The Asia Pacific Economic Forum (APEF) V Conference, Chuncheon, Korea, 5-6 July 2006

Are Exports of China, Japan and Korea Diverted in the Major Regional Trading Blocks?

by

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Abstract

In recent years, China, Japan and Korea, the three major economies in East Asia, have been gearing up their efforts to sign FTAs with many different regions and countries. One of the main reasons for this is that they fear that with the movement of regionalism rising in every corner of the world, their exports are discriminated against and diverted in the trading blocks of others. The main purpose of this paper is to investigate if this fear is real. We utilize the gravity equation augmented with dummy variables for regional trading blocks in two different models. One is the static, standard gravity model to examine the effect of regional blocks on the "level" of exports from these three countries in 2003; the other is the dynamic, partial-adjustment model to examine the effect of blocks on the "changes" in exports for the period from 1993 to 2003. The results show that a diversion effect is not observed in major trading blocks such as EU, NAFTA and ASEAN, but only in small blocks such as BAFTA (China, Japan and Korea), CACM (China), CAN (China), CEFTA (China and Japan), CEMAC (China, Japan and Korea), CIS (Japan), COMESA (Korea), EAEC (Japan), EFTA (China), GCC (China), MERCOSUR (Japan), SAPTA (Japan), SPARTECA (China and Korea), and UEMOA WAENU (Japan and Korea). Thus, fear of trade diversion on the part of China, Japan and Korea is grounded, but only to a limited extent.

JEL Classification Numbers: F10, F20, L51, F80
Keywords: regional trading blocks, China, Japan, Korea, gravity model, diversion effect

1. Introduction

In very recent years, China, Japan and South Korea (Korea hereafter), the major economies in East Asia, have been involved in negotiations with many countries or groups of countries on the formation of bilateral/plurilateral agreements. China, in November 2004, reached a free trade agreement (FTA) with the Association of South East Asian Nations (ASEAN) for trade in goods. It is now negotiating/studying FTAs with countries such as New Zealand, Chile, Australia, Japan and Korea.

Japan signed a FTA in January 2002 with Singapore and another in September 2004 with Mexico. It also concluded a FTA with countries like the Philippines, Malaysia and Thailand, and is currently in official negotiation for concluding FTAs with Korea, Indonesia and ASEAN.

Korea also concluded a FTA with Chile in October 2002, for the first time in its history. Subsequently, Korea signed a FTA with Singapore in August 2005 and with a group of EFTA countries (Switzerland, Norway, Iceland, and Liechtenstein) in December 2005. It has also been having formal government level talks with Japan for a FTA since December 2003. Korea has also begun FTA negotiations with ASEAN, Canada, Mexico, India and the U.S. It has also been conducting a joint feasibility study on FTAs with the Southern Common Market (MERCOSUR) and China.

The recent trend of regionalism on the part of these three countries in Northeast Asia is in part due to the spread of regionalism elsewhere in the world. Particular examples are enlargements of the European Union (EU), deepening of the ASEAN Free Trade Area (AFTA) and growing Pan-American moves to increase free trade arrangements, such as expanding the North American Free Trade Agreement (NAFTA) into the proposed Free Trade Area of the Americas (FTAA), which includes the entire American continent except Cuba.[1]

In short, the three countries in Northeast Asia are now trying to build their own version of regional trading blocks[2] because they fear that with the movement of regionalism

1 It is also alarming that the United States, the major export market for China, Japan and Korea, and long-time proponent of multilateralism under the framework of the GATT/WTO, has recently pursued bilateral and regional FTAs as a new reality of the global multilateral trading system. See the website of the US Trade Representative (http://www.ustr.gov) for a list of plurilateral and bilateral trade agreements.

2 We use the term “regional trading blocks” with regional trade arrangements and preferential trade

rising in every corner of the world, their exports are discriminated against and diverted in the trading blocks of others. The main purpose of this paper is to investigate if this fear is real.

To accomplish this purpose, we use the gravity equation augmented with dummy variables for regional trading blocks in two different models. One is the static, standard gravity model to examine the effect of regional blocks on the "level" of exports from these three countries in 2003; the other is the dynamic, partial-adjustment model to examine the effect of blocks on the "changes" in exports for the period from 1993 to 2003. The results show that a diversion effect is not observed in major trading blocks such as EU, NAFTA and ASEAN, but only in small blocks such as BAFTA (China, Japan and Korea), CACM (China), CAN (China), CEFTA (China and Japan), CEMAC (China, Japan and Korea), CIS (Japan), COMESA (Korea), EAEC (Japan), EFTA (China), GCC (China), MERCOSUR (Japan), SAPTA (Japan), SPARTECA (China and Korea), and UEMOA WAENU (Japan and Korea).

It is worth noting at the outset that by utilizing the gravity model, the influence of regional trade arrangements on bilateral trade has been analyzed by the huge literature, but main focus has been the trade creation effect, not the trade diversion effect. That is, in their investigation on regional trading blocks, researchers have looked for positive deviations from the "norm of trade" given by gravity. See Fontagne, Mayer and Zignago (2005) and Carrère (2006) for the most recent examples. However, the present paper is intended to search for negative deviations from the norm of trade after we control for as many "natural" and "institutional" causes of trade as possible.

The rest of the paper is organized as follows. Section 2 presents the static and dynamic models of the gravity equations to be estimated. The main empirical results are presented in Section 3. Finally, Section 4 summarizes the main findings.

2. Static and Dynamic Models of the Gravity Equations

Static Gravity Model

Since Tinbergen (1962) and Pöyhönen (1963) it has been well known that the simple gravity equation, in which the volume of trade between two countries is proportional to the product of their masses (GDPs) and inversely related to the distance between them,

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arrangements interchangeably.

is empirically highly successful. Recently, with renewed interest among economists in geography, it has again become widely used in the literature. Indeed, many researchers have shown that the gravity equation can be derived from many different models of international trade (Helpman and Krugman, 1985; Deardorff, 1995; Evenett and Keller, 1998; Eaton and Kortum, 2002).[3]

In addition, researchers like Anderson and van Wincoop (2001) have shown that bilateral trade depends not only on country size and distance, but also on relative distance. That is, trade will be greater between country pairs that are far from the rest of the world than between country pairs that are close to the rest of the world. Thus, the standard gravity equation drawn from theory can take the following form:

$$(1)\ Ln\mathrm{EXP}_{ij} = \alpha + \beta_1 Ln\mathrm{GDP}_i + \beta_2 Ln\mathrm{GDP}_j + \beta_3 Ln\mathrm{DIST}_{ij} + \beta_4 Ln\mathrm{REMOTE}_i + \beta_5 Ln\mathrm{REMOTE}_j + \varepsilon_{ij},$$

where $Ln\mathrm{EXP}_{ij}$ = log of export flows from country i to country j

$Ln\mathrm{GDP}_i$ = log of GDP of country i

$Ln\mathrm{GDP}_j$ = log of GDP of country j

$Ln\mathrm{DIST}_{ij}$ = Geographical distance between country i and country j

REMOTE_i = Remoteness of country i

$= 1/\sum_i(\mathrm{GDP}_i/\mathrm{GDPw})/\ \mathrm{DISTANCE}_{ij})$

where GDP_w = world GDP

REMOTE_j = Remoteness of country j

$= 1/\sum_i(\mathrm{GDP}_j/\mathrm{GDPw})/\ \mathrm{DISTANCE}_{ij})$

ε_{ij} = random disturbance term

Because country i stands for only one country (China, Japan or Korea) and we take a single year 2003, variables for country i have no variation and hence are removed from the gravity equation. Therefore, Equation (1) becomes

$$(2)\ Ln\mathrm{TRADE}_j = \alpha + \beta_1 Ln\mathrm{GDP}_j + \beta_2 Ln\mathrm{DIST}_{ij} + \beta_3 Ln\mathrm{REMOTE}_j + \varepsilon_j.$$

Many authors include per capita GDPs in a gravity equation like Equation (2). The idea

[3] Harrigan (2001) provides a comprehensive review of the theoretical models of the gravity equation. Greenaway and Milner (2002) provide a review of research utilizing the gravity model to investigate the trade effects of regional trading blocks.

behind this appears to be that higher income countries trade more in general, because higher income countries may have superior transportation infrastructure and lower trade barriers. However, there is a problem with including per capita GDP along with GDP in the right hand side of the equation, because GDP is the product of per capita GDP and population and, hence, GDP and per capita GDP are highly correlated with each other.

Therefore, in a different equation, we include population and per capita GDP in place of GDP. There is also an advantage in estimating a separate equation which includes population and per capita GDP. That is, it has been pointed out that there is a built-in accounting relationship between trade and GDP because exports and imports are part of GDP, and this inflates the R^2 of the regressions. This has led some studies to use population as an instrumental variable for GDP.

(3) $Ln\text{TRADE}_j = \alpha + \beta_1 Ln\text{POP}_j + \beta_2 Ln\text{PCGDP}_j + \beta_3 Ln\text{DIST}_{ij} + \beta_4 Ln\text{REMOTE}_j + \varepsilon_j$.
where $Ln\text{POP}_j$ = log of population of country j
$Ln\text{PCGDP}_j$ = log of GDP per capita of country j.

In the equation above, we augment land area and dummy variables for countries surrounded by land or sea.[4] We also take into account the level of tariff barriers. Taking note of debate on the role of the WTO (Rose, 2004; 2005; Subramanian and Wei, 2003), we also include a dummy variable for WTO member countries. Lastly, we include a dummy variable for countries belonging to any regional trading blocks in the world.[5] Thus our augmented gravity equation is

(4) $Ln\text{EXP}_j = \alpha + \beta_1 Ln\text{GDP}_j + \beta_2 Ln\text{DIST}_{ij} + \beta_3 Ln\text{REMOTE}_j + \beta_4 Ln\text{AREA}_j$
$+ \beta_5 \text{LANDLOCKED}_j + \beta_6 \text{ISLAND}_j + \beta_7 \text{TARIFF}_j + \beta_8 \text{WTO}_j + \beta_9 \text{RTA}_j + \varepsilon_j$

(5) $Ln\text{EXP}_j = \alpha + \beta_1 Ln\text{POP}_j + \beta_2 Ln\text{PCGDP}_j + \beta_3 Ln\text{DIST}_{ij} + \beta_4 Ln\text{REMOTE}_j$
$+ \beta_5 Ln\text{AREA}_j + \beta_6 \text{LANDLOCKED}_j + \beta_7 \text{ISLAND}_j + \beta_8 \text{TARIFF}_j + \beta_9 \text{WTO}_j$
$+ \beta_{10} \text{RTA}_j + \varepsilon_j$

[4] It is also customary to include a dummy variable for the country pairs sharing a land border. Japan is an island country and hence does not share a land border with any country. Korea shares a border with the DPRK but trade with the DPRK is not included in this study. China shares borders with a number of countries, and hence we included a dummy variable for these border sharing countries but found no significant results. Therefore, this variable is not included in the regressions reported in this paper for the sake of comparison among the three countries.

[5] Bilateral blocks are not considered because there are too many and their trade diversion effects are expected to be smaller than for plurilateral blocks.

where $LnAREA_j$ = log of land area of country j

$LANDLOCKED_j$ = 1 if country j is a landlocked country
= 0 otherwise

$ISLAND_j$ = 1 if country j is an island country
= 0 otherwise

$TARIFF_j$ = simple average tariff of country j

WTO_j = 1 if country j is a WTO member
= 0 otherwise

RTA_j = 1 if country j is a member of regional trading block(s)
= 0 otherwise.

Most studies on regional trade arrangements focus on the trade creation effect and ignore any trade diversion effect. Therefore, they include regional block dummies for the countries which are members of the same regional blocks. Our data are based on year 2003. Among the regional trade arrangements associated with the three countries, the Japan-Singapore FTA was the only regional block which was effective as of year 2003.[6] However, we do not try to take into account the Japan-Singapore FTA, because it was signed in January 2002 and became effective only in November 2002, and hence its full effect was not felt in the market in 2003.

To summarize, we try to control for as many "natural" and "institutional" causes of trade as possible and search for effects of regional trading blocks in the residual. That is, once other factors have been taken into account, we compare exports from China, Japan and Korea to countries belonging to any regional trading blocks with exports to those outside the trading blocks.

All data are for 2003 except for the time invariant variables. Exports data are taken from the United Nations' comtrade.[7] Exports here are manufacturing exports (SITC 5-9).[8]

Among the explanatory variables, GDP, GDP per capita, population, and area (in square kilometers) are taken from the World Bank's WDI Online data.[9] Geographical distance

[6] Korea-Chile FTA was signed in October 2002, but became effective in April 2004.

[7] http://unstats.un.org/unsd/comtrade

[8] Effects of RTA could be investigated for more detailed product groups, but we do not attempt this for brevity.

[9] http://publications.worldbank.org/WDI

is taken from Centre d'Etudes Prospectives et d'Informations Internationales (CEPII)'s website.[10] It is noted that the distances are weighted distances, which use city-level data to assess the geographic distribution of population inside each nation. The remoteness index is also calculated by using the weighted distances. The variables indicating whether the country is landlocked or island are also taken from Centre d'Etudes Prospectives et d'Informations Internationales (CEPII)'s website. Tariff rates ($TARIFF_j$) are simple unweighted averages for all goods, obtained from the World Bank website.[11]

Lastly, information on the members of the World Trade Organization (WTO) and regional trading blocks is taken from the website of the WTO.[12] There are 32 regional trade arrangements listed on the WTO website. Among the 32 blocks, 8 regional trade arrangements are excluded because members overlap (AFTA, ECO, EEA, MSG, and PATCRA) or because they are not considered as regional trading blocks (BANGKOK, GSTP, and OCT). The Appendix Table lists the 24 regional trading blocks with the names of their members, respectively. Because the depth of the integration among trading blocks is different, not all blocks will have the same effects. Therefore, in a separate specification, we also tackle separately the impact of each regional block.

The total number of observations is 137. In 2003, manufacturing exports to these 137 countries from China, Japan and Korea were 78%, 75% and 79% of total manufacturing exports, respectively.

Partial Adjustment Model

It should be noted that because the static gravity model deals with only one year, there may exist some unexplained factors in the system even though we tried to include the most variables possible. Accordingly, a large part of the trade effects of regional trade arrangements may be due to unobservable characteristics of countries entering into such arrangements. A usual way out is to use panel data to control for unobserved characteristics in the system.

Therefore, in the next stage we take one more year, 1993, and consider the factors that have impact on the "changes" in exports of China, Japan and Korea between 1993 and 2003. For this purpose, we use the partial adjustment model that can be found elsewhere, such as Curry and George (1983) and Stone and Lee (1995).

[10] http://www.cepii.fr/anglaisgraph/bdd/distances.htm
[11] http://siteresources.worldbank.org/INTRANETTRADE/Resources/tar2002.xls
[12] http://www.wto.org

Suppose that the desired level of $LnEXP_j$ at time t is $LnEXP_{jt}^*$; then, the relationship between the actual and the desired level of $LnEXP_j$ may be specified as follows:

(6) $(LnEXP_{jt} - LnEXP_{jt-1}) = \delta(LnEXP_{jt}^* - LnEXP_{jt-1})$,

where δ is the rate of adjustment and is bounded by zero and one. Because $LnEXP_{jt}^*$ is not observed, several formulations are possible. One formulation assumes that $LnEXP_{jt}^*$ is determined by the level forms of the determinants of $LnEXP_j$ in period t-1, as well as the difference forms (which incorporate changes in the long-run extent of $LnEXP_j$ between periods t-1 and t). Thus, the equation for changes in $LnEXP_j$ is

(7) $(LnEXP_{jt} - LnEXP_{jt-1}) = -\delta\, LnEXP_{jt-1} + \lambda_1 X_{jt-1} + \lambda_2(X_{jt} - X_{jt-1})$,

where X is a vector of explanatory variables.

If the coefficients in Equation (7) are invariant to the choice of time period (which obtains at equilibrium with constant coefficients) and if the errors between t and t-1 are not correlated, then the λ coefficient on each level variable divided by the rate of adjustment parameter (δ) equals the corresponding long-run coefficient (β). The λ coefficients on the first-difference variables represent the short-run adjustments to contemporaneous changes in the determinants of $LnEXP_j$.

A special case of Equation (7) is where $\lambda_1 = \lambda_2$ and hence $LnEXP_{jt}^*$ is determined only by the level variables in period t and the lagged value of $LnEXP_j$. This specification embodies the assumption that changes in the determinants of $LnEXP_j$ are correctly anticipated and fully reflected in the current $LnEXP_j$. In this instance, Equation (7) becomes

(8) $(LnEXP_{jt} - LnEXP_{jt-1}) = \delta\, LnEXP_{jt-1} + \lambda_1 X_{jt}$.

Thus, we evaluate the dynamic structure by first estimating Equation (7) and then testing the null hypothesis that the first-differenced variables have no significant effect (i.e., $\lambda_2 = 0$). If the null hypothesis is not rejected, we then test the hypothesis that the coefficients for the levels and changes are equal (i.e., $\lambda_1 = \lambda_2$). If this second null hypothesis is not rejected, we then estimate Equation (8).

In our gravity equation, most variables are time invariant except for the dependent variable and the size variables such as GDP, POP and PCGDP, and hence we specifically estimate the following two equations:[13]

$$(9)\ (LnEXP_{jt} - LnEXP_{jt-1}) = \delta LnEXP_{jt-1} + \beta_1 LnGDP_{jt-1} + \beta_2(LnGDP_{jt} - LnGDP_{jt-1}) + \beta_3 LnDIST_{ij} + \beta_4 LnREMOTE_j + \beta_5 LnAREA_j + \beta_6 LANDLOCKED_j + \beta_7 ISLAND_j + \beta_8 TARIFF_j + \beta_9 WTO_j + \beta_{10} RTA_j + \varepsilon_i,$$

$$(10)\ (LnEXP_{jt} - LnEXP_{jt-1}) = \delta LnEXP_{jt-1} + \beta_1 LnPOP_{jt-1} + \beta_2(LnPOP_{jt} - LnPOP_{jt-1}) + \beta_3 LnPCGDP_{jt-1} + \beta_4(LnPCGDP_{jt} - LnPCGDP_{jt-1}) + \beta_5 LnDIST_{ij} + \beta_6 LnREMOTE_j + \beta_7 LnAREA_j + \beta_8 LANDLOCKED_j + \beta_9 ISLAND_j + \beta_{10} TARIFF_j + \beta_{11} WTO_j + \beta_{12} RTA_j + \varepsilon_j,$$

where t-1 stands for 1993 and t for 2003.

By first-differencing the dependent variable and the time variant explanatory variables, this methodology accounts not only for observed country-fixed effects, but also for unobserved country-fixed effects.

3. Estimation Results

Table 1 gives the descriptive statistics of the variables included in the study. Shown in Table 2 are correlations between the explanatory variables. Among the variables, *Ln*AREA is found to be highly correlated with *Ln*GDP (0.55) and *Ln*POP (0.80). *Ln*REMOTE is also highly correlated with *Ln*GDP (-0.41) and *Ln*PCGDP (-0.51). ISLAND is highly correlated with *Ln*POP (-0.47). Nonetheless, as will be seen in what follows, multicollinearity among explanatory variables is tolerable as significant results are obtained for these explanatory variables. On the other hand, RTA, the variable of interest, is correlated with the dummy variable for WTO members (0.34), suggesting that members of the regional trading blocks also tend to be members of the WTO. Therefore, without the WTO dummy variable, the estimated coefficient of RTA could be overestimated.

[13] Remoteness variable also changes over time because it is calculated by using both distance and GDPs of countries, but its changes are nil and hence we do not consider its changes. Tariff rates also change over time, but here we use only the 2003 tariff data because the 1993 tariff data are available only for a limited number of countries.

In the following, we present the regression results obtained by the static analysis of the gravity model and subsequently the dynamic results obtained by the partial adjustment model.

Static Results

Table 3 shows regression results of the static gravity model for manufacturing exports from China, Japan and Korea. Our specification is the standard augmented gravity model, estimated with ordinary least squares and robust standard errors. There are two columns for each country: one with GDP and the other with population and GDP per capita, in addition to all other relevant variables.

The gravity model works well for all equations. The three countries export more to larger and richer countries and less to countries that are farther apart. These traditional gravity effects are not only large and highly statistically significant, but also economically sensible in size and in line with estimates from the literature. It is also shown that these countries, except for China, export more to countries that are farther away from most other countries in the World, and export less to the countries that are larger in terms of land area, when other factors remain constant. These three countries export less to landlocked countries, island countries (except for Japan), and countries with high tariff rates. The dummy variable for the countries being WTO members yields coefficients that are statistically insignificant at conventional levels. Thus, these countries do not seem to export more to WTO members.

Above and beyond these effects, does membership by trading partners of China, Japan and Korea in any regional trading blocks have anything to do with exports of these three countries?

The dummy variable for the countries being members of any regional trading blocks, RTA, has negative values for exports from all three countries, but is statistically different from zero at conventional significance levels only for exports from China. The coefficient on the regional trading block dummy variable for China is -0.63 with the robust t-statistic of 1.86 (column 1), that is, China exports 88% less (exp(0.63) – 1.0 = 0.88) to countries that are members of any trading blocks than to otherwise similar countries. However, one should not place too much confidence in such estimates, because the trade effect should be quite different among different blocks.

Accordingly, we will also split the variable RTA into various dummies for individual regional trading blocks, so as to differentiate the effects of different blocks. Before doing this, we will estimate Equations (9) and (10) to consider the aggregate effects of regional trading blocks on the "changes" in exports of China, Japan and Korea between 1993 and 2003.

Dynamic Results

Ordinary least-squares estimates of Equations (9) and (10) are presented in Table 4. As noted previously, the dependent variable is the first difference of log of exports from the three countries, respectively. Again, there are two columns for each country: one with GDP and the other with population and GDP per capita, in addition to all other relevant variables. The results are generally similar to the ones obtained with the static gravity model, but the overall fit of the equation is smaller, with a coefficient of determination of 0.47~0.50 (China), 0.57~0.59 (Japan), and 0.68 (Korea).

The coefficient in Ln*EX*_93, the adjustment rate, is 0.38 ~ 0.60, that is statistically significant at the one percent level. The coefficients of the levels and difference-form variables of the log of GDP (Ln*GDP*) have expected positive signs, which are significant at the one percent level. When that is replaced by the log of population (Ln*POP*) and the log of per capita GDP (Ln*PCGDP*), the coefficients continue to be significant, except for difference-form variable of the log of population. When we test the hypothesis that the coefficients for the levels and changes are equal, it is rejected and hence we do not estimate Equation (8).

It seems worth noting that the estimated coefficients and their corresponding t-statistics of the lagged levels and difference form of GDP and per capita GDP appear to be largest for Korea and smallest for China. This may suggest that among the three countries, Korea (China)'s exports respond most (least) sensitively to the economic conditions of trading partners.

The log of distance has an expected negative coefficient, significant at the one percent level, except for China. It appears, indeed, to be most important for Korea, and this may suggest that in comparison with China and Japan, Korea increased more of its exports to the countries that are closer in terms of geographical distance.

Remoteness of trading partners does not seem to contribute to the changes in exports from any of the three countries. Size of land area and whether trading countries are landlocked or island countries seem to have some limited effects on changes in exports, for the period 1993-2003, from China, Japan and Korea. Tariff level also has a strong (and similar) effect on the dynamic pattern of exports from the three countries, while WTO membership of trading partners does not.

Lastly, the dummy variable for the countries being members of any regional trading blocks, RTA, has negative values for exports from all three countries, but is not statistically different from zero at any conventional significance levels. As noted previously, however, this does not suggest that "any" of the trading blocks has a meaningful impact on exports from the three countries.

Accordingly, in what follows, we will estimate the gravity model, with the RTA variable split into various dummies for individual regional trading blocks, so as to differentiate the effects of different blocks.

When Individual Trading Blocks are Included

As noted previously, among the 32 regional trade arrangements listed on the WTO website, we consider 24 regional trading blocks to compare the effects of different agreements. Table 5 shows the coefficients and their t-statistics for only regional block dummies, estimated by the equations which include GDPs (i.e., estimates by the equations which include population and per capita GDP are not reported, for brevity).[14] Columns (1), (3) and (5) are the estimates from the static gravity model, and columns (2), (4) and (6) are from the partial adjustment model.

There are several points worth noting. First, as expected, the value of the parameter estimate shows a very large difference among the different blocks, revealing even positive values in some cases. Specifically, among the coefficients which are statistically significant, it ranges from -1.49 (GCC for China's export level) to +1.15 (ASEAN for Korea's export changes). The number of regional blocks which reveal negative estimates (i.e., trade diversion effect) for level of exports is 7 (China), 7 (Japan), and 4 (Korea), while that for changes in exports is 3 (China), 4 (Japan), and 1 (Korea). In total, 18 cases for export levels and 8 cases for export changes show trade diversion effect. On the other hand, the number of regional blocks with positive

[14] Estimates for other covariates remain qualitatively the same.

estimates is 2 (Japan's export level), 3 (Japan's export changes), and 2 (Korea's export changes). Thus, in general, there are more blocks with negative estimates than with positive estimates, and this may suggest that trade diversion effects are more evident than trade creation effects for the exports of China, Japan and Korea.

Second, trade diversion is not observed in major trading blocks such as EU, NAFTA and ASEAN, but only in small blocks such as BAFTA (China, Japan and Korea), CACM (China), CAN (China), CEFTA (China and Japan), CEMAC (China, Japan and Korea), CIS (Japan), COMESA (Korea), EAEC (Japan), EFTA (China), GCC (China), MERCOSUR (Japan), SAPTA (Japan), SPARTECA (China and Korea), and UEMOA WAENU (Japan and Korea). If we take a more conservative approach, considering the blocks which reveal trade diversion effect in both levels and changes, the effect is evident only in CAN (China), CEMAC (China), GCC (China), SAPTA (Japan), SPARTECA (China), and UEMOA WAENU (Japan and Korea). Thus, we have evidence that a trade diversion effect of regional blocks exists for exports from China, Japan and Korea, but only in some minor blocks to a limited extent.

Third, when we compare the results for levels and changes, there is a smaller number of trading blocks for changes which show statistically significant negative estimates, and, among the statistically significant estimates, the absolute size of estimates and t-statistics become smaller in equations for changes. The results may suggest that the trade diversion effect of some trading blocks is already embodied in existing levels of exports, but is no longer evident in changes in exports during the period 1993-2003.

4. Concluding Remarks

To estimate the effects of regional trading blocks on exports of China, Japan and Korea, we have relied on two different models of gravity equation: the static gravity model and the dynamic partial adjustment model of bilateral trade, augmented with a number of extra conditioning variables that affect trade in order to account for as many extraneous factors as possible.

Thus, we have asked whether, above and beyond the natural and institutional effects, membership by trading partners in any trading blocks has some effect on the 2003 "level" of exports from China, Japan and Korea, or on "changes" in exports from these countries for the period from 1993 to 2003.

It turns out that major regional trading blocks such as EU, NAFTA and ASEAN do not create a trade diversion effect in exports from China, Japan and Korea, once standard factors have been taken into account. However, a diversion effect is observed in small blocks such as BAFTA (China, Japan and Korea), CACM (China), CAN (China), CEFTA (China and Japan), CEMAC (China, Japan and Korea), CIS (Japan), COMESA (Korea), EAEC (Japan), EFTA (China), GCC (China), MERCOSUR (Japan), SAPTA (Japan), SPARTECA (China and Korea), and UEMOA WAENU (Japan and Korea). This may suggest that fear of trade diversion on the part of China, Japan, and Korea is grounded, but only to a limited extent.

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Table 1. Descriptive Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
*Ln*EX_93_CN	156	16.79	2.87	0.00	23.71
*Ln*Ex_93_JP	156	18.29	3.04	0.00	25.38
*Ln*Ex_93_KR	156	16.74	3.53	0.00	23.60
*Ln*EX_03_CN	156	18.66	3.04	0.00	25.22
*Ln*Ex_03_JP	156	18.39	3.02	0.00	25.48
*Ln*Ex_03_KR	156	17.61	3.26	0.00	24.23
*Ln*EX_C_CN	156	1.88	1.10	-1.31	7.77
*Ln*Ex_C_JP	156	0.11	1.10	-3.37	5.16
*Ln*Ex_C_KR	156	0.88	1.64	-1.98	15.84
*Ln*GDP_93	156	22.96	2.40	17.31	29.52
*Ln*POP_93	156	15.61	1.96	10.63	20.89
*Ln*PCGDP_93	156	7.35	1.51	4.12	10.46
*Ln*GDP_03	156	23.41	2.41	17.88	30.02
*Ln*POP_03	156	15.75	1.96	10.75	20.98
*Ln*PCGDP_03	156	7.66	1.60	4.41	10.79
*Ln*GDP_C	156	0.46	0.35	-0.64	1.19
*Ln*POP_C	156	0.14	0.11	-0.13	0.33
*Ln*PCGDP_C	156	0.31	0.37	-0.89	1.10
*Ln*DIST_CN	156	9.02	0.54	6.93	9.86
*Ln*DIST_JP	156	9.13	0.51	5.97	9.84
*Ln*DIST_KR	156	9.05	0.61	5.04	9.88
*Ln*REMOTE	156	8.60	0.50	7.13	9.39
*Ln*AREA	156	11.64	2.46	5.70	16.64
LANDLOCKED	156	0.21	0.41	0.00	1.00
ISLAND	156	0.19	0.39	0.00	1.00
TARIFF_02	138	12.92	7.77	0.00	40.00
WTO_03	156	0.80	0.40	0.00	1.00
RTA_03	156	0.87	0.34	0.00	1.00

Note: See the main text for the definitions of the variables.

Table 2. Correlation Matrix

	*Ln*GDP_03	*Ln*POP_03	*Ln*PCGDP_03	*Ln*GDP_C	*Ln*POP_C	*Ln*PCGDP_C	*Ln*DIST_CN	*Ln*DIST_JP	*Ln*DIST_KR	*Ln*REMOTE_03	*Ln*AREA	LANDLOCKED	ISLAND	TARIFF_02	WTO_03	RTA_03
*Ln*GDP_03	1.00															
*Ln*POP_03	0.75	1.00														
*Ln*PCGDP_03	0.48	-0.21	1.00													
*Ln*GDP_C	0.11	-0.05	0.22	1.00												
*Ln*POP_C	-0.23	0.07	-0.44	-0.07	1.00											
*Ln*PCGDP_C	0.17	-0.06	0.34	0.96	-0.36	1.00										
*Ln*DIST_CN	-0.32	-0.32	-0.06	-0.13	0.16	-0.17	1.00									
*Ln*DIST_JP	-0.37	-0.28	-0.18	-0.06	0.20	-0.12	0.92	1.00								
*Ln*DIST_KR	-0.37	-0.31	-0.12	-0.05	0.21	-0.11	0.90	0.90	1.00							
*Ln*REMOTE_03	-0.41	-0.08	-0.51	-0.23	0.51	-0.36	0.28	0.30	0.31	1.00						
*Ln*AREA	0.55	0.80	-0.24	-0.10	0.12	-0.12	-0.10	-0.07	-0.10	0.11	1.00					
LANDLOCKED	-0.19	0.04	-0.32	-0.15	-0.06	-0.12	-0.15	-0.06	-0.03	-0.05	0.11	1.00				
ISLAND	-0.19	-0.47	0.34	0.03	-0.06	0.04	-0.06	-0.19	-0.12	0.16	-0.55	-0.27	1.00			
TARIFF_02	-0.21	0.06	-0.40	-0.10	0.29	-0.18	0.11	0.18	0.14	0.28	0.02	-0.07	-0.03	1.00		
WTO_03	0.21	0.14	0.12	0.02	0.03	0.01	0.16	0.11	0.10	-0.04	0.08	-0.16	-0.05	-0.24	1.00	
RTA_03	0.12	-0.01	0.19	-0.07	-0.19	-0.01	0.03	-0.02	-0.02	-0.03	-0.02	0.02	0.05	-0.26	0.34	1.00

Table 3. Determinants of Levels of Exports from China, Japan and Korea, 2003

	China		Japan		Korea	
	(1)	(2)	(3)	(4)	(5)	(6)
*Ln*GDP_03	0.94*** (12.60)		1.12*** (12.97)		1.17*** (10.67)	
*Ln*POP_03		1.11*** (10.42)		1.08*** (11.56)		1.25*** (10.45)
*Ln*PCGDP_03		0.73*** (7.53)		1.16*** (9.53)		1.07*** (6.49)
*Ln*DIST	-0.91*** (3.85)	-0.68** (2.46)	-1.09*** (5.28)	-1.14*** (4.82)	-0.81*** (3.41)	-0.7** (2.32)
*Ln*REMOTE	0.32 (1.15)	0.00 (0.01)	1.15*** (3.99)	1.22*** (3.91)	0.65** (2.19)	0.48 (1.40)
*Ln*AREA	-0.04 (0.44)	-0.12 (1.39)	-0.24*** (3.61)	-0.22*** (3.30)	-0.15** (2.12)	-0.19** (2.39)
LANDLOCKED	-0.97*** (3.56)	-1.10*** (3.94)	-1.05*** (3.63)	-1.02*** (3.33)	-0.76** (2.17)	-0.84** (2.15)
ISLAND	-0.85** (2.18)	-0.48 (1.14)	-0.09 (0.36)	-0.18 (0.64)	-0.61* (1.67)	-0.42 (1.12)
TARIFF_02	-0.03*** (3.39)	-0.05*** (4.37)	-0.03** (2.50)	-0.03* (1.83)	-0.03** (2.02)	-0.04** (2.01)
WTO	0.21 (0.63)	0.07 (0.21)	-0.21 (0.75)	-0.18 (0.59)	-0.06 (0.17)	-0.13 (0.33)
RTA	-0.63* (1.86)	-0.55* (1.80)	-0.43 (1.35)	-0.45 (1.43)	-0.57 (1.35)	-0.53 (1.3)
CONSTANT	3.94 (1.13)	4.64 (1.23)	-3.52 (0.92)	-3.63 (0.96)	-4.75 (1.00)	-4.32 (0.87)
# OBS	137	137	137	137	137	137
R^2	0.82	0.84	0.84	0.84	0.81	0.81

Notes: 1. All estimates are made with the Ordinary Least Squares method. 2. See the main text for the definitions of the variables. 3. Shown in parentheses are t-statistics calculated with the robust errors corrected for heteroskedasticity. 4. ***, **, and * denote one, five, and ten percent level of significance, respectively, for a two-tailed test.

Table 4. Determinants of Changes in Exports from China, Japan and Korea (1993-2003)

	China		Japan		Korea	
	(1)	(2)	(3)	(4)	(5)	(6)
*Ln*EX_93	-0.46***	-0.47***	-0.45***	-0.38***	-0.60***	-0.60***
	(5.48)	(5.99)	(6.19)	(4.90)	(3.86)	(3.94)
*Ln*GDP_93	0.45***		0.50***		0.63***	
	(4.62)		(4.90)		(3.05)	
*Ln*GDP_C	0.78***		1.11***		1.60***	
	(3.77)		(6.92)		(5.85)	
*Ln*POP_93		0.59***		0.44***		0.66***
		(5.87)		(4.11)		(3.08)
*Ln*POP_C		0.31		-0.92		2.88***
		(0.29)		(1.14)		(2.65)
*Ln*PCGDP_93		0.31***		0.38***		0.61***
		(2.82)		(3.24)		(2.92)
*Ln*PCGDP_C		0.70***		1.06***		1.57***
		(3.24)		(6.75)		(5.82)
*Ln*DIST	-0.28	-0.14	-0.63***	-0.55***	-0.82***	-0.80***
	(1.47)	(0.71)	(3.81)	(3.33)	(3.96)	(3.59)
*Ln*REMOTE	-0.14	-0.27	0.15	0.21	0.31	0.12
	(0.51)	(0.80)	(0.60)	(0.85)	(0.94)	(0.41)
*Ln*AREA	-0.02	-0.08	-0.13**	-0.12**	-0.06	-0.07
	(0.22)	(1.03)	(2.16)	(2.21)	(1.00)	(1.10)
LANDLOCKED	-0.74***	-0.84***	-0.59***	-0.59***	-0.26	-0.27
	(2.93)	(3.32)	(2.86)	(2.91)	(1.12)	(1.14)
ISLAND	-0.59	-0.35	-0.13	-0.15	-0.49*	-0.40
	(1.55)	(0.83)	(0.55)	(0.59)	(1.82)	(1.43)
TARIFF_02	-0.02***	-0.03***	-0.02**	-0.02**	-0.02*	-0.03*
	(2.84)	(3.86)	(2.39)	(2.02)	(1.72)	(1.73)
WTO	-0.20	-0.27	-0.29	-0.25	-0.25	-0.31
	(0.70)	(1.00)	(1.33)	(1.15)	(0.93)	(1.05)
RTA	-0.08	-0.08	-0.02	-0.07	-0.09	-0.02
	(0.29)	(0.28)	(0.11)	(0.32)	(0.36)	(0.06)
CONSTANT	3.67	3.59	3.02	2.55	1.95	3.06
	(1.48)	(1.25)	(1.16)	(1.02)	(0.52)	(0.83)
# OBS	137	137	137	137	137	137
R^2	0.47	0.50	0.57	0.59	0.68	0.68

Notes: 1. All estimates are made with the Ordinary Least Squares method. 2. See the main text for the definitions of the variables. 3. Shown in parentheses are t-statistics calculated with the robust errors corrected for heteroskedasticity. 4. ***, **, and * denote one, five, and ten percent level of significance, respectively, for a two-tailed test.

Table 5. Effects of Individual Trading Blocks on Exports of China, Japan and Korea

	China		Japan		Korea	
	Level (2003)	Change (93-03)	Level (2003)	Change (93-03)	Level (2003)	Change (93-03)
ASEAN	0.06	0.11	0.78*	0.33	0.61	1.15**
	(0.15)	(0.42)	(1.80)	(1.14)	(1.20)	(2.03)
BAFTA	-1.19**	-0.17	-1.64**	-0.40	-1.61**	-0.61
	(2.41)	(0.38)	(2.15)	(0.62)	(2.16)	(0.80)
CACM	-0.69*	-0.02	0.28	0.28	0.73	0.78*
	(1.72)	(0.06)	(0.69)	(0.91)	(1.19)	(1.68)
CAN	-1.34***	-0.86*	0.07	-0.02	-0.56	-0.22
	(3.36)	(1.85)	(0.19)	(0.06)	(1.17)	(0.57)
CARICOM	-0.49	0.18	0.42	0.64*	-0.30	-0.15
	(0.82)	(0.36)	(1.00)	(1.82)	(0.46)	(0.35)
CEFTA	-1.16***	-0.04	-1.98***	-0.74	-0.55	-0.54
	(3.09)	(0.08)	(5.36)	(1.54)	(1.29)	(1.52)
CEMAC	-1.64***	-0.52	-1.09***	-0.60**	-1.83***	-0.80
	(2.85)	(1.29)	(3.04)	(2.21)	(3.36)	(1.66)
CER	-0.12	-0.03	0.20	0.31	-0.61	0.48
	(0.18)	(0.04)	(0.5)	(0.88)	(0.94)	(0.86)
CIS	-0.57	0.22	-0.97**	0.77	-0.75	-0.35
	(0.83)	(0.31)	(2.13)	(1.58)	(1.05)	(0.63)
COMESA	-0.34	0.06	-0.35	0.12	-1.14**	-0.66
	(0.86)	(0.20)	(0.90)	(0.42)	(2.07)	(1.60)
EAC	0.03	-0.02	0.38	0.04	0.83	0.74
	(0.11)	(0.05)	(1.12)	(0.15)	(0.98)	(0.89)
EAEC	0.26	-0.47	-0.95	-1.06**	0.14	0.52
	(0.30)	(0.59)	(1.25)	(2.45)	(0.18)	(0.82)
EU	-0.14	0.46	0.43	0.78*	0.68	0.37
	(0.25)	(0.95)	(0.74)	(1.89)	(0.97)	(0.63)
EFTA	-1.37***	-0.64	-0.13	-0.03	-0.51	0.06
	(2.74)	(1.37)	(0.19)	(0.05)	(0.88)	(0.12)
GCC	-1.49**	-0.79**	0.67**	0.33*	-0.40	-0.15
	(2.49)	(2.52)	(2.41)	(1.68)	(1.09)	(0.45)
LAIA_NET	0.14	0.30	-0.20	-0.13	-0.19	0.14
	(0.27)	(0.64)	(0.54)	(0.55)	(0.40)	(0.45)
MERCOSUR	-0.27	-0.15	-0.79*	-0.51	-0.99	0.07
	(0.34)	(0.24)	(1.83)	(1.11)	(1.36)	(0.12)
NAFTA	-0.69	-0.52	0.57	0.24	-0.42	0.40
	(1.46)	(1.26)	(1.5)	(0.79)	(0.88)	(1.09)
PTN	-0.04	0.14	0.00	-0.02	0.25	0.29
	(0.14)	(0.63)	(0.02)	(0.11)	(0.92)	(1.40)
SADC	-0.06	0.22	-0.03	-0.21	-0.39	-0.25
	(0.16)	(0.68)	(0.06)	(0.60)	(0.76)	(0.59)
SAPTA	-1.23	-0.64	-0.80**	-0.59**	-0.63	-0.51
	(1.48)	(1.17)	(2.22)	(2.07)	(1.16)	(1.31)
SPARTECA	-1.02**	-0.64*	-0.42	-0.39	-0.91	-0.85*
	(2.03)	(1.88)	(0.81)	(1.09)	(1.35)	(1.88)
TRIPARTITE	-0.04	0.05	0.48	0.17	0.58	0.34
	(0.11)	(0.10)	(0.97)	(0.67)	(0.90)	(0.77)
UEMOA WAENU	0.00	0.24	-1.07***	-0.67**	-1.35*	-0.60
	(0.01)	(0.66)	(3.06)	(2.32)	(1.82)	(1.37)
# OBS	137	137	137	137	137	137
R^2	0.86	0.54	0.90	0.71	0.85	0.74

Notes: 1. Estimates are made when RTA is replaced with dummies for individual regional trading blocks in the equation where GDP (i.e. instead of POP and PCGDP) is included. 2. Estimates for other variables are not shown, for brevity.

Appendix Table. List of Regional Trading Blocks

ASEAN	Association of South East Asian Nations	Brunei, Darussalam, Cambodia, Indonesia, Laos, Malaysia, Myanmar, Philippines, Singapore, Thailand, Vietnam
BAFTA	Baltic Free-Trade Area	Estonia, Latvia, Lithuania
CACM	Central American Common Market	Costa Rica, El Salvador, Guatemala, Honduras, Nicaragua
CAN	Andean Community	Bolivia, Colombia, Ecuador, Peru, Venezuela
CARICOM	Caribbean Community and Common Market	Antigua & Barbuda, Bahamas, Barbados, Belize, Dominica, Grenada, Guyana, Haiti, Jamaica, Monserrat, Trinidad & Tobago, St. Kitts & Nevis, St. Lucia, St. Vincent & the Grenadines, Surinam
CEFTA	Central European Free Trade Agreement	Bulgaria, Croatia, Romania
CEMAC	Economic and Monetary Community of Central Africa	Cameroon, Central African Republic, Chad, Congo, Equatorial Guinea, Gabon
CER	Closer Economic Relations Trade Agreement	Australia, New Zealand
CIS	Commonwealth of Independent States	Azerbaijan, Armenia, Belarus, Georgia, Moldova, Kazakhstan, Russian Federation, Ukraine, Uzbekistan, Tajikistan, Kyrgyz Republic
COMESA	Common Market for Eastern and Southern Africa	Angola, Burundi, Comoros, Democratic Republic of Congo, Djibouti, Egypt, Eritrea, Ethiopia, Kenya, Madagascar, Malawi, Mauritius, Namibia, Rwanda, Seychelles, Sudan, Swaziland, Uganda, Zambia, Zimbabwe
EAC	East African Cooperation	Kenya, Tanzania, Uganda
EAEC	Eurasian Economic Community	Belarus, Kazakhstan, Kyrgyz Republic, Russian Federation, Tajikistan
EC	European Communities	Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Poland, Portugal, Slovak Republic, Slovenia, Spain, Sweden, United Kingdom
EFTA	European Free Trade Association	Iceland, Liechtenstein, Norway, Switzerland
GCC	Gulf Cooperation Council	Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, United Arab Emirates
LAIA	Latin American Integration	Argentina, Bolivia, Brazil, Chile, Colombia,

	Association	Cuba, Ecuador, Mexico, Paraguay, Peru, Uruguay, Venezuela
MERCOSUR	Southern Common Market	Argentina, Brazil, Paraguay, Uruguay
NAFTA	North American Free Trade Agreement	Canada, Mexico, United States
PTN	Protocol relating to Trade Negotiations among Developing Countries	Bangladesh, Brazil, Chile, Egypt, Israel, Mexico, Pakistan, Paraguay, Peru, Philippines, Republic of Korea, Romania, Tunisia, Turkey, Uruguay, Yugoslavia
SADC	Southern African Development Community	Angola, Botswana, Lesotho, Malawi, Mauritius, Mozambique, Namibia, South Africa, Swaziland, Tanzania, Zambia, Zimbabwe
SAPTA	South Asian Preferential Trade Arrangement	Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan, Sri Lanka
SPARTECA	South Pacific Regional Trade and Economic Cooperation Agreement	(Australia), (New Zealand), Cook Islands, Fiji, Kiribati, Marshall Islands, Micronesia, Nauru, Niuev, Papua New Guinea, Solomon Islands, Tonga, Tuvalu, Vanuatu, Western Samoa
TRIPARTITE	Tripartite Agreement	Egypt, India, Yugoslavia
UEMOA WAENU	West African Economic and Monetary Union	Benin, Burkina Faso, Côte d'Ivoire, Guinea Bissau, Mali, Niger, Senegal, Togo

Countries in parenthesis are excluded.