# PAYMENT SYSTEM IN INTERNATIONAL TRADE AND INTEREST RATES

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# Abstract

This research incorporates trade credit costs into celebrated gravity equations, under the assumptions of particular method of payment used in international trade. The equations derived are tested with US data on foreign trade and the implications of the model are used to explain the deteriorating US exports during 2007-2009 Global Financial Crisis.

# 1. Introduction

Welfare gains from international trade have been acknowledged by Economists and policy makers long ago. Even the simplest Ricardian model of international trade predicts welfare gains for consumers of the countries who move from autarky to open trade. More advanced and recent models of international trade make even firmer the argument that huge benefits can be gained from international trade. Particularly the Nobel Prize wining model of international trade developed by Krugman (1980) based on the assumptions of monopolistic competition and product differentiation (Dixit and Stiglitz).Consumers become happier after country opens to trade as they have access to more variety of products produced by foreign exporters. The welfare gains and happier consumers are not the only benefits gained from trade. Imported production inputs and technologies can lead to the better use of production possibilities and lead to sustainable growth. The openness to trade was shown to lead intra_ industry allocations of firms within economy (Melitz 2003). This will lead to the survival of more productive firms and productivity lead gains for the all Economy. There are studies that point to the evidence that firms are becoming even more productive after becoming an exporter (De Locker2007).

All the benefits and gains from international trade shrink because of the trading costs present for any county involved in international trade. The investigation of the trade costs and their negative effects on gains from trade has a big share in the existing pool of literature of international trade. The trade credit which is a vital source of short term finance and is commonly used by firms involved in international trade can lead to high and considerable costs in the times of crunching credits and high interest rates. Although trade credit is an important component of costs of an internationally trading firm and affects terms of trade significantly it has been left in the shadow by researchers.

The main goal of this research is to find out whether there is a significant trade reduction effect by trade credits or not. And if yes under which circumstances it affects the frims trade most of all.

I formulate the channels through which cost of the trade credit can reduce international trade. Based on the information gathered from international trade insurance companies and banks main methods of payments used in international transactions and costs involved are presented. Under the assumption of each different method theoretical gravity equations are derived and the possible costs from trade credit are explicitly modeled except in one case.

The equations derived are estimated for the USA panel data ranging from years 2003 to 2007 of international trade with 135 countries of the world.

The main findings of the paper are used to explain the falling exports and imports of the USA during the 2007-2009 Global Financial Crisis.

The continuation of this research goes as follows.Part2 presents the existing pool of literature used and related to this study. Part 3 presents and describes different methods of payments used in international trade and comments on country default risks estimated by trade insurance companies and OECD. In part 4 based on the assumptions of different payment system gravity equations are derived.Part5 describes the data used for estimation and presents estimation results.Part6 gives the analysis of the US international trade during the (2007-2009) financial crisis.Part8 concludes.

## 2. Literature Review.

Provided below are list of studies related to or used in this research. The gravity equation model used in this research was first derived by Walter Isard in 1954. Later on different authors derived the same gravity model based on different theoretical assumptions which involved only complete specialization. For example Helpman and Krugman (1985) derive gravity equations based on the Nobel Prize winning model of Dixit and Stiglitz of monopolistic competition and product differentiation and increasing returns to scale. The method used in this research is m closest to the one used by Anderson Win coop (2000).

There is huge pool of existing literature devoted to the trade costs. These costs are believed to have great trade and consequently welfare reducing effect. That is why many authors devoted their research towards the estimation of these costs and tried to find ways to reduce them. Because of nonlinearity in trade costs it is difficult to estimate these costs. Direct and indirect measures are used to estimate trade costs. Anderson and Win coop (2004) use partial and incomplete data to measure the trade costs directly and at the same time make inference on trade costs using trade flows and prices. Hummels (2001) uses trade freight data and gives direct and indirect evidence on trade costs, which arise from trade barriers such as distance, non adjacency, absence of common language or common colonizer.

Ferris (1981) develops a model of trade credit describing the joint attempt of by trading partners to lower the cost rising from the uncertainty of the delivery of goods. Mian and Smith (1992), Schwartz and Wincoop (1979) emphasize the price motive as the main source of the trade credit movements. Schwartz considers the use of trade credit for disguised price discrimination.

A.C.J. Stockman (1997) finds stability of trade credit relations in international trade for Netherlands and Germany over a long period of time. He finds a weak response of terms of payment in international trade to market interest rates on the other hand a strong impact of profitability on terms of payment is found which leads him to conclude about the credit

rationing in international trade. He considers the price and transaction motives to be relevant factors in the determination of international trade credit.

Bullow and Roggof(1989a) describe the difficulties and problems arising from the country default risks on international trade including the seizure and interruption of the short term trade credit.

Andrew and Spiegel (2002) develop a trade model with country risk and trade credit. They show that the default by a country on its trade credit may have significant reductions on trade, consequently countries which share closer trade links and have more benefits from trade with each other, will not default on their trade credits under the threat of bigger welfare losses.

Kletzer and Bardhan (2002) ration countries by the costs first born from credit market imperfections involving moral hazard imperfections in international credit markets under the sovereign risks than by the level of contract enforcements under incomplete information by the institutions in these countries. The effects and implications of these costs on international trade are analyzed.

# 3. Methods of Payments in International Trade



One of the main strategic decisions an internationally trading firm has to make is the method of payment that it agrees on with its trading partner to pay for the goods and services that it processes.

Hereby I am introducing the most popular methods of payments in international trade, and discuss the distributional effects of the risk for exporters and importers associated with particular method.

### *3.1. Clean Payment (Open Account and Cash in Advance)*

Under the method of Clean Payment the transaction is made purely by trading parties without an intervention of the third party. The necessary condition for the method to be used is the trust towards the trading partner. The role of the Banks and other financial institutions involved as third party is limited in the transaction process. The Clean Payment method is exercised in two ways either Open Account (OA hereafter) method or Cash in Advance (CA hereafter).

The way OA Transaction works is as follows. The exporter sends the goods to the importer and waits for the importer to send the payment, moreover sometimes the payment can be made even after a particular time the importer receives the goods, in this way exporter gives trade credit to its client. The OA method can be very decisive for an exporter to gain competitive advantage over its competitors in a particular import market, when the competitor exporters are demanding other methods to be paid for the goods that they sent to importers. Under the OA the exporter takes all the risks on itself as the commodities it has sent to the importer is a gift until it receives the money from the importer, the only advantage to the exporter is the gained business reputation and contact with the importer which will pay of in the long run, as for the importer the OA method to pay is the most desirable.

Under the mentioned method the importer assumes no risks involved in the transaction even more it gains trade credit from exporter and enjoys the delayed use of the its cash resources. The gains for the importer from trade credit can be especially high when the credit markets are tight in the importer's country and the trade credit can be used as a vital source to provide short term financing for importer firm.

The opposite distribution of gains and risks occurs when the CA method is used to make the transactions in international trade. In this case the importer sends the payment directly to the exporter and waits for the exporter to send the goods and documents needed to collect the goods at the port or at the country border. Obviously exporter assumes no risks, while at the

same time all the burden of risk is put on importer moreover the importer faces opportunity costs of using the company cash resources until the goods arrive, these costs can be high enough when the credit markets are tight and the interest rates prevailing in the domestic market are high.

For both OA and CA method to be exercised a substantial trust towards the business partner must exist. Sometimes the CA method can be demanded by an exporter particularly because of the absence of trust towards the importer. In this case exporter will demand CA before sending the goods, to be insured against the default by the importer.

In international trade one big problem is that exporter and importer do not see each other and can't observe the creditworthiness of the opposite side as they are located in different countries. The commercial risks of a partner firm usually are assessed based on the country risks in which this particular firm operates. This method is used first of all because there is big role that a country and its institutions are playing in international trade as opposed to the transactions between firms inside the domestic country. Another reason to use country risks to evaluate the firm risk in that country is that country risks are usually observable as opposed to the individual firm risk which is highly correlated to the country risk but is not observable by the foreign trade partner.

In the contemporary world financial intermediaries have a great role in business transactions as a third party this is also the case for international trade. To avoid the default risks and negative externalities discussed above, firms can let the financial intermediaries (banks, trade insurance companies) to be involved in their transactions in international trade as a third party.



## *3.2. Letter of Credit*

The involvement of the Banks in payment procedures in international trade can be both necessary and efficient when the trading partners are just starting to do business with each

other, or when one side of the party is in a country with high political risk, low contract enforcement, unreliable legal infrastructure and other attributes which lead to the high country risk. In this case Letter of Credit (LC hereafter) can be helpful as a method of payment in International Trade.

Letter of a Credit is a written undertaking by the importers bank to pay the exporters bank within certain time limits, certain sum of money against the presentation of documents which must comply with certain terms and conditions mentioned in the Letter of Credit. Banks are not involved here in checking and insuring the proper delivery of goods they must be only assured that the documents presented and the Letter of the Credit are in compliance with the same terms and conditions. The rules, definitions and practices governing Letters of Credit are issued by the International Chamber of Commerce.

To give more detailed picture of how the method of payment involving the LC works it is useful to divide the process into 3 steps which are *issuance, flow of goods and documents and flow of payments.*

After an agreement between trading parties has been made to trade and use the LC as a method of payment, the importer applies for a LC from its bank (Issuing Bank) in favor of Exporter (Beneficiary) an existing credit line in the Issuing Bank is needed for the importer to be granted credit.

After issuing the LC the Issuing Bank sends the letter to the bank located in the country of exporter (Advising Bank).As the Advising Bank receives the LC it passes it to the Exporter, sometimes exporter can ask for an additional confirmation about the payment by the Advising Bank if it does not trust the Issuing Bank.

After examining the LC and observing that the terms and conditions in the LC are in compliance with the deal it has made with the importer and that it can produce all the documents stipulated in the LC, the exporter ships the goods to the importer. After the

shipment of goods has been completed and all the necessary documents about the shipment are ready (statements from the port, receipt by freight company etc.) the exporter presents them to the Advising Bank which makes the payment to the exporter and sends the documents to the Issuing Bank. The latter in turn examines the documents and if they comply with the terms stated in LC then it presents the documents to the importer to be paid for the amount it has already passed to the exporter's bank. Importer may be asked to pay at once in exchange for documents if the LC is stated as Sight LC or in a future fixed time if a contract is made as Term LC. After obtaining the documents the importer collects the goods with these documents from the port or from the border. One important thing worth to mention is that Banks are not insuring the movement of goods. They are involved in financial transactions and are mitigating the commercial risks that traders face in exchange for particular fees.

The LC method of payment moves the positions of both exporter and importer from the extreme poles of risk compared to the Clean Payment method to a situation there they share the risks.

For importer the main advantage is that it is assured that the exporter will be paid only in case it has send all the goods properly, but some risk remains still for the exporters as the banks are guarantying correctness of documents but are not providing insurance for the correctness of goods.

Advantage gained by the exporter is that it is ensured that it will be paid once it has met the terms and conditions in the letter of credit, as it can have the confirmation of its local or other multinational bank if needed. The disadvantage for the exporter is that after shipping the goods the exporter can be refused to be paid if it has made a mistake in the proper preparation of documents.

There is one disadvantage that both exporters and importers are facing under the LC compared to the Clean Payment that is the fees and debt service cots that is given to the bank.

This can have substantial trade reducing effects especially if one of the parties is assumed to have high risk of default. I will analyze this issue later in this paper.

### *3.3. Documentary Collections*

There exists another widely used method of payment in international trade known as Documentary Collections. Method of payment by Documentary Collections work as follows. After the trade partners have agreed on using this method of payment the exporter sends the goods to importer. At the same time the exporter sends the documents necessary for the collections of these goods to the bank located in the importer country. The documents are sent through the bank located in the country of the exporter. The importer will receive the documents needed to collect the goods only in case it pays the amount mentioned in the contract to the bank in its home country, which in its turn sends the money to the exporter via the exporter country bank. There is no guarantee or credit issuance by the banks, they are only involved in secure procession of the documents and move exporter and importer to a little beet more favorable risk position compared to the risks incurred by OA and CA method respectively. This last method of payment does not incur higher or lower costs related to interest rates fluctuations or country risks.



## 4. The Model

I use here the model of monopolistic competition with differentiated products first developed by Stiglitz and Dixit to derive the gravity equation with trade costs. Later I add interest rates into the model to analyze the effects of interest rates under the assumption of different payment systems that exporters and importers use to complete their transactions.

Let's start with the assumptions that firms in each of the $j = 1....M$ countries on the world have complete specialization in the production of the goods which are traded with other countries and not produced by any other firm. Goods are differentiated and have low degree of substitution. The product differentiation gives the producing firm monopoly power over the good it produces and consequently prices are set with a mark up over production costs.

The consumers in each economy have homothetic preferences summarized in the following utility function which can be shown to be homothetic.

$$U_j = \left[ \sum_i^M (C_{ij})^{\beta-1/\beta} \right]^{\beta/\beta-1} \quad (1)$$

$C_{ij}$ is the consumption of goods $i$ by the consumers in country $j$ and $\beta$ is the elasticity of substitution between all goods, the lower $\beta$ the stronger the effects from product differentiation.

Consumers in country $j$ are maximizing their utility subject to the following budget constraint.

$$\sum_i^M p_{ij} c_{ij} = E_j \quad (2)$$

There $p_{ij}$ is the price of the good in country $j$ produced by country $i$ and the $E_j$ is the nominal aggregate income of the residents in country $j$ .The prices $p_{ij}$ differ across the regions $j$ .

I assume there is no price discrimination by producers across the markets in different countries of the world for the same good and these differences in prices are borne because of trade costs which include transportation costs, marketing and distribution costs, costs associated with legal procedures and country's policy on international trade e.g. tariffs and quotas. These costs differ from country to country depending on distance of the markets from

the exporting country the level of the development of infrastructure in these markets, the efficiency of conducting international trade and many other country specific features.

I assume the exporter country $i$ has a supply price of $p_i$ and passes all the costs to importer adding $(\tau_{ij} - 1)p_i$ to its supply price there $\tau_{ij}$ is the country specific cost. $\tau_{ij} \succ 1$ is iceberg cost used by Samulson 1954 , it states that $\tau_{ij}$ amount of goods must be sent from country $i$ so that 1 amount of good reaches to country to $j$.

The price of the commodity $j$ in country $i$ can be written as the product of producer country's supply price and the country specific trade costs $p_{ij} = \tau_{ij} p_i$.

The maximization of (1) subject to (2) yields the nominal demand for good $i$ in country $j$.

$$D_{ij} = \left[ \frac{p_i \tau_{ij}}{P_j} \right]^{1-\beta} E_j \quad (3)$$

Here the $P_j$ is the effective price index in country $j$ , represented as $P_j = \left( \sum_i^M (p_i \tau_{ij})^{1-\beta} \right)^{1/1-\beta}$ ,

which is derived by solving the dual problem of the consumer utility maximization.

We should also note that $D_{ij} = \tau_{ij} p_i c_{ij}$ , which states that the nominal value of exports from $i$ to $j$ is equal to the demand of good $i$ in country $j$.

Market clearing conditions imply that aggregate income of the country $i$ is equal to the sum of the demands for the goods produced by country $i$ in all markets of the world including the own internal market demand. Using the demand function (3) we can formulate the upper mentioned fact in the following form.

$$E_i = \sum_{j=1}^{M} D_{ij} = \sum_{j=1}^{M} \left( \frac{p_i \tau_{ij}}{P_j} \right)^{1-\beta} E_j = p_i^{1-\beta} \sum_{i=1}^{M} \frac{\tau_{ij}}{P_j} E_j \quad (4)$$

j=1….M

Following Anderson and Wincoop [2003] I denote the supply prices $p_i = 1$ without the lost of generality the gravity equation can be derived solving for all $p_i$ from (4) and substituting them to the demand equation (3).

$$EXP_{i \longrightarrow j} = \frac{E_i E_j}{E_w} \left( \frac{\tau_{ij}}{\theta_i P_j} \right)^{1-\beta} \quad (5)$$

Where $E_w = \sum_{i=1}^{M} E_j$ is the world output defined as the sum of individual country output

$Exp_{i \longrightarrow j}$ is the nominal exports from country $i$ to $j$.

The equation (5) implies that exports are affected by both trader countries' aggregate incomes positively and on the other side are adversely affected by trade costs. The elasticity of substitution $\beta$ exacerbates the effect if it is big and alleviates it if it is small. The intuition behind this is as follows country $i$ will consume fraction of the country $j$ output $Ej$ commensurate to its market size relative to the global market which is equal $\frac{E_i}{E_w}$.The presence of the trade costs give upward pressure to the final consumption price for country $j$ residents. Depending on the degree of the substitutability of a particular good the negative reaction on the level of consumption by the importer country consumers will be strong or weak. Below are described the multilateral resistance terms which enter the equation (5) and

have negative effects on trade, $P_J$ is the average trade cost that face the exporters in country $j$ and the $\theta_i$ is the average trade cost faced by the importer country consumers.

$$P_j = \left[ \sum_{i=1}^{M} \left( \frac{\tau_{ij}}{\theta_i} \right)^{1-\beta} \frac{E_i}{E_w} \right]^{\frac{1}{1-\beta}} \quad (6)$$

$$\theta_i = \left[ \sum_{i=1}^{M} \left( \frac{\tau_{ij}}{P_j} \right)^{1-\beta} \frac{E_j}{E_w} \right]^{\frac{1}{1-\beta}} \quad (7)$$

Now when we have derived the gravity equation with trading costs its time to analyze how interest rates affect the trade under different methods of payments that the firms use.

## *4.1.Gravity equation with OA Payment system*.

As already mentioned under the OA method of payment exporters from country $i$ send goods to country $j$ and wait for the money to be delivered to them as the importer receives the goods. Suppose there does exist enough trust towards the exporter country( country risk is low), or there exists a long and good business relationship between the exporter and importer firms so that OA is the optimal choice of the payment to avoid additional fees and costs associated with the service of banks and trade insurance companies.

Suppose $r_i$ is the prevailing market interest rate in country $i$.It takes $T_{ij}$ amount of time for importer $i$ to send the money to the open account of the exporter from country $j$ for the

goods that it has send. Obviously $T_{ij}$ depends on the distance between trading countries so that it will take longer time for the goods to reach to the further countries. Hence the time of the trade credit $T_{ij}$ that the exporter is giving to the importer will depend on the distance of the trading partner country (assuming that there is homogeneity in transportation technology used by the freight companies across the world).

As we assumed earlier firms in the exporter country have complete specialization over the differentiated products, which gives them monopoly power and hence they use mark up price setting rule so that the supply price in country $i$ will be

$$P_i = \frac{W_i}{\beta} \quad (8)$$

Where the $W_i$ is the wage level in country $i$ and $\beta$ is the elasticity of demand. The opportunity cots of the delayed cash flows emerged from trade credit, suggest that firms must increase the price for their exports if they don't want to lose their profit margin (or to remain at 0 profit level in case of high competition).Consequently the supply price must be increased depending on the level of the interest rates and the amount of time $T_{ij}$ that delays the cash flows for the exported goods.

The numerator of the left hand side of the equation (9) is the new supply price for country j net of other trade costs. The intuition behind equation (9) is as follows ,as the wages and demand elasticity are the same for trade credit giver firms, they have to charge higher price compared to the price which would be charged if the payment was immediate( $T_{ij}$ =0),to keep the profit margin unchanged.

$$\frac{P_i(1+r_i)^{T_{ij}}}{(1+r_i)^{T_{ij}}} = \frac{W_i}{\beta} \quad (9)$$

The ultimate price faced by the importer in country $j$ will be $P_{ij} = p_i(1+r_i)^{T_{ij}}\tau_{ij}$. Here $\tau_{ij}$ are country specific trade costs. So that the gravity equation which incorporates the effects of trade credit will become

$$EXP_{i\longrightarrow j} = \frac{E_i E_j}{E_w}\left(\frac{(1+r_i)^{T_{ij}}\tau_{ij}}{\theta_i P_j}\right)^{1-\beta} \quad (10)$$

Equation (10) states that the exports from country $i$ to country $j$ are negatively affected by the prevailing interest rates in the exporter country and $T_{ij}$ .The logarithmic transformation of the equation (10) yields.

$$Ln(EXP_{ij}) = Ln(E_i) + Ln(\frac{E_{US}}{E_W}) + (1-\beta)T_{ius}Ln(1+r_i) + (1-\beta)Ln\tau_{ius} + (1-\beta)Ln(\frac{1}{\theta_i P_j}) \quad (11)$$

## *4.2. Gravity with CA*

Now suppose the firm which is importing goods is located in a country which has low likelihood of external debt service, unstable political climate, low level of contract enforcement, highly volatile and underdeveloped financial markets and economy. These and many similar factors will lead to the high commercial risk assignment towards the importer firms operating in such a country. When having such a firm as a customer an exporter firm can hedge its risks of nonpayment choosing CA as method of payment. Provided that the exporter itself has a low commercial risk (followed by the fact that it is located in a country with very low risk) the importer will agree on the CA option to pay for its imports, as there is a demand on the differentiated goods in the importer country market and a profit gaining opportunity by importer firms.

In this case as discussed before the importer sends the money to exporter and waits for the goods to be delivered. The supply price that the exporter sets based on the mark up rule is equal to $P_i = \frac{W_i}{\beta}$, but the importer country faces higher price because of the opportunity cost of the cash which is generated because of the existing time gap between the payment for and obtainment of the imported good. Let's denote this time gap by $T_{ij}$ which I assume is a linear function of the distance between the exporter and importer country. Incorporating the opportunity cost into the gravity equation (5) we arrive to similar results as in the case of the OA method. The difference is that now the interest rates in the importer countries will increase the prices faced by the importer country consumers and affect the trade negatively as shown in the equation below.

$$EXP_{i \longrightarrow j} = \frac{E_i E_j}{E_w} \left( \frac{(1 + r_{Dj})^{T_{ij}} \tau_{ij}}{\theta_i P_j} \right)^{1-\beta} \quad (12)$$

### *4.3. Gravity with LC*

In case the importer uses LC as a method of payment the debt service to the Issuing Bank will become heavier if domestic interest rates are high.

Issuing Bank who pays the exporter through exporter's bank (Advising Bank) will charge higher interest rates on the loan it has issued for its client the importer. In this case the demand on foreign exports will be affected negatively by higher domestic interest rates. The equation below describes the relationship.

$$EXP_{i \longrightarrow j} = \frac{E_i E_j}{E_w} \left( \frac{(1 + r_{Lj})^{T_{ij}} \tau_{ij}}{\theta_i P_j} \right)^{1-\beta} \quad (13)$$

It is important to note that in all above mentioned cases the costs generated by higher interest rates increase with the money value of the goods traded. For example the transportation cost for the diamonds worth 10000$ are much cheaper than for the wheat worth 10000$ that's why the transportation costs should not add to the prices in multiplicative rule. While for the cash opportunity costs incurred by interest rates both diamond and wheat has the same cost, so that it is reasonable to add the interest rate incurred cost( $[1+r_i]^{T_{ij}}$ )in multiplicative order to the prices for aggregate trade. The difference between (13) and (12) are in interest rates.

Equations (12) and (13) look very similar to each other. The subtle difference between them is described below.

In case firms are using CA method of payment the deposit rate will enter the gravity equation (12), on the other hand if countries use LC lending rate will enter the gravity equation (13).

## *4.4. Gravity equation with country risks*

Finally let's consider how the country risk itself can enter the gravity equation.

As mentioned earlier $\tau_{ij}$ is the iceberg cost which is a function of distance, variables indicating country's trade policy (tariffs, quotas, subsidies) and dummy variables indicating whether trading countries speak common language or have been colonized by the same colonizer( see Anderson and Wincoop 2004) .

I add the country risks to the factors affecting the trade costs and arrive to the equation below after logarithmic transformation.

$$Ln\tau_{ij} = \alpha_0 + \alpha_1 Lndis\tan ce_{ij} + \alpha_2 \ln Risk_{ij} + \sum_{j=1}^{n} \alpha_i Z_{ij} + \varepsilon_{ius} \quad (14)$$

There are many channels through which the country risk can affect the trade costs, where the destination country interest rates are not present( at least directly) .Among these are the insurance costs that are charged by trade insurance companies to ensure trade debts, obviously the insurance costs will be high for high risk countries.

Another channel of negative effect which is not captured by the previous equations and is not related to the interest rates is the cost that the Advising Bank will charge in case the exporters asks for confirmation on the LC issued by the Issuing Bank of importer country. This can be the case when exporter does not trust the domestic Issuing Bank of the Importer country.

Finally and most importantly country risks can have significantly positive effect on trade costs if the exporter asks risk premiums on the interest rates charged for its export debt to a high risk country. The equation (13) captures the positive effects of country risks on trade costs which can not be modeled explicitly in this paper, as the later estimation of the model will require data which I was not able to find.

## 5. Data and Estimation

Data used for the estimation of gravity equations range from the years 2003 to 2007 and include 135 countries. Full list of countries are provided at the end of the Appendix.

US total merchandise Exports to and Imports from 135 countries are taken from US Census Bureau database and are measured in $million. GDP (measured in $million), Lending and Deposit interest rates are from IFS database. Country distance from USA is measured in kilometers taken from Cepii tables. Country Risks are from OECD country risk database and from ONDD trade insurance company. Country risks are estimated by OECD CRAM (country risk assessment model) based on the political instability, risk of expropriation,

likelihood of bankruptcy, contract enforcement and development level of institutions in particular country.

## *5.1. Estimation of the Gravity equation with OA Payment system for US*

To check whether there is a significant trade reducing effect from high interest rates in trade partner countries on US imports the equation (15) must be estimated.

$$Ln(EXP_{i \longrightarrow us}) = \mu_0 + Ln(E_i) + Ln(\frac{E_{US}}{E_W}) + (1-\beta)T_{ius}Ln(1+r_i) + U_{ius} \quad (15)$$

As stated earlier the time of the trade credit that exporter country gives to the US firms depends itself on the distance between the exporter country and the US. The following equation describes the relationship.

$$T_{ius} = \alpha_0 + \alpha_1 dis\tan ce_{ius} \qquad (16)$$

The constant term in the equation below incorporates the average extra time that is given to the US firms for trade credit after the goods arrive to US border from country $i$ .Assuming homogeneity among the technologies of trade freight companies across the world the time needed for a particular good to reach US is linearly dependent on the distance of the exporter country from US. So the latter fact suggests that the further countries give longer trade credit to US firms as they have to wait more than the closer to US countries to have their goods reach US and have their money delivered to them.

Inserting (16) into the (15) we arrive to the following equation.

$$Ln(Exp_{it \longrightarrow us\,t}) = \sum_{\gamma=0}^{4}\eta_\gamma + \delta_1 Ln(E_{i\,t}) + \delta_2 Ln(1+r_{i\,t}) + \delta_3 DistLn(1+r_{it}) + \varpi_{ius} \qquad (17)$$

The variable $Exp_{it \longrightarrow us\,t}$ is the total import of merchandise goods by US from country $i$ in year $t$ .

The variables $\eta_\gamma$ are year dummy variables which account for the year to year changes in the US and World GDP, international shocks and other year specific effects. The multilateral resistance terms for the US are also incorporated in coefficients $\eta_\gamma$ . For the exporter country the trade resistance term is in the error term $\varpi_{itus}$ of the equation. Index $t$ under the variables denotes year.

The coefficients of our interest are $\delta_2$ and $\delta_3$ , if there is a substantial trade reducing effect by the trading partner interest rates on the US imports, then the upper mentioned coefficients must have negative sign and be statistically significant.

The first column of Table 5.1 reports the results from the estimation with pooled OLS $\delta_2$ is insignificant, this can be the effect of the multicolliniearity between the variables $Ln(1+r_{it})$ and $DistLn(1+r_{it})$ .Coefficient on the interacted variable of distance and interest rates $\delta_3$ is highly significant and has negative trade reducing effect.

To avoid the multicoliniearity the equation was estimated with each of the highly correlated variables separately. Column 2 and 3 of the Table5.1show the results from estimation. Coefficient $\delta_3$ is highly significant and has the expected sign.

Estimation of equation (17) was carried using heteroskedasticity robust standard errors to avoid possible heteroskedasticity.

There are persistent time fixed effects in the error term of the equation (17) both because of the average cost on trade that country $i$ producers are facing (remember the multilateral resistance term in the gravity equation) and also because of the trade costs $\tau_{ius}$ which are omitted because of the data unavailability.

| | OLS(pooled) | OLS(pooled) | OLS(pooled) | FD |
|---|---|---|---|---|
| $\delta_1$ | 1.09(0.04)** | 1.09(0.03)* | 1.09(0.04)** | 1.18(0.51)* |
| $\delta_2$ | -0.04(0.01)* | -0.22(0.17) | - | -0.0026( 0.09) |
| $\delta_3$ | 0.14(0.04) | - | -0.036(0.01)** | 0.007(0.01) |
| $\eta_0$ | -4.29(0.612)** | -4.29(0.6)** | -4.1(0.5)** | 0.07(0.07) |
| $\eta_1$ | 0.05(0.07) | 0.05(0.07) | 0.032(0.07) | - |
| $\eta_2$ | 0.042(0.08) | 0.04(0.08) | 0.0.27(0.08) | -0.08(0.07) |
| $\eta_3$ | -0.017(0.09) | -0.03(0.09) | -0.023(0.09) | -0.17(0.07)* |
| $\eta_4$ | -0.21(0.10) | -0.21(0.10)* | -0.21(0.10)* | -0.29(0.08)** |
| $R^2$ | 0.76 | 0.76 | 0.76 | 0.02 |
| AR(1) | 1 | 1 | 1 | 0 |

Table 5.1 Estimation results of the gravity equation under the assumption of OA. Estimates with** denote significance higher than 1%, estimates with* denote significance higher than 5%. 1 indicates that the hypothesis of serial correlation in the residuals can not be rejected; o means that it can be rejected. Standard Errors of estimated coefficients are in parentheses.

Time fixed effects in the error of the equation will lead to the serial correlation. The standard errors are estimated with white diagonal methods to avoid the downward bias in standard errors which will persist because of the serial correlation. The serial correlation can be handled with appropriate econometric estimation techniques, but the correlation between the persistent error and the explanatory variable will lead to omitted variable bias.

It can be easily seen that the distance which is omitted is correlated with $DistLn(1+r_{it})$.The fixed effect estimation can help to wipe out the distance which is fixed along the time and causes omitted variable bias. Column 4 of the Table5.1 reports the results from estimation with FD which yields both coefficients of our interest to be insignificant, Fixed Effects and

Random Effects methods also yielded insignificant results, which are not reported in the table because of space limitation. Note that AR (1) disappeared so the estimates of FD are reliable, and suggest that there is no significance reduction effect on US imports because of the heavy trade credit cost that US trade partners are facing in the times of the high interest rates.

The main reason why high domestic interest rates of exporters do not affect US trade I think is because of the availability of US dollar denominated loans from international capital markets. Suppose an exporter from country $i$ has sent its goods to US and waits for the US firm to pay him after receiving the goods. In case the local interest rates are high the firm can use its contract with the US firm about the receivable dollar amount in particular date at future to gain loans from international capital markets and hence it will be exposed to US dollar interest rates. If most of the exporters use this tactic then the local interest rate variation will not yield any effect on the trade with US. The usage of the forward contracts to eliminate exchange rate risk will make the loans from international capital markets more easily obtainable.

Another possible thing is that the exporters to US have high profit margins and can absorb the trade credit costs into their production cost and be still profitable without increasing the price for the exported goods to US. Recent studies have indicated that exporter firms are bigger, more productive and pay higher wages (see Mayer and Ottaviano, 2008), so it is highly probable that exporters are earning higher profits than just needed to cover their costs. In this case the costs born by the temporary volatilities in interest rates can be absorbed in to the costs and not be passed to the prices of US importers. Using this strategy firm and valuable business contacts with US firms can be established which will pay off in the long run.

## *5.2. Estimation of the Gravity equation with CA method of payment for US*

As described earlier the OA method of payment puts all the risks on to the shoulders of exporter, on the other hand it is client attractive. If importer firms are operating in a country with a very low risk it is optimal for the US firms to use OA as a method of payment. In either case US exporters can loose market shares in these low risk countries to a competitor firm who will offer OA as a method of payment for its exported goods.

In case the firm is in a country with high risks US firms will require CA or LC as method of payment. In that case local interest rates (deposit and lending) will add to the trade costs as an opportunity cost for CA method or a debt service cost when LC will be chosen as method of payment.

To test whether this hypothesis holds for the firms who import from US, the following equations must be estimated, which are derived by the logarithmic transformation of (12) and (13).

$$Ln(Exp_{ust\longrightarrow it}) = \sum_{\gamma=0}^{4}\sigma_{\gamma} + \psi_1 Ln(E_{it}) + \psi_2 TusiLn(1+r_{Dit}) + \psi_3 dist + \upsilon_{it} \quad (18)$$

$$Ln(Exp_{ust\longrightarrow it}) = \sum_{\gamma=0}^{4}\sigma_{\gamma} + \psi_1 Ln(E_{it}) + \psi_2 TusiLn(1+r_{L\,it}) + \psi_3 Dist + \upsilon_{it} \quad (19)$$

The $\sigma_{\gamma}\ \gamma = 1...5$ are year dummy variables, to account for year to year changes of US and World GDP and year specific effects such as oil price shocks. $T_{usit}$ is the time of the credit that USA firms are given by local (Issuing ) banks or its the time for calculation of the opportunity cost of the cash in case of CA.

$$T_{usit} = \begin{cases} \text{Distance}_{usit} & \text{if } R_{it} \succ 0 \\ 0 & \text{otherwise} \end{cases}$$

If country risk is 0 than the US firms will use OA as a method of payment and there is no effect by domestic interest rates as $Tusi = 0$, in case there is a possible default US firm will ask CA or LC to be paid for its exports and in this case $Tusi = Distance_{usi.}$

Estimating the equation (18) using appropriate panel data estimation techniques yields insignificant results which are not reported here, thus the hypothesis that the opportunity cost of cash reduces the imports from US is rejected.

As described before the importers from US can absorb the opportunity cost of cash into high murk ups that they use to transform import prices into domestic consumer prices.

Table 5.2 provides the results from estimation of equation (19). The coefficient of our interest $\psi_2$, is significant and has expected sign when Random Effects and pooled OLS are used to estimate the equation (19). Random Effect estimation makes the coefficient $\psi_2$ smaller compared to the pooled OLS estimation, probably because part of the fixed effect which is correlated with distance or interest rates was removed by RE transformation and the upward bias in coefficient $\psi_2$ became smaller.

If there is no systematic relation between interest rates and tariffs or other trade policy measures among the countries across the world the coefficient on the variable $\psi_2$ can be trusted. It is can be rarely the case that all countries across the world use such a combination of fiscal and monetary policy that results to the systematic correlation between interest rates and trade affecting policy. Moreover the sign of the correlation must be the same to plague coefficient of our interest.

The results found inform that 1% decline is expected in US exports to countries there lending rate is higher by 1% compared to the prevailing interest rate during the previous period or in an other country.

| | OLS(pooled) | FE | RE | FD |
|---|---|---|---|---|
| $\psi_1$ | 0.84(0.04)** | 0.32(0.19) | 0.80(0.04)** | 0.19(0.18) |
| $\psi_2$ | -0.02(0.01)* | -0.010(0.006) | -0.01(0.004)** | -0.0049(0.05) |
| $\psi_2$ | -0.11(0.04)** | | -0.13(0.03)** | |
| $\sigma_0$ | -1.02(0.46)* | - | -0.67(0.47) | 0.18(0.03)** |
| $\sigma_1$ | 0.06(0.04) | 0.16(0.03)** | 0.08(0.03)* | |
| $\sigma_2$ | 0.04(0.04) | 0.21(0.04)** | 0.07(0.03) | -0.11(0.05)* |
| $\sigma_3$ | 0.09(0.04)* | 0.32(0.05)** | 0.12(0.03)* | -0.05(0.04) |
| $\sigma_4$ | 0.16(0.05)** | 0.46(0.07)** | 0.20(0.04)** | -0.02(0.04) |
| $R^2$ | 0.80 | 0.45 | 0.56 | 0.02 |
| AR(1) | 1 | 0 | 1 | 0 |

Table 5.2 Estimation results of the gravity equation under the assumption of LC as a method of payment. Estimates with** denote significance higher than 1%, estimates with* denote significance higher than 5%. 1 indicates that the hypothesis of serial correlation in the residuals can not be rejected; o means that it can be rejected. Standard Errors of estimated coefficients are in parentheses.

Note the estimation was carried assuming that US firms will ask for a letter of credit to be paid for their exports. As the data are aggregate they incorporate information about the firms who are using LC as method of payment along with the firms who are not using, but if there is an information in the data regarding the firms using LC it would emerge , which is the case for the upper mentioned case. The sign and the significance of the coefficient are under my attention. More precise estimation which will use firm level data and exact time on trade credits (not proxied with distance) I leave for the future researchers.

## *5.3. Estimation of gravity equation with country risks for USA*

Now let's try to capture the negative effects on US trade from country risks with which US is trading. As stated later in this research country risks add to the trade cost, because of the higher insurance costs or interest rate premiums that countries will charge for their exports to a risky country for giving trade credit to them.

Taking the logs from both parts of equation (5) and inserting (14) for the trade cost we arrive to the following equation.

$$Ln(Exp_{us\longrightarrow it}) = \sum_{\gamma=0}^{4} \chi_{\gamma} + \partial_1 Ln(E_{i_t}) + \partial_2 LnR_{it} + \zeta_{it} \quad (20)$$

Where $\chi_i$ $i = 0...4$ year dummies are $LnE_{it}$ is the logarithm of annual GDP of country $i$ in year $t$ and $LnR_{it}$ is the logarithm of the country risks. Note that the $\partial_2 = (1-\beta)\alpha_2$ there $\beta$ is the elasticity of the substitution between goods and $\alpha_2$ is the elasticity of trade cost with respect to the country risks.

Table5.3 shows the results from estimation.

There is no serial correlation remaining in the errors after RE estimation and Haussmann Test suggests that there is no omitted variable in the model that is the FE and RE estimators do not differ significantly. So the RE effects estimators can be trusted which suggest that each %age change in country risk will lead to the 0.41 % decrease in US exports to these countries. This is big enough effect considering the narrow range of the risks (1-8) assigned to the countries so that 1 point increase in risks can lead to substantial reductions in US exports to countries with upgraded risks.

| | Pooled OLS | RE | FE | FD |
|---|---|---|---|---|
| $\partial_1$ | 0.85(0.005)** | 0.75(0.05)** | 0.32(0.16) | 0.17(0.18) |
| $\partial_2$ | -0.27(0.09)** | -0.41(0.13)** | -0.42(0..24) | -0.35(0.20) |
| $\chi_0$ | -2.06(0.40) | -0.85(0.63) | _ | 0.18(0.04)** |
| $\chi_1$ | 0.08(0.15) | 0.09(0.04)* | 0.16(0.03) | _ |
| $\chi_2$ | 0.06(0.15) | 0.09(0.03)* | 0.21(0.04) | -0.11(0.05)* |
| $\chi_3$ | 0.11(0.15) | 0.14(0.04)** | 0.32(0.06) | -0.05(0.05) |
| $\chi_4$ | 0.17(0.15) | 0.21(0.04)** | 0.45(0.08) | -0.02(0.04) |
| $R^2$ | 0.75 | 0.54 | 0.46 | 0.02 |
| AR(1) | 1 | 0 | 1 | 0 |

Table 5.3 Estimation results of the gravity equation with country risks.. Estimates with** denote significance higher than 1%, estimates with* denote significance higher than 5%. 1 indicates that the hypothesis of serial correlation in the residuals can not be rejected; o means that it can be rejected. Standard Errors of estimated coefficients are in parentheses.

## 6.1. Analysis of (2007-2009) Global Crisis Effects on US International Trade.

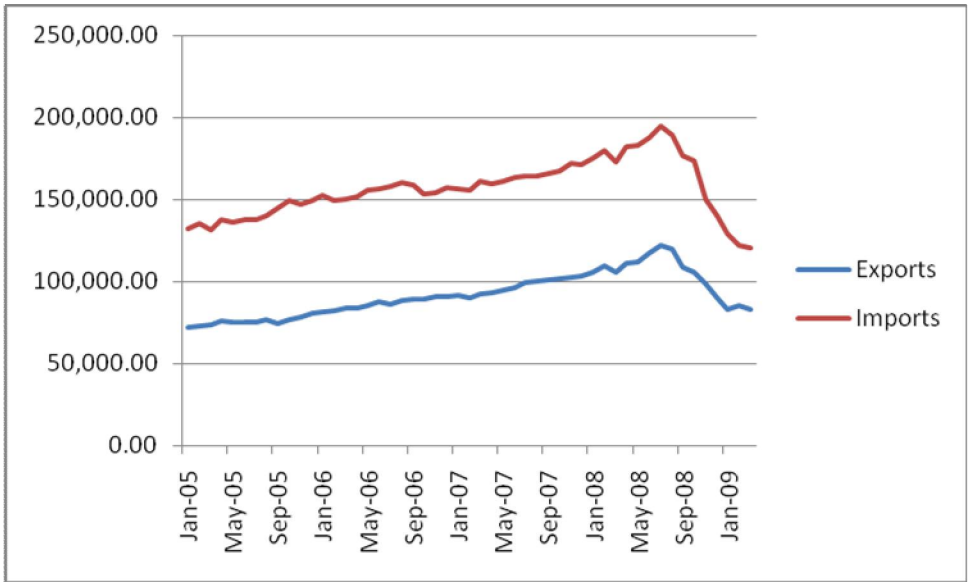
In July 2007 the burst of the housing bubble in the United States lead to the increase of the high default rates of sub prime and adjustable rate mortgages. This led to the loss of confidence by investors and high credit risks which reached their peak at October 10 2008. In September 2008 stock markets crashed dramatically across the world which led to the bankruptcy of many banks, insurance companies and mortgage lenders.

The chain of events described above lead to high volatility of the stock markets across the world, crunching credits, low investor confidence and rise in the default risk.

In this environment even healthy firms started to face difficulties with financing and faced huge downturns. The repercussions of the crises born in US went across the globe and eventually lead to the worst global recession since World War II.

Among the wide aspects that the 2007-2009 financial crises has touched it is of particular interest to look at its effects on US trade deficit which has been in the center of attention of many economists recently.

The growth of the US total trade was interrupted by the sub prime crisis in fall 2008, when the real cost and seriousness of the financial crisis became known and the world was captured the financial panic. The graph 6.1 shows how both US total exports and imports plunged since Sep 2008. At their historical peaks before the first hit of the crisis at July 2008 US total export and imports of merchandise output were registered to be $ 121.6 billion and $194.4 billion respectively. Since than they both fell continuously as the crisis developed to new phases and touched all the corners of the world. By April 2009 US exports declined by 31 % and imports by 38 %.




Graph 6.1 US Total Exports and Imports of merchandise output.

In the circumstances of the Global Economic downturn it is logical to expect that US total trade would fall as both US demand and on foreign goods and foreign demand on US goods fell because of the global recession and economic freezing.

The equation below describes the US total exports, which was derived by summation of (5) across all j=1…185.Similar equation can be derived for the US imports from the rest of the world.

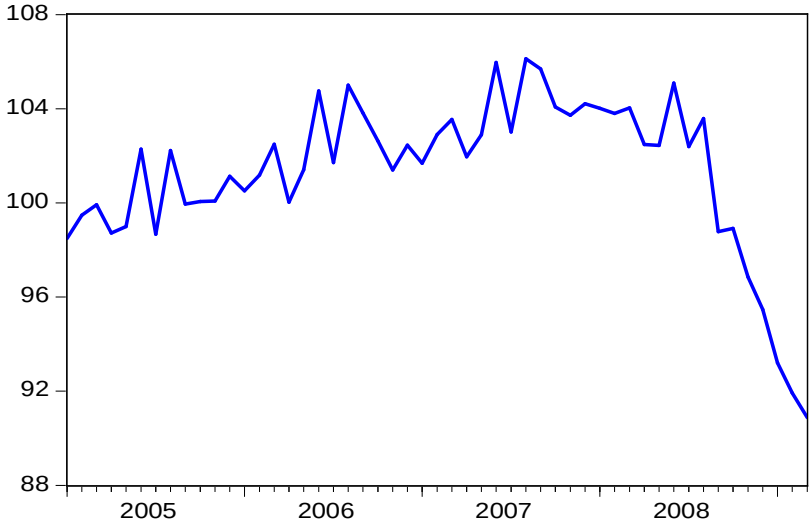
$$\sum_{i=1}^{185} EXP_{ust \longrightarrow jt} = \frac{E_{us\,t}(E_{wt} - E_{ust})}{E_{wt}} \sum_{i=1}^{185} \left( \frac{\tau_{usjt}}{\theta_{ust} P_{jt}} \right)^{1-\beta} \quad (18)$$

Writing (18) in logarithmic form we see that 1% drop in US output will decrease the US total exports by 1%, this will happen under the frictionless trade. The coefficients which were estimated in this paper for real US data suggest close to 1% response of US exports to US output decline.

$$LnExp_{ust} = LnE_{ust} + Ln\frac{(E_{wt} - E_{ust})}{E_{wt}} + (1-\beta) Ln \sum_{j=1}^{185} \left( \frac{\tau_{usjt}}{\theta_{ust} P_{jt}} \right) (19)$$

Graph 6.2 shows the decline of the Industrial Product Index of US which is perfectly correlated with GDP and shows monthly changes of GDP. Looking at the graph we see the sharp decline in US output since July 2008. At March 2009 the output decreased by 13.5% compared to the level at July 2008.

The same picture prevails for other advanced economies and major trade partners of US (see Graph8.6 in the Appendix), so that there was both declining supply by US firms and declining demand by the rest of the world from June2008 till March 2009. Although the decline in output was dramatic across the globe the decrease of the US total trade was much higher than is expected from the output decline.




Graph6.2 Industrial Production Index of USA.

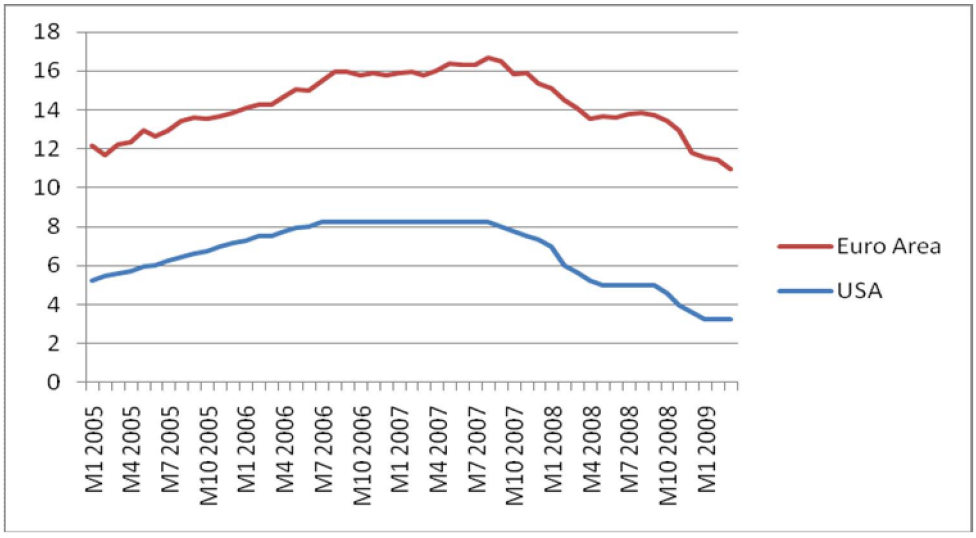
The second term of the equation (19) shows the effect of the relative to the rest of the world US GDP changes on total exports. As the crisis was global US GDP went down with the world GDP so there is negligible change in $\frac{E_{wt} - E_{ust}}{E_{wt}}$ and hence any effect from the second part of the equation. It is easy to guess that there is a big negative effect coming from the trade costs which are summarized in the last part of the equation (19).

Most of the components affecting trade costs and entering the multilateral resistance terms are fixed across time such as distance, common language, and historical connections. Other components such as technologies in transportation, trade agreements and trade policy conducted by government could not have changed for a period of 8 months to affect the US trade to such a big negative extent.

Lending rates did not increase in any of the countries which have substantial trade with US during the period (see Graphs8.3 and8.4 in Appendix). Moreover the monetary policies conducted by the Central Banks across the countries all over the world have lowered interest rates significantly. Graph 7.3 shows the falling interest rates in USA and other advanced

economies since July 2007.According to the results obtained from the estimation of equation (19) falling interest rates must contribute to the increase of international trade.

First let's note that this effect must become lower during economic crisis and financial panic. In these circumstances banks and other credit providing financial institutions will be extremely careful and reluctant to provide credit, so that firms will still face problems with financing and the trade credit and cash opportunity costs will be high although the interest rates set by Central Banks remain low.




Graph7.3. Lending rates in USA and other advanced economies.

The last candidate to be blamed for the deep decrease of US total trade is country default risk, which was shown in the previous chapter to have a huge negative impact on international trade.

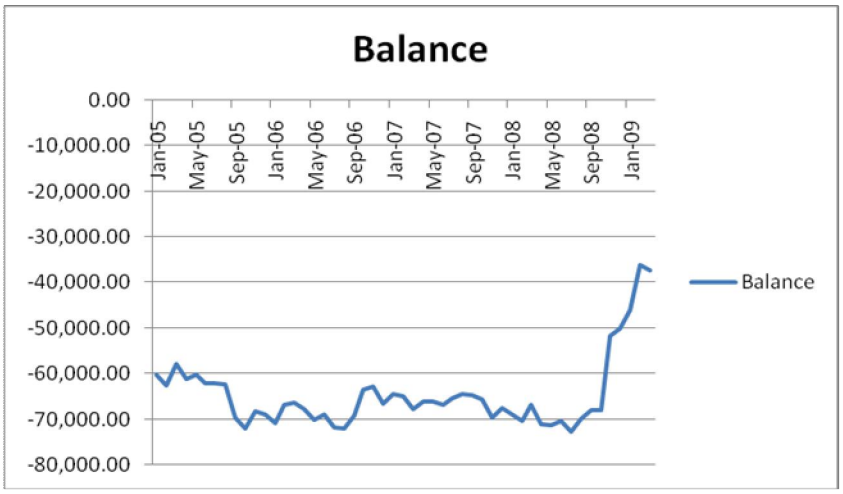
Table8.1 in the appendix shows December 04 report on the increase of the country risks by financial news provider Seeking Alpha. In the table are provided 38 countries which have experienced unprecedented risk increase compared to the beginning of 2007.Argentina leads the list which experienced 770% increase in its debt insurance cost from the beginning of the

year till December 04, although it decreased compared to the level prevailing in November its country risk remained the highest in the list. Most of the US top trade partners in exports appear in the list. Mexico experienced 400% rise in its debt insurance from the beginning of the 2008 till early December of the same year. These waves of the risk increase continued during 2009. Table 8.2 shows the last report by Seeking Alpha on risk development released at 05 March 2009. Things have become even worse since the beginning of 2009.The most developed countries which appeared in the lowest end of the list of last report now are leading the group by risk development rates since the beginning of 2008.Japan has seen the highest risk increase with 129% change in debt insurance cost, Germany, France, Belgium, Australia and Mexico all have seen more than 50% worsening in debt insurance cost in two months.

As seen most of the US export markets experienced huge increases in country default risks which added to the trade destructive effects of falling GDPs across the world and lead to the decrease in exports by 38%.

United States itself had huge increase in country default risk. At the beginning of 2007 the cost for insurance of $10000 was 8$, by March 05 it reached to $95. To imagine the magnitude of the risk increase in US, note that at the beginning of 2007 the cost of insurance of Mexican debt was $70, for Brazil it was $103.This unprecedented worsening of country image must have lead to the decrease in the attractiveness of US markets, loss of trust towards the US firms and hence plunge in US imports.

One positive thing for US among the troublesome picture caused by the global financial crisis is the improvement of notorious US trade deficit. The graph below shows how the gap between US imports and exports narrowed since the development of the financial crisis.




Graph7.4 US Trade balance of merchandise goods.

Before its propagation to the other economies of the world the ongoing financial crisis hit US the first. Falling US GDP and the import using industry shrinking lead to the falling demand on foreign goods by US citizens and firms. Falling oil prices made US imports even cheaper. At the same time the uneven distribution of the destructive effects of the crisis on country risk profile and monetary policies put US in a comparably favorable situation which leads to the slower rates of the decline in US exports than imports. As a result US trade deficit started to recover and on February 2009 reached to -$36.2 billion, which was last registered 7 years ago. Some rumors started to revolve even that US economy can recover from the crisis because of improving trade balance and growing relative exports.

But things are still far from being optimistic and worst is still to be met by US in terms of trade deficit. I think the US was able to maintain short term benefits in the turbulence of the financial crisis when not all the economies were pushed to the recession. The increase in the country risks shown in Table8.2 in the appendix will destroy most of the markets where US exports found their destination. The expected deep drop in the GDPs of the countries which were hit by the crisis later than US will further worsen the US trade balance because of the low demand on US exports (see the Graph 8.6). The first signs of the worsening balance are already being seen. In March 2009 US deficit was registered to increase which can be seen on

the Graph7.4. This picture will continue till the desired date 2010 (see Graph 8.6) when the output growth will start and crisis born country risks will disappear and world will enter to a more developed and sustainable phase of growth.

# 7. Conclusion

In this research gravity equations for international trade were derived incorporating the costs of the credit under different assumptions of methods of payments used in international trade. Country risks were modeled in to the gravity equation separately to capture negative effects on trade arising from risk premiums on trade credit interest rates and higher insurance and credit confirmation costs which arise from country risks.

Estimation with panel data on USA international trade with other 135 countries from year 2003 to 2007 was carried using pooled OLS, Random Effects, Fixed Effects and First Difference methods. The estimation results suggest that US exports are negatively affected by the destination market interest rates probably because of the high credit costs that are rising because of the usage of Letters of Credit as a method of payment.

The other interesting finding in this research is that countries with higher risks receive fewer exports from USA or equally true the risk rise in a country reduces the US exports to these countries.

Based on the upper mentioned results it is logical to expect deep plunges in US Exports and Imports during the 2007-2009 Global Crisis as both USA and its major trade partners risk has experienced astrological deterioration. Although the interest rates are low they are not enough to motivate trade to an extent that will surpass the destructive effects of falling demand and deteriorating risk on USA exports and imports.

# Appendix

**Country Default Risk As Measured By CDS Prices***

| Country | Current | 11/7/2008 | 1-Mth % Chg | Start of Year |
|---|---|---|---|---|
| Argentina | 4014.5 | 4453.0 | -9.8 | 460.7 |
| Venezuela | 2175.0 | 2016.7 | 7.8 | 451.5 |
| Iceland | 1103.9 | 613.8 | 79.8 | 64.7 |
| Russia | 773.4 | 523.3 | 47.8 | 87.5 |
| Indonesia | 771.5 | 638.3 | 20.9 | 153.5 |
| Egypt | 669.6 | 662.8 | 1.0 | 101.6 |
| Vietnam | 591.3 | 529.6 | 11.7 | 126.2 |
| Kazakhstan | 577.9 | 508.3 | 13.7 | 201.8 |
| Lebanon | 550.0 | 800.0 | -31.3 | 333.3 |
| Bulgaria | 533.2 | 435.7 | 22.4 | 78.6 |
| Turkey | 463.5 | 445.0 | 4.2 | 166.5 |
| Philippines | 459.6 | 418.3 | 9.9 | 153.0 |
| South Africa | 427.5 | 397.3 | 7.6 | 78.3 |
| South Korea | 401.5 | 335.0 | 19.9 | 46.5 |
| Colombia | 373.3 | 339.2 | 10.1 | 130.0 |
| Brazil | 370.5 | 331.4 | 11.8 | 103.0 |
| Peru | 359.6 | 332.1 | 8.3 | 115.7 |
| Mexico | 348.2 | 322.7 | 7.9 | 70.0 |
| Thailand | 338.4 | 220.0 | 53.8 | 55.0 |
| Malaysia | 301.8 | 228.3 | 32.2 | 43.5 |
| Greece | 246.6 | 122.5 | 101.3 | 22.1 |
| Poland | 244.5 | 185.0 | 32.2 | 26.3 |
| Ireland | 225.4 | 105.5 | 113.6 | - |
| China | 215.0 | 166.7 | 29.0 | - |
| Chile | 214.8 | 185.0 | 16.1 | 30.1 |
| Italy | 179.5 | 100.4 | 78.8 | 20.3 |
| Israel | 173.2 | 161.3 | 7.4 | 33.5 |
| Slovakia | 168.3 | 118.3 | 42.3 | 18.2 |
| Austria | 148.7 | 72.7 | 104.5 | 8.1 |
| Spain | 115.8 | 73.1 | 58.4 | 18.2 |
| Portugal | 114.6 | 71.2 | 61.0 | 17.7 |
| UK | 113.4 | 57.3 | 97.9 | 8.9 |
| Australia | 90.0 | 74.8 | 20.3 | - |
| Belgium | 88.8 | 48.8 | 82.0 | 10.6 |
| USA | 60.0 | 35.7 | 68.1 | 8.0 |
| France | 58.7 | 36.7 | 59.9 | 9.7 |
| Japan | 50.0 | 39.5 | 26.6 | 8.5 |
| Germany | 42.1 | 27.5 | 53.1 | 6.9 |

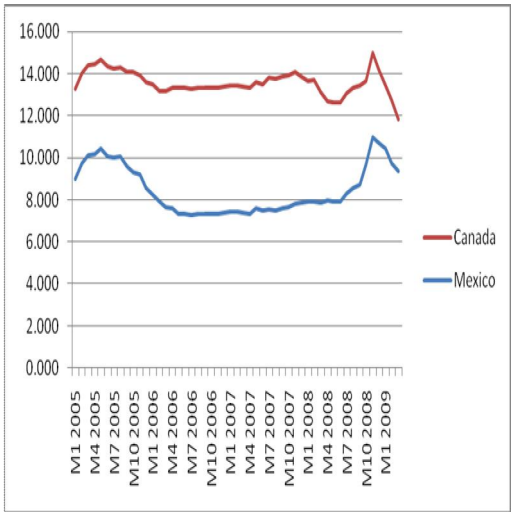
*cost per year to insure $10,000 worth of debt for 5 years.

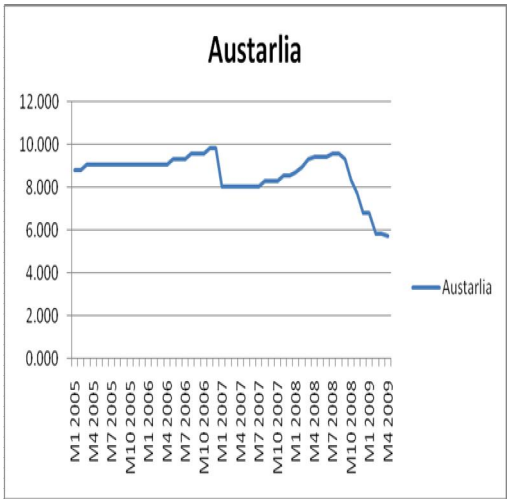
Table8.1 December 4 2008 report on cost of country debt insurance by Seeking Alpha. Start of the year is 2008.

| Country Default Risk As Measured By CDS Prices* | | | | |
|---|---|---|---|---|
| Country | Current | 12/31/2008 | YTD % Chg | Start of 2008 |
| Japan | 101.1 | 44.2 | 128.7 | 8.5 |
| Kazakhstan | 1369.0 | 670.8 | 104.1 | 201.8 |
| Ireland | 361.1 | 181.0 | 99.5 | - |
| Austria | 264.1 | 132.8 | 98.9 | 8.1 |
| Germany | 87.6 | 45.9 | 90.8 | 6.9 |
| Belgium | 143.8 | 79.5 | 80.9 | 10.6 |
| Israel | 275.7 | 161.4 | 70.8 | 33.5 |
| France | 91.7 | 54.1 | 69.4 | 9.7 |
| Australia | 189.4 | 117.8 | 60.8 | - |
| Mexico | 462.4 | 291.8 | 58.5 | 70.0 |
| Poland | 372.9 | 244.7 | 52.4 | 26.3 |
| Colombia | 466.3 | 307.5 | 51.7 | 130.0 |
| Peru | 448.6 | 302.5 | 48.3 | 115.7 |
| Spain | 145.8 | 100.7 | 44.8 | 18.2 |
| UK | 153.8 | 106.9 | 43.8 | 8.9 |
| South Korea | 456.2 | 318.7 | 43.2 | 46.5 |
| USA | 95.0 | 67.4 | 40.9 | 8.0 |
| Portugal | 133.1 | 96.3 | 38.2 | 17.7 |
| Malaysia | 308.3 | 225.1 | 36.9 | 43.5 |
| Brazil | 407.0 | 298.5 | 36.4 | 103.0 |
| Slovakia | 210.7 | 155.0 | 36.0 | 18.2 |
| China | 249.7 | 188.4 | 32.6 | - |
| Chile | 265.9 | 203.0 | 31.0 | 30.1 |
| Bulgaria | 637.7 | 499.4 | 27.7 | 78.6 |
| South Africa | 495.0 | 395.7 | 25.1 | 78.3 |
| Italy | 192.5 | 156.9 | 22.7 | 20.3 |
| Philippines | 466.9 | 383.6 | 21.7 | 153.0 |
| Turkey | 495.4 | 411.1 | 20.5 | 166.5 |
| Thailand | 304.4 | 255.8 | 19.0 | 55.0 |
| Greece | 264.7 | 232.1 | 14.0 | 22.1 |
| Vietnam | 562.1 | 497.7 | 12.9 | 126.2 |
| Indonesia | 693.7 | 638.3 | 8.7 | 153.5 |
| Egypt | 650.0 | 600.0 | 8.3 | 101.6 |
| Iceland | 1038.9 | 976.8 | 6.4 | 64.7 |
| Russia | 766.7 | 743.5 | 3.1 | 87.5 |
| Lebanon | 510.0 | 545.0 | -6.4 | 333.3 |
| Argentina | 3401.3 | 3905.0 | -12.9 | 460.7 |
| Venezuela | 2448.4 | 3229.3 | -24.2 | 451.5 |

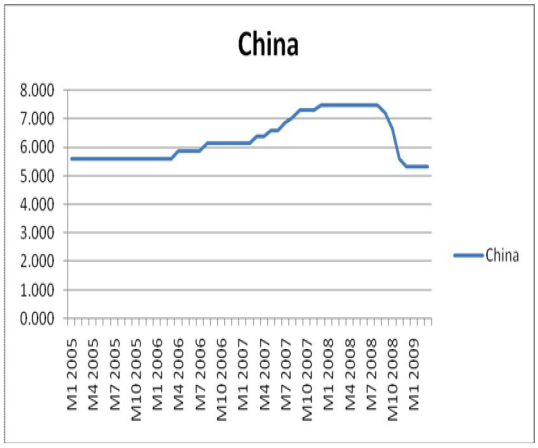
*Cost per year to insure $10,000 of debt for 5 years. US CDS prices are priced in Euros.

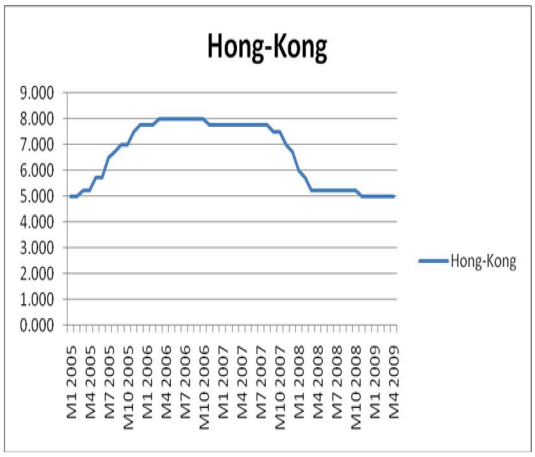
Table8.2. 05 March 2009 report on cost of country debt insurance by Seeking Alpha.



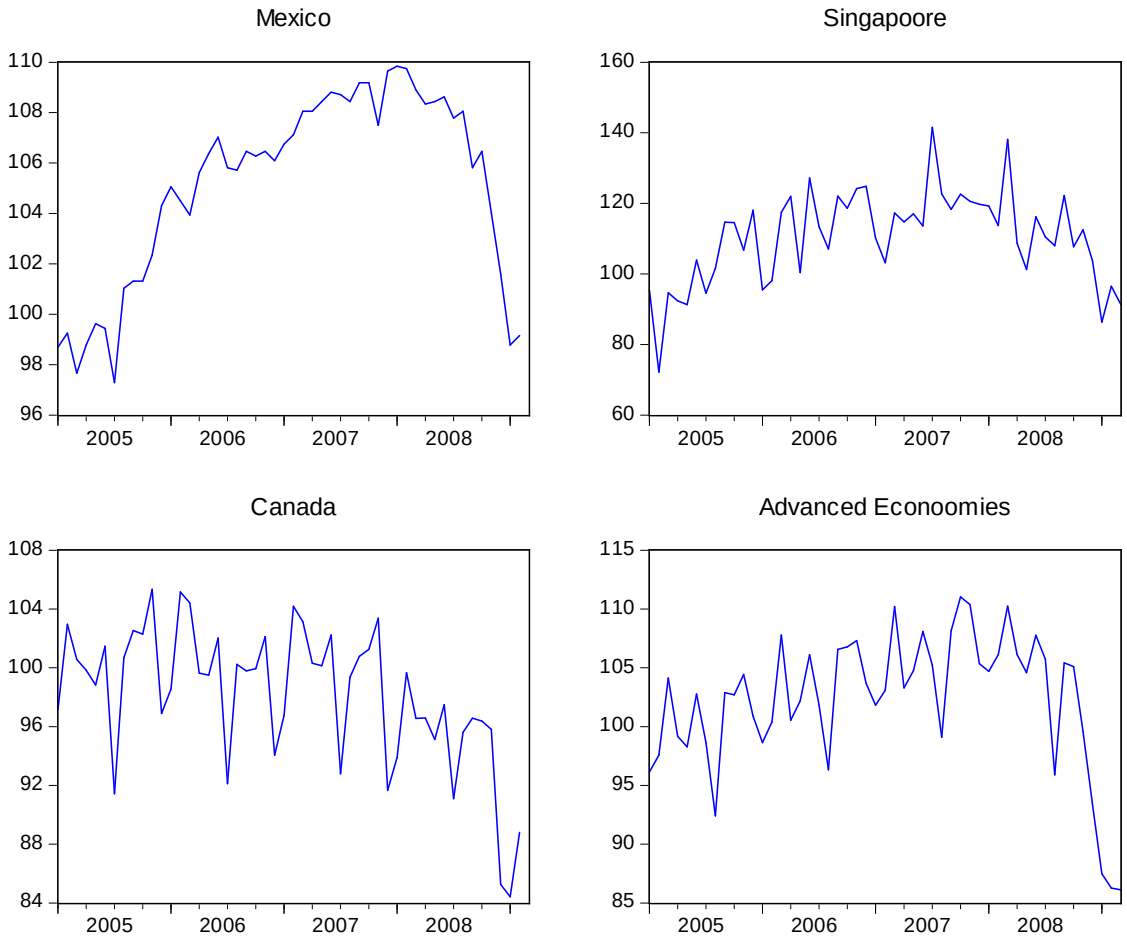




Graph 8.3 Lending rates of Australia, Canada and Mexico.

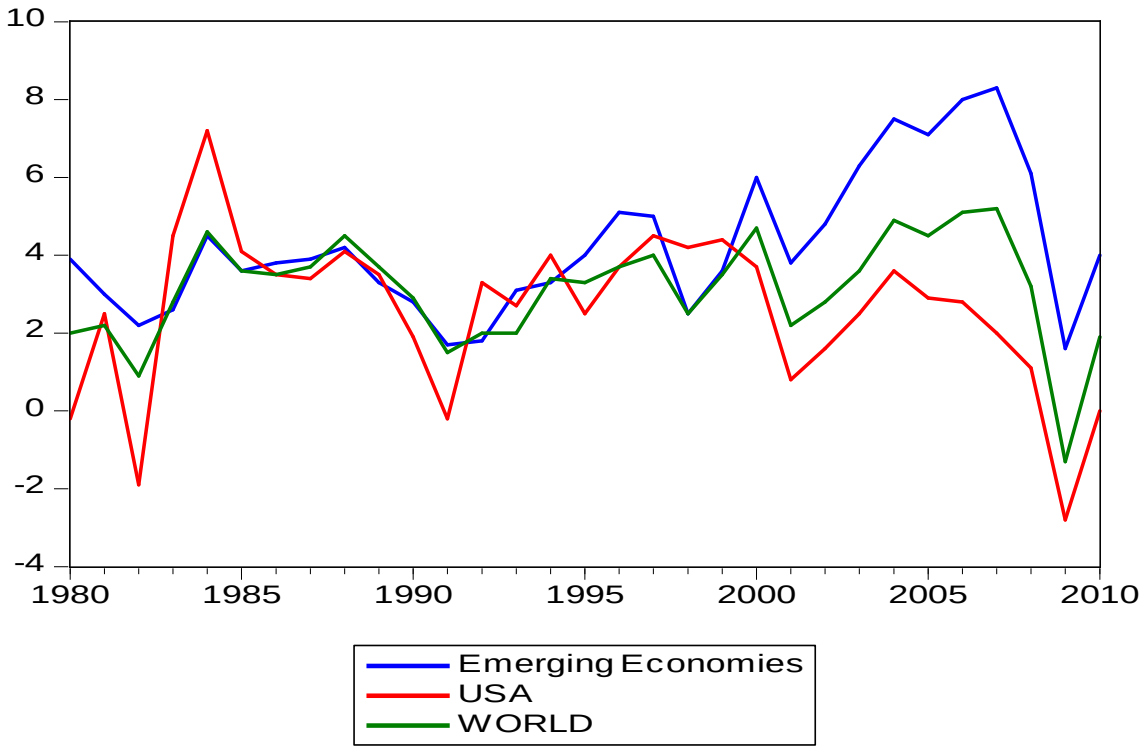



Graph 8.4 Lending rates of China and Hong-Kong.




Graph8.5 Industrial Production Indexes of US major trade partners.




Graph 8.6 IMF forecast on falling outputs.

Albania
Algeria
Angola
Antigua and Barbuda
Argentina
Armenia
Australia
Austria
Azerbaijan
Bahamas
Bahrain
Bangladesh
Belarus
Belgium
Belize
Bhutan
Bolivia
Bosnia-Hercegovina
Botswana
Brazil
Brunei
Bulgaria
Burundi
Cameroon
Canada
Cape Verde
Central African Republic
Chad
Chile
China
Colombia
Congo (Brazzaville)
Costa Rica
Croatia
Czech Republic
Denmark
Djibouti
Dominica
Dominican Republic
Ecuador
Egypt
Equatorial Guinea
Estonia
Federal Republic of Germany
Fiji
Finland
France
Gabon
Gambia
Georgia
Greece
Grenada
Guatemala
Guyana
Haiti
Honduras
Hong Kong
Hungary
Iceland
India
Indonesia
Iran
Ireland
Israel
Italy
Jamaica
Japan
Jordan
Kenya
Korea, South
Kuwait
Kyrgyzstan
Laos
Latvia
Lebanon
Lesotho
Liberia
Lithuania
Luxemburg
Macedonia (Skopje)
Madagascar
Malawi
Malaysia
Maldives
Mauritius
Mexico
Moldova
Mongolia
Morocco
Mozambique
Namibia
Nepal
Netherlands
New Zealand
Nicaragua
Nigeria
Norway
Panama
Papua New Guinea
Paraguay
Peru
Philippines
Poland
Portugal
Qatar
Republic of Yemen
Romania
Russia
Rwanda
Seychelles
Sierra Leone
Singapore
Slovakia
Slovenia
Solomon Islands
South Africa
Spain
Sri Lanka
St Kitts and Nevis
St Lucia
St Vincent and the Grenadines
Suriname
Swaziland
Sweden
Switzerland
Syria
Tanzania
Thailand
Tonga
Trinidad and Tobago
Turkey
Uganda
Ukraine
UK

Full list of the countries used in estimation.

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