

The Asian Crisis: Growth that Immiserizes the South and Benefits the North

By

E. KWAN CHOI

Iowa State University

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Address for Correspondence: E. Kwan Choi, Department of Economics, Iowa State University, Ames, Iowa 50010, (515) 294-5999 Fax: (515) 294-9913.
E-mail: kchoi@iastate.edu.

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Abstract

This paper investigates the effect of population growth and China's entry into the world trading regime on the North and other countries in South. In the absence of terms of trade effect, an increase in population reduces the standard of living and causes a reduction in welfare. If China, or a large labor-abundant developing country initiates trade liberalization, it will lower the terms of trade of other countries in the South, while improving the terms of trade of the North. Thus, population control is an important means to close the gap in per capita income between developing and developed economies.

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I. INTRODUCTION

The Asian Crisis first became recognized when the Bank of Thailand stopped supporting the overvalued baht in July 1997. Other countries which followed suit include Malaysia, the Philippines, Indonesia, South Korea and Taiwan. While experts were looking for this strange virus that affected Asian economies, little attention has been paid to the rising volume of trade of China during this decade (Wong, 1998) or to the potential benefit that may have accrued to the industrial countries.

The volume of US exports increased 70% from \$394 billion in 1980 to \$683 billion in 1998, whereas Japan's exports increased 34% from \$288 billion to \$388 billion. Japan's economy was little affected by the Asian Crisis, and she can be excluded from the developing area of Asia. Exports of the Asian Developing Countries (ADCs) almost doubled from \$504 billion to \$1,055 billion. ADCs can be decomposed into two subregions, China and the rest. China's export tripled from \$62 billion to \$184 billion during the same period. Exports of the rest of ADCs increased from \$442 billion in 1990 to \$871 billion in 1998. On the other hand, US imports grew from \$517 billion in 1990 to \$944 billion in 1998.

While the Asian economies are slowly recovering from the trauma, the Asian Crisis deserves thorough investigations. It is not within the scope of this paper to go through all the possible explanations for the Asian Crisis. The purpose of this paper is to demonstrate that the Asian Crisis may have been caused by a large labor-abundant country that enters the world market and dramatically changed the pattern of trade for other countries. Such an expansion of China's exports is not likely to be unnoticed by other countries. First, this increase in China's exports is likely to have caused a terms-of-trade deterioration in the importing developed economies such as U.S., the European Community, and Japan. If the competing countries were to maintain high values of their currencies, this may cause a sudden reduction in exports and an eventual depreciation of their currencies. Second, if the exchange rates were not manipulated, it would have reduced the welfare even if their export

volumes were unchanged. As a matter of fact, the exports of the rest of ADCs reached \$853 billion in 1995 and have not since grown much. This suggests much of China's trade creation or export expansion may have been brought about by the increase in imports in the developed economies. The sudden depreciation of the weak currencies of the other ADCs during the Asian Crisis seems to have barely stopped a trade diversion by China.

Although the repercussions of China's trade expansion are felt throughout the world, the most adversely affected countries seem to be the Asian and other LDCs which compete with China in labor-intensive exports. However, not all countries seem to have been adversely affected by China's sudden growth. Throughout the Asian Crisis, scant attention has been paid to the benefit which accrued to the developed economies.

The effect of international trade on income convergence, a topic apparently unrelated to the Asian Crisis, has received much attention in recent years. Rassekh and Thompson (1996) argue that since trade tends to equalize factor prices, per capita income can differ between countries primarily because of differences in capital abundance. In a recent study, Ben-David (1996) provides evidence that trade tends to play an equalizing role. Slaughter (1997) also provides empirical evidence for convergence of per capita income through international trade. Will China's trade liberalization have the income equalizing effect?

China appears to be at the epicenter of the Asian Crisis, and there are two stylized facts about China: (i) China has a large population, and (ii) due to rapid trade liberalization China's trade expanded suddenly during the nineties. The purpose of this paper is to analyze the impacts of population change and trade liberalization on trade, national income, and welfare. It is shown that in the traditional Heckscher-Ohlin framework, a rapid trade liberalization of a large labor-abundant country can cause a deterioration of the terms of trade of other labor-abundant countries and benefit the industrial countries.

The plan of this paper is as follows: Section 2 provides the basic framework to analyze the impacts of population growth and China's trade liberalization. Section 3 analyzes the immiserizing growth without terms of trade effect. Section 4 considers the welfare effects of population growth and trade liberalization in a large economy. Section 5 investigates how

China's trade liberalization affect the terms of trade and welfare of other countries. Finally, Section 6 contains the concluding remark.

2. THE BASIC MODEL

China's entry in the world trading system may benefit or hurt other trading countries, depending on whether they are competing with China or they and China are complementary in their trade. If the factor endowment of a country is similar to that of China, i.e., it is labor-abundant, the Heckscher-Ohlin theory suggests that it will compete in China in the markets for the supply of the labor-intensive goods. On the other hand, a capital-abundant country will import labor-intensive products, and is likely to become a natural trade partner with China.

In the presence of many industries, most trading countries are likely to compete with China in some industries, while they are in complementary relationship with China in other industries. However, to simplify our analysis, the world is assumed to consist of three regions: North, China, and the rest of South (Asia). The primary purpose of this paper is to investigate how China's entry into the world trading system, i.e., trade liberalization, affects the welfare of other countries. Hence, China is assumed to be the home country (C) in the South. The neighboring country (A) represents the rest of Asia which competes with China in exporting labor-intensive products. Both A and C are assumed to be labor-abundant. Country B, or the North represents the industrial countries, including Japan, Europe and North America that import labor-intensive products.

To investigate the impacts of China's trade liberalization, we employ the following assumptions:

- (i) The domestic economy consists of L identical workers who are also consumers.
- (ii) Two factors, capital K and labor L , are used to produce two goods, the exportable Z and the importable Y .
- (iii) The exportable is the numeraire, and the domestic price and the foreign price of the exportable are equal to unity. The economy may be small or large.

- (iv) The home country is a labor-abundant developing country.
- (v) Factors are fully employed and are mobile between sectors.
- (vi) Perfect competition prevails in product and factor markets.

The Three Economies

We first describe the production patterns of the three countries in the South: China (C) and the rest of Asia (A), excluding Japan, and the North, which includes all the industrial countries which are assumed to be capital-abundant. Let Z and Y denote the domestic production of the exportable and the importable, respectively. Variables of the neighboring country A will be denoted by lowercase letters, and asterisks (*) will be used to denote the variables for the rest of the world or the North (B).

Production possibilities of the three countries are given by

$$\begin{aligned} Z &= F(Y), \\ z &= f(y), \\ z^* &= f^*(y^*). \end{aligned}$$

There is no uncertainty in the product prices, and producers are assumed to observe the world price P^* and the domestic prices, P , p , and p^* .

Let C and X denote domestic consumption of the exportable and the importable, respectively. The total labor force is

$$L = \gamma M,$$

where M is population. Assume initially that $\gamma = 1$. In reality, $\gamma < 1$ for most countries. However, as long as γ is fixed, the analysis is unaffected.

Consumer preferences are represented by a monotone increasing and quasiconcave utility function, $U = U(C, X)$, where C and X denote domestic consumption of the exportable and the importable, respectively. Similarly, preferences of the other Asian consumers and the North are denoted by $u = u(c, x)$ and $u^* = u^*(c^*, x^*)$, respectively. Instead of using an

aggregate utility function which depends on aggregate consumption of the two goods, we employ per capita utility function.¹

Per capita utility functions of the three regions are written as:

$$\begin{aligned} U &= U(C/L, X/L), \\ u &= u(c/\ell, x/\ell), \\ u^* &= u^*(c^*/\ell^*, x^*/\ell^*). \end{aligned}$$

The budget constraints of the consumers are:

$$\begin{aligned} PC + X &= I, \\ pc + x &= i, \\ p^*c^* + x^* &= i^*, \end{aligned}$$

where P , p , and p^* are the domestic prices of the Y good, and I , i , and i^* denote consumer income in terms of the numeraire good of China, the rest of Asian developing countries, and the North, respectively. The first order condition for China's optimal consumption is $U_X/U_C = P$. Let $C = C(P, I)$ and $X = X(P, I)$ denote the demand for the importable and the exportable. We assume that both goods are normal in all countries. For instance, in China, $\partial C/\partial I > 0$ and $\partial X/\partial I > 0$. Demands for the two goods, $c = c(p, i)$ and $x = x(p, i)$ of the ADCs, and $c^* = c^*(p^*, i^*)$ and $x^* = x^*(p^*, i^*)$ of the North are similarly defined. The indirect utility function can be written as

$$V(P, I) \equiv U[C(P, I), X(P, I)], \quad (1a)$$

$$v(p, i) \equiv u[c(p, i), x(p, i)], \quad (1b)$$

$$v^*(p^*, i^*) \equiv u^*[c^*(p^*, i^*), x^*(p^*, i^*)]. \quad (1c)$$

Assume that the home government (China) restricts trade by imposing a tariff $T = P - P^*$ on imports. The import demand function is

$$Q(P, I) = X(P, I) - Y(P), \quad (2a)$$

which implies $Q_I = X_I$, where subscripts denote partial derivatives. Similarly, in country A, we have

$$q(p, i) = x(p, i) - y(p), \quad (2b)$$

In practice, export taxes are rarely used. However, since the exportable good is used as a numeraire in our analysis, we invoke Lerner's symmetry theorem that an export tax and an import tariff are equivalent in that they have identical effects on trade. Thus, we use the export tax t^* on exports Q^* for country B which represents the North. Since the North imposes an export tax, the world price, $P^* = p^* + t^*$, and the export price of Y in the North can deviate from its domestic price p^* .

$$Q^*(p^*, i^*) = y^*(p^*) - x^*(p^*, i^*), \quad (2c)$$

where $Q^*(p^*, i^*)$ is the export supply of Y in the North.

In China, the government revenue from trade taxes is

$$G = TQ,$$

where T is a specific tariff China imposes. Following the convention, we assume that the tariff revenue is rebated to the consumer. Consumer income is written as

$$I = Z + PY + TQ. \quad (3)$$

Following the standard Heckscher-Ohlin model, the relationship between input and output are written as:

$$\begin{aligned} a_{LZ}Z + a_{LY}Y &= L, \\ a_{KZ}Z + a_{KY}Y &= K. \end{aligned}$$

where a_{ij} is the input-output coefficient representing the amount of input i used to produce one unit of product j , $i = K, L$, $j = Z, Y$. Since the home country is assumed labor-abundant, an increase in L increases the production of the labor-intensive good ($\partial Y/\partial L > 0$) by the Rybczynski Theorem.

3. IMMISERIZING GROWTH WITHOUT THE TERMS OF TRADE EFFECT

Consider the effects of population growth in the absence of the terms of trade effect. In general, an increase in population can affect welfare directly, and also indirectly via a change in the terms of trade. In this section, we focus on the direct effect of a change in population, holding the terms of trade constant.

Total revenue $Z + PY$ is distributed to factors, and is equal to factor income,

$$Z + PY = WL + RK.$$

Hence, including the tariff rebate, consumer income is:

$$I = Z + PY + TO = WL + RK. \quad (4)$$

If the home country is small and free trade is practiced, then I reduces to $WL + RK$, and hence

$$\frac{\partial I}{\partial L} = W.$$

Note that an increase in L increase national income $I = WL + RK$. However,

$$\frac{\partial(I/L)}{\partial L} \equiv -\frac{RK}{L^2} < 0. \quad (3')$$

Accordingly, an increase in population reduces per capita income of the representative worker.

Per capita indirect utility is written as

$$V = V[P, (Z + PY + TQ) / L]. \quad (5a)$$

Without loss of generality, populations are normalized, except in China, i.e., $\ell^* = \ell = 1$.

$$v = v[p, (z + pY + tq) / \ell] \equiv v[p, z + py + tq], \quad (5b)$$

where t is the specific tariff in the other ADCs.

The indirect utility of the North is

$$v^* = v^*[p^*, z^* + p^* y^* + t^* Q^*], \quad (5c)$$

where t^* is the export tax and Q^* is North's export supply of good Y , which is China's importable good.

Consider the welfare implications of population growth for a small country. In this case, the terms of trade are fixed, P^* is held constant, and $\partial P^* / \partial L = 0$. Differentiating (5a) with respect to L gives

$$\frac{dV}{dL} = V_I \frac{d(I/L)}{dL} = V_I \frac{WL - I}{L^2} = -V_I \frac{RK}{L^2} < 0, \quad (5a')$$

since $dZ + PdY = d(wL + rK) = wdL$ and $YdP = 0$. That is, in a small country the representative worker becomes worse off as population increases, because per capita income decreases as L increases. From (3'), we note that $-RK/L^2$ represents the change in per capita income. Thus, $-rK/L^2$ can be treated as the *standard of living effect*. Hence, an **immiserizing population growth** is the necessary consequence in a small country.

Proposition 1: In the absence of terms of trade effect, an increase in population increases national income, but reduces per capita income, and hence population growth is immiserizing.

4. POPULATION GROWTH AND WELFARE IN A LARGE COUNTRY

We now consider the effect of an increase in L in the home country, China. Recall that the home country is labor-abundant and hence exports the labor intensive product and imports the capital intensive good. Presumably, an increase in L in a labor-abundant country, the outputs of its competitor being held constant, will increase its import demand, and hence causes a deterioration in its terms of trade. We will examine this effect.

Let the domestic price of the importable be

$$P = P^* + T,$$

where T is the specific tariff. Note that in (2a) an increase in L changes income, which in turn affects the import demand. Substituting (2a) into (3) gives

$$Q(P, I) = X(P, Z + PY + TQ(P, I)) - Y \equiv Q(P^*, T, L), \quad (6a)$$

where $Q(P^*, T, L)$ is now the reduced-form import demand function in terms of the foreign price P^* , tariff T , and population L . Specific tariff rates, T and t , are assumed fixed.

Similarly,

$$q(p, i) = x(P^* + t, z + py + tq(p, i)) - y \equiv q(P^*, t, \ell), \quad (6b)$$

where the domestic price of the importable in country B is $p = P^* + t$.

Note that the North imposes an export tax $t = P^* - p^*$ and hence the domestic price in the North is $p^* = P^* - t^*$. From $q^*(p^*, i^*) = y(p^*) - x^*[(p^*, z^* + p^*y^* + t^*Q^*)]$, we get

$$\begin{aligned} Q^*(p^*, i^*) &= y - x[P^* - t^*, z^* + (P^* - t^*)y^* + t^*Q^*(p^*, i^*)] \\ &\equiv Q^*(P^*, t^*, \ell^*), \end{aligned} \quad (6c)$$

We now consider the properties of the reduced import demand function.

We consider the impacts of increased population only in the home country, the

populations of the other countries being held constant. Thus, the foreign population variables, ℓ and ℓ^* , are suppressed. The market clearing condition for the importable is:

$$Q(P^*, T, L) + q(P^*, t, \ell) = Q^*(P^*, t^*, \ell^*), \quad (7)$$

where $Q^*(P^*, t^*, \ell^*)$ is the export supply of Y in the North. Assume that the export supply curve in country B is positively sloped, i.e., $\partial Q^*/\partial P^* > 0$.² An increase in L will affect the foreign price P^* and hence domestic price P . Since the specific tariff is assumed fixed, $\partial P^*/\partial L = \partial P/\partial L$.

Since the export supply curve $Q^*(P^*, t^*, \ell^*)$ originates in the North, changes in domestic population do not affect it directly, i.e., an increase in L does not shift the foreign export supply, $Q^*(P^*, t^*, \ell^*)$, or the import demand $q(P^*, t, \ell)$ of the ADCs. To examine the shift of $Q(P, L)$ differentiate (6) with respect to L , noting consumer income I is a variable, and holding p^* constant:

$$\frac{\partial Q}{\partial L} = X_I \frac{\partial I}{\partial L} - \frac{\partial Y}{\partial L}. \quad (8a)$$

Differentiating I in (2) with respect to L , holding P^* and T constant, gives

$$\frac{\partial I}{\partial L} = W + T \frac{\partial Q}{\partial L}. \quad (8b)$$

Substituting (8b) into (8a) gives

$$\frac{\partial Q}{\partial L} = \frac{WX_I - Y_L}{1 - TX_I} > 0, \quad (9a)$$

$$\frac{\partial I}{\partial L} = \frac{W - TY_L}{1 - TX_I} > 0, \quad (9b)$$

where $1 - TX_I > 0$, since the marginal propensity to consume the importable, PX_I , is less than

unity. The term Y_L represents the effects of an increase in population on the production of the importable. For a developing country with abundant labor, the well-known Heckscher-Ohlin Theory (i.e., the Rybczynski Theorem) suggests that an increase in population increases the production of the labor-intensive good Y , its exportable, but decreases the production of the capital-intensive good, its importable. That is, $\partial Y/\partial L < 0$. If the income effect on the importable consumption is zero, then (9a) suggests $\partial Q/\partial L > 0$. Since the importable good Y is a normal good, $X_Y > 0$. Thus, an increase in population increases import demand and increases consumer income, i.e., $\partial Q/\partial L > 0$, and $\partial I/\partial L > 0$.

If the home country is abundant in capital, it exports capital-intensive good and the importable good Y is a labor-intensive product. An increase in population in this case increases the production of Y , and hence $\partial Y/\partial L > 0$. For an advanced economy, tariff revenue is a small fraction of income, and hence the income effect from the tariff revenue is negligible, i.e., $wX_T \approx 0$. Thus, if the tariff revenue effect (WX_T) is sufficiently, then for an advanced capital-abundant country, $\partial Q/\partial L < 0$.

Thus, whether the import demand curve shifts to the right or not as L increases depends on whether the importable is a normal good and whether domestic production of the importable increases as population increases. How does an increase in population affect the terms of trade? Differentiating the market clearing condition (7), holding the specific tariff constant gives

$$\frac{\partial Q}{\partial L} + \left(\frac{\partial q}{\partial p} + \frac{\partial Q}{\partial P} \right) \frac{\partial P^*}{\partial L} = 0.$$

Rearranging the above gives

$$\frac{\partial P^*}{\partial L} = - \frac{\frac{\partial Q}{\partial L}}{\left(\frac{\partial q}{\partial p} + \frac{\partial Q}{\partial P} \right)} > 0. \quad (10)$$

Thus, the price of the importable increases with L . That is, an increase in population lowers

the terms of trade of the labor-abundant developing country ($dP^*/dL > 0$).

Proposition 2: An increase in population of a labor-abundant country increases its import demand and lowers its terms of trade. An increase in population in a labor-poor country reduces its import demand and improve its terms of trade if the tariff revenue effect is sufficiently small, i.e., $WX_I - Y_L < 0$.

We now consider the effect of China's population growth on the welfare of the trading countries. Differentiating (5a) with respect to L gives

$$\frac{\partial V}{\partial L} = V_p \frac{\partial P}{\partial L} + V_I \frac{d(I/L)}{dL}.$$

Using Roy's identity, $V_p = -X \cdot V_I$, we get

$$\frac{\partial V}{\partial L} = -V_I X \frac{\partial P}{\partial L} + \frac{V_I}{L^2} \left(L \frac{dI}{dL} - I \right). \quad (11a)$$

Note that since the specific tariff T is fixed, $\partial P/\partial L = \partial P^*/\partial L$. The first term on the RHS is the terms of trade effect on welfare, which is negative, and the second term represents the (per capita) income effect, which is also negative. Thus, a labor-abundant country becomes worse off as its population increases.

Differentiating (5b) with respect to L gives

$$\begin{aligned} \frac{\partial v}{\partial L} &= v_p \frac{\partial p}{\partial L} + v_I y \frac{\partial p}{\partial L} \\ &= -v_I (x - y) \frac{\partial p}{\partial L} < 0. \end{aligned} \quad (11b)$$

That is, the other labor-abundant country which competes with China in the exports of the labor-intensive products suffers from the induced deterioration of its terms of trade.

Differentiating (5c) with respect to L gives, and letting $\ell^* = 1$ and using Roy's identity, $V^*_{p^*} = -V^*_{I^*} X^*$, gives

$$\frac{\partial v^*}{\partial L} = v^*_{P^*} \frac{\partial P^*}{\partial L} + v^*_{I^*} \left(y^* + \frac{dQ^*}{dP^*} \right) \frac{\partial P^*}{\partial L}$$

$$v^*_{I^*} (Q^* + Q^{*'}) \frac{\partial P^*}{\partial L} > 0. \quad (11c)$$

Thus, we present

Proposition 4. An increase in China's population reduces her own welfare, hurts other countries in the South, but benefits the North.

5. CHINA'S TRADE LIBERALIZATION AND THE TERMS OF TRADE

To lay the basis for analyzing the effects of China's trade liberalization, we first examine how various parameters affect the reduced import demand function in (6).

Differentiating (6) with respect to T , we get

$$\frac{\partial Q}{\partial T} = X_P - Y' + X_I \left(Y + Q \frac{\partial Q}{\partial T} \right)$$

where $X_p^u \equiv X_p + X \cdot X_I (< 0)$ is the slope of the compensated demand curve, and $Y'(P)$ is the slope of the supply curve. Thus,

$$\frac{\partial Q}{\partial T} = \frac{X_p^u - Y'}{1 - TX_I} < 0. \quad (12a)$$

Differentiating (6) with respect to P^* gives

$$\begin{aligned} \frac{\partial Q}{\partial P^*} &= X_P - Y' + X_I \left(Y + T \frac{\partial Q}{\partial P^*} \right) \\ &= (X_p^u - QX_I - Y') + TX_I \frac{\partial Q}{\partial T}. \end{aligned}$$

Rearranging terms, we get

$$\frac{\partial Q}{\partial P^*} = \frac{X_P^u - QX_I - Y}{1 - TX_I} < 0. \quad (12b)$$

since the importable is a normal good, compensated demand curve is negatively sloped and the supply curve is positively sloped.

Similarly, repeating this process for the other Asian country, we get

$$\frac{\partial q}{\partial t} = \frac{x_p^u - y'}{1 - tx_I} < 0, \quad (13a)$$

$$\frac{\partial q}{\partial P^*} = \frac{x_p^u - qx_I - y'}{1 - tx_I} < 0. \quad (13b)$$

provided that the importable is a normal good.

Let T° be the prohibitive tariff at which China will not import any product from the rest of world. That is, at $T \geq T^\circ$, China is in autarky, and the terms of trade is determined by $q(P^*, t, \ell) = q^*(P^*, t^*, \ell^*)$, or

$$Q(P^*, T^\circ, L) + q(P^*, t, \ell) = Q^*(P^*, t^*, \ell^*), \quad (7')$$

where $Q(P^*, T^\circ, L) = 0$ by definition.

How does China's entry affect the terms of trade and welfare of the three countries? China's entry into the world market means lowering of tariff from the prohibitive rate T° , i.e., trade liberalization. Differentiating (7') with respect to T , holding all other tariffs constant, gives

$$\left(\frac{\partial Q}{\partial P^*} + \frac{\partial q}{\partial P^*} - \frac{dQ^*}{dP^*} \right) \left(\frac{\partial P^*}{\partial T} \right) + \frac{\partial Q}{\partial T} = 0.$$

$$\frac{\partial P^*}{\partial T} = - \frac{\frac{\partial Q}{\partial T}}{\left(\frac{\partial Q}{\partial P^*} + \frac{\partial q}{\partial P^*} - \frac{dQ^*}{dP^*} \right)}.$$

Note that $Q(P^*, T, L) - q(P^*, t, \ell) - Q^*(p^*, t^*, \ell^*)$ measures the world's excess import demand for (China's) importable good Y . Hence, While individual countries may impose tariffs, the world's excess import demand must be inversely related to its price P^* . This implies that

$$\partial P^*/\partial T < 0. \quad (14)$$

Thus, we present

Proposition 3. An increase in the specific tariff in China will improve its terms of trade, improve its rival's terms of trade, but worsens the terms of trade of the North. Alternatively, when lowering the tariff from the prohibitive level and entering the world market, China also worsens the terms of trade of its rival Asian countries in the South, but improves the terms of trade of the North.

Differentiating $I = Z + PY + TQ$ with respect to T gives

$$\frac{\partial I}{\partial T} = Y \frac{\partial P}{\partial T} + Q > 0. \quad (15a)$$

When evaluated at the prohibitive tariff T^0 , $\partial I/\partial T = Y(1 + \partial P^*/\partial T)$. If a paradox does not occur, an increase in tariff increases the domestic price of the importable, and hence, the home country's per capita income increases, i.e., $\partial I/\partial T > 0$. Differentiating (5a) with respect to T and using Roy's identity, we get

$$\frac{\partial V}{\partial T} = \frac{VI}{L} \left[Q \left(1 - \frac{\partial P}{\partial T} \right) + T \frac{\partial Q}{\partial T} \right] < 0. \quad (15b)$$

When evaluated at the prohibitive tariff T^0 , $Q = 0$ and $\partial Q/\partial T < 0$, and hence (15b) is negative. That is, China benefits from trade liberalization, i.e., from lowering the tariff from the prohibitive level.

$$v = v[p, (p + pY + tq) / \ell] \equiv v[p, z + py + tq]. \quad (5b)$$

Differentiating $i = z + py + tq$, and noting that the specific tariff t is held constant ($\partial P / \partial T = \partial P^* / \partial T$), we get

$$\frac{\partial i}{\partial T} = \left(y + t \frac{\partial q}{\partial P^*} \right) \frac{\partial P^*}{\partial T}, \quad (16a)$$

which is indeterminate. If ADCs adopt free trade or if the tariff revenue is small, then per capita income increases as China increases her tariff.

Differentiating (5b) with respect to T gives

$$\frac{\partial v}{\partial T} = V_I \left(-q + t \frac{\partial q}{\partial P^*} \right) \frac{\partial P^*}{\partial T} > 0, \quad (16b)$$

where $q = x - y$ is the import demand of country A. That is, China's trade liberalization reduces the welfare of the competing ADCs.

Next, consider the North. Differentiating $i^* = z^* + P^*y^* + t^*Q^*$ with respect to t , and noting that $\partial P^* / \partial t < 0$, gives

$$\frac{\partial i^*}{\partial t} = \left(y^* + t^* \frac{\partial Q^*}{\partial P^*} \right) \frac{\partial P^*}{\partial t} < 0. \quad (17a)$$

That is, per capita income of the North shrinks as China enters the world market.

Differentiating (5c) with respect to T gives

$$\begin{aligned} \frac{\partial v^*}{\partial T} &= v_I^* \left((-x^* + y^*) \frac{\partial P^*}{\partial T} + t^* \frac{\partial Q^*}{\partial P^*} \frac{\partial P^*}{\partial T} \right) \\ &= V_I^* \left(Q^* + t^* \frac{dQ^*}{dP^*} \right) \frac{\partial P^*}{\partial T} < 0, \end{aligned} \quad (17b)$$

since the foreign export supply curve is positively sloped ($\partial Q^* / \partial P^* > 0$), where $Q^* = y^* - x^*$ is the foreign export supply of the Y good.

Proposition 4. Trade creation by lowering the tariff of a labor-abundant country improves its own welfare and the welfare of the North, but reduces the welfare of the competing labor-abundant countries.

This implies that an increase in China's tariff improves her income and reduces the income of the North. Alternatively, China's trade expansion (by lowering the tariff below the prohibitive level)

Ben-David (1993) had argued that trade liberalization has an income equalizing effect. Comparing (14a) and (17a), we see that China's trade liberalization increases the income gap between the high and low income countries. Comparing (15a) and (17b), China's trade liberalization shows that gains from trade accrues to both trading countries, and hence does not reduce the real income (utility) gap. Due to the change in terms of trade, welfare and income do not always move in the same direction.

Now consider the role reversal, and let V denote the indirect utility of the North and v^* the indirect utility of the South. In this case, the capital-abundant home country imports the labor-intensive product Y . Then (14a) and (16a) show that an increase in tariff in the capital-abundant country increases the gap in per capita income between the two blocks. Alternatively, trade liberalization by the North reduces its own income but increases the income of the South. Thus, trade liberalization in the North has the income equalizing effect.

Proposition 5. Trade liberalization by a labor-abundant country increases the gap in per capita income between the labor-abundant and labor-poor countries. On the other hand, trade liberalization by a capital-abundant country decreases the gap in per capita income between the two trading blocs. Nevertheless, trade liberalization always improves the welfare of the both trading countries.

6. CONCLUDING REMARK

This paper attempted to provide a possible explanation for the Asian Crisis. This paper showed that a sudden economic growth of a low income, labor-abundant country may cause a

crisis in other labor-abundant countries in the South and benefit the capital-abundant industrial countries in the North. We have also shown that trade liberalization by a labor-abundant country increases the income gap between the South and the North, whereas trade liberalization has an income equalizing effect.

Will there be another crisis like the Asian Crisis in 1997? India and Africa are possible candidates for causing another crisis comparable to the Asian Crisis in magnitude. South American countries currently enjoy much higher income than Asian or African countries. Its growth on other economies will have different effects, depending on whether it is induced by the growth of capital or population. Its sudden economic growth is achieved by population growth, it may make them a labor-abundant bloc and create another crisis, similar to the Asian Crisis in 1997. However, this is not very likely, as income growth is usually accompanied by reduced fertility. On the other hand, its sudden growth through capital accumulation may make them a capital-abundant country, reduce the terms of trade of other industrial countries of the North, and hence may cause an American crisis.

India's export volume was still less than \$33 billion in 1998. Its population just exceeded one billion, and India has currently lower per capita income. Thus, further population growth India or her sudden trade liberalization may cause another crisis during the next few decades. Africa also has low per capita income with a large population. Her export volume increased from \$69 billion to \$134 billion for the period 1985-1998, but South Africa has the dominant share of trade in Africa. If all other countries in that continent imitate her, Africa also contains a seed of a potential crisis.

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NOTES

1. A similar attempt has been made to utilize per capita income as the basis for comparing welfare. In a world of two factors, national income can be written as $WL + RK$, where W and R are wage and capital rental, and L and K denote fixed supplies of labor and capital, respectively. Rassekh and Thompson (1996) and Slaughter (1997) focus their attention on per capita income,

$$I/L = W + R (K/L),$$

where i is per capita income. Countries can differ in capital endowment and population, as well as in factor prices. If trade equalizes factor prices, then differences in per capita income reflect the differences in capital abundance (K/L). One possible way to increase standard of living is to control population; it might be a practical policy for low income developing countries with large populations such as India and China.

2. It can be shown that North's export supply curve is positively sloped. Practically, this proof is the same as (12c) that since the exportable is normal, compensated demand curve is negatively sloped and the supply curve is positively sloped.