	-6.0
1996	6.3	0.0	0.5	6.9	7.9	-14.5
1997	5.7	0.0	1.5	7.2	7.9	-9.7
1998	5.8	0.2	1.4	7.4	6.4	13.6
1999	6.2	0.3	0.4	6.9	5.0	27.6
2000	6.2	0.4	0.7	7.3	5.3	28.0
2001	6.1	0.4	0.6	7.0	4.9	30.0
2002	6.5	0.1	0.0	6.6	5.5	16.8

Annex Table: 4 Percentage of US Export Dumping: Rice

	Unit cost	Unit PSE	Transportation Cost	Full Cost	Export Price	
Year	$ per cwt	$ per cwt	$ per cwt	$ per cwt	$ per cwt	% of Dumping
1991	9.9	0.6	8.9	19.4	16.5	15.2
1992	9.2	1.0	10.9	21.0	16.8	20.2
1993	10.0	0.7	8.1	18.8	16.1	14.4
1994	9.9	0.6	12.4	22.9	19.1	16.2
1995	11.3	0.4	7.5	19.2	16.7	13.1
1996	11.1	0.1	9.7	20.8	19.6	5.7
1997	11.7	0.1	11.2	23.0	20.9	9.2
1998	12.0	0.2	10.1	22.3	19.0	14.9
1999	11.4	0.6	11.1	23.1	17.0	26.5
2000	8.6	0.8	9.2	18.6	14.8	20.3
2001	8.6	1.1	10.3	20.0	14.6	27.2
2002	8.3	1.1	7.3	16.7	11.8	29.3