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Are exports of China, Japan, and Republic of Korea diverted in the major regional trading blocks?

by

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1. INTRODUCTION

Until the late 1990s China, Japan, and South Korea (hereafter Korea), the three major economies in East Asia, stood out as the only major economies without regional trade arrangements (RTAs) in the world. In very recent years, however, the three countries have signed bilateral/plurilateral trade arrangements with many countries or groups of countries. China triggered the recent East Asian domino effect when Chinese leader Zhu Ronji suggested a free trade agreement (FTA) between China and the Association of South East Asian Nations (ASEAN) at the China-ASEAN Summit in November 2000 (Baldwin, 2006a). This surprising suggestion led to the ASEAN-China FTA in November 2004. China also concluded an FTA with Chile in November 2005 and another with Pakistan in November 2006. It is now negotiating FTAs with countries such as New Zealand, Australia, India, Singapore, South Africa, and the countries of the Gulf Cooperation Council (GCC).

Japan signed an FTA in January 2002 with Singapore and another in September 2004 with Mexico. It also concluded an FTA with countries including Malaysia (December 2005), the Philippines (September 2006), Chile (March 2007), Thailand (April 2007), Brunei (June 2007), and Indonesia (August 2007), and is currently in official negotiation for concluding FTAs with Australia, India, Indonesia, Korea, Switzerland, Vietnam, ASEAN, and GCC.

Korea also concluded an FTA with Chile in October 2002, for the first time in its history. Subsequently, Korea signed an FTA with Singapore (August 2005), EFTA (December 2005), and ASEAN (December 2005). More importantly, Korea concluded an FTA with the USA in April 2007. It has also been having formal government-level talks with countries including Japan, the EU, Canada, Mexico, and India. In addition, it has been conducting a joint feasibility study on FTAs with China, GCC, and the Southern Common Market (MERCOSUR).

The recent trend toward regionalism on the part of these three countries in Northeast Asia is in part due to the spread of regionalism elsewhere in the world.[1] Particular examples are enlargements of the European Union (EU), intensification of the ASEAN Free Trade Area (AFTA), and growing pan-American moves to increase free trade

[1] See Kaiwai (2005), Dee (2007) and Pomfret (2007) for a more detailed explanation on the recent regionalism in East Asia.

arrangements, such as by 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.[2]

In short, the three countries in Northeast Asia have embarked on negotiations for preferential trade agreements because they fear that the proliferation of regional trading blocks elsewhere would create discrimination against their goods.[3] In other words, the three countries are now moving towards regionalism as a defensive response because they fear that with regionalism rising in every corner of the world, their exports are discriminated against and diverted in the trading blocks of other nations.[4] The main purpose of this paper is to investigate whether this is a real fear.

To accomplish this, we use the gravity equation augmented with dummy variables for the major regional trading blocks. Most studies formally assessing the influence of regional trade arrangements on bilateral trade also make use of the gravity equation (See, e.g., Bayoumi and Eichengreen, 1995; Frankel and Wei, 1998; and for more recent studies Ghosh and Yamarik, 2004; Carrère, 2006; Spies and Marques, 2006; and Baier, Bergstrand and Vidal, 2007). It is worth noting that their main focus has been the trade creation effect, not the trade diversion effect.[5] That is, in their investigation on regional trading blocks, researchers have looked for positive deviations from the "norm of trade" given by gravity. However, the present paper is intended to search, from the non-members' point of view, for negative deviations from the norm of trade after we control for as many "natural" and "institutional" causes of trade as possible.

We construct three different empirical models of gravity equation. 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 second is the fixed effects and random effects panel model for the period 1993 – 2003; and the third is the dynamic, partial-adjustment

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[2] 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.

[3] We use the term "regional trading blocks" with regional trade arrangements and preferential trade arrangements interchangeably.

[4] The concept of trade diversion in its original version refers only to producers and consumers inside the FTA area (Viner, 1950). Trade diversion here, however, refers to the reduction of imports to the FTA area from non-member countries.

[5] An exception is Spies and Marques (2006).

model to examine the effect of blocks on the “changes” in exports from China, Japan, and Korea, respectively, between 1993 and 2003. The results show that Japan’s and Korea’s fear of discrimination and trade diversion is ungrounded, while China’s fear is grounded only to a limited extent.

The remainder of the paper is organized as follows. Section 2 presents the three models of the gravity equation to be estimated and describes our data. The main empirical results are presented in Section 3. Finally, Section 4 summarizes the main findings.

2. EMPIRICAL MODELS OF THE GRAVITY EQUATION

As noted in the introduction, we utilize three different estimation models. First, as is common, we focus on one single year, 2003, and use the ordinary least squares (OLS) method to estimate the static gravity model. Second, we utilize the two estimation procedures of panel data spanning ten years from 1993 to 2003. Third, the so-called partial-adjustment model is utilized to consider the factors that have impact on the “changes” in exports of China, Japan, and Korea between 1993 and 2003..

a. 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, 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; Bergstrand, 1989; Deardorff, 1998; Evenett and Keller, 1998; Eaton and Kortum, 2002).[6] Thus, it possesses “more theoretical foundation than any other trade model” (Baldwin, 2006b).

In addition, researchers such as Anderson and van Wincoop (2003) have shown that bilateral trade depends not only on country size and distance, but also on relative

[6] Harrigan (2001) and Anderson and van Wincoop (2004) provide a comprehensive review of the literature on the theoretical foundations for the gravity model. Greenaway and Milner (2002) provide a review of research utilizing the gravity model to investigate the trade effects of regional trading blocks.

distance (i.e., multilateral price terms). 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:

$$\mathrm{LnEXP}_{ij} = \alpha + \beta_1 \mathrm{LnGDP}_i + \beta_2 \mathrm{LnGDP}_j + \beta_3 \mathrm{LnDIST}_{ij} + \beta_4 \mathrm{LnREMOTE}_i + \beta_5 \mathrm{LnREMOTE}_j + \varepsilon_{ij}, \quad (1)$$

where LnEXP_{ij} = log of export flows from country i (China, Japan or Korea) to country j

LnGDP_i = log of GDP of country i

LnGDP_j = log of GDP of country j

LnDIST_{ij} = log of geographical distance between country i and country j

$\mathrm{LnREMOTE}_i$ = log of remoteness of country i

$= \log(1/\sum_k(\mathrm{GDP}_k/\mathrm{GDP}_w)/\ \mathrm{DISTANCE}_{ik})$

where GDP_w = world GDP

$\mathrm{LnREMOTE}_j$ = log of remoteness of country j

$= \log(1/\sum_k(\mathrm{GDP}_k/\mathrm{GDP}_w)/\ \mathrm{DISTANCE}_{jk})$

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

$$\mathrm{LnEXP}_{ij} = \alpha + \beta_1 \mathrm{LnGDP}_j + \beta_2 \mathrm{LnDIST}_{ij} + \beta_3 \mathrm{LnREMOTE}_j + \varepsilon_j. \quad (2)$$

Many authors include per capita GDPs in a gravity equation such as Equation (2). The idea 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, as has been pointed out, 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.

$$LnEXP_{ij} = \alpha + \beta_1 LnPOP_j + \beta_2 LnPCGDP_j + \beta_3 LnDIST_{ij} + \beta_4 LnREMOTE_j + \varepsilon_j, \quad (3)$$

where $LnPOP_j$ = log of population of country j

$LnPCGDP_j$ = 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.[7] 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 nine most active regional trading blocks in the world.[8] Thus, our augmented gravity equations are

$$LnEXP_{ij} = \alpha + \beta_1 LnGDP_j + \beta_2 LnDIST_{ij} + \beta_3 LnREMOTE_j + \beta_4 LnAREA_j + \beta_5 LANDLOCKED_j + \beta_6 ISLAND_j + \beta_7 WTO_j + \beta_8 RTA_j + \varepsilon_j, \quad (4)$$

$$LnEXP_{ij} = \alpha + \beta_1 LnPOP_j + \beta_2 LnPCGDP_j + \beta_3 LnDIST_{ij} + \beta_4 LnREMOTE_j + \beta_5 LnAREA_j + \beta_6 LANDLOCKED_j + \beta_7 ISLAND_j + \beta_8 WTO_j + \beta_9 RTA_j + \varepsilon_j, \quad (5)$$

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

[7] It is also customary to include a dummy variable for 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 Democratic People's Republic of Korea (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 we 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.

[8] The nine regional trading blocks will be discussed in the following. Bilateral blocks are not considered because there are too many and their trade diversion effects are, in general, expected to be smaller than those of plurilateral blocks'.

WTO_j = 1 if country j is a WTO member
= 0 otherwise
RTA_j = 1 if country j is a member of the nine major regional trading block(s)
= 0 otherwise.

In our benchmark, static model of the gravity equation, our data are based on the year 2003. Among the regional trade arrangements associated with the three countries, the Japan-Singapore Economic Partnership Agreement was the only preferential agreement which was effective as of year 2003.[9] 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 the nine major regional trading blocks with exports to countries outside the trading blocks.

Exports data are taken from the United Nations’ Comtrade.[10] Exports here are manufacturing exports (SITC 5-9).[11] Among the explanatory variables, GDP (in US dollars), GDP per capita, population, and area (in square kilometers) are taken from the World Bank’s WDI Online data.[12] Geographical distance is taken from Centre d'Etudes Prospectives et d'Informations Internationales (CEPII)’s website.[13] 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.

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

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

[11] Effects of RTA could be investigated for services trade or more detailed product groups, but we leave this for future study. As a matter of fact, Kimura and Lee (2006) show that services trade is better predicted by gravity equation than goods trade.

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

[13] http://www.cepii.fr/anglaisgraph/bdd/distances.htm

Lastly, information on the members of the World Trade Organization (WTO) and regional trading blocks is taken from the website of the WTO and Wikipedia (online encyclopedia).[14] There are 32 regional trade arrangements listed on the WTO website at the time of writing, but many of them are not considered as RTAs by most accounts. In Africa, for example, four RTAs have been signed covering almost all African countries, but with little implementation. In Latin America, the Latin American Integration Agreement (LAIA) was signed in 1981, but this agreement never had the scope or depth of an FTA (Baier, Bergstrand, and Vidal, 2007). Thus, among the 32 regional trade arrangements, we consider only nine most active regional trading blocks to compare the effects of different agreements. Therefore, RTA is a dummy variable taking the value one if the trading partner is a member of any of the nine regional trading blocks.

Appendix Table 1 lists the nine regional trading blocks with the names of their members, respectively. By including one aggregate RTA dummy variable, we will first treat the effect of all RTAs as the same and examine whether exports of China, Japan, and Korea are impeded by membership of their trading partners in any of the nine trading blocks. Because the depth of integration among the trading blocks is different, not all blocks will have the same effect. Therefore, in a separate specification, we also include nine dummies for the nine regional blocks and tackle the impact of each regional block separately.

The total number of observations is 143. The names of the countries included are listed in Appendix Table 2.

b. Panel Model

It should be noted that even though we try to include as many conditioning variables as possible in the static gravity model, some unexplained factors may still exist in the system. 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 and control for unobserved country heterogeneity in the system.

Therefore, we construct a full panel data set for the 143 countries over the period 1993 - 2003 and re-estimate the gravity equations. Thus, the equation to be estimated is:

[14] WTO (http://www.wto.org);
Wikipedia (http://en.wikipedia.org/wiki/Trade_bloc#Most_active_regional_blocs)

$$\text{LnEXP}_{ijt} = \alpha + \beta_1\text{LnGDP}_{jt} + \beta_2\text{LnDIST}_{ij} + \beta_3\text{LnREMOTE}_{jt} + \beta_4\text{LnAREA}_j + \beta_5\text{LANDLOCKED}_j + \beta_6\text{ISLAND}_j + \beta_7\text{WTO}_{jt} + \beta_8\text{RTA}_{jt} + u_j + u_t + \varepsilon_{jt}, \quad (6)$$

where u_j and u_t denote the country and time effects, respectively.[15] Thus, we consider not only country-specific effects but also time effects to take account of factors such as business cycles, exchange rates, and so forth.

Most scholars run either fixed effects or random effects models, which share the property that their estimates are not biased by time-invariant omitted variables. The random effects model yields consistent estimates only when the unobservable unit effects are not correlated with the error term. The conducted Hausman tests (Hausman 1978) suggest that random effects are inconsistent and a fixed effects specification is required. Nonetheless, random effects are also chosen as a viable second best option because while our main focus is to examine the effects of RTAs (overall and individual) on exports from China, Japan, and Korea, there seems to be very little chance that unobserved time-invariant variables influence simultaneously the presence of an RTA and the exports from China, Japan, and Korea. As will be seen later, the magnitude and significance of the RTA estimates are very similar in both fixed effects and random effects models.

It is noted that because most of the nine individual RTA dummies are time-invariant during the period of study, the fixed effects model does not yield the coefficient estimates for the time-invariant RTA dummies and, hence, when estimating the effects of the nine individual RTAs by using the panel data, we rely solely on the random effects model, which may not yield inconsistent estimates. It is also noted that despite the fact that the fixed effects and random effects panel models are useful to control for unobserved characteristics in the system, they have a disadvantage in the sense that they cannot distinguish the short-run contemporaneous effect from the long-run steady-state effect.

Accordingly, in the next stage we take only two years, 1993 and 2003, and estimate the so-called partial-adjustment model.

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[15] As in the static model, we also split GDP into population and GDP per capita, but we find that this does not qualitatively change the estimates of our key variables. Therefore, we do not report the results from this split in the case of the panel model, for brevity.

c. Partial-adjustment Model

The partial-adjustment model can be found elsewhere, such as Kmenta (1971), Curry and George (1983), and Stone and Lee (1995). Suppose that the desired level of $LnEXP_{ij}$ at time t is $LnEXP_{ijt}^{*}$; then, the relationship between the actual and the desired level of $LnEXP_{ij}$ may be specified as follows:

$$(LnEXP_{ijt} - LnEXP_{ijt-1}) = \delta(LnEXP_{ijt}^{*} - LnEXP_{ijt-1}), \tag{7}$$

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

$$(LnEXP_{ijt} - LnEXP_{ijt-1}) = - \delta\, LnEXP_{ijt-1} + \lambda_1 X_{jt-1} + \lambda_2(X_{jt} - X_{jt-1}), \tag{8}$$

where X is a vector of explanatory variables.

If the coefficients in Equation (8) 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 $LnEXP_{ij}$.

A special case of Equation (8) is where $\lambda_1 = \lambda_2$ and hence $LnEXP_{ijt}^{*}$ is determined only by the level variables in period t and the lagged value of $LnEXP_{ij}$. This specification embodies the assumption that changes in the determinants of $LnEXP_{ij}$ are correctly anticipated and fully reflected in the current $LnEXP_{ij}$. In this instance, Equation (8) becomes

$$(LnEXP_{ijt} - LnEXP_{ijt-1}) = -\delta\, LnEXP_{ijt-1} + \lambda_1 X_{jt.} \tag{9}$$

Thus, we evaluate the dynamic structure by first estimating Equation (8) 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 (9).

In our gravity equation, variables such as DISTANCE, AREA and dummies for landlocked and island countries are time-invariant, and hence we specifically estimate the following equation:

$$
\begin{aligned}
(\text{LnEXP}_{ijt} - \text{LnEXP}_{ijt-1}) = & -\delta\text{LnEXP}_{ijt-1} + \beta_1\text{LnGDP}_{jt-1} + \beta_2\text{LnGDP\_C}_j \\
& + \beta_3\text{LnDIST}_{ij} + \beta_4\text{LnREMOTE}_{jt-1} + \beta_5\text{LnREMOTE\_C}_j + \beta_6\text{LnAREA}_j \\
& + \beta_7\text{LANDLOCKED}_j + \beta_8\text{ISLAND}_j + \beta_9\text{WTO}_{jt-1} + \beta_{10}\text{WTO\_C}_j + \beta_{11}\text{RTA}_{jt-1} \\
& + \beta_{12}\text{RTA\_C}_j + \varepsilon_i, \qquad (10)
\end{aligned}
$$

where $t\text{-}1 = 1993$; $t = 2003$

$\text{LnGDP\_C}_j = \text{LnGDP}_{jt} - \text{LnGDP}_{jt-1}$

$\text{LnREMOTE\_C}_j = \text{LnREMOTE}_{jt} - \text{LnREMOTE}_{jt-1}$

$\text{WTO\_C}_j = \text{WTO}_{jt} - \text{WTO}_{jt-1}$

$\text{RTA\_C}_j = \text{RTA}_{jt} - \text{RTA}_{jt-1}$.

Thus, we can distinguish the short-run contemporaneous effect from the long-run steady-state effect.[16] Another advantage of this model is that by first-differencing the dependent variable and the time-variant explanatory variables, this methodology also accounts for unobserved country-fixed effects as well as observed country-fixed effects. This is particularly useful because most of our individual RTA dummy variables are time-invariant during the period of study.

3. ESTIMATION RESULTS

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

[16] As in the static model, we also split GDP into population and GDP per capita, but we find that this does not qualitatively change the estimates of our key variables. Therefore, we do not report the results from this split in the case of partial-adjustment model, for brevity.

a. Static Results

Table 1 shows our benchmark regression results of the static gravity model for manufacturing exports from China, Japan, and Korea. Our specification is the standard augmented gravity model for the 2003 data, 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, as indicated by the large size of R^2. 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. That is, importer GDPs, population and per capita GDPs all have coefficient estimates close to unity, and estimates for distance are close to minus one.

It is also shown that these countries, except for China, tend to export more to countries that are farther away from most other countries in the world and, except for China, tend to export less to countries that are larger in terms of land area, when other factors remain constant. These three countries are also found to export less to landlocked countries. No such effect, however, is found for island countries. The dummy variable for the countries being WTO members yields coefficients that are statistically insignificant at conventional levels.

Above and beyond these effects, does membership by trading partners of China, Japan, and Korea in any of the most active nine regional trading blocks have anything to do with exports of these three countries? The dummy variable for the countries being members of the nine active regional trading blocks, RTA, has no significant result in the Chinese export equation, but is significantly positive in the equations for Japanese and Korean exports. The coefficient on the regional trading block dummy variable for Japan is 0.56 with the robust t-statistic of 3.14 (column 3), that is, Japan exports 75 per cent more (exp(0.56) – 1.0 = 0.75) to countries that are members of the nine trading blocks than to otherwise similar countries. However, one should not place too much confidence in such estimates, because all trading blocks do not carry equal weight and the trade effect should be quite different among different blocks.

Accordingly, we will 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 Equation (6) in fixed effects and random effects model to consider the aggregate effects of regional trading blocks on exports of China, Japan, and Korea for the period 1993 - 2003.

b. Results from Fixed Effects and Random Effect Models

As explained previously, we estimate both the fixed effects and random effects models even if the Hausman test rejects the null hypothesis of no correlation between the unobservable unit effects and error term and hence the fixed effects model is preferred.

To provide comparability, fixed effects and random effects estimates of Equation (6) are presented side by side in Table 2. Our key gravity variables appear to hold similar results to those in the previous specifications: importers' GDPs continue to have positive and significant estimates in both the fixed effects and random effects models for the three countries, and geographic distance has negative and significant estimates for all countries. The result for remoteness of trading partners is somewhat mixed, yielding negative and significant estimates for China (in the fixed effects model), while yielding positive and significant estimates for Japan (in the random effects model). In contrast to our static model, size of land area of importing country no longer has a statistically meaningful relation with China's exports, while landlocked countries continue to import less from the three countries. It also seems worth noting that WTO membership of trading partners seems to have contributed to the exports from Japan, and Korea, but not to the exports from China.

Lastly, RTA, the dummy variable for countries being members of the nine regional trading blocks, is significantly positive in the equations for Japanese and Korean exports. This is in line with our benchmark static result. It is also worth noting that the magnitudes and significance of the coefficient estimate for the RTA dummy variable are very similar in both the fixed effects and the random effects models.

c. Results from the Partial-adjustment Model

Ordinary least squares estimates of the partial-adjustment model represented by Equation (10) are presented in Table 3. As noted previously, the dependent variable is the first difference of log of exports from the three countries, respectively. The results are generally similar to the ones obtained with the static gravity model and panel model, but the overall fit of the equation is smaller, with a coefficient of determination of 0.353 (China) ~ 0.585 (Japan).

The coefficients in LnEXP $_{t-1}$, the adjustment rates, are -0.34 (Korea) ~ -0.39 (Japan) and are statistically significant at the one percent level. The coefficients of the levels and difference-form variables of the log of GDP (LnGDP) have the expected positive signs and are significant at the one percent level. 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 (9).

It seems worth noting that the estimated coefficients and their corresponding t-statistics of the difference form of 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 growth of trading partners.

The log of distance has an expected negative coefficient which is highly significant in all of the three equations. In terms of the size of the coefficient estimates, however, geographical distance appears to be least important for changes in China's exports from 1993 to 2003, among the three countries' exports.

Looking at other conditioning variables, we find that remoteness of trading partners seems to contribute much to the changes in China's exports only. Between 1993 and 2003, Japan's exports appeared to increase less to countries with a large size of land area. Whether trading countries are landlocked or island countries does not seem to have any meaningful effect on changes in exports from China, Japan, and Korea. It is also worth noting that WTO membership of trading partners does not seem to have contributed to an increase in exports of the three countries between 1993 and 2003.

More interestingly, our key variable, the dummy variable for countries being members of the nine regional trading blocks, RTA, is significantly positive in the equations for Japanese and Korean exports. This is consistent with our static and panel results shown above, and in contrast with the common belief that exports from non-members to members of a trading block may be diverted. As noted previously, however, this does not suggest that "each" of the nine trading blocks has no impact on exports from China and has positive impact on exports from Japan and Korea.

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

d. When Individual Trading Blocks are Included

As noted previously, among the 32 regional trade arrangements listed on the WTO website we consider only nine most active regional trading blocks, to compare the effects of different plurilateral agreements on exports from China, Japan, and Korea. Table 4 shows the coefficients and their t-statistics for only regional block dummies, estimated by the equations which include GDPs.[17]

Even though the static model is inferior to the other two models in the sense that it may suffer from an omitted-variable bias, we also present the estimated parameters of our benchmark static model to provide comparability, alongside those of the random effects model and the partial-adjustment model. When interpreting the results, however, we put more weight on the estimates from the panel model and the partial-adjustment model. Columns (1), (4), and (7) are the estimates from the static gravity model, columns (2), (5), and (8) the estimates from the random effects panel model, and columns (3), (6), and (9) 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, ranging from negative to positive values. Second, and more importantly, among the nine trading blocks a negative and statistically significant estimate is obtained only for China's exports in EAEC (panel model), EFTA (static and partial-adjustment models), and EU (panel model). Specifically, for instance, the estimated diversion effect for EU in the Chinese equation is -0.41, implying that Chinese exports are 51 [= 100*(exp(0.41) – 1.0)] per cent smaller to the EU countries than to otherwise similar countries over the period 1993-2003.

[17] Estimates for other covariates remain qualitatively the same as in the equations where there is only one aggregate RTA dummy variable.

Third, some trading blocks reveal positive and statistically significant estimates: China's exports are "greater" in the ASEAN market (panel model), Japan's exports are "greater" in the ASEAN market (all three models), CACM (static model), CARICOM (static and partial-adjustment models), EAEC (panel model), EU (static and panel models) and NAFTA (static model), and Korea's exports are "greater" in ASEAN (static), CACM (all three models), EAEC (panel and partial-adjustment models), and MERCOSUR (partial-adjustment model). More specifically, for instance, Japanese exports are 156 [= 100*(exp(0.94) – 1.0) in panel model] per cent greater to the ASEAN member countries than to otherwise similar countries.

We are not in a position to offer a complete explanation of why we observe only "trade creation" but no "trade diversion" in some of the nine trading blocks. Here are some explanations that we can offer. A positive coefficient estimate for ASEAN may be due to the fact that although AFTA came into force in 1992 it did not create much preferential trade (Baldwin, 2006a; Dee, 2007). As a matter of fact, the ASEAN member countries unilaterally cut their tariff rates to zero or very low levels, especially in the 1990s, so as to attract investment from Japanese firms (Baldwin, 2006a). This may be why the magnitude and significance of coefficient estimates for the ASEAN dummy are greater in the Japanese equations than in other equations.

It is also noted that EAEC grew out of the Commonwealth of Independent States (CIS) Customs Union, which was a group of successor states to the former USSR, and hence the dummy variable for EAEC countries is in a sense not taking account of the effect of the formation of a regional block, but rather the dissolution of a stronger regional block.

4. CONCLUDING REMARKS

The recent surge of regionalism on the part of China, Japan, and Korea is in part a defensive response to the proliferation of preferential trade agreements elsewhere, which these countries fear would create discrimination against their goods. Accordingly, this paper has investigated whether regional trade arrangements elsewhere impinge negatively on exports of China, Japan, and Korea.

To estimate the effects of regional trading blocks on exports of China, Japan, and Korea, we have relied on three different models of gravity equation: the static gravity model, the fixed effects and random effects models, and the 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.

It turns out that trade diversion is observed only for China's exports in EU, EFTA, and EAEC, but no diversion effect is observed for Japan's and Korea's exports in any of the major trading blocks. On the other hand, trade creation is observed for exports from China in ASEAN, for exports from Japan in ASEAN, CACM, CARICOM, EAEC, EU, and NAFTA, and for exports from Korea in ASEAN, CACM, EAEC, and MERCOSUR. Thus, Japan's and Korea's fear of discrimination and trade diversion is ungrounded, while China's fear is grounded only to a limited extent.

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Table 1. Determinants of Levels of Exports from China, Japan, and Korea, 2003

	China		Japan		Korea	
	(1)	(2)	(3)	(4)	(5)	(6)
LnGDP	0.90*** (11.49)		1.11*** (13.48)		1.13*** (10.73)	
LnPOP		0.96*** (10.76)		1.04*** (13.26)		1.10*** (10.77)
LnPCGDP		0.82*** (7.51)		1.19*** (10.52)		1.16*** (7.64)
LnDIST	-1.00*** (4.76)	-0.94** (4.15)	-1.29*** (5.95)	-1.35*** (5.98)	-1.33*** (4.57)	-1.35** (4.24)
LnREMOTE	0.21 (0.84)	0.08 (0.26)	0.87*** (3.08)	1.01*** (3.12)	0.57* (1.81)	0.62 (1.58)
LnAREA	-0.01 (0.16)	-0.05 (0.63)	-0.21*** (3.20)	-0.17*** (2.71)	-0.16* (1.82)	-0.15* (1.77)
LANDLOCKED	-0.70** (2.53)	-0.75** (2.60)	-0.62** (2.32)	-0.56** (2.01)	-0.88*** (2.67)	-0.86** (2.47)
ISLAND	-0.43 (1.47)	-0.31 (0.98)	0.12 (0.08)	-0.12 (0.49)	-0.49 (1.59)	-0.54 (1.60)
WTO	0.13 (0.51)	0.12 (0.45)	-0.22 (0.66)	-0.21 (0.62)	-0.29 (0.63)	-0.29 (0.61)
RTA	-0.06 (0.28)	-0.01 (0.03)	0.56*** (3.14)	0.50*** (2.65)	0.46** (2.22)	0.44** (2.04)
CONSTANT	5.38 (1.41)	5.87 (1.43)	-0.26 (0.06)	-0.95 (0.23)	-0.91 (0.18)	0.72 (0.14)
# OBS	143	143	143	143	143	143
R^2	0.831	0.833	0.862	0.864	0.808	0.808

Notes: 1. All estimates are made with the Ordinary Least Squares method. 2. See the main text for 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 2. Determinants of Exports from China, Japan, and Korea, Panel 1993-2003

	China		Japan		Korea	
	(1) Fixed	(2) Random	(3) Fixed	(4) Random	(5) Fixed	(6) Random
LnGDP	0.84*** (9.44)	0.92*** (10.61)	0.80*** (10.30)	0.97*** (18.78)	0.65*** (6.70)	0.90*** (14.79)
LnDIST		-0.92*** (4.65)		-1.19*** (5.39)		-1.21*** (5.27)
LnREMOTE	-6.03*** (6.14)	-0.07 (0.29)	-0.88 (0.88)	0.61** (2.56)	-0.08 (0.07)	0.11 (0.42)
LnAREA		0.005 (0.08)		-0.07 (1.22)		-0.01 (0.20)
LANDLOCKED		-0.84*** (3.21)		-0.91*** (3.59)		-1.21*** (4.20)
ISLAND		-0.36 (1.21)		0.33 (1.10)		-0.28 (0.84)
WTO	0.05 (0.68)	0.10 (1.38)	0.16** (2.45)	0.18*** (2.88)	0.14* (1.70)	0.13* (1.71)
RTA	-0.18 (1.63)	-0.16 (1.60)	0.33*** (3.28)	0.40*** (4.48)	0.50*** (4.06)	0.55*** (5.00)
CONSTANT	50.8*** (5.50)	6.37** (2.01)	7.45 (0.82)	2.45 (0.76)	-3.21 (0.32)	7.12** (1.99)
# OBS	1540	1540	1540	1540	1540	1540
R^2 within	0.471	0.456	0.102	0.100	0.165	0.162
R^2 overall	0.514	0.810	0.707	0.824	0.749	0.802

Notes: 1. All estimates are made with country dummies and year dummies. 2. See the main text for definitions of the variables. 3. Shown in parentheses are t-statistics. 4. ***, **, and * denote one, five, and ten percent level of significance, respectively, for a two-tailed test.

Table 3. Determinants of Changes in Exports from China, Japan, and Korea (1993-2003)

	China	Japan	Korea
	(1)	(2)	(3)
$LnEXP_{t-1}$	-0.37***	-0.39***	-0.34***
	(5.54)	(4.93)	(4.54)
$LnGDP_{t-1}$	0.33***	0.45***	0.33**
	(4.40)	(4.59)	(2.56)
LnGDP_C	0.68***	1.03***	1.10***
	(3.11)	(5.53)	(4.73)
LnDIST	-0.40***	-0.77***	-0.83***
	(2.70)	(3.66)	(3.85)
$LnREMOTE_{t-1}$	0.18	0.12	-0.06
	(0.96)	(0.63)	(0.26)
LnREMOTE_C	-3.52**	-1.48	-0.07
	(2.12)	(0.93)	(0.04)
LnAREA	-0.02	-0.10**	-0.02
	(0.29)	(2.40)	(0.30)
LANDLOCKED	-0.37	0.07	-0.23
	(1.37)	(0.38)	(0.99)
ISLAND	-0.15	0.01	-0.22
	(0.91)	(0.09)	(1.01)
WTO_{t-1}	-0.07	-0.22	-0.16
	(0.29)	(1.04)	(0.52)
WTO_C	-0.29	0.11	-0.13
	(0.94)	(0.41)	(0.34)
RTA_{t-1}	-0.06	0.32**	0.23
	(0.46)	(2.37)	(1.35)
RTA_C	-0.26	0.61**	0.49*
	(1.06)	(2.08)	(1.72)
CONSTANT	2.57	3.90	6.95*
	(0.91)	(1.50)	(1.89)
# OBS	143	143	143
R^2	0.353	0.585	0.361

Notes: 1. All estimates are made with the Ordinary Least Squares method. 2. See the main text for 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. Effects of Individual Trading Blocks on Exports of China, Japan, and Korea

	China			Japan			Korea		
	(1) Static (2003)	(2) Panel (1993-2003)	(3) Partial (1993-2003)	(4) Static (2003)	(5) Panel (1993-2003)	(6) Partial (1993-2003)	(7) Static (2003)	(8) Panel (1993-2003)	(9) Partial (1993-2003)
ASEAN	0.44	0.57*	0.10	1.36***	0.94***	0.72**	0.98**	0.43	0.40
	(1.13)	(1.82)	(0.39)	(3.61)	(3.31)	(2.60)	(2.54)	(1.25)	(1.59)
CACM	0.09	0.01	0.36	0.82**	0.42	0.42	1.50***	1.10*	0.82**
	(0.33)	(0.01)	(1.31)	(2.47)	(0.84)	(1.31)	(3.53)	(1.88)	(2.32)
CAN	-0.51	-0.60	0.04	0.30	0.41	-0.08	0.42	0.52	0.16
	(1.36)	(1.10)	(0.12)	(1.10)	(0.79)	(1.41)	(0.95)	(0.86)	(0.38)
CARICOM	-0.29	-0.11	-0.16	0.81**	0.42	0.55**	0.25	0.10	-0.60
	(0.56)	(0.38)	(0.58)	(2.42)	(1.55)	(2.57)	(0.49)	(0.32)	(1.54)
EAEC	0.25	-0.29*	-0.38	-0.74	0.34**	0.69	0.01	1.01***	1.37**
	(0.33)	(1.91)	(0.64)	(1.46)	(2.54)	(1.00)	(0.01)	(6.07)	(2.38)
EFTA	-0.91***	-0.90	-0.59**	0.47	0.67	-0.19	0.03	0.21	0.24
	(3.66)	(1.33)	(2.04)	(0.77)	(1.04)	(0.80)	(0.07)	(0.28)	(0.78)
EU	-0.42	-0.41**	-0.34	0.65*	0.35*	0.03	-0.13	-0.001	0.14
	(1.34)	(1.99)	(1.21)	(1.94)	(1.87)	(0.13)	(0.30)	(0.00)	(0.37)
MERCOSUR	0.39	0.54	0.52	0.29	0.09	0.41	0.89	0.97	0.76*
	(0.64)	(0.86)	(1.09)	(0.75)	(0.15)	(1.11)	(1.39)	(1.38)	(1.78)
NAFTA	0.03	0.18	0.06	0.79**	0.28	0.20	0.25	0.07	0.37
	(0.06)	(0.63)	(0.13)	(2.28)	(1.06)	(0.91)	(0.48)	(0.23)	(0.66)
# OBS	143	1540	143	143	1540	143	143	1540	137
R^2	0.837	0.814	0.374	0.873	0.828	0.606	0.816	0.804	0.418

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. "Partial" represents the partial-adjustment model, and "Panel" represents the random effects panel model. 3. For panel analysis, year dummies are included. 4. Shown in parentheses are t-statistics. 5. Coefficient estimates for other variables are not shown, for brevity.

Appendix Table 1. List of Most Active Regional Trading Blocks

Abbreviation (Year in force)	Full Name	Member Countries (Year of entry)
ASEAN (1992)	Association of South East Asian Nations	Brunei, Cambodia (1999), Indonesia, Laos (1997), Malaysia, Myanmar (1997), Philippines, Singapore, Thailand, Vietnam (1995)
CACM (1961)	Central American Common Market	Costa Rica (1963), El Salvador, Guatemala, Honduras, Nicaragua
CAN (1988)	Andean Community	Bolivia, Colombia, Ecuador, Peru, Venezuela (until 2006)
CARICOM (1973)	Caribbean Community and Common Market	Antigua & Barbuda (1974), Bahamas (1974), Barbados, Belize (1974), Dominica (1974), Grenada (1974), Guyana, Haiti (2002), Jamaica, Montserrat (1974), St. Kitts & Nevis (1974), St. Lucia (1974), St. Vincent & the Grenadines (1974), Surinam (1995), Trinidad & Tobago
EAEC (1997)	Eurasian Economic Community	Belarus, Kazakhstan, Kyrgyzstan Republic, Russian Federation, Tajikistan, Uzbekistan (2006)
EFTA (1960)	European Free Trade Association	Iceland, Liechtenstein, Norway, Switzerland
EU (1958)	European Union	Austria (1995), Belgium, Bulgaria (2007), Cyprus (2004), Czech Republic (2004), Denmark (1973), Estonia (2004), Finland (1995), France, Germany, Greece, Hungary (2004), Ireland (1973), Italy, Latvia (2004), Lithuania (2004), Luxembourg, Malta (2004), Netherlands, Poland (2004), Portugal, Slovak Republic (2004), Romania (2007), Slovenia (2004), Spain, Sweden (1995), United Kingdom (1973)
MERCOSUR (1991)	Southern Common Market	Argentina, Brazil, Paraguay, Uruguay
NAFTA (1994)	North American Free Trade Agreement	Canada, Mexico, United States

Source: WTO (http://www.wto.org/english/tratop_e/region_e/region_e.htm)

Wikipedia (http://en.wikipedia.org/wiki/Trade_bloc#Most_active_regional_blocs)

Note: Numbers in parentheses next to the country names are the years of full membership of the countries that joined the blocks in a later year than the year in force.

Appendix Table 2. List of Countries Included in the Study

Algeria	Egypt Arab Rep	Lithuania	Senegal
Argentina	El Salvador	Madagascar	Seychelles
Armenia	Estonia	Malawi	Sierra Leone
Australia	Ethiopia	Malaysia	Singapore
Austria	Finland	Maldives	Slovak Republic
Azerbaijan	France	Mali	Slovenia
Bahrain	Gabon	Malta	Solomon Islands
Bangladesh	Gambia The	Marshall Islands	Spain
Barbados	Germany	Mauritania	Sri Lanka
Belarus	Ghana	Mauritius	St Lucia
Belize	Greece	Mexico	St Vincent and the Grenadines
Benin	Grenada	Moldova	Suriname
Bolivia	Guatemala	Mongolia	Sweden
Brazil	Guinea	Morocco	Switzerland
Bulgaria	Guinea-Bissau	Mozambique	Syrian Arab Republic
Burkina Faso	Guyana	Nepal	Tajikistan
Burundi	Honduras	Netherlands	Tanzania
Canada	Hong Kong China	New Zealand	Thailand
Cape Verde	Hungary	Nicaragua	Togo
Central African Republic	Iceland	Niger	Tonga
Chad	India	Nigeria	Trinidad and Tobago
Chile	Indonesia	Norway	Tunisia
Colombia	Iran Islamic Rep	Oman	Turkey
Comoros	Ireland	Pakistan	Turkmenistan
Congo Dem Rep	Israel	Panama	Uganda
Congo Rep	Italy	Papua New Guinea	Ukraine
Costa Rica	Jamaica	Paraguay	United Kingdom
Cote d'Ivoire	Jordan	Peru	United States
Croatia	Kazakhstan	Philippines	Uruguay
Cyprus	Kenya	Poland	Uzbekistan
Czech Republic	Kiribati	Portugal	Vanuatu
Denmark	Kyrgyz Republic	Romania	Venezuela RB
Djibouti	Latvia	Russian Federation	Vietnam
Dominica	Lebanon	Rwanda	China
Dominican Republic	Liberia	Samoa	Japan
Ecuador	Libya	Saudi Arabia	Korea Rep

Note: The number of countries listed in the table is 144. In the regression, the observations for 143 countries (excluding China, Japan, or Korea) are used, depending upon the dependent variables.