Empirically Analyzing the Impacts of U.S. Export Credit Programs on U.S. Agricultural Export Competitiveness

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Abstract

This paper looked at the on the ongoing debate on the use of public export credit programs and their impact on US exports. Our results indicate that cost saving is significant beneficial to the importing countries as a result of the export credit programs. There is also an increase in US exports as a result of the US export credit programs. However, there is a reduction in cost savings to the importing countries when the length of repayment of export credit is 180 days. Thus, the more restrictive terms and conditions of officially supported export credits which the WTO is trying to discipline based on their implicitly subsidized components will have some adverse impact on the importing countries.

Introduction

Ever since Article 10.2 of the Agreement on Agriculture was agreed upon at the Uruguay Round, the use of officially supported export credits for financing and stimulating export sales of agricultural products has been an on-going negotiation at the World Trade Organization (WTO). The Article states that, "The WTO member countries undertake the development of internationally agreed upon disciplines to govern the provision of export credits, export credit guarantees, or insurance programmes and, after agreement on such disciplines, to provide export credits, export credit guarantees, or insurance programmes only in conformity therewith", (WTO, 1995). Its implementation has not yet been finalized as the WTO disciplinary rulings even after the conclusion of the sixth WTO Ministerial Conference in Hong Kong, China, in December 2005. Prior to the sixth Conference, on August 1, 2004, the WTO General Council reached a decision

on the framework to continue with the "multilateral" trade negotiations under the Doha Development Agenda (DDA). The framework refers to the "July Package". Its key components concerning agricultural trade include: (i) the future elimination of all forms of export subsidies and better disciplines on export credits, state trading enterprises, and food aid, (ii) introducing new commitments to discipline trade distorting domestic farm subsidies and promoting deeper cuts in countries with higher domestic farm subsidies, and (iii) committing WTO member countries to pursue "progressity" in tariff reductions with a view to achieving substantial improvements in market access while allowing for flexibility in treatment of sensitive products (WTO, 2004).

Surprisingly without final agreements regarding agricultural trade, in April 2004, the Dispute Settlement Body of the WTO ruled in favor of Brazil, and the Appellate Body upheld the finding by the WTO Panel that:

"the United States export credit guarantee programmes at issue—GSM 102, GSM 103, and SCGP—constitute a per se export subsidies within the meaning of item (j) of the Illustrative List of Export Subsidies in Annex I of the SMC Agreement," (WTO, 2005).

However, the introduction of the Article 3 of the GATT 1994 legal text states that, "Except as provided in the Agreement on Agriculture, within the measuring of the Article 1 the Sub-Articles 3.1 (a) and 3.1 (b) list the subsidies that are subjected to be prohibited." This seems to indicate that agricultural products are exempt from item (j) of the Illustrative List of Export Subsidies in Annex I of the Subsidies and Countervailing Measures (SCM) Agreement. Item (j) states that export credit facilities provided by governments or other institutions on their behalf should be at premium rates adequate to cover long-term operating costs and losses such as sunk costs (WTO, 1994). This agreement was reached by integrating the principle guidelines, which were originally

agreed on by the member countries of the Organization for Economic Co-operation and Development (OECD). The agreement was intended to be applied only for manufactured goods (OECD, 1998).

It is unclear whether in the future the Dispute Settlement Body of the WTO will apply the SMC Agreement to discipline the use of officially supported export credits for other agricultural commodities as it did to the United States (US) cotton exports. Also, the European Union (EU) has advocated that they are willing to reduce their direct export subsidies if the US and other countries are willing to reduce their export credits, state trading enterprises, and food aid. Additionally, the July Framework gives further instruction to the WTO Committee on Agriculture that disciplines of the use of officially supported export credits should build upon the "Harbinson Text". With respect to disciplining the use of officially supported export credits, the Text emphasizes in establishing consensual agreements on terms and conditions of officially supported export credits. They include maximum repayment terms, a minimum cash payment, payment of interest rates, minimum interest rates, repayment of principal, premiums in respect of coverage of risks under export insurance, reinsurance and export credit guarantees, foreign exchange risk, and period of validity of export financing. For instance, to reflect the duration-life of agricultural products the maximum repayment period of an export credit for most agricultural product has been negotiated for a maximum period not exceeding 180 days (WTO, 2003). If the agreement is finalized, the General Service Management (GSM) programs of the US such as GSM 102 and GSM 103 will need to reduce their maximum required repayment period from 3 years to six months for the GSM 102 and from 7 years to six months for the GSM 103.

The objective of this paper is to examine how the terms and conditions of officially supported export credits are likely to affect the import demands of importing countries. According to the United Nations Conference on Trade and Development (UNCTAD) (1976), besides providing domestic benefits, export credits also provide significant benefits to the importing countries by enabling them to import necessary goods and services even though they do not have hard currencies at hand to pay fully in cash. Abraham (1990) shows that export credits such as subsidized buyer credit and official development assistance provide favorable financing conditions to importers, which induce the importers to demand more of the export good. Alternatively, many studies pointed out that an export credit could generate an additionality to importing countries, which would result in increasing volume of trade. At the same time the world price is not necessary depressed as in the case of a direct export subsidy (Baron, 1983; Smith and Ballanger; 1989, Diersen, 1995; OECD, 2000, Young et al., 2001). The problem we address is economically significant since if the additionality exists, then the more restrictive terms and conditions of officially supported export credits which the WTO is trying to discipline based on their implicitly subsidized components will have more adverse impact on the importing countries. To meet its objective, the paper is organized as follows. Section 1 provides a brief background on the functioning of export credit programs and the ongoing negotiations at the WTO. Section 2 provides the derivation of the theoretical model. Section 3 provides a brief description of data sources used and the empirical model. Section 4 presents the empirical results. Lastly, section 5 concludes.

Background

Following the lead of the British government that established its export credit programs in 1919, many developed, developing, and other countries established their export credit programs with similar objectives[1]. These were: (i) to promote the growth of exports by providing insurance to exporters, (ii) to offer financing for exporters' foreign clients, and (iii) to make guarantees to exporters' commercial banks in obtaining their export financing. They considered their export credit programs to be useful policy instruments and as means of encouraging their producers to expand and diversify exports. These export credit programs were thought necessary to improve their trade balance, diversify their exports beyond primary products, increase their foreign exchange reserves, and reduce their national unemployment (UNCTAD, 1976; Mutharika, 1976). They also felt that their export credits could contribute at least three direct benefits to their countries: (i) protect exporters from potential losses due to non-payment risks, (ii) serve as collateral for exporters in securing bank financing from the private sector, and (iii) reduce the cost of collecting information on the credit standing of foreign markets.

The importance of export credits in the trade of manufactured and agricultural goods has been apparent, especially during periods of economic and financial crises in importing countries, such as the oil shock in the 1970's, debt crises in the 1980's, and the financial bubble in the 1990's. For instance, the International Monetary Fund (IMF) recommended that the debt crisis of least-developed and developing countries could be alleviated if the Export Credit Agencies (ECAs) of developed countries resumed their export credits to

[1] The first group of followers was developed countries, which included France, Spain, Italy, Japan, the United States, and Canada. After the oil shock of 1970, developing and other countries such as Argentina, Brazil, Columbia, Czechoslovakia, Hong Kong, Hungary, India, Israel, Jamaica, Mexico, Pakistan, Peru, Poland, the Republic of Korea, Uruguay, and Yugoslavia also developed their export credit insurance programs (UNCTAD, 1976).

these countries. The export credits would provide vital short-term liquidity and facilitate the imports of capital goods that were necessary to renew their economic growth, since following their debt crisis, most foreign commercial banks and private lending institutions were reluctant to lend to them (Brau et al., 1986). By 1998, the IMF estimated that the total export credit exposure to the developing countries and economies in transition by the ECAs of developed countries had reached US $550 billion (Gianturco, 2001). Between 1995 and 1998, the total value of export credits provided on agricultural trade by fifteen OECD countries increased from US $5.5 to $7.9 billion (OECD, 2000).

However, the flow of export credits to least-developed and developing countries is not free from controversy, and the use of export credits has become a highly politicized issue in trade policy (Abraham and Dewit, 2000; and Leathers, 2001). Prior to multilateral agreements among member countries of the OECD to establish benchmarks on terms and conditions offered through export credits, various ECAs could aggressively use their export credits to underbid their competitors by offering lower interest rates, longer, and more favorable conditions on loan credits, tied and/or untied aid[2], and mixed credits[3] to importing countries. For example, the European ECAs offered lower interest rates through their export credits to importers than the rates charged by private markets. In contrast, the Export-Import Bank (Eximbank) of the United States (U.S.) charged interest rates close to market rates but offered longer terms for repayment, which the

[2] Tied aid is aid which is in effect tied to the procurement of goods and/or services from the donor country and a limited number of other countries. Untied aid is aid whose proceeds are fully and freely available for procurement of goods and/or services from all OECD countries and substantially from non-OECD countries (OECD, 1998).

[3] A mixed credit is a mixture of the direct loan credit and grant element (or the subsidy on the loan) as foreign aid to produce concessional financing packages having a grant element between official export credits and official development assistance (Fleisig and Hill, 1984).

European ECAs and private markets would not offer. In addition, to match the consessional export financing granted by other exporting countries and attempting to persuade them to eliminate such practices, the U.S. Congress gave a mandate to and equipped with sufficient funds for the Eximbank to match the consessional export financing granted by other nations (Baron, 1983). Due to aggressive practices of underbidding and/or matching export financing offers among the ECAs from different countries with the financial supports from their governments, export credits have become known as officially supported export credits[4].

Consequently, the export credit races from underbidding practices became expensive to finance and resulted in inefficient use of financial resources for those countries that used such strategy to increase their exports. In addition, the export credit races gave significant power to importing countries to bargain for more favorable import contracts among different exporting countries (Fleigsig and Hill, 1984; Fitzgerald and Monson, 1988; and Rodriguez, 1987). They further argue that the economic costs are substantially greater than the economic benefits of providing export credits. They also assert that to reduce unemployment or improve the balance of payments, governments can implement fiscal and/or monetary policies, instead of using export credits to promote exports.

Unlike other studies, Baron (1983) points out that the economic costs may be greater than the economic benefits under matching the consessional export financing if only the consessional export financing is permanent so that importing countries could permanently withdraw resources from the sector that benefited from foreign consessional

[4] According to the OECD (1998), an officially supported export credit program is a program with the involvement of government such as: (i) directly offering credit, (ii) offering interest rate subsidies, (iii) assuming risk for private loans, and (iv) offering supported insurance to private lenders.

export financing to other sectors. He also contends that the provisions of export credit insurance and guarantee programs are economically justified due to non-payment risks associated with importing countries and if importing countries face imperfect capital markets. From financial strategy, not many private financial institutions from foreign countries would be willing to lend or buy government bonds of those countries face political turmoil or reschedule their heavy debt with the Paris Club[5]. As mentioned above, during debt crisis in the 1980s most foreign commercial banks and private lending institutions were reluctant to lend to least-developed and developing countries.

The principle guidelines on the use of export credits for manufactured goods resulted from a gradual and long series of negotiations of the member countries of the OECD (known as Arrangement) from 1978 to 1997. It is beyond the scope of this paper to provide historical negotiations and consensus agreements of the Arrangement[6]. Thus, the remainder of this section will only highlight the benchmarks of the Arrangement, which were consensually agreed to prevent export credit races in export ofe manufactured goods and which are relevant to the current negotiation for agricultural exports.

The benchmarks included credit terms and conditions of export credits. The credit terms refer to interest rates, length of the repayment terms, down payments, and risk premium rates. The conditions of export credits refer to the financial

[5] The Paris Club is an informal group of creditor governments that meet on a regular basis in Paris to reschedule bilateral debts. Creditors meet with a debtor country in order to reschedule its debts as part of international support provided to a country that is experiencing debt-servicing difficulties and is pursuing an adjustment program supported by the IMF (Ross and Harmsen, 2001).

[6] OECD (1998) summarizes historical events of negotiations and consensually agreed principle guidelines reached by the Arrangement from 1978 to 1997.

interdependence of export credits with other programs such as large-scale projects[7], tied and/or untied aids, and mixed credits.

To set benchmarks on the credit terms and conditions of export credits, the Arrangement classified importing countries into three classes: rich, intermediate, and poor based on their per capita GDP[8]. First, the benchmark for minimum interest rates was set based on (i) the income class of an importing country, (ii) length of the repayment period, and (iii) market rates reflecting credit worthiness/economic conditions of the importing country[9]. Second, the benchmark for maximum repayment period was set based on (i) the income class of an importing country, and (ii) financial involvement such as credit lending or investment lending. Third, the benchmark for minimum down payments was based on the income class of an importing country. Fourth, the benchmark for minimum risk premium rates was set based on (i) the risk assessment of an importing country, (ii) cost of covering long-term operating costs and losses, and (iii) quality and percentage of risk coverage provided. Fifth, the Arrangement set the benchmark for offering aid credits as follows. Prior to a face-to-face consultation to match any aid credit

[7] A large–scale project refers to a project involving mining operations, steel mills, industrial plants, and public utility plants, which requires a large scale of financing with a long term maturity.

[8] These countries are classified based on having their gross national product per capita at a level at which the World Bank would or would not grant a loan longer than 17 years to them. For example, for a rich country, the World Bank would not grant a loan longer than 17 years to it since it is considered to be creditworthy enough to attract commercial credits (OECD, 1998).

[9] The Arrangement agreed to use the Commercial Interest Reference Rates (CIRRs) as the minimum interest rates to respond to the movement of interest rates determined by the market and to prevent an interest rate subsidy that results from the divergent range between high- and low-interest-rate countries. The CIRRs were established according to five principles: (i) to represent final commercial lending interest rates in the domestic market of the currency concerned; (ii) to correspond closely to the rate for first-class domestic borrowers; (iii) to be based, where appropriate, on the funding cost of fixed interest-rate finance over a period of no less than five years; (iv) to not distort domestic competitive conditions; and (v) to correspond closely to a rate available to first-class foreign borrowers.

offered among the OECD participants, all aid credits must contain less than a 35% grant element of the total export credit value[10].

By 1997, the key benchmarks for the credit terms and conditions of export credits were consensually agreed by the OECD participants in establishing the principle guidelines for the use of export credits on manufactured exports. As mentioned above, the principle guidelines of the Arrangement have been recognized and integrated into the multilateral trading system of the WTO, which are codified within Article 3 of the GATT-1994 Agreement on the SCM Agreement which prohibit many forms of export subsidization. Two specific disciplinary rulings with regard to the provisions of risk premium are —item (j) and interest rates—item (k) of the Illustrative List of Export Subsidies in Annex I.

Starting in 1994, the OECD Participants undertook a work program with the goal of arriving at an *understanding on disciplines for officially supported export credits on agricultural products*, which would be in conformity with Article 10.2 of the WTO's Agreement on Agriculture. Currently, there is no report indicating whether the Arrangement of the OECD has reached a consensus agreement on the guidelines for the use of export credits for agricultural products. On July 9, 2002, a progress report by the Chairman of the Arrangement was released which stated that the OECD Participants had not reached consensus agreements upon the content of the report (OECD, 2002).

With respect to establishing benchmarks on the use of export credits for agricultural exports, the following elements were defined and reported within the

[10] It was agreed that each Participant must notify other Participants about its offering aid credit to a particular importing country, and that the other Participants then have the right to match it in a face-to face consultation. However, the matching is agreed not to be in any form of underbidding. By 1991, the Arrangement agreed to prohibit the use export credits in any form of tied or partially tied aid to richer developing countries.

progress report. First, the repayment term was defined as the period between the starting point of credit and the contractual date of the final payment. It was proposed that the maximum length of repayment of export credits used for most agricultural products should not exceed 180 days[11]. Second, the starting point of an export credit was defined as a date no later than the weighted mean date or actual date of arrival of the agricultural goods in the recipient country for a contract under which shipments are made in any consecutive six-month period. Third, for any export credit contract, the duration of which is one year or longer, the repayment of principal is defined as the principal sum of the export credit[12]. Fourth, for any export credit contract which has a duration of one year or longer, the payment of interest should not be capitalized during the repayment period and should be paid with a frequency of no less than every six months. Further, the first payment should be made no later than six months from the starting point of the export credit. Fifth, any purchaser of exported agricultural products is required to make a minimum cash payment of 15% of the total value of the export contract from his/her own resources at or before the starting point of credit. Sixth, in terms of risk sharing, any case in which no cash payment is imposed, an OECD member should not cover 100% of the export value of a transaction. Seventh, if the repayment term is two years or greater, the minimum interest rate should be determined based on the CIRR system [13]. Finally, when the repayment term exceeds 180 days, credit terms and conditions for an individual

[11] In some exceptions, such as those for breeding cattle, cotton, agricultural vegetable reproduction materials, cereals and cereal preparations, and oilseeds and oilseed products, their repayment can exceed 180 days but cannot be longer than the durable life of the products.

[12] It should be repaid in equal and regular installments no less frequent than every six months, and the first installment should be made no later than six months after the starting point of the export credit.

[13] The minimum interest rate with the repayment term less than two years will be developed later by the OECD Participants.

export credit or line of export credits should not be fixed for a period exceeding six months .

The member countries of the WTO's Committee on Agriculture (CA) that are also the member countries of the OECD were waiting and hoping for the Arrangement to reach a consensus agreement on the use of officially supported export credits for agricultural products. The outcome of the agreement could then be integrated into the WTO system for implementing Article 10.2. Meanwhile, the non-member countries of the OECD expressed their concerns. They contended that the guidelines on the use of officially supported export credits for agricultural products should be negotiated and established under the WTO's negotiation forum. Their main reason for this view is that the guidelines agreed on by the Arrangement are unlikely to reflect their concerns. In addition, many developing countries who are net food importers expressed their concerns in a fear of high import prices if export credits were to be faced out (WTO, 2000, 2001a, and 2001b). In spite of different concerns, the Harbinson Text in which the July Framework instructs the WTO CA to build on to discipline the use of officially supported export credits outlines similar credit terms and conditions which the Arrangement of the OECD drafted described above. Thus, when and how Article 10.2 will be finally implemented hinges on an on-going-negotiation process of the WTO's CA.

Theoretical Model

As mentioned above, the credit terms and conditions on the use of government-supported export credits for agricultural goods are still under negotiation by the WTO and the OECD. One question that needs to be addressed is how these credit terms and conditions of export credit programs can be effectively assessed as subsidized elements in

terms of affecting import demands and/or export supplies of agricultural goods. There are many studies which have developed several approaches to calculate the subsidy values of export credit programs. The present value approach was developed and applied in several studies such as Baricello and Vercarmen (1994), Baron (1983), Hyberg et al. (1995), Raymand (1992), Skully (1992), and Wilson and Yang (1996). A cost-benefit analysis was conducted by Fleig and Hill (1984). These studies calculated subsidy values that are associated with government-supported export credits such as subsidized interest rates and provided long period repayments. They have considered them as a cost savings to an importer, which could be interpreted as a price discount on imports. Empirically, the OECD (2000) applied the present value approach to calculate the subsidy values of export credit programs for agricultural goods as a series of price discounts, in terms of their impact on the import demand side. They concluded that the subsidized elements of officially supported export credits of fifteen member countries of the OEDC are small.

Alternatively, Diersen (1995) applies the present value approach to calculate the subsidy values of export credit programs and empirically treats it as an additionality. His theoretical approach is based on the two-period intertemporal consumption decision and relies on the assumption that officially supported export credits increases loan supply which in turn relaxes budget constraint of importing countries. Paarlberg (1997) and Rude (2005) also apply the two-period intertemporal consumption decision framework. This approach seems to capture the interest term of officially supported export credits. As described above an officially supported export credit can be offered in multiple combinations of various terms and conditions. Moreover, the general result of the two-period intertemporal consumption decision framework implies that, consumption will

increase in the first period if it is possible to borrow from a future period provided the consumer has a large discount rate.

Our study contends that if the secondary benefits arise from an export credit program in terms of a cost saving to the importing country, the decision on how much to import is likely influenced by the budget constraint of the importing country. Moreover, we presume that the cost saving may be viewed as an additional income to the importing country. Alternatively, our study supposes that the secondary benefits of an export credit program, received by the importing country, can be represented as a fixed discount rate '*d*' on its import payment. We use '*d*' as a general measure to capture the secondary benefits arising from many of the potential policy parameters of export credit programs such as (i) down payments, (ii) annual subsidized or guaranteed interests with the export credits, (iii) annual discount rates (or market rates without export credits), and (iv) payments per year, length of repayments, grace periods, and fee rate which is expressed as a percent of value.

We consider one possibility such that '*d*' is the difference of two present value streams. The first present value stream (PV_1) is calculated under the scenario of which there is no subsidy element being offered to the importing country such as when the importing borrowing in its home country. The second present value stream (PV_2) is calculated under the scenario in of which there is a subsidy element being offered to the importing country through an export credit program. Thus, the fixed discount rate '*d*' can be calculated as,

$$d = \frac{PV_1 - PV_2}{PV_1} * 100 \qquad (1)$$

(i) Domestic Demands of the Importing Country in the Absence of Secondary Benefits from an Export Credit Program

(a) The Marshallian Demands with the Absence of Export Credits

For simplicity, we assume that there is one tradable and homogeneous good, namely good 1. Regarding good 2, we assume the importing country produces it for domestic consumption. Alternatively, good 2 can be assumed that trade is not possible or there is no benefit from trading it. However, the two goods are substitutable in consumption. Suppose that the preferences of the representative consumer can be represented by a Cobb-Douglas utility function such as,

(2) $$U(c_1, c_2) = c_1^{\alpha} c_2^{\beta}$$

It is assumed that $0 < \alpha < 1$, $0 < \beta < 1$, and $\alpha + \beta = 1$. With fixed income I, suppose that the consumer faces the prices of good 1 and good 2 such that p_1 and p_2 respectively. From the perspective of the consumer in the importing country, if he/she does not receive secondary benefits from an export credit program of the exporting country, his/her budget constraint is not affected. Then, the utility maximization of the consumer can be expressed as:

(3*a*) $$Max_{c_1 \& c_2} \{U\ (c_1, c_2) = c_1^{\alpha} c_2^{\beta}\}$$

Subject to

(3*b*) $$p_1 c_1 + p_2 c_2 = I$$

Forming the Lagrange function, deriving the first order conditions, and solving them, the Marshallian demands of goods 1 and 2 can be obtained as:

(4) $$c_1 = \frac{\alpha I}{p_1}$$

(5) $$c_2 = \frac{\beta I}{p_2}$$

(b) The Marshallian Demands with the Presence of Export Credits

In contrast, if the consumer in the importing country receives secondary benefits from an export credit program, his/her budget constraint is likely to be affected due to the cost saving on the import payment. From above discussion, this study presumes that the consumer views his/her cost saving on the import payment as being discounted. Thus, his/her budget constraint can be formulated as:

(6) $$p_{1f}C_{1f} - d(p_{1f}C_{1f}) + p_{2f}C_{2f} = I_f$$
$$\Rightarrow p_{1f}(1-d)C_{1f} + p_{2f}C_{2f} = I_f$$

Note that '*d*' refers to the fixed discount rate discussed above[14]. The range of the subsidy element is assumed to take on the value of $0 \le d < 1$. If $d = 0$, this implies that there is no discount on the import payments; thus, the budget constraint formulated in equation (6) is just the same as the budget constraint in equation (3b). If $d = 1$, then there is a full discount such as for aid relief, which implies that consumption of good 1 is not an optimization choice for the consumer in the importing country. Thus, this study assumes that $d < 1$.

By applying a similar utility maximization procedure, , the Marshallian demands of goods 1 and 2 can be obtained as:

[14] See Rienstra-Munnicha (2004) for more detailed formulation of this budget constraint.

(7) $$c_1 = \frac{\alpha I}{(1-d)p_1}$$

(8) $$c_2 = \frac{\beta I}{p_2}$$

From the above result, it can be seen that '*d*' does not appear as an argument of the domestic demand of the importing country for good 2. This shows that the demand of good 2 is not affected by the presence of secondary benefits from of an export credit.

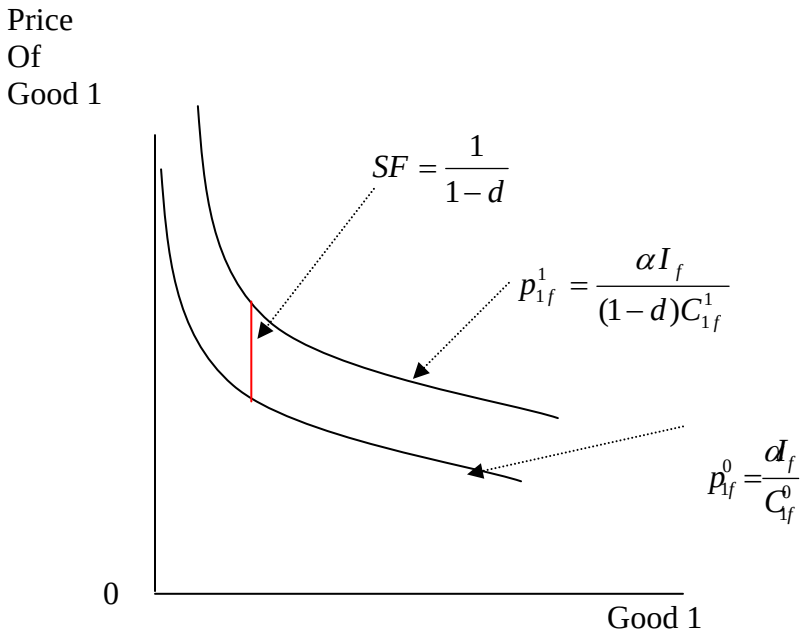
Figure 1 illustrates the inverse import demands of the importing country for good 1 derived from the CD utility function in the absence and presence of secondary benefits while holding income of the importing country fixed, and assumed that there is no domestic production. Note that $p_{1f}^0 = p(C_{1f}^0, I_f)$ and $p_{1f}^1 = p(C_{1f}^1, I_f)$ represent the inverse import demands of good 1 which are derived by respectively by inverting the (direct) import demands defined in equation 4 and 7. They express the price of good 1 as a function of quantity consumed, and income of the importing country. Figure 1 shows that the inverse import demand curve of the importing country shifts to the right if it receives the secondary benefit relative to the scenario where the importing country receives no secondary benefits. This arises because for any demand quantity, the price differential between the two scenarios receiving and not receiving secondary benefits can be derived as,

(9) $$SF = p_{1f}^1 = p_{1f}^0 /(1-d)$$

Note that the result presented in Figure 1 resembles the graphical result of a direct consumption subsidy presented by Houck (1986) (see Figure 9.2 on p89-90). In his graphical analysis, he supposes that the importing country directly offers the consumption

subsidy on a particular good to its consumers whether the good is domestically produced or imported while this study supposes that the exporting country offers the fixed discount on the import to the representative consumer in the importing country[15].

Figure 4.3: *A Shifted Inverse Demand of the Importing Country in the Presence of Secondary Benefits of an Export Credit program under Cobb-Douglas Utility*



(ii) Domestic Supply Function of an Importing country

With the assumption of certainty setting for payment and full information about productivity and both input and output prices, we apply the standard profit maximization

[15] Houck (1986) also illustrates that if the importing country directly offers the consumption subsidy on a particular good to its importers instead of offering to its consumers, its domestic demand would not shift out. By construction, this study also expects that if the secondary benefits from an export credit program are offered to an importer, instead of offering to the representative consumer in the importing country, the domestic demand of the importing country would not shift out.

problem derive the short-run supply function of a competitive firm in the exporting country. Suppose that the firm produces a single output, namely good *y*, by using two inputs x_1 and x_2, and suppose that its short-run variable cost of the firm is defined as[16]:

(10) $$C(y) = By^2$$

Additionally, let G be the short run fixed cost of the firm. The profit maximization of the firm can be formulated as:

(11) $$Max_y \left\{ \Pi(y) = Py - C(y) - G \right\}$$

Where $C(y) = By^2$ and P is the output price.

Applying standard profit maximization approach and applying Hotelling's lemma, the short-run supply function of the firm can be obtained as,

(12) $$y(P) = \frac{\partial \Pi^*}{\partial P} = \frac{P}{2B}$$

(iii) The Import Demands of the Importing Country in the Absence and Presence of Secondary Benefits from an Export Credit Program

As a price taker, the absence or presence of secondary benefits from an export credit program offered by the exporting country to the consumer in the importing country does not affect the production cost. Thus, when trade opens up, in the absence or presence of secondary benefits from an export credit program, the short-run supply function of the firm in the importing country is the same as its short-run supply prior to trade recorded in equation 11.

[16] Rienstra-Munnicha (2004) applied two-input-model of cost minimization to derive the short-run variable cost of the firm as $C(y) = By^2$. Where $\gamma = 1/(\alpha + \beta)$ and both α and β are the parameters of the production function. He further explained that it is reasonable to assume that $\gamma = 2$.

(a) The Import Demands of the Importing Country in the Absence of Secondary Benefits from an Export Credit Program

If good Y is allowed to trade between the two countries, the excess demand of good Y of the importing country is the difference between its domestic demand (4) and supply (12) for any price level P which lies below its autarky prices P^a. The import demand can be derived as:

(13) $$Q^N = c_1 - y$$

$$\Rightarrow Q^N = \frac{\alpha I}{P} - \frac{P}{2B}$$

$$\Rightarrow Q^N = \frac{2\alpha B\, I - P^2}{2B\, P}$$

Note that the introduction of the additional superscript 'N' refers to the absence of secondary benefits from an export credit program offered by the exporting country.

(b) The Import Demands of the Importing Country in the Presence of Secondary Benefits from an Export Credit Program

With the assumption that the tradable good Y is homogeneous, in the sense that it is impossible to distinguish its source, its market in the importing country is satisfied from domestic and imported quantities. If a secondary benefit from an export credit program is offered to the consumer in the importing country, his/her budget constraint is altered from the case of not receiving any secondary benefits (see equation 6). It is a difficult task to separate the quantities being discounted on the payment from those which are produced domestically. However, from the perspective of the consumer in the importing country, his/her consumption of domestic or imported good Y depends on

where he/she can purchase the tradable good Y at a cheaper price due to cost savings. This is captured by the effective price with the cost savings recorded in equation (9).

When trade opens up, both the consumer and firm in the importing country face the same effective price. Therefore, this study derives the import demands of the importing country in the presence of secondary benefits from an export credit program by replacing price of the import demands expressed in equations (13) by the effective price expressed in equation (9). The import demands of the importing country in the presence of secondary benefits from an export credit program are recorded in equation 14 below. Note that the introduction of the superscript 'S' refers to the presence of secondary benefits from an export credit program offered to the importing country.

$$(14) \qquad Q^S = \frac{2\alpha B_f I_f (1-d)^2 - P^2}{2B_f (1-d)P}$$

Holding all other exogenous variables and parameters fixed, the two scenarios of the importing country's inverse import demand can be presented graphically as in Figure 1. It is seen that in the presence of secondary benefits from an export credit program, the inverse import demand of the importing country vertically shifts to the right of the import demand where there are no secondary benefits. As cited earlier, the results presented here resemble the graphical result of a direct consumption subsidy presented by Houck (1986).

Data Sources:

In choosing the importing countries in our data sample, we consider seven importing countries which received GSM 102 export credits from the US over a consistent period. Most of these countries are either not granted or approved export credit for wheat imports

under the GSM 103 and SCGP programs, we limit our focus to the impact of GSM 102 export credit programs on US wheat import demand in seven importing countries: Egypt, Korea, Mexico, Algeria , Turkey, Jordon and Indonesia. Data on the quantity and value of wheat imported by these countries from the Unites States and the World were obtained from the United Nations' Comtrade database. Quantity and value of wheat imports by the importing countries from the rest of the world (ROW) were calculated as the difference between total wheat imports from the world and US. Import price of US (US price) wheat was calculated by dividing value of wheat imports from the US by quantity. Import price of wheat imported from the world (world price) was calculated in a similar manner. The import price of wheat from the ROW was calculated as the difference between world price and the US price. Data on the gross domestic product (GDP) of the importing countries, consumer price index and interest rates of the importing countries, and the exchange rate between the United States and the importing countries were obtained from the International Financial Statistics (IFS) of the International Monetary Fund. Domestic production of wheat in the importing countries were obtained from the Food and Agricultural Organization of the United Nations' (FAO). Finally data on the amount of export credits under the GSM-102 program and the specified repayment periods (which were later converted into cost savings-see appendix 1 for details) given by the United States to the importing countries were collected from the Foreign Agricultural Trade of the United States (FATUS) various fiscal year end issues. All data used in this study are annual data for the time period 1994-2004. All prices, import value of wheat, GDP and cost savings were converted into real values by dividing by the corresponding CPI of the importing countries.

Empirical Model:

Prior empirical works on the impact of export credit programs on US export include Koo and Karemera (1991) and Diersen (1995).[17] Other empirical studies analyze import demand models on the impact of US non-price export promotion programs on US exports (Le et al (1998); Halliburton and Henneberry (1995)).[18] Our empirical import demand model is based on a general consumer demand model with the inclusion of demand shifters such as exchange rates and a variable of cost savings resulting from export credit to test our concept of additionality. Thus an importing countries' demand for wheat is a function of own price, price of substitutes, income and domestic supply. Thus our model is specified as follows:

$$M_i^j = f\left(P_j / P_C, GDP_i, DOM_i, EX_i^j, PVC_i\right) \qquad (1)$$

Common demand theory applied to import demand model states that imports of an importing country *i* from a exporter *j* (M_i^j) are a function of the price of the exporting country (P_j) and price of its competitors (P_c) .[19] Exchange rates (EX_i^j) determine the price

[17] Koo and Karemera (1991) used a similar approach to analyze the impact of export credit programs. Using a gravity model approach, they incorporate dummy variables based on in the periods in which export credit under GSM-102 was offered to capture the shift in the import demand. On the other hand Diesren (1995) on the other hand tested for additionality under the GSM-102 program using an intertemporal consumption model and "loans" as choice variables . Our study differs from Diesren (1995) in that we include the net present value of cost savings into the budget constraint Empirically, we calculate the present value of cost savings based on semi-annual payment and use actual repayment period while Diersen (1995) assumed single payment and fixed repayment period of 3 years.

[18] The estimated coefficient of the amount spent on non-price export promotion programs in these studies are interpreted as additionality, that is, additional imports due to the increased spending on these programs.

[19] See Lord, 1991 for details on application of common demand theory to trade models. Ideally we should use the Canadian price of wheat and prices of other competetitors' , which compete directly with the US in the international wheat market as a substitute for US wheat. But due to lack of data we use the ROW price. Moreover as the US price and the ROW price move closely together we use a price ratio to avoid multicollinearity problems.

paid for imported goods. Thus, as long as a product has substitutability, importing countries can choose alternate sources to satisfy their import demand (Anderson and Garcia, 1989). Similarly, income (GDP_i) positively influences the quantity demanded. As mentioned in the previous section export credit relaxes the budget constraint of the importers in the sense that they gain additional income due to cost savings. Thus in this sense they have more income and are likely to import more with increase in income. Therefore income is included in our model. Finally, domestic production (DOM_i) has a negative impact on demand in the importing countries provided wheat is a normal good. Finally in our theoretical model we incorporate a discount factor resulting from the present value of cost savings accrued from export credits (PVC_i). In our empirical specification, we calculate the net present value of cost savings resulting from GSM 102 export credit as a demand shifter. We use this variable to test our theory of additionality as a result of export credits. Based on equation (1) we specify our empirical model as follows:

$$\ln M_{i,t} = \beta_0 + \beta_1 \ln \frac{P_{US\,i,t}}{P_{ROW\,i,t}} + \beta_2 \ln EX_{i,t} + \beta_3 \ln GDP_{i,t} + \beta_4 \ln DOM_{i,t} + \beta_5 \ln PVC_{i,t} + e_{i,t} \quad (2)$$

where M is the value of imports of US wheat in real US dollars. The subscript *i* denotes the seven importing countries (*i*= Egypt, Korea, Mexico, Algeria, Turkey, Jordon and Indonesia) ,the subscript *t* represents the time period (*t*=1994-2004) while *ln* stands for the natural log of the variables.

$\frac{P_{US\,i,t}}{P_{ROW\,i,t}}$ is the price ratio of US wheat imports relative to ROW wheat import price. EX is the relative exchange rate between US and the importing countries. GDP is the real gross domestic of the importing country, which represents the income of the importing country

expressed in US dollars. DOM is the domestic production of the importing countries in metric tons while PVC is the present value of cost savings to the importing country from export credits. [20]

Finally $e_{i,t}$ is the error term which is assumed to independent and normally distributed.

A similar model was used to estimate the impact of credit programs when the length of repayment is reduced to 180 days, the only difference being the PVC variable which was calculated using 180 days as the length of repayment and short term interest rate (less than a year).

An increase in the price of US relative to the ROW would reduce the demand for US wheat. On the other hand, an increase in the price of the ROW wheat relative to the US will increase the demand for US wheat. The variable price ratio is therefore expected to be negative. An increase in the value of US dollar relative to the importing countries' currency would increase the price paid for US wheat and thereby reduce the value of wheat imports from the US. Similarly, a depreciation in the value of the US dollar relative to the importing countries would make US wheat cheaper and increase the demand for US wheat. Thus the variable exchange rate (EX) is expected to be negative.

As income of the importing countries increases they are likely to import more wheat from the US therefore the variable GDP is expected to be positive.

As domestic production of wheat increases in the importing countries' they are likely to import less wheat from the US and the variable DOM is expected to be negative. Finally the variable PVC for additionality is expected to be positive. As importing

[20] See Appendix I for details on calculation of PVC.

countries' benefit from the increased present value of cost savings resulting from the GSM 102 export credits granted by the US, they are likely to import more wheat from the US.

Estimation Method:

Due to the limited availability of time span of availability of data on the GSM- 102 export credits given by the US to the importing countries, we pool time-series and cross-section data to increase the sample size of our data set. Several econometric problems were addressed before estimation. First we evaluated estimated the stationarity properties of the variables using an Im, Pesaran and Shin panel unit root test. Results of the test are reported in Table 1.[21]

The variables price ratio and domestic production were found to be stationary both under the presence of a constant and constant and trend at the one percent level. On the other hand, exchange rate, income and cost saving and cost saving were found to be stationary under the presence of a constant but non-stationary under the presence of a constant and a time trend at the 5 percent level (with the exception of exchange rate which was significant at the one percent level). Based on our results we can conclude that there is lack of sufficient evidence of non-stationary in the variables tested. Next we address the potential endogeneity of the price ratio.

The demand for US wheat by importing countries may influence the import price of wheat. Thus the value of US imports and price are jointly determined causing the price ratio to be correlated with the error term. Presence of an endogenous variable indicates

[21] For additional literature on testing stationary properties of variables in panel data see Breitung and Meyer,1994; Im, Pesaran, and Shin ,2003; Pedroni,2004;Baltagi,2005. Results of panel unit root test for model II are similar and not reported here to conserve space. These are available from the authors on request.

that instrumental variable (IV) techniques must be used for estimation. In order to justify the use of IV techniques we must show that endogenous variable satisfies the endogeneity test. To test the exogeneity of the price ratio variable, we use the Davidson and MacKinnon (1993) test.[22] The null hyothesis of the test states that using the ordinary least squares estimator would (OLS) that is, the OLS fixed effect model would result in consistent estimates and the presence of endogeneity among the regressors would not bias the OLS results. Rejection of the the null hypothesis indicates the need to use instrumental variable techniques. We fail to reject the null hypothesis for both models, indicating that endogeinety of the price ratio variable is not a potential problem and the results from OLS fixed effects estimation would be consistent.

Finally due to the panel nature of our data set we test for any evidence of serial correlation . We use the Wooldridge test for serial correlation in panel data models correlation.[23] The null hypothesis of this test states that there is no serial correlation. Significance of the F-statistics indicates that there is presence of serial correlation. In both the models we fail to reject the null hypothesis indicating that serial correlation is not a problem.

[22] This test is similar to to the Durbin-Wu-Hausman test. Davidson and Mackinnon (1993) show that that this superior to the Hausman test in that we are always able to compute a test statistic. On the other hand, computation of a test statistic under the Hausman test is possible when the difference between estimated covariances matrices results in a positive definite matrix.Thus it is difficult to compute a reasonable test statistic using standard matrix inversion techniques. See Davidson and Mackinnon (1993) for details.

[23] Under this test the null hypothesis states that the residuals from the regression performed on first differenced variables should have an autocorrelation value of about -0.5. That is when we regress lagged residuals on current residuals, the coefficient on the lagged residuals should be -0.5. Ducker (2003) show that this test performs well when the sample size is reasonable. See Wooldridge (2002) and Drukker (2003) for more details.

One of the major problems with panel data is heterogeneity across panels. If the unobserved heterogeneity effects of the individual panels are correlated with the variables, a fixed-effect model is estimated.

However, if the unobserved effects are uncorrelated with the variables, there will be efficiency gains if we model the individual panel –effects as randomly distributed components of the error using a random-effect estimator (Baltagi, 1995).[24] We perform a Hausman specification test to test compare the estimates from the consistent fixed effects model to the estimates from the efficient random effects estimator. The null hypothesis is that the individual effects are uncorrelated with the model. If null hypothesis is rejected (individual effects are correlated), a random effect model produces biased estimators and a fixed effects model is preferred. For both the models the Hausman test rejected the null hypothesis in favor of the fixed effects model. But, when we used the Bresusch and Pagan Lagrangian multiplier test for random effects, we rejected the null hypothesis in favor of the random effects model.[25] However, due to the inconsistencies of the Hausman test, we decided to use the random effects model.[26]

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[24]The standard random effects estimator is that the weighted average of the fixed effect and between effect estimator. See Baltagi (1995) chapter 7 for details.

[25] We also test for random effects using the Breusch and Pagan Lagrange multiplier (LM) test. The null hypothesis is that the variances across groups are zero. If the null hyothesis is not rejected, pooled OLS regression is appropriate. We reject the null hypothesis in favour of random effect model in both models.

[26] One of the more stronger assumptions of the Hausman test is that one of the estimators is efficient, that is, has minimum asymptotic variance. If this is violated, results are inconsistent. In our analysis, when we specified the random effects model as efficient (tested fixed vs random), we rejected the null hyothesis in favour of the fixed effect model in both models I and II. However, when we specified the fixed effects model as efficient (that is tested random vs fixed) we obtained a negative Chi-Square value in both the models. Though a negative Chi-Square value may be interpreted as allowing us to accept that the random effects model in favour of the fixed effects model. However, the results of the Hausman test are sensitive to specification of the regression model and need to interpreted with caution. Please see Greene (2003) for more details.

Empirical Results:

Results of the estimated demand equations are reported in Table 1. All the variables had the expected signs in both the models. Domestic production was negative and significant in both the models at the one percent level indicating that as domestic production of wheat in the importing countries' increases they are likely to import less wheat from the US. Exchange rate was negative and significant at the one percent level in both the models indicating that an appreciation of the US dollar relative to the importing countries currency decreases the amount of wheat imported from the US. GDP was also significant at the five percent level in both the models indicating that an increase in importing countries' income increases the demand for US wheat. More importantly cost savings from export credit was positive and significant at the 5 percent in both the models supporting our theory of additionality. In model I, where the length of repayment was more than 180 days, an increase in the present value of cost saving results in about a three percent increase in the value of US imports. Our impacts are smaller compared to Diersen (1995) who finds benefits from export credit programs result in a eight percent increase in the quantity imported from the US.[27] In model II where the length of repayment is reduced to 180 days as proposed under the new WTO guidelines, cost savings result in a 2.5 percent increase in the value of US imports. Though the reduction in import value is less than one percent following reduction in terms of repayment, this is significant when we consider the overall value of wheat imports by the importing countries' from the US.

[27] The difference in results is due to the fact that our technique of calculating cost saving is different from Diersen(1995) as explained earlier.

Summary and Concluding Remarks

This paper looked at the on the ongoing debate on the use of public export credit programs and their impact on US exports. The principle guidelines for government-supported export credits on manufactured goods were consensually agreed on by the Participants of the Arrangement after a long and gradual series of many negotiation rounds, from 1976 to 1997. The guidelines of the Arrangement were integrated into the WTO Rulings to discipline the use of officially supported export credit programs on manufactured goods. However, the integration guidelines do not apply in the case of export credits for agricultural goods, which has been the subject of negotiations after the conclusion of the Uruguay Round and the WTO's Agreement on Agriculture under Article 10.2. We developed a theoretical framework to analyze the additionality resulting from the use of export credit programs, particularly, the GSM 102 program of the US. We incorporate both the cost savings offered to the importing country as a result of export credits in our model. In our empirical model we test the concept of additionality using an import demand model. Our results indicate that there are significant cost saving benefits to the importing countries as a result of the export credit programs. There is also an increase in US exports as a result of the export credit programs. Our results imply that an export credit program increases quantity exported due to the shifting of the import demand curve to the right. This contradicts other studies which claim that export credit causes a movement along the import demand curve and a shift in the excess supply curve to the right in order to increase quantity exported and lower the world price. However, there is a reduction in cost savings to the importing countries when the length of repayment of export credit is 180 days. Thus, the more restrictive terms and conditions of

officially supported export credits which the WTO is trying to discipline based on their implicitly subsidized components will have some adverse impact on the importing countries.

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Table 1: Results of Panel Unit Root Tests [1]

Variable	Constant	Constant and Trend
Value of Wheat imports from the United States	-2.789(0.003)*** [2]	-3.015(0.001)***
Ratio of import prices between the United States and the Rest of the world (ROW)	-10.047(0.000)***	-8.414(0.000)***
Exchange rate between importers and the United States	-2.302 (0.011)***	1929(0.973)
GDP of the importing countries	-1.995(0.023)**	1.525(0936)
Domestic production of Wheat in the importing countries	-30.132(0.000)***	-23.222(0.000)***
Cost Saving of the importing countries	-1.636(0.051)**	-0.088(0.465)

[1]Reported values include the test statistic and in parenthesis is the probability for the null hypothesis that the variable has unit root.

[2]***, ** and * indicate significance at the one , five and ten percent level respectively.

Table 2: Results of the Randon Effects (RE) Models

Variable	Description	Model I-More than 180 days	Model II-180 days
LPRAT	Ratio of import prices between the United States and the Rest of the world (ROW)	-0.28 (0.30)	-0.27 (0.30)
LEXRATE	Exchange rate between importers and the United States	-0.86 (0.19)***	-0.85 (0.19)***
LGDP	GDP of the importing countries	0.47 (0.20)**	0.45 (0.20)**
LDOMPRD	Domestic production of Wheat in the importing countries	-0.31 (0.86)***	-0.31 (0.08)***
LPVC	Cost Saving of the importing countries	0.03 (0.031)**	0.025 (0.01)**
Davidson-Mackinnon test of exogeneity		F(1,57)=2.42 p=0.12	F(1,57)=2.24 p=0.13
Wooldridge test for serial correlation		F(1,6)=2.17 p=0.191	F(1,6)=2.07 p=0.199
Durbin-Wu-Hauman test- Fixed effect model vs random effects model		$\chi^2(5) = 39.34$ p=0.00***	$\chi^2(5) = 29.99$ p=0.00***
Breusch and Pagan Lagrangian Mutiplier test for random effects		$\chi^2(1) = 23.06$ p=0.00***	$\chi^2(1) = 22.86$ p=0.00***

*** and ** indicate significance at the one and five percent level respectively. Numbers in parenthesis are for the standard errors.

Appendix I: Calculation of Present Value of Cost Savings

We demonstrate the method utilised in calculating the present value of cost savings (PVCS) using an example where export credit is given by US to Egypt. In this example PVCS is calculated when the term of repayment is greater than 180 days. A similar approach was used to calculate PVCS when the period of repayment is 180 days, except we use short term interest rate.

Step 1: Finding semi-annual payment (PMT_{US}) if borrowing in the US

$$EC_{US} = PMT_{US}\left[\frac{1-\left(\frac{1}{(1+r_{US})^{n}}\right)}{r_{US}}\right]$$

$$PMT_{US} = EC_{US}\left[\frac{r_{US}}{1-\left(\frac{1}{(1+r_{US})^{n}}\right)}\right]$$

where EC_{US} is export credit given by US to Egypt, i_{US} is the interest rate in the US , n is term of repayment (semi-annual payment for 2 periods or 12months) and

$$r_{US} = \frac{i_{US}}{n*100}, n = 2$$

Step 2: Finding the future value (FV_{US}) of the credit under US borrowing

$$FV_{US} = PMT_{US}\left[\frac{(1+r_{US})^{n}-1}{r_{US}}\right]$$

Step 3: Finding semi-annual payment (PMT_{EC}) if borrowing in Egypt

$$EC_{EG} = EC_{US} * \text{Exchange rate}$$

$$PMT_{EG} = EC_{EG}\left[\frac{1-\left(\frac{1}{(1+r_{EG})^{n}}\right)}{r_{EG}}\right]$$

where EC_{EG} is the export credit received by Egypt from the US, i_{EG} is the interest rate in Egypt and $r_{EG} = \frac{i_{EG}}{n*100}, n = 2$

Step 4: Finding the future value (FV_{EG}) of the credit under Egypt borrowing

$$FV_{EG} = PMT_{EG}\left[\frac{(1+r_{EG})^{n}-1}{r_{EG}}\right]$$

Step 5: Converting FV_{EG} into US dollars

$$FV^{*}{}_{EG} = \frac{FV_{EG}}{\text{Exchange rate}}$$

Step 6: Calculating the future value of cost savings (FVCS) from steps 1 and 4

$$FCSV = FV_{US} - FV^{*}_{EG}$$

Step 7: Calculating the present value of cost savings (PVCS)

$$PVCS = FVCS\left(\frac{1}{(1+r_{EG})^{n}}\right)$$

Note: When we calculate present value of cost savings for 180 days, the term of repayment is one (n=1). All other formulas remain the same.