The Global Financial Crisis and
The Korea-China Trade Relations

by

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July 5, 2012

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1. Introduction

The global financial crisis that started with the collapse of the Lehman Brothers Holdings Inc. in the United States in 2008 has been regarded as the worst economic disaster for the world economy since the Great Depression in the thirties. Many countries had been hit badly by the crisis, and saw drop in economic activities and national income but a rise in unemployment. The governments had been trying very hard to find policies to lessen the adverse impact of the financial crisis on their economies and to improve the economic situation of their countries.

The financial crisis was initially thought of a crisis that was limited to the US economy. First, the crisis originated from the United States, and second, people saw the failure of many financial institutions like big banks in the United States. Moreover, it has been recognized that the subprime mortgage crisis that happened two years earlier was a sign that there was something wrong with the housing market and financial sector of the United States, and argued that it should be treated as part of the financial crisis. However, it seemed that the subprime mortgage crisis and the financial crisis were only the problems of the US economy.

That was wrong, however. Many other economies in the world showed a lot of problems, with unemployment, regression, failure of the financial sector, and debt problems for the governments and the economies. There is strong evidence that the problems of these economies are linked to the financial crisis in the United States. In other words, the financial crisis that was commonly signified by the collapse of the Lehman Brothers Holdings Inc. was in fact a global financial crisis, and was not limited to the US economy. As a matter of fact, some of these other economies had problems even more severe than that of the US economy.

Table 1 presents the gross domestic products (GDPs) of some countries in the past two decades. The United States, being the epic center of the financial crisis, experienced a drop in its GDP in 2009, one year after the collapse of the Lehman Brothers Holdings Inc. This shows the power of the financial crisis. The United States managed to have its GDP return to the pre-crisis level in 2010. The world as a whole was hit by the financial crisis, and the aggregate GDP did drop in 2009 as well. In the world, the Euro area was severely damaged by the crisis. Its aggregate GDP dropped in both years, showing that the crisis in Europe for most countries is not over yet.

However, not all economies were hit equally during the crisis. In general, Asian economies experienced problems much milder than those experienced by most European economies. The drop in the national income of many Asian economies was small and short, and very quickly

these economies recovered. Although these economies are still feeling the after-shocks of the financial crisis, they are nevertheless growing with amazing rates.

This paper focuses on two of the economies in Asia: South Korea and China. It will examine how their economies are affected by the global financial crisis, and how they are inter-related through foreign trade. Furthermore, it will be shown that the Chinese economy performed very well during the financial crisis and that South Korea trades heavily with China. So, this paper will analyze how the performance of the Chinese economy may impact the national income of South Korea. Unlike many other papers in the literature about the global financial crisis, this paper analyzes the performance of two trade-related economies and examines how they faced the external shocks of the financial crisis.

Table 1 also shows that the Korea economy was hit heavily by the financial crisis. Korea's GDP dropped in both 2008 and 2009 by about 20 percent from its highest level. Then in 2010, its GDP rose up back to nearly its pre-crisis level. Korea's experience about the shock caused by the financial crisis was not unique, as many other economies also received similar shocks. What is so special is that the Korean economy recovered so much and so quickly in 2010.

The last column of Table 1 presents the GDP of China in these years. China's performance was very impressive as it did not experience any drop in its GDP in any of these years. Despite the financial crisis, its GDP kept on rising, although there had been small drops in its growth rates; for example, the growth rates of China's (nominal) in in 2006 to 2010 were 12.3 percent, 21.2 percent, 5.7 percent, 6.0 percent, and 10.8 percent, respectively. There is no doubt that China was hurt by the financial crisis. The economy showed its strength when only the growth rate of its GDP are hurt, but its GDP kept on rising.[1]

The economies of South Korea and China are the focus in the present paper for the following reasons. First, South Korea has been growing very impressively in the past years. It is thus important to see how the financial crisis may affect the growth of the Korean economy, and whether the growth of the Korean economy has been interrupted. Second, the trade volumes between South Korea and China had been growing extremely rapidly in the past two decades. For example, in 1989,

This paper is organized as follows. Section 2 examines the global financial crisis, which originated from the United States, was transmitted to other economies, especially to those in Asia. It is argued that there are two main transmission channels through which the shock waves were sent to other economies: the financial sector and foreign trade. For most Asian economies, the financial crisis was transmitted mainly through the trade channel, partly because of the strength and stability of their financial sectors, and partly because traditionally the US has been the

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[1] See Blanchard et. al. (2010), Corden (2009), Leightner (2008), and Wong (2012) for more discussion about the impacts of the current financial crisis on emerging economies.

biggest market for most of their products. The section also examines how the shocks had impacted the Chinese and the Korean economies.

Section 3 analyzes the performance of the Chinese and Korean economies during the financial crisis. In particular, we try to estimate the sizes of the shocks experienced by China and South Korea. A hypothetical model is considered in which an economy trades only with the US but not with other economies. The simple macroeconomic multiplier is derived. Section 4 considered a two-economy model, in which two economies trade with the US and with each other. We can then examine how an external shock may affect both economies. Section 5 examines more closely how China and South Korea interacted during the financial crisis and how as a whole were affected. Section 6 concludes

2. How Were Korea and China Affected by the Financial Crisis?

The global financial crisis originated from the United States. Yet, it affected not just the US economy but also many other economies in the world. The question is, while would other economies affected by the financial crisis? Moreover, why were different economies affected differently by the financial crisis? The last question is particularly interesting, but to answer this question, it is important to answer the first question first.

The second question is important because it is noted that the impacts of the financial crisis on many Asian economies were relatively mild, and many of them did recover quickly. It was explained earlier in this paper that South Korea was hit by the financial crisis, experiencing a drop in its GDP two years in a row during the financial crisis. However, South Korea rose up again in 2010 when its GDP climbed back to nearly its level before the crisis. Furthermore, there are also economies like the Chinese economy that experienced only mild impacts from the financial crisis, and which kept on growing although the growth rates had been slightly retarded by the crisis.

In addition to understanding why differently economies were affected, we also need to find out how the financial crisis that initially occurred in the United States could send shocking waves to other economies, making the financial crisis a global one. It was argued in Wong (2012) that there are two main channels through which the financial crisis was transmitted to most other countries: the financial channel and the trade channel. The financial channel works through the linkages among the financial intermediaries in different countries, through the direct involvement of the financial intermediaries in the US housing and financial markets, and through direct and indirect investment of other economies in the US housing and financial markets. The trade channel, on the other hand, works through the movements of goods and services across countries and also the economic impacts of these movements of goods and services.

Wong (2012) argues that for many Asian economies, the major channel through which the financial crisis was transmitted from the United States was the trade channel. That is because the financial sectors in many Asian economies are relatively solid and healthy. Therefore their financial sectors could absorb the adverse impacts of the financial crisis that came from the United States. On the other hand, most Asian economies had large trade volumes with the United States and also European countries. In fact, the US and Europe markets are major destinations of the goods and services from many of these Asian economies. Thus when the US and European countries experienced economic downturn caused by the financial crisis, their demand for the goods and services from Asia (and also from some other areas) dropped. This could lead to a substantial drop in the export demand for the goods and services of these Asian economies and thus macroeconomic contraction of their economies.

While Wong (2012) focuses on the experience of the Chinese economy and various government policies to improve the domestic economic situation, the present paper looks at two economies at the same time. These two economies trade with each other and are thus inter-dependent. When there is an external shock, both economies will be affected but the impacts of the shock on each economy will depend on not only the characteristics of the economy but also on how the two economies are related to each other. These external export demands are regarded as exogenous by China and South Korea.

Table 2 shows the observed values of exports to the United States from 1989 to 2011. It is noted that the export values dropped substantially in 2009, although they climbed up back in 2010 and 2011, for both China and South Korea. However, it is not quite correct to argue that the drops in the observed exports to the United States from 2008 to 2009 as the magnitudes of the shocks experienced by China and South Korea, because the exports would continue to rise in these years should there be no financial crisis. Therefore to more accurately estimate the sizes of the external shocks, we need to estimate the export volumes in the absence of the financial crisis.

3. South Korea and China under the Financial Crisis

As explained, the present focuses on two economies, South Korea and China, that are trade related and that are affected by the global financial crisis. There are several reasons why these two economies are considered in the present paper. First, South Korea has been trading a lot with China, and China has become the biggest foreign buyer of Korean goods and services. China, on the other hand, sells most of its goods and services to the United States. Second, the impact of the global financial crisis on China has been mild, as the Chinese economy kept on growing during the period of the financial crisis. It is thus interesting to find out how the growth of the Chinese economy may have help the recovery and development of the Korean economy. Third,

since the present paper examines the impacts of the financial crisis on two economies at the same time, it is necessary to construct a theoretical model of two economies that are trade related. The model will help us establish a more complete analysis of the impacts on the two economies.

To begin our analysis, we first need to have an idea of the magnitudes of the shocks. In this paper, we focus on the shock through the trade channel, and also we consider only the change in the export demand from the United States.[2] For both China and South Korea, the export demands are regarded as exogenous. With this assumption, we postulate that for China or South Korea the export demand at time t from the US rises as a function of the time according to the following function:

$$E_t^{iu} = A^i + B_1^i t + B_2^i t^2 + \varepsilon_t, \tag{1}$$

where the superscript "i" stands for either China or South Korea, E^{iu} is country i's export to the US, t is the time trend with $t =1$ for 1989, 2 for 1990, and so on, and ε_t is the error term.

Equation (1) is estimated for both China and South Korea, with the observed data from 1989 to 2007. This will give us the estimated export values in the absence of the financial crisis.[3] The results of the estimation are:

$$\hat{E}^{cu} = 30.345 - 10.3999\,t + 1.06\,t^2$$
$$\quad\quad (11.07)\quad (2.549)\quad\quad (0.124)$$
$$R^2 = 0.9610$$

$$\hat{E}^{ku} = 18.4923 - 0.0531\,t + 0.0831\,t^2$$
$$\quad\quad (2.207)\quad (0.508)\quad\quad (0.0246)$$
$$R^2 = 0.9227$$

where the number inside a pair of parentheses is the standard deviation. The two equations are then used to project the exports of the countries to the US from 2008 to 2011 to give an estimate of the shock in each year for China or South Korea. The results are given in Table 2. The difference between the estimated export and the observed export is regarded as the shock that China or South Korea experienced. For example, as a percent of the estimated ones, the shocks for China in 2008 to 2011 are –2.5%, 20.9%, 9.9%, and 7.8%, respectively, while those for South Korea are 8.2%, 30.0%, 13.1%, and 7.8%, respectively. These numbers show that the

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[2] We may have underestimated the size of the shock. Since it is a global crisis, many other economies should have been adversely affected, and thus could lower their demand for China's and Korea's goods and services. The notable example is many of the European countries, which have been badly hit by the crisis. For simplicity, we ignore these indirect impacts through third countries.

[3] The estimation should include only observed data before the financial crisis occurs. However, when the crisis starts is not clear, depending on what has happened in the US and other countries, and on when the focused economy first experienced the shock. In Wong (2012), the estimation for China was done using the data up to 2008. In the present paper, it is observed that there are signs that South Korea have felt about external adverse shocks in 2008. Therefore we use data up to 2007 for the estimation.

shocks in 2008 were mild, but the shocks were the biggest in 2009, and then they tapered off gradually.

The sizes of the shocks to China and South Korea caused by the financial crisis are significant. The impacts on the national income of the two countries could be even more damaging, because of the multiplier effect. To see the latter point more clearly, assume for the time being that the two economies are independent, and do not trade with each other. Let us consider the following equilibrium condition for the two countries:

$$Y^i = C^i + I^i + G^i + E^i - M^i,$$ (2)

where for country i, $i = k$ (for Korea) or c (for China),

      $Y =$ gross domestic product, GDP (or gross national product, GNP since there is no movement of factors;

      $C =$ household consumption demand;

      $I =$ investment demand;

      $G =$ government expenditure demand;

      $E =$ external export demand;

      $M =$ import demand;

      $T =$ income/corporate profit tax revenue.

For example, Y^k is the national income (GDP) of South Korea and C^c is the household consumption demand of China. Equation (2) represents the equilibrium of the commodity market. For simplicity, we assume that I^i, G^i, and E^i are all given exogenously, and can be written as I_0^i, G_0^i, and E_0^i, respectively. The consumption and import demands, and the direct tax revenue can be written as

    $C^i = C_0^i + c^i(Y^i - T^i)$;

    $M^i = M_0^i + m^iY^i$;

    $T^i = T_0^i + t^iY^i$.

In the above functions, C_0^i, M_0^i, T_0^i are the autonomous (exogenous) components of the corresponding functions and are independent of the national income level. Substitute these functions into the equilibrium condition (2) and rearrange terms to give

$$Y^i = \frac{C_0^i - cT_0^i + I_0^i + G_0^i + E_0^i - M_0^i}{1 - c^i(1 - t^i) + m^i},$$ (3)

Equation (3) explains how the equilibrium national income can be determined from the known values of the exogenous variables. Equation (3) can be used to derive the single-economy simple macroeconomic multiplier:

$$\alpha^i = \frac{1}{1 - c^i(1 - t^i) + m^i}. \tag{4}$$

In general, the multiplier is greater than one. The usefulness of the multiplier is that if one of the exogenous variables such as export drops by one dollar, then the national income drops by α^i dollars.

To have a better idea of the impacts of the financial crisis on the Chinese and Korean economies, we did a straightforward estimation of the multipliers of the two economies. We assume that the autonomous parts of the household consumption demand and the import demand of each economy are functions of the time trend and the square of the time trend, and that the direct tax revenue is given exogenously and independent of the national income. The latter assumption implies that $t^i = 0$. We then ran simple (OLS) regressions of the household consumption and import against national income, time trend (*time* = 1 for 1989, and so on), and the square of the time trend for each economy. The results are

(a) China

$$\hat{C}^c = 12.9944 + 0.3147 \ Y^c + 15.710 \ t - 0.4126 \ t^2$$
$$\phantom{\hat{C}^c =} (28.36) \quad (0.0205) \quad (5.945) \quad (0.416)$$
$$R^2 = 0.9973$$

$$\hat{M}^c = 80.945 + 0.1034 \ Y^c - 29.514 \ t + 2.9805 \ t^2$$
$$\phantom{\hat{M}^c =} (59.73) \quad (0.0431) \quad (12.522) \quad (0.8771)$$
$$R^2 = 0.9821$$

(b) South Korea

$$\hat{C}^k = -11.399 + 0.5415 \ Y^k + 1.187 \ t - 0.0347 \ t^2$$
$$\phantom{\hat{C}^k =} (7.463) \quad (0.0198) \quad (1.137) \quad (0.050)$$
$$R^2 = 0.9973$$

$$\hat{M}^k = 13.0120 + 0.3321 \ Y^k - 11.0097 t + 0.7947 \ t^2$$
$$\phantom{\hat{M}^k =} (25.275) \quad (0.0669) \quad (3.851) \quad (0.1694)$$
$$R^2 = 0.9681$$

For China, the estimated marginal propensity to consume and the marginal propensity to import are 0.3147 and 0.1034, respectively. These are low as compared with those numbers for many other countries, reflecting the high saving rates in China. The estimated figures imply a multiplier of 1.2679, as implied by equation (4).

For South Korea, the estimated marginal propensity to consume and the marginal propensity to import are 0.5415 and 0.3321, respectively. The resulting multiplier is 1.2649, which is very close to that of China.

The multipliers of both countries are quite low. The good thing is that the drop in external export demand as a result of the financial crisis will not cause a very big drop in each country's national income.

The one-economy model introduced above may not be appropriate for China and South Korea, mainly because they trade a lot with each other, and thus their economies are inter-related. When one or both of them experience an external shock, trade between them will be affected, and thus their national income levels will be affected.

It is clear from trade statistics that South Korea depends a lot on the trade relations with China, and the dependence grows over time. In 1989, 33.2 percent of South Korea's goods and services went to the US, while China was only the eighth important market, buying only 2.1 percent of South Korea's export. In 2011, China was the biggest buyer of the South Korean goods and services, and the US was at the second place. In fact, the importance of China for Korea's goods and services had been rising substantially in the past two decades. As shown in Table 5, the year of 2003 marked the first time in the modern era that South Korea sold more goods and services to China than to the US.

On the other hand, Table 6 shows a different picture for China. For the goods and services from China, South Korea has been remaining a relatively small market. South Korea constantly purchased around 4 to 5 percent of China's export. However, the importance of the US as a market of Chinese goods and services has been rising rapidly, and since 1993, the US has been buying around 20 percent of China's export, although the percentage dropped slightly during the financial crisis.

4. A Two-Country Model

In view of the trade relations between South Korea and China, we now try to develop a two-country model to examine the inter-relationship between them and to analyze how they as a whole may be affected by an external shock.[4] For the following model, we will maintain generality, but we will look at the case of South Korea and China more explicitly. Consider two countries labeled A and B. Both countries trade with each other and the rest of the world, with the latter being denoted by R. Since the present analysis focuses on trade relations and commodity market adjustment, we ignore the monetary side of the economies. Similarly, we assume that the interest rates and exchange rates of the economies do not change.

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[4] Strictly speaking, this is a three-country model, which includes the two countries that we analyze plus the rest of the world. Since the two countries are the focus of the analysis, we conveniently call the model a two-country model.

Define the national accounting variables as before, but use a superscript "*a*" or "*b*" to represent the variables of country A or B, respectively. For example, Y^a is GDP of economy A, M^b is the import of economy B, and so on. The equilibrium of the commodity market of economy i, $i = a, b$, at a particular time is given by equation (2). For simplicity, the time index is omitted.

The present model is similar to the one-economy model introduced above, except that we now emphasize trade between the two economies. Country i's import consists of its import from country j, $j = a, b, i \neq j$, and that from the rest of the world, or we can write

$$M^i = M^{ij} + M^{ir}, \tag{5}$$

where the superscript "*ij*" denotes country i's import from country j and "*ir*" denotes that from the rest of the world. Each import component consists of two parts, the autonomous part that does not depend on the disposable income and the endogenous part that depends on the disposable income. Thus we can write

$$M^{ij} = M_0^{ij} + m^{ij}Y^i, \tag{6}$$

where M_0^{ij} is the autonomous import, and m^{ij} is the marginal propensity to import from country j. Similarly, for the import from the rest of the world, we have

$$M^{ir} = M_0^{ir} + m^{ir}Y^i. \tag{7}$$

The two components of import can be combined to give the aggregate import:

$$\begin{aligned} M^i &= (M_0^{ij} + M_0^{ir}) + (m^{ij} + m^{ir})Y^i \\ &= M_0^i + m^iY^i, \end{aligned} \tag{8}$$

where M_0^i is the autonomous aggregate import and m^i is the aggregate marginal propensity to import.

Country i exports goods to country j, $j = a, b, i \neq j$, and the rest of the world. Therefore, we can write

$$E^i = E^{ij} + E^{ir}. \tag{9}$$

The export demands are determined in other countries and are taken as given by country i. The country's export to country j is the latter's import, i.e., $E^{ij} = M^{ji}$. If country j's economic structure is similar to that of country i, the analysis given above implies

$$E^{ij} = M^{ji} = M_0^{ji} + m^{ji}Y^j. \tag{10}$$

Substitute equations (5) to (10) into the equilibrium equation (2) to give

$$\phi^i Y^i + \theta^j Y^j = \sigma^i, \tag{11}$$

where

$$\phi^i = 1 - c^i(1 - t^i) + m^i > 0$$
$$\theta^j = -m^{ji} \leq 0 \tag{12}$$
$$\sigma^i = C_0^i + I_0^i + G_0^i + E_0^{ir} + M_0^{ji} - M_0^i > 0.$$

Note that $\theta^j = 0$ if country j does not import from country i. The same analysis can be applied to country j, yielding the following equation

$$\theta^i Y^i + \phi^j Y^j = \sigma^j, \tag{13}$$

where

$$\theta^i = -m^{ij} \leq 0$$
$$\phi^j = 1 - c^j(1 - t^j) + m^j > 0 \tag{14}$$
$$\sigma^j = C_0^j + I_0^j + G_0^j + E_0^{jr} + M_0^{ij} - M_0^j > 0.$$

The equations (11) and (13) are applied to countries A and B, with i standing for country A and j representing country B. After rearranging the terms, we have:

$$\begin{bmatrix} \phi^a & \theta^b \\ \theta^a & \phi^b \end{bmatrix} \begin{bmatrix} Y^a \\ Y^b \end{bmatrix} = \begin{bmatrix} \sigma^a \\ \sigma^b \end{bmatrix}. \tag{15}$$

Equation (15) can be solved for the equilibrium GDPs of the countries:

$$Y^a = \frac{\phi^b \sigma^a - \theta^b \sigma^b}{\phi^a \phi^b - \theta^a \theta^b}$$
$$\tag{16}$$
$$Y^b = \frac{\phi^a \sigma^b - \theta^a \sigma^a}{\phi^a \phi^b - \theta^a \theta^b}.$$

From the marginal propensities of the countries, $\phi^a \phi^b - \theta^a \theta^b > 0$. Equation (16) explains how the GDPs of the countries can be determined from the exogenous variables. Under normal values of the exogenous variables, the countries' equilibrium GDPs are positive. The equation can also be used to find out the impact of a shock such as an increase in a country's government expenditure on its national income. For example, differentiate country A's GDP with respect to σ^a to give

$$\hat{\alpha}^a = \frac{\partial Y^a}{\partial \sigma^a} = \frac{\phi^b}{\phi^a \phi^b - \theta^a \theta^b}. \tag{17}$$

The expression in (17) is what is commonly called multiplier. In the present model, the multiplier is affected by the trade relations between the two economies. The same analysis can be applied to country B to determine its multiplier:

$$\hat{\alpha}^b = \frac{\partial Y^b}{\partial \sigma^b} = \frac{\phi^a}{\phi^a \phi^b - \theta^a \theta^b}. \tag{18}$$

Rearrange the terms to write the multipliers in an alternative form:

$$\hat{\alpha}^a = \frac{1}{\phi^a - \theta^a \theta^b / \phi^b}$$

$$\hat{\alpha}^b = \frac{1}{\phi^b - \theta^a \theta^b / \phi^a}. \tag{19}$$

Recall equation (4), which gives the multiplier of a single economy. Comparing equations (4) and (19) shows that

$$\alpha^i \leq \hat{\alpha}^i. \tag{20}$$

The two multipliers are equal, when $\hat{\alpha}^i$ reaches its minimum point, if at least θ^a or $\theta^b = 0$. To examine how trade between the two economies may affect their multiplier, let us consider a special case in which there is no trade between the two economies. This implies that $M^{ij} = M^{ji} = 0$, or that $m^{ij} = m^{ji} = 0$. From (14), we have $\theta^a = \phi^b = 0$. The two multipliers in (17) and (18) reduce to the single-economy multiplier given in (4).

The multipliers in (4) are the usual multipliers in a single-economy model.[5] As a matter of fact, equations (17) and (18) can be rearranged to give alternative expressions of the multipliers: From (19) it is clear that the multipliers reach their minimum values when θ^a or θ^b equals zero, or both.

5. The Case of South Korea and China

The two-country model introduced in the previous section can be applied to the case of South Korea and China. We now let South Korea be country i and let China be country j. In reality, both countries trade with each other so that $\theta^k < 0$ and $\theta^c < 0$. The two-country model can be applied in several cases. First, consider equation (13). If South Korea takes China's national income as an exogenous variable, then the impact of a change in China's national income on Korea's national income is equal to

$$\frac{\partial Y^k}{\partial Y^c} = -\frac{\theta^c}{\phi^k} > 0. \tag{21}$$

Equation shows how Korea's national income is affected by China's national income. The implication is that Korea benefits from the economic growth of the Chinese economy and from China's performance during the financial crisis period.

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[5] See Wong (2012) for more details.

Second, equation (16) shows that Korea's national income is affected by a change in some of the exogenous variables in China. For example,

$$\frac{\partial Y^k}{\partial \sigma^c} = -\frac{\theta^c}{\phi^k \phi^c - \theta^k \theta^c} > 0. \tag{22}$$

Equation (22) demonstrates again the interdependence between the two economies.

Third, during the global financial crisis, there is a drop in the external export demand, due to a drop in the export to the United States. The impact is measured by the multiplier given by (19). The multiplier effect enhances the adverse effect of the drop in external export demand.

Fourth, when the United States was hit by the financial crisis, unemployment rose and national income dropped. It lowered its import of goods from many countries, including South Korea and China.

In order to have a better idea of the trade relations between South Korea and China, we estimate the marginal propensities of import of the countries from each other using OLS regression. The results are: $m^{kc} = 0.004323$ and $m^{ck} = 0.03961$. Using (12) and (14), we get $\theta^k = -m^{kc} = -0.004323$ and $\theta^c = -m^{ck} = -0.03961$. On the other hand, from the simple multipliers derived earlier, we get $\phi^k = 1/\alpha^k = 0.7906$ and $\phi^c = 1/\alpha^c = 0.7887$. Substitute these values into (17) and (18) to get $\hat{\alpha}^k = 1.2652$ and $\hat{\alpha}^c = 1.2683$. Both multipliers are only slightly bigger than the corresponding simple multipliers in the case of an isolated economy.

The results are interesting and not too surprising. Both countries have a very low marginal propensity to import from each other. From (19), it is clear that for each country, the multiplier obtained in the two-economy model is very close to that obtained in the single-economy model.

The two-country model introduced in the previous section can be applied to other pairs of countries, or groups of countries. If they have substantial trade with each other, we would expect that the multipliers would be much greater than the simple multipliers suggested by the single-economy model.

Despite the fact that the multipliers of South Korea and China estimated using the two-economy are close to their simple ones assuming no trade connection between them, the financial crisis did have impacts on the trade relations between the two countries. Tables 5 and 6 show the changes in the shares of the countries' trade with each other and with the US. From Table 5, we see that South Korea's share of trade with China grew substantially after the financially crisis, while that with the US dropped. The table shows that the share of Korea's export to China had been rising in the past two decades. From 2005 to 2008, the percentage of

Korea's goods and services export to China stayed within a narrow band roughly between 21 percent to 22 percent. Then in 2009, after the break-out of the financial crisis, the share jumped to 23.9 percent, and remained historically high in 2010 and 2011. On the other hand, the share of Korea's export to the US had been declining in the past two decades. We noted earlier that in 2003, China replaced the US as the biggest market for Korea's exports. In 2011, the value of the goods and services South Korea sold to China is nearly 250 percent of that to the US. As a matter of fact, the financial crisis seemed to accelerate the growing importance of China as the leading destination for Korea's goods and services. In 2008, Korea's share of export to the US dropped between 12 percent for the first time in recent years. In 2011, the share fell down to nearly 10 percent.

The increasing importance of the Chinese economy as a market for the goods and services from South Korea is easy to understand. The Chinese economy showed its strength and ability to resist foreign adverse shocks during the financial crisis. The growth of the economy has led to an increase in foreign products, and this will have positive impacts of the economies of its trading partners.

For China, the US remains to be the biggest market for its goods and services, although because of the economic slowdown in 2008 and recent years, the importance of the US as a destination for China's export dropped slightly. South Korea is an important international buyer of China's goods and services, and in recent years, the share of China's export to South Korea remained fairly constant with values above 4 percent. In general, China's export relations with the US and South Korea remain fairly stable, and had not been much affected by the financial crisis.

6. Concluding Remarks

The present paper is a preliminary attempt to explore the trade relations between South Korea and China and how the trade relations have been affected by the global financial crisis. We argued that when two economies trade heavily between themselves, any shock experienced by one of them will be transferred to another one through foreign trade. This happened between China and South Korea. For the present global financial crisis, the trade relations between China and South Korea will play an even more significant role because the major channel through which the financial crisis was transmitted from the US to the Asian economies.

Because for many Asian economies, the effects of the global financial crisis worked mainly through the trade channel, their trade relations will be affected one way or the other. For South Korea, we note that the Chinese economy has becoming more and more important market for the Korean goods and services. On the other hand, economic slowdown of the US economy lowered

the significance of the economy as a destination of the goods and service from South Korea. Right now, South Korea's export of goods and services to China is more than twice of that to the US. The case of South Korea is a good example of how Asian economies can benefit from the growth of the Chinese economy during the financial crisis.

On the other hand, China has been maintaining relatively stable trade relations with many other economies. Despite the financial crisis, the composition of foreign markets for the Chinese goods and services stayed fairly constant.

Table 1 The GDP of Selected Countries, 1989 - 2010

US$ bn

year	world	US	Euro area	Korea	China
1989	19,625.7	5,439.7	4,527.2	230.5	344.0
1990	21,921.2	5,750.8	5,688.2	263.8	356.9
1991	22,996.2	5,930.7	5,907.8	308.2	379.5
1992	24,553.0	6,261.8	6,520.6	329.9	422.7
1993	24,920.2	6,582.9	5,971.6	362.1	440.5
1994	26,757.1	6,993.3	6,316.1	423.4	559.2
1995	29,698.6	7,338.4	7,294.5	517.1	728.0
1996	30,310.2	7,751.1	7,375.2	557.6	856.1
1997	30,229.4	8,256.5	6,732.2	516.3	952.7
1998	30,123.8	8,741.0	6,909.4	345.4	1,019.5
1999	31,240.7	9,301.0	6,871.0	445.4	1,083.3
2000	32,249.7	9,898.8	6,256.1	533.4	1,198.5
2001	32,056.5	10,233.9	6,348.1	504.6	1,324.8
2002	33,314.9	10,590.2	6,907.8	575.9	1,453.8
2003	37,471.8	11,089.2	8,528.6	643.8	1,641.0
2004	42,230.7	11,812.3	9,771.7	722.0	1,931.6
2005	45,659.7	12,579.7	10,142.5	844.9	2,256.9
2006	49,503.6	13,336.2	10,756.2	951.8	2,713.0
2007	55,840.4	13,995.0	12,368.8	1,049.2	3,494.1
2008	61,290.9	14,296.9	13,545.4	931.4	4,521.8
2009	58,074.1	14,048.1	12,414.3	834.1	4,991.3
2010	63,257.0	14,586.7	12,149.1	1,014.5	5,926.6

Source: World Bank, *World Development Indicators*, various years

Table 2 China's and Korea's Observed and Estimated Exports to the US, 1989-2011

US$ bn

year	China observed	est.	Korea observed	est.
1989	$4.4	$21.0	$20.7	$18.5
1990	$5.2	$13.8	$19.4	$18.7
1991	$6.1	$8.7	$18.6	$19.1
1992	$8.6	$5.7	$18.2	$19.6
1993	$17.0	$4.9	$18.2	$20.3
1994	$21.5	$6.1	$20.7	$21.2
1995	$24.7	$9.5	$24.3	$22.2
1996	$26.7	$15.0	$21.9	$23.4
1997	$32.7	$22.7	$21.9	$24.7
1998	$38.0	$32.4	$22.8	$26.3
1999	$42.0	$44.3	$29.6	$28.0
2000	$52.2	$58.3	$37.8	$29.8
2001	$54.4	$74.5	$31.4	$31.8
2002	$70.1	$92.7	$32.9	$34.0
2003	$92.6	$113.1	$34.4	$36.4
2004	$125.1	$135.6	$43.0	$38.9
2005	$163.2	$160.2	$41.5	$41.6
2006	$203.8	$186.9	$43.3	$44.5
2007	$233.2	$215.8	$45.9	$47.5
2008	$252.8	$246.7	$46.5	$50.7
2009	$221.3	$279.8	$37.8	$54.0
2010	$283.8	$315.1	$50.0	$57.6
2011	$325.0	$352.4	$56.4	$61.2

Source: United Nations, *Comtrade Database*, various years and author's computation

Table 3 South Korea's Real GDP and Its Components, 1989 - 2010

2000 US$ Bn

Year	GDP	C	I	G	E	M
1989	270.8	142.2	91.9	31.2	83.4	77.8
1990	295.6	153.0	110.9	34.9	82.6	85.8
1991	323.4	165.8	128.5	37.6	85.2	93.7
1992	342.4	177.4	127.7	41.2	91.0	95.0
1993	363.4	189.1	129.8	43.0	96.4	95.0
1994	394.4	206.4	145.7	45.1	105.1	108.0
1995	430.5	224.8	162.2	48.2	124.1	128.8
1996	460.7	244.1	179.1	53.5	128.4	144.4
1997	482.1	255.9	173.4	55.7	156.2	159.1
1998	449.1	221.5	112.3	57.5	207.3	149.5
1999	491.7	255.1	143.2	60.5	192.1	159.2
2000	533.4	291.4	163.0	63.8	205.7	190.5
2001	554.6	309.6	161.7	70.7	198.2	185.7
2002	594.2	337.0	173.5	75.0	196.8	188.1
2003	610.9	334.8	182.6	79.7	216.1	202.2
2004	639.1	336.1	191.3	85.1	261.3	234.7
2005	664.4	357.0	197.2	92.2	260.9	242.9
2006	698.8	380.7	207.0	101.4	277.3	267.6
2007	734.5	399.3	216.1	107.9	307.9	296.8
2008	751.4	410.8	234.5	114.9	398.3	407.1
2009	753.8	407.2	198.1	120.5	374.8	346.9
2010	800.2	421.8	233.3	122.9	419.2	396.9

Source: World Bank, *World Development Indicators*, various years

Table 4 China's Real GDP and Its Components, 1989 - 2010

2000 US$ Bn

Year	GDP	C	I	G	E	M
1989	428.3	215.6	159.6	59.3	59.5	65.7
1990	444.6	207.8	160.7	62.9	71.5	58.2
1991	485.5	220.4	175.4	74.9	84.3	69.5
1992	554.4	253.6	207.7	86.6	103.4	96.8
1993	632.1	269.7	281.2	98.2	124.2	141.1
1994	714.9	294.0	301.7	109.7	152.0	142.6
1995	792.8	338.4	332.1	109.3	160.3	147.3
1996	872.1	379.4	352.7	122.1	174.9	157.0
1997	953.2	413.2	361.7	135.4	207.4	164.5
1998	1027.5	451.7	381.2	150.5	209.1	164.9
1999	1105.6	501.0	406.3	169.1	223.0	193.7
2000	1198.5	559.5	420.9	189.2	279.6	250.7
2001	1297.9	592.6	470.7	207.1	293.3	265.8
2002	1416.1	622.7	536.2	220.8	355.9	319.5
2003	1557.7	651.8	641.8	229.8	460.4	426.1
2004	1715.0	689.7	742.0	239.6	582.3	538.5
2005	1908.8	727.2	803.6	272.5	707.8	602.3
2006	2151.2	757.5	924.4	303.6	841.8	676.2
2007	2456.7	883.3	1025.4	331.8	943.7	727.5
2008	2692.5	940.9	1186.0	358.0	941.8	734.1
2009	2940.2	998.0	1418.5	394.1	785.4	655.8
2010	3246.0	1134.2	1550.9	433.8	959.9	832.8

Source: World Bank, *World Development Indicators*, various years.

Table 5 Korea's Exports to World, China, and the US, 1989 - 2011

US$ bn, %

Year	world	China		US	
		value	share	value	share
1989	62.4	1.3	2.1%	20.7	33.2%
1990	65.0	1.4	2.1%	19.4	29.9%
1991	71.9	1.0	1.4%	18.6	25.9%
1992	76.6	2.7	3.5%	18.2	23.7%
1993	82.2	5.2	6.3%	18.2	22.2%
1994	96.0	6.2	6.5%	20.7	21.6%
1995	125.1	9.1	7.3%	24.3	19.5%
1996	129.7	11.4	8.8%	21.9	16.9%
1997	136.2	13.6	10.0%	21.9	16.0%
1998	132.3	11.0	8.3%	22.8	17.2%
1999	143.7	13.7	9.5%	29.6	20.6%
2000	172.3	18.5	10.7%	37.8	21.9%
2001	150.4	18.2	12.1%	31.4	20.8%
2002	162.5	23.8	14.6%	32.9	20.3%
2003	193.8	35.1	18.1%	34.4	17.7%
2004	253.8	49.8	19.6%	43.0	16.9%
2005	284.4	61.9	21.8%	41.5	14.6%
2006	325.5	69.5	21.3%	43.3	13.3%
2007	371.5	82.0	22.1%	45.9	12.4%
2008	422.0	91.4	21.7%	46.5	11.0%
2009	363.5	86.7	23.9%	37.8	10.4%
2010	466.4	116.8	25.1%	50.0	10.7%
2011	555.2	134.2	24.2%	56.4	10.2%

Source: United Nations, *Comtrade Database*, various years.

Table 6 China's Exports to World, South Korea, and the US, 1992 - 2011

US$ bn, %

Year	world	South Korea		US	
		value	share	value	share
1989	52.5	0.5	0.9%	4.4	8.4%
1990	62.1	1.3	2.0%	5.2	8.3%
1991	71.8	2.2	3.0%	6.1	8.6%
1992	84.9	2.4	2.8%	8.6	10.1%
1993	91.7	2.9	3.1%	17.0	18.5%
1994	121.0	4.4	3.6%	21.5	17.7%
1995	148.8	6.7	4.5%	24.7	16.6%
1996	151.0	7.5	5.0%	26.7	17.7%
1997	182.8	9.1	5.0%	32.7	17.9%
1998	183.8	6.3	3.4%	38.0	20.7%
1999	194.9	7.8	4.0%	42.0	21.5%
2000	249.2	11.3	4.5%	52.2	20.9%
2001	266.1	12.5	4.7%	54.4	20.4%
2002	325.6	15.5	4.8%	70.1	21.5%
2003	438.2	20.1	4.6%	92.6	21.1%
2004	593.3	27.8	4.7%	125.1	21.1%
2005	762.0	35.1	4.6%	163.2	21.4%
2006	968.9	44.5	4.6%	203.8	21.0%
2007	1220.1	56.4	4.6%	233.2	19.1%
2008	1430.7	73.9	5.2%	252.8	17.7%
2009	1201.6	53.7	4.5%	221.3	18.4%
2010	1577.8	68.8	4.4%	283.8	18.0%
2011	1898.4	82.9	4.4%	325.0	17.1%

Source: United Nations, *Comtrade Database*, various years.

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