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DEVELOPMENT ALTERNATIVES TO EXPORT LED INDUSTRIALIZATION IN ASEAN

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Abstract

The paper addresses micro (sectoral) and macro economic aspects of an alternative to "manufacturing exports-led" growth through regional trade agreements (RTAs) in ASEAN. While a return to the old protectionist, import substitution industrialization policies seems to have little support, agriculture remains, today, a large and typically lagging sector in the regional economies. The paper examines an alternative regional growth strategy: economic growth, in an open trade regime, driven by productivity growth in the agricultural sector. Comparative simulations are carried out in the empirically based GTAP computable general equilibrium (CGE) model to examine the implications of a strategy shift toward focus on agricultural productivity growth, in the region. The 57 sector Global Trade Analysis Project (GTAP) model is relatively detailed in its treatment of the agricultural sector making it suitable for this exercise. As the ASEAN Economic Community is to take effect in 2015 it is timely to examine the public policy options that will govern its development. We do so retrospectively, looking forward from 2001 to what has been more than a decade of preferential trade liberalization agreements as the engine of growth versus an alternative agricultural productivity focus.

The results of the simulations indicate real GDP gains to ASEAN members from a posited 1% Hicks neutral technical progress in 14 primary sector industries or 21 including agricultural processing industries that are, respectively, 5 to 10 times those from a discriminatory elimination of all tariffs on trade among ASEAN members, alone – larger than those from simulations of any of four other RTAs to include the members of ASEAN in a process similar to the ASEAN++FTA initiative announced in 2011. The technical progress leads

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to smaller sectoral expansions and contractions in output and trade along with the larger gains in real GDP in comparison to the RTAs. This implies lower adjustment costs of resource reallocation as well as greater benefits from a public policy focus on promoting economic growth through productivity growth in agriculture and food processing rather than through RTAs. In addition poorer members of ASEAN fare better in comparison to richer members from the technical progress in primary production and processing in contrast to the discriminatory trade liberalization of RTAs.

Key Words : Development Alternatives, Export Led Industrialization, ASEAN

1. Introduction

This paper addresses micro (sectoral) and macro economic aspects of an alternative to "manufacturing exports-led" growth in ASEAN and developing Asia more generally. It responds to some concerns of critics of that strategy. Critics in Asia called after the 1997 Crisis for a new strategy less dependent on (and less volatile than) embracing globalization. Critics in the EU and the US complaining of growing Asian trade surpluses, reserve accumulations and under-valued currencies, after the 1997 Crisis also called for adoption of a more domestically oriented growth strategy. Other critics demanded alternatives that might promote greater global and regional income equality, while still others argued that the beneficial effects on food availability of the "green revolution" initiated in the region in the 1960s have run their course. While a return to the old protectionist, import substitution industrialization policies seems to have had little support, agriculture remains, today, a large and typically lagging sector in the regional economies.

However, the public policy response in ASEAN was to "double-down" on manufacturing exports-led growth through expanded emphasis on preferential, i.e., discriminatory, reductions in some trade barriers through a multitude of Regional Trade Agreements (RTAs) including development of the ASEAN Economic Community (AEC) agreed by the ten ASEAN member countries in 2007 and to be implemented by 2015 (ASEAN, 2007). Petri, Plummer and Zhai (2012) provide an analysis of the potential effects of completion of the AEC vision of a fully integrated single market and production platform with free movement of goods and services, skilled labor and foreign direct investment. A strong bias toward manufacturing growth is identified by them, with limited gains for some primary producers in ASEAN in spite of estimates of overall 5.3% GDP growth in a completed AEC.

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This paper examines an alternative regional growth strategy. It is inspired by work of Adelman (1984) on a strategy she dubbed Agricultural Demand Led Industrialization (ADLI), i.e., economic growth, in an open trade regime, driven by productivity growth in the agricultural sector. The paper does not replicate the simulations carried out by Adelman nor does it use the hypothetical, single country CGE model she employed. The paper uses comparative simulations carried out in the empirically based GTAP CGE model (6.2, based on 2001 data) to examine the implications of a strategy shift toward focus on agricultural productivity growth, in the region. The GTAP model is relatively detailed in its treatment of the agricultural sector making it suitable for this exercise.

That regional trade agreements (RTA) have been embraced by Asian economies, especially the members of ASEAN, is well documented (Baldwin, 2007). That embrace is an expression of commitment in the region to relying on the forces of globalization and discriminatory partial trade liberalization to propel economic growth in the regional economies. RTAs take many forms and may include tariff reduction or elimination on trade among members, may extend to reduction in other trade barriers while often exempting some products or industries from trade barrier reductions. RTAs may include investment related provisions as well as trade related ones.

For the remainder of the paper, Section II discusses methodology and relevant literature. Section III reports analytical results at the Macroeconomic level, while sectoral level results are shown in Section IV. The conclusions are in Section V.

2. Method

Conclusions regarding the consequences of any proposed RTA will depend on the particular form the RTA takes, including its membership, the size of the countries, their trade patterns before the RTA and the model employed for the analysis (Chaipan, Nguyen, and Ezaki, 2006; Sudsawasd and Mongsawad, 2007; Plummer, 2007). The model employed here is a long run, general equilibrium, full-employment, comparative static model in which goods exchange at prices equal to marginal cost and factors are paid their marginal products.[1] The GTAP model is described briefly below and in more detail in Danupon Ariyasajjakorn, et al (2009) and Hertel and Tsigas (1997).

This study employs comparative static simulation exercises to find the empirical effects of FTAs on income, trade and the composition of output. Similarly, the effects of a posited one percent rate of technical progress in primary production and processing industries are calculated.

Multiple studies of trade liberalization and regional integration with cross-regional, multi-industry, and multi-endowment characteristics have used the CGE approach employed here.

A CGE model has the ability to provide a complete assessment of trade liberalization simultaneously by taking inter-industry and cross-country analysis into account through the quantification of input-output relationships. The CGE model used here has been developed by the Global Trade Analysis Project (GTAP) of the Center for Global Trade Analysis, Department of Agricultural Economics, Purdue University. Reasons for choosing this model include the GTAP database that is provided with the model, covering a wide range of countries and industrial sectors, and the detailed treatment of agricultural sectors.

The GTAP database version-6.2 used by this study reflects the world economy in 2001, after recovery from the Asian Crisis that began in 1997 and at the outset of a decade characterized by accelerated preferential trade liberalization between ASEAN and its Asian trading partners. The database is formatted as an input–output structure within each country with bilateral international trade values. Moreover, the granularity of the bilateral trade data extends down to the sector level. We can therefore analyze the effects of RTAs to the sector level. The GTAP database contains data for 57 sectors of economic production in each of 87 economies or regions which have been consolidated in some cases in this paper for analytical convenience.

The model links multiple agents in multiple economies together. The behavioral characteristics of the GTAP model are based on neoclassical assumptions. These include perfect competition, maximizing behavior, positive and decreasing marginal productivity and constant returns to scale, and equilibrium conditions that follow Walras's law. When the system is ‘‘disturbed'' it will adjust itself to the next equilibrium level.

Final consumers pay for final demand in the form of government spending and household consumption expenditures, in the domestic economy. Residual payments are kept as saving. Producers make payments for intermediate inputs and services of factors of production. International payments for imported final goods and services come from the households in each region/country, while producers pay for importing intermediate goods and receive payments when exporting them. Governments impose tariffs and subsidies on various payment flows between regions/countries. Factors of production cannot move from one region to another. Capital moves only as a payment flow, settling accounts. There are no financial markets. All aspects of investment and capital are treated as commodities.

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Each agent in each economy will have the same behavior. Each regional household is ruled by an aggregate utility function to allocate payments to government expenditures, private consumption and savings. The government expenditures function is based on a Cobb-Douglas type of utility function, with the assumption of constant budget shares and constant elasticities of substitution. The private consumption function uses a constant difference of elasticities (CDE) functional form and assumptions of elasticity have been applied to allow substitution among composite products.

The production function in each sector of each region is a constant elasticity of substitution (CES) production function with the constant returns-to-scale. The CES is applied among composite intermediate inputs and among factor endowments but not between the intermediates and factors. Producers are assumed to choose the optimal mix of primary factors independently of the intermediate input prices and vice versa. Imported intermediate inputs are assumed to be separated from domestically produced inputs. The technology variable is a constant in each nest of combinations (among intermediates, on one hand, and among factors, on the other) in the production process. In the bottom nests, combinations of intermediate inputs are restricted by the intermediate input that augments technological change. Factor combinations are restricted by factor (value-added) endowments that will augment technological change as well. In the top nest, combinations and re-combinations of combined intermediates and combined factors are represented by Hicks-neutral technological changes.

The model itself is so complex that we do not take the numerical results at face value but view them only as suggestive of the order of magnitudes of empirical results from various public policy initiatives. The order in which bilateral agreements are posited here is based on the historical ordering of ASEAN+1 agreements made between ASEAN members and their Asian trading partners. Results show the size of the impacts tends to follow this order, especially in the case of the ASEAN+1 free trade area with China. But note that the posited movements to free trade in each scenario exceed the actual liberalization that has been agreed and would more nearly represent but still goes beyond the degree of liberalization and integration of preferential agreements anticipated in the ASEAN++ FTA process, the Regional Comprehensive Economic Partnership (RCEP).

Some tentative conclusions may be drawn from examining the simulations on original 2001 GTAP data of the elimination of all internal tariffs on trade in five RTAs defined to include respectively, the 10 members of ASEAN; ASEAN1 (ASEAN plus China); ASEAN2 (ASEAN plus China and Korea); ASEAN3 (ASEAN plus China, Korea and Japan); ASEAN4 (ASEAN plus China, Korea, Japan and India) (Table 1.a). It should be noted that the degree of integration posited for the RTAs simulated here substantially exceeds that which has been achieved to date since even now all tariffs have not been removed among ASEAN members nor between the various partner entities with ASEAN in respective RTA agreements which may be described as ASEAN+1 agreements (Fukunaga and Kuno, 2012).

3. Macro Analysis

Generally economies gain in real GDP if included in these simulated RTAs and lose if left out (Table 1.a). The percentage changes in real GDP tend to be larger in absolute value the more members there are in the RTA. Among the members of ASEAN, Malaysia gains the largest percentage increase in real GDP from tariff elimination among the 10 ASEAN members, alone or when China is included with ASEAN members in tariff elimination among the members (ASEAN1). All ASEAN member countries gain when China is included in the simulated RTA but Thailand has a small percentage loss of real GDP, and Viet Nam a relatively large one, when China is not included with the ASEAN members in the RTA. In all five RTAs simulated here USA, EU and the Rest of the World, ROW, experience trivially small percentage losses in real GDP. Of the members of ASEAN, Viet Nam gains the biggest percentage increase in real GDP when Korea (ASEAN2) or Korea and Japan (ASEAN3) are included in the simulated RTA. Of all possible members Korea has the largest percentage increase in real GDP when it is included in the RTA. China's percentage real GDP gains are small even when it is included but are greater when Japan (ASEAN3) and India (ASEAN4) are included.

When efforts are made to update the GTAP original data to 2006 values by simulating Hicks neutral technological change across each of the economies that is sufficient to replicate the World Bank reported increase in real GDP from 2001 to 2006 and the RTA simulations are repeated the above results are only slightly modified (Table 1.b). China's gains are increased for ASEAN2, ASEAN3 and ASEAN4 scenarios, Korea's gains are reduced relative to using the 2001 GTAP data while those of the Philippines are increased. In general the percentages of gains and losses in real GDP are much less than 1% of real GDP, although surprisingly large for Korea relative to the other economies. These results are not markedly different from others in the literature on RTAs.

Terms of trade (export prices / import prices) improvements may be an important source of gains from RTAs (Table 2.a). Among ASEAN members the terms of trade improve for most members in most RTA scenarios but there are frequent negative impacts for Philippines, Viet Nam and the combination of the rest of Southeast Asia (XSE), Brunei Darussalam, Cambodia,

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Laos, and Myanmar among the simulated RTAs. China's and India's terms of trade deteriorate in all simulations. India's deteriorate more when included in the RTA. Those of Korea and Japan decline if out of an RTA but improve if included. For the economies excluded from an RTA the decline in their terms of trade is less when growth to 2006 has been taken into account (Table 2.b). When growth to 2006 is accounted for the absolute values of the terms of trade changes are generally smaller. However, the information gained from examining the simulated updated data does not warrant continuing to use it in the analysis.

The several times larger potential gains from technical progress, to be discussed below, contrast starkly with the small potential real GDP gains from tariff elimination in the various RTA configurations. A 1% Hicks neutral technological improvement in 14 primary, principally agricultural sectors, only in the ASEAN members, without and when combined with possible RTA is examined. ASEAN's overall elasticity of real GDP with respect to the posited technological change is .15 with a range for individual members of .26 for the Philippines and .01 for Singapore (Table 3.a). Comparing the effects of the technical change to those of RTA, which are additive in the GTAP simulations when combined, indicates no negative impacts on countries excluded from the posited technical progress and positive impacts on real GDP in ASEAN members as a whole that are 5 times those of eliminating tariff barriers among those members. Indonesia's gain is 6 times greater from the technical progress than from the trade liberalization. Similarly for Xse ASEAN members the gain is 9 times larger and 1.5 times for the Philippines, while Thailand and Viet Nam show significant gains from technical progress rather than the losses recorded in the ASEAN, only, RTA (Table 1.a). In contrast Malaysia's and Singapore's gains are 1/3 and 1/4, respectively, from the technical progress compared to elimination of tariffs on internal ASEAN trade. The benefits of the technical progress are shared with trading partners since negative terms of trade changes generally accompany the technical progress (Table 3.b) in contrast to the terms of trade gains at the expense of excluded countries in the RTAs examined earlier (Tables 2.a and 2.b).

Extending the posited 1% Hicks neutral technical progress to 21 sectors, the 14 previously considered agricultural, forestry and fishing sectors plus 7 processing industries (but excluding beverages and tobacco) nearly doubles the real GDP gains from technical progress: less than double for Viet Nam, only slightly less for Philippines, slightly more than double for Thailand, more for Singapore (Table 4.a). Again, there are frequent negative terms of trade changes sharing the gains from technical progress with trading partners (Table 4.b) but when combined with the effects of the various RTAs, the terms of trade changes are positive for most members, although not for the Xse ASEAN members. In addition there is an increase in net capital inflow to all the ASEAN countries as a result of the technological change – which is substantially greater with the elimination of tariffs on trade within ASEAN and grows incrementally with enlargement of the RTA (Table 4.c). Incremental impacts on China's capital flows are not found until China joins the RTA with ASEAN but net capital inflows increase to China in the ASEAN1 simulation with increases in those incremental capital flows with each successive enlargement of the RTA. Net capital outflows from USA and EU increase with each successive simulation and the same is the case for Japan until it is included in the RTA when its incremental net capital outflows become negative. This is consistent with the Danupon Ariyasajjakorn et. al. (2009) finding that the successive RTA scenarios raise the return on capital in the members of the RTAs.

The macro analysis, above, indicates gains for ASEAN members from – even 1% technical progress in agriculture, forestry and fishing – which are much greater than those from membership in the preferential tariff eliminating RTAs. Of course these are not necessarily alternative foci of policy and the gains are greater when the two policies are combined rather than either alone. Since all members of ASEAN do not gain equally from either the posited technological progress or the tariff elimination in the RTAs distributional implications are relevant as well. In general, the poorer members of ASEAN gain absolutely and relatively more, compared to the richer members, from the technical progress rather than the RTAs. There are likely, as well, to be greater opportunities for poverty reduction from a policy focus on raising agricultural productivity through unbiased technical progress (Warr, 2006). That goal may not be well served by many RTA configurations (Chaipan et. al., 2006).

4. Sectoral Analysis

4.1. (a) Effects on Output

Conducting a micro analysis of the technological progress in industries allows identification of the magnitude of changes in output by industry for all members of ASEAN combined (Table 5). With technical progress only in 14 sectors, increases in output of $100 million or more are indicated for sectors: paddy rice; vegetables, fruit, nuts; sugar cane; and the miscellaneous categories of crops, nec and animal products, nec. Additionally, although no technical progress was posited for the processing industries in this case, forward linkages to the processing industries result in increases in output of $100 million or more for processed rice, wood products and the miscellaneous categories of meat products, nec and other food products, nec. General equilibrium resource allocation effects draw resources away from electronic

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equipment and machinery and equipment, nec. When technical progress is extended as well to seven processing industries resources are drawn away from paddy rice and sugar cane whose outputs expand less than previously. Vegetables, fruit, nuts; crops, nec and animal products, nec are joined in posting increases of $100 million or more by fishing. In the processing industries, the previously noted increases are sustained and increases in output of approximately $400 million are indicated for meat products, nec and vegetable oils and fats; twice that again for other food products, nec. The decline in output in electronic equipment and in machinery and equipment nec doubles and decreases in output of approximately $100 million are indicated also in textiles; wearing apparel; and chemical, rubber, plastic products. In general ASEAN's comparative advantage in food and food processing is enhanced by the technical progress while that in other manufacturing areas is reduced.

The patterns, if not the magnitudes, described above are sustained when the technological progress in 21 industries is combined with RTAs of ASEAN or ASEAN1. The changes in the industrial sector outside the food processing sectors are especially interesting as textiles, wearing apparel, leather products and wood products contract along with electronic machinery and manufactures, nec while there is substantial expansion in output in petroleum, coal products; chemical, rubber, plastic products (dramatic expansion); mineral products nec and motor vehicles. The results for transport equipment nec are oppositely affected when the RTA excludes China from when it is included; negatively with China in, positively with it out.

Two points stand out. First, the value magnitudes of the indicated changes in output in the non food processing sectors are often 4 to 10 times those recorded for the food and food processing sectors (Table 5). Second, while the real GDP gains from the RTAs are small compared to those to be derived from one percent, Hicks neutral technological progress in agriculture, fishing and forestry and their related processing industries (Table 4.a) the adjustment costs of the RTAs look much greater, given the larger positive and negative magnitudes of the impacts on output in a larger number of sectors. The likelihood that the actual RTAs negotiated through the political process will be less liberalizing than the assumption of tariff elimination used here also seems to be increased by the conflict of interests of different sectors that is shown in Table 5.

The changes in value magnitudes of production are one view of the impacts of the technological change and preferential tariff cutting but additional perspective is provided by examining percentage changes in output by sector. For example, the large reductions in the value of output for electronic equipment shown in Table 5 are seen to be little more than a 1% decline if we look into changes in each sector. Of course these percentage changes are not uniform across the members of ASEAN and exceptionally large percentage changes in particular countries are noted. As a percentage of output the technological change in 21 industries (assuming no trade liberalization) leads to relatively large increases, in excess of 2%, in wool and silk (6.1% in Malaysia), wheat, vegetable oils and fats (5.61 % in Malaysia), meat products nec (9.41 % in Malaysia), dairy products (7.97% in Viet Nam and 6.7% in Malaysia) and other food products, nec (3.25% in Thailand) with no negative changes of similar size. The increase in wheat production is large on a trivial base, of course, illustrating the potentially misleading consequences of looking only at the percentage changes rather than the magnitudes of changes in value. When taken in combination with elimination of tariffs on internal ASEAN trade the sectors expanding by more than 2% include oil seeds, crops nec, raw milk, meat products nec, dairy products, sugar, other food products nec, metal products, motor vehicles, transport equipment nec, and machinery and equipment nec, while only leather products output declines by more than 2%. The percentage changes are particularly large for dairy products and transport equipment nec.

Additionally liberalizing trade with China in ASEAN1 in combination with the technological progress in 21 industries in ASEAN alters the pattern of changes in output. In the primary sectors ASEAN output expands by 2% or more only in crops nec, while shrinking by 2% or more in plant based fibers, wool and silk and forestry products. In the processing industries meat products nec, dairy products nec and sugar expand by 2% or more with no contraction in ASEAN output in any food processing sector. Nonfood manufacturing expands by more than 2% in chemical, rubber and plastic products, mineral products nec, motor vehicles, and machinery and equipment nec. Negative output impacts in ASEAN manufacturing of 2 % or more are shown for wearing apparel, leather products, wood products, non ferrous metals, transport equipment nec and manufactures nec. China experiences 2% or more increases in output only in transport equipment nec and electronic equipment; similar decreases, in crops nec (in both ASEAN and ASEAN1 RTAs), vegetable fats and oils, and chemical, rubber, plastic products.

Technical progress in the 21 industries strengthens ASEAN's comparative advantage in agriculture and food processing expanding output in those sectors with a general tendency for output to shift away from manufacturing. In contrast preferential trade liberalization (i.e., discriminatory trade protection) in ASEAN or ASEAN1 RTAs tends to expand the manufacturing sectors in ASEAN but with much variation in the sign and magnitude of effects across different manufacturing sectors.

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4.2. (b) Effects on Trade

ASEAN's trade pattern is only modestly altered in the simulation of technological change in 21 industries. Without an RTA ASEAN imports change by more than 1% in only, but nearly all, the 21 industries; falling by approximately 4% or more in paddy rice, raw milk and meat products nec. ASEAN exports increase by more than 1% only in, but nearly all, the 21 industries; 8% or more for paddy rice, raw milk, wool and silk, meat, and dairy products. Trading partners' seldom see changes in imports or exports of a sector by even 1%, but exports of paddy rice, processed rice, and vegetable fats and oils of other economies are commonly reduced by approximately 2%.

The combination of the technological change with elimination of internal tariffs in ASEAN leads to much more dramatic changes in trade. Increases in ASEAN members' imports of 3% or more are ubiquitous throughout the manufacturing sectors but the most extreme changes are found in the agricultural and processing sectors, e.g., paddy rice (23%), other crops nec (43%), processed rice (42%), and beverages and tobacco (22%). ASEAN members' exports increase by extraordinary rates, more than 10%, in a number of the 21 focus agricultural and processing industries, e.g., paddy rice, oil seeds (34%), other crops nec (17%), cattle, sheep, goats and horses (25%), meat products nec, dairy products (42%), processed rice, refined sugar (22%); also, outside the 21 industries, e.g., beverages and tobacco (38%), metal products, motor vehicles (30%) and transport equipment nec (25%). There is significant crowding out of exports from non ASEAN countries in world markets in paddy rice (-5%, China), other crops (more than -5%, China, Japan and XEA), meat products nec (-5% Korea, -6% Japan), processed rice (-4% USA), sugar (-5% China), beverages and tobacco (-5% Japan, -9% XEA) and induced increases in exports of gas (8% China and India).

When tariffs on trade between ASEAN members and China are also posited to be eliminated, ASEAN1, imports by China and by ASEAN members rise by several percentage points – in both economies in nearly every tradable sector. The larger percentage changes are in paddy rice; vegetables, fruit, nuts; crops nec, meat products, vegetable oils and fats; beverages and tobacco; processed rice; textiles; wearing apparel; chemical, rubber, plastic products; and motor vehicles. Export values also increase for both ASEAN members and China, often in the same sectors and frequently by double digit percentage changes. The frequency of observation of substantial percentage increases in China's imports, China's exports, ASEAN's imports and ASEAN's exports – in the same sector – points to the substantial role that the RTA would play in expansion of intra industry trade. There are, however, several sectors where inter industry trade effects within ASEAN1 are also substantial, e.g., paddy rice; vegetables, fruit, nuts; crops nec; vegetable oils and fats; wearing apparel; wood products; chemical, rubber, plastic products; metals nec; machinery and equipment nec; and manufactures nec. These sectors often correspond to those showing significant changes – in output (Table 5).

Negative sectoral impacts as great as -5% on the exports of economies excluded from the RTA are relatively few when the simulation combines technical progress in 21 sectors and only ASEAN members are included in the RTA. As noted above, such negative impacts are only in agriculture and processing industries. When China is included in the RTA, ASEAN1, those trade diversion impacts on China are eliminated and China's exports grow in the same sectors in which they decline when excluded from the RTA. When China is included, in the RTA, trade diversion impacts on non members' exports are focused on fewer excluded economies and fewer agricultural and processing sectors, increasing their magnitude in, e.g., crops nec and meat products nec but reducing it in paddy rice, processed rice, and sugar. However, when China is included similar negative impacts on the exports of excluded economies are found in the industrial sectors of chemical, rubber and plastic products and transport equipment nec (Table 6.c). Although the EU does not experience negative export impacts approaching even -1%, except in transport equipment nec in the ASEAN1 simulation, the USA experiences negative impacts several times that number on exports of crops nec, processed rice and transport equipment nec when China is in the RTA.

The resulting sectoral specialization between ASEAN members and China does not sort neatly into agriculture versus industry. Rather, some ASEAN agricultural exports would contract while others would expand; similarly for the industrial sectors, although generally food processing sector exports would expand. The statement above, seems at variance with that of Danupon Ariyasajjakorn et. al (2009), "Comparing to ASEAN industrialized developing countries, China is relatively an agricultural exporter. Thus, the ASEAN industrialized developing countries have a comparative advantage in producing and exporting manufacturing products. The results [analysis of the ASEAN1 scenario] show that this is true in all manufacturing except for products of the electronic equipment sector." However, ASEAN includes several members, Brunei Darussalam, Indonesia, Myanmar, Cambodia, Laos and Viet Nam, not counted (appropriately so) by Danupon, et. al. among the industrialized developing countries. Furthermore, the simulation of ASEAN1 being referenced there was not examined in combination with the effects of the technical progress in agriculture, forestry and fishing and in food processing posited, as is the case here. The differential macroeconomic impacts of RTAs alone, on ASEAN members are addressed above

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and in Tables 1 and 2. Similar differential effects of RTAs combined with technological change are addressed above and in Tables 3 and 4.

5. Conclusions

The analysis in Section IV(b) of the trade impacts of the simulations carried out for this paper indicates that the RTAs we have explored have much greater incremental impact on ASEAN members' sectoral trade than does the technological progress examined here. This is the opposite of the conclusions drawn in Section III of this paper regarding the relative impacts of the technological progress versus RTAs on ASEAN members' real GDP and in Section IV(a) regarding their relative impacts on sectoral outputs in ASEAN members. In contrast to the effects of the posited technical progress the RTAs result in larger both positive and negative sectoral changes in output, and still greater changes in sectoral imports and exports. Nevertheless the RTAs result in much smaller increases in real GDP than does the technical progress. The RTAs also result in greater secondary effects, changes in their sectoral outputs and trade, on trading partners outside ASEAN.

Since adjustment costs to either technical change or trade liberalization will be attendant to the resource movements that are induced in bringing about output changes, the greater output changes due to RTAs are likely to mean greater adjustment costs for RTA members and for excluded economies than those that would result from the technical change. Even 1% technical progress in agriculture, forestry, fishing and processing sectors would deliver much larger gains in real GDP – at less economic dislocation and lower adjustment costs than would the most likely RTAs, ASEAN members only, or the RTA most incrementally beneficial to ASEAN members, ASEAN plus China, even when making the practically elusive assumption of full elimination of tariffs on trade internal to the RTAs.

The simplified treatment of a policy focus on agricultural productivity growth examined in this paper, inspired by, but not replicating the ADLI development strategy, seems to bear out the conclusion of Adelman (1984) that public investment policy to promote agricultural led development in a relatively open trading regime offers substantial growth and distribution benefits in some Asian economies. Furthermore this paper finds explicitly greater benefits to be offered by such a focus over the current focus on discriminatory trade liberalization policy initiatives, i.e., regional trade agreements.

The mechanism at work in the alternative policy explored here of technical progress in agriculture and related industries does not always seem to correspond to that modeled by Adelman. Substantial forward linkages effects from the industries experiencing technical progress are implied in Table 5, i.e., from 14 agricultural, forestry and fishing sectors to 7 food processing sectors and the wood products sector. However, when the assumed technical progress is extended to the 7 food processing sectors negative impacts on the outputs of the rest of the industrial sectors are almost universal although typically very small. Even the beverages and tobacco products sector, which was excluded from the assumption of technical progress in the industry as a control, shows little expansion either from forward supply linkages or demand linkages from a focus on agricultural productivity growth. The trade openness of the ASEAN members results in marginal adjustments in inter industry trade specialization toward the industries experiencing the productivity growth and away from the rest of the industrial sectors.

In contrast the marginal effects of the RTAs examined most closely, here, are principally to expand intra industry trade, both imports and exports, in nearly all the industrial sectors and by much larger percentages than result from improved productivity in agricultural and food processing industries – with much smaller incremental gains in real GDP that are shown to be distributed among the ASEAN members in ways that would exacerbate per capita real GDP differences (Table 4.a). The techniques of analysis employed here are insufficient to discern whether (1) the welfare gains from the RTAs are substantially underestimated by changes in real GDP because the very substantial increases in intra industry trade in the RTAs are a source of welfare gains from increased variety; or, (2) real GDP gains are not very large from the RTAs alone because much of the observed increase in trade is simply the result of welfare reducing (for the RTA members) trade diversion away from lower cost suppliers. Petri, Plummer and Zhai (2012) find much larger gains from the full integration of economies envisioned by the AEC which will go far beyond discriminatory trade liberalization after being completely phased in but the gains shown here from promoting agricultural and food processing productivity increases would be additive, off-setting to the decline or slow growth in agricultural output shown by their calculations and inequality reducing.

We conclude that the potential welfare gains for ASEAN members from a public policy focus on promoting productivity growth in agricultural and food processing sectors would substantially outweigh the gains that might result from discriminatory elimination of tariffs alone and – would be an important addition to the AEC for most – and especially the poorest of the members. The policy focus on regional, discriminatory trade liberalization seems to be a diversion

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from public policy that would lead to greater growth in some member's national incomes and reduce income inequality among the ASEAN members and within the members.[2, 3]

Endnotes:

1Much of the analysis of this paper was developed for Reynolds, et.al., 2008. This CGE model is exceedingly complex, a marriage of 87 different individual country's empirical input-output tables with varying structures and numbers of sectors. In the GTAP there are 22 parameters of general equilibrium and partial equilibrium types, the values of which vary both across the countries and across the 57 industrial sectors. As a result our focus is on the results of the various shocks we specify rather than on complex sensitivity analysis of the consequences of varying individual parameter values with an exceptionally large number of permutations and combinations of parameter values among which to choose. The CGE model is so complex that we take the numerical results at face value but view them only as suggestive of relative magnitudes in comparisons of alternative simulations. There are known problems with the rice, motor vehicles and electronic machinery sectors that also counsel caution in the use of the values of sectoral results of the simulations (Pungchareon, 2005).

[2] Danupon Ariyasajjakorn, et. al. (2009) note that in each RTA considered there, i.e., ASEAN, ASEAN1, ASEAN2, ASEAN3 and ASEAN4, as defined here, – but without the technical progress posited in this paper – the returns to capital increase more than those to labor. The results here are more mixed from a policy focus on raising agricultural productivity and – as may be seen from Table 7 – more likely to result in reduced poverty within most ASEAN members since labor often experiences greater increased factor returns than the physical means of production in response to the technical progress in 21 sectors examined here.

[3] Interesting as may be the political economy of why policy makers pursue through RTAs other objectives than the consumption gains that multilateral trade liberalization can deliver, e.g., to attract foreign capital or to gain access to foreign markets, as Plummer (2006) points out, that does not obviate the need for economists to offer policy alternatives that offer greater opportunity to raise national income.

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Table 1. Real GDP % Change from Elimination of All RTAs' Internal Tariffs

1.a 2001 GTAP Data

	ASEAN	ASEAN1	ASEAN2	ASEAN3	ASEAN4
China	-0.004	0.036	0.024	0.079	0.094
Korea	-0.005	-0.023	1.682	2.153	2.183
Japan	-0.002	-0.007	0.014	0.414	0.416
Xea	-0.005	-0.018	-0.026	-0.043	-0.045
Indonesia	0.029	0.069	0.083	0.081	0.062
Malaysia	0.224	0.419	0.366	0.526	0.543
Philippines	0.165	0.244	0.263	0.222	0.223
Singapore	0.044	0.055	0.062	0.057	0.062
Thailand	-0.050	0.103	0.090	0.225	0.261
Viet Nam	-0.319	0.191	0.646	1.024	1.034
Xse	0.014	0.032	0.040	0.058	0.054
India	-0.007	-0.019	-0.023	-0.034	0.050
USA	0.000	-0.001	0.000	-0.001	-0.001
EU	-0.001	-0.003	-0.001	-0.002	-0.002
ROW	-0.002	-0.007	-0.016	-0.022	-0.026

1.b Adjusted for Growth to 2006

	ASEAN	ASEAN1	ASEAN2	ASEAN3	ASEAN4
China	-0.002	0.022	0.032	0.101	0.105
Korea	-0.002	-0.012	0.692	0.988	1.013
Japan	-0.002	-0.006	0.009	0.495	0.491
Xea	-0.004	-0.009	-0.012	-0.023	-0.025
Indonesia	0.011	0.034	0.048	0.055	0.040
Malaysia	0.203	0.374	0.345	0.480	0.489
Philippines	0.195	0.259	0.327	0.310	0.318
Singapore	0.009	0.012	0.014	0.005	0.002
Thailand	-0.063	0.016	0.014	0.162	0.184
Viet Nam	-0.194	0.000	0.276	0.515	0.526
Xse	0.013	0.027	0.034	0.050	0.050
India	-0.003	-0.009	-0.010	-0.015	0.100
USA	0.000	-0.001	0.000	0.001	0.001
EU	0.000	0.000	0.002	0.002	0.002
ROW	-0.001	-0.003	-0.007	-0.008	-0.010

Source: Authors' calculations from GTAP database

Notes: Xea is the Rest of East Asia; Xse is the Rest of Southeast Asia: Cambodia, Laos and Myanmar; EU is Austria, Belgium, Bulgaria, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden and United Kingdom. Adjustment to 2006 shocks original data with Hicks neutral technological change sufficient to replicate the actual growth in real GDP reported by the World Bank. Growth may have been due to other factors so this is only a rough approximation of the true 2006 values for the elements of GTAP. ASEAN1, ASEAN2, ASEAN3, ASEAN4, respectively are: ASEAN members plus China; plus China and Korea; plus China, Korea and Japan; plus China, Korea, Japan and India.

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Table 2. Terms of Trade % Change from Elimination of All RTAs' Internal Tariffs

2.a 2001 GTAP Data

	ASEAN	ASEAN1	ASEAN2	ASEAN3	ASEAN4
China	-0.072	-0.201	-0.423	-0.554	-0.49
Korea	-0.08	-0.345	1.788	0.372	0.565
Japan	-0.112	-0.375	-0.444	1.356	1.484
Xea	-0.058	-0.223	-0.424	-0.748	-0.816
Indonesia	0.473	1.2	0.986	0.707	1.428
Malaysia	0.155	0.85	0.683	0.274	0.789
Philippines	0.237	0.602	0.401	-0.074	-0.003
Singapore	0.876	1.585	1.527	1.531	1.868
Thailand	0.349	1.934	1.693	1.843	1.915
Viet Nam	-0.208	1.617	0.821	0.899	0.866
Xse	-0.767	-0.387	-0.451	-0.497	0.173
India	-0.108	-0.201	-0.379	-0.538	-2.348
USA	-0.027	-0.091	-0.146	-0.295	-0.331
EU	-0.018	-0.05	-0.062	-0.104	-0.122
ROW	0	-0.002	-0.054	-0.124	-0.178

2.b Similar to 2.a but Data Adjusted for Growth to 2006

	ASEAN	ASEAN1	ASEAN2	ASEAN3	ASEAN4
China	-0.066	-0.086	-0.274	-0.613	-0.537
Korea	-0.065	-0.331	1.398	0.444	0.58
Japan	-0.102	-0.343	-0.386	1.056	1.143
Xea	-0.041	-0.18	-0.311	-0.537	-0.591
Indonesia	0.517	1.081	0.819	0.409	0.873
Malaysia	0.201	0.759	0.58	0.185	0.734
Philippines	-0.232	-0.187	-0.483	-1.095	-1.059
Singapore	0.638	1.119	1.041	0.893	1.043
Thailand	0.242	1.129	0.985	0.978	1.038
Viet Nam	-0.176	0.466	-0.294	-0.353	-0.381
Xse	-0.67	-0.496	-0.61	-0.329	0.605
India	-0.087	-0.175	-0.233	-0.366	-2.224
USA	-0.013	-0.049	-0.08	-0.174	-0.204
EU	-0.011	-0.026	-0.031	-0.055	-0.072
ROW	-0.008	-0.015	-0.066	-0.126	-0.185

Source: Authors' calculations from GTAP data

Notes: As for Table 1

Table 3. Macro Effects of +1% Technological Change in 14 Agricultural Sectors in ASEAN Only: Alone and Additional Elimination of All RTAs' Internal Tariffs

3.a Real GDP % Change

	Tech14	+ ASEAN	+ ASEAN1	+ ASEAN2	+ASEAN3	+ ASEAN4
China	0.001	-0.003	0.041	0.038	0.089	0.100
Korea	0.000	-0.005	-0.023	1.385	1.727	1.762
Japan	0.000	-0.002	-0.007	0.004	0.579	0.573
Xea	0.000	-0.005	-0.017	-0.026	-0.043	-0.045
ASEAN	0.150	0.180	0.350	0.360	0.410	0.410
Indonesia	0.193	0.221	0.261	0.275	0.273	0.254
Malaysia	0.078	0.304	0.512	0.466	0.619	0.636
Philippines	0.257	0.421	0.500	0.515	0.472	0.473
Singapore	0.011	0.055	0.066	0.072	0.063	0.068
Thailand	0.146	0.096	0.252	0.240	0.370	0.406
Viet Nam	0.211	-0.107	0.407	0.857	1.229	1.241
Xse	0.122	0.136	0.157	0.165	0.184	0.183
India	0.001	-0.006	-0.018	-0.023	-0.035	0.050
USA	0.000	0.000	-0.001	0.000	-0.001	-0.001
EU	0.000	-0.001	-0.003	-0.002	-0.003	-0.003
ROW	0.000	-0.001	-0.007	-0.015	-0.022	-0.026

3.b Terms of Trade % Change

	Tech14	+ ASEAN	+ ASEAN1	+ ASEAN2	+ ASEAN3	+ ASEAN4
China	0.003	-0.069	-0.196	-0.474	-0.589	-0.489
Korea	0.003	-0.078	-0.342	2.059	0.968	1.158
Japan	0.007	-0.105	-0.368	-0.445	1.126	1.234
Xea	0.005	-0.053	-0.218	-0.422	-0.744	-0.814
Indonesia	-0.020	0.453	1.182	0.962	0.687	1.413
Malaysia	-0.007	0.148	0.844	0.682	0.308	0.824
Philippines	0.019	0.259	0.626	0.424	-0.047	0.030
Singapore	0.004	0.881	1.590	1.525	1.486	1.822
Thailand	-0.028	0.317	1.897	1.645	1.956	2.032
Viet Nam	-0.009	-0.231	1.563	0.795	1.036	1.005
Xse	-0.067	-0.835	-0.499	-0.559	-0.575	0.093
India	0.005	-0.103	-0.196	-0.368	-0.514	-2.305
USA	-0.002	-0.028	-0.093	-0.151	-0.294	-0.334
EU	0.000	-0.019	-0.050	-0.067	-0.108	-0.126
ROW	0.000	0.001	-0.001	-0.059	-0.124	-0.180

Source: Authors' calculations from GTAP data

Notes: As for Table 1; Detail of industry groupings is shown in Table 5

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Table 4. Macro Effects of +1% Technological Change in 21 Agricultural and Processing Sectors in ASEAN Only: Alone and Additional Elimination of All RTAs' Internal Tariffs

4.a Real GDP % Change

	Tech 21	+ ASEAN	+ ASEAN1	+ ASEAN2	+ ASEAN3	+ ASEAN4
China	0.001	-0.002	0.042	0.039	0.089	0.100
Korea	-0.001	-0.005	-0.023	1.381	1.722	1.757
Japan	0.000	-0.002	-0.007	0.004	0.579	0.573
Xea	0.000	-0.005	-0.017	-0.026	-0.043	-0.045
ASEAN	0.290	0.320	0.490	0.510	0.560	0.560
Indonesia	0.383	0.412	0.452	0.466	0.464	0.449
Malaysia	0.177	0.406	0.615	0.568	0.722	0.750
Philippines	0.485	0.647	0.725	0.740	0.697	0.698
Singapore	0.049	0.093	0.104	0.110	0.107	0.112
Thailand	0.309	0.257	0.411	0.400	0.536	0.572
Viet Nam	0.340	0.022	0.533	0.982	1.353	1.364
Xse	0.221	0.234	0.255	0.263	0.282	0.282
India	0.009	0.002	-0.010	-0.016	-0.028	0.056
USA	0.000	0.000	-0.001	0.000	-0.001	-0.001
EU	0.001	0.000	-0.002	-0.002	-0.003	-0.003
ROW	0.001	-0.001	-0.006	-0.014	-0.021	-0.025

4.b Terms of Trade % Change

	Tech21	+ ASEAN	+ ASEAN1	+ ASEAN2	+ ASEAN3	+ ASEAN4
China	0.005	-0.067	-0.194	-0.473	-0.590	-0.489
Korea	0.005	-0.075	-0.339	2.064	0.972	1.162
Japan	0.014	-0.098	-0.361	-0.439	1.134	1.242
Xea	0.008	-0.050	-0.214	-0.418	-0.741	-0.811
Indonesia	-0.050	0.425	1.155	0.935	0.661	1.373
Malaysia	-0.025	0.128	0.824	0.662	0.286	0.793
Philippines	0.032	0.276	0.645	0.442	-0.028	0.047
Singapore	0.005	0.882	1.591	1.526	1.490	1.827
Thailand	-0.065	0.280	1.856	1.603	1.916	1.991
Viet Nam	-0.015	-0.249	1.547	0.778	1.025	0.993
Xse	-0.039	-0.807	-0.469	-0.529	-0.541	0.129
India	0.021	-0.087	-0.181	-0.353	-0.500	-2.269
USA	-0.003	-0.029	-0.093	-0.151	-0.294	-0.335
EU	0.000	-0.019	-0.050	-0.067	-0.108	-0.126
ROW	0.002	0.002	0.000	-0.057	-0.122	-0.178

4.c Trade Balance Change ($ Millions) = Change in Net Capital Outflow

	Tech21	+ ASEAN	+ ASEAN1	+ ASEAN2	+ ASEAN3	+ ASEAN4
China	-28.05	-3.80	-2504.93	-3149.38	-4241.88	-4107.22
Korea	-1.60	52.70	178.58	-3684.83	-3942.03	-3958.34
Japan	39.51	733.50	2026.84	3048.10	-139.02	-300.45
Xea	1.23	35.06	116.18	211.14	378.48	436.24
Indonesia	-1.54	-28.70	-41.36	-143.06	-354.95	-191.10
Malay	38.13	-401.38	-118.20	-379.24	-1013.58	-745.49
Philippines	-113.68	-417.18	-683.81	-662.66	-621.71	-670.68
Singapore	-0.64	-422.65	-784.85	-730.00	-733.56	-891.79
Thailand	-6.47	-1118.02	-1585.44	-1747.83	-2679.32	-2710.43
Viet Nam	-117.40	-440.45	-1678.59	-1886.70	-2208.99	-2196.62
Xse	-27.33	-176.17	-170.60	-173.89	-142.09	-38.62
India	-3.32	36.48	97.65	138.45	215.95	-2215.29
USA	86.60	788.54	2047.37	3494.76	6612.55	7456.26
EU	95.44	832.24	1884.66	3258.44	5240.13	5979.32
ROW	39.12	529.83	1216.50	2406.70	3630.00	4154.16

Source: Authors' calculations from GTAP data

Notes: As for Table 1

Table 5. Effects of +1% Technological Change, 14 vs. 21 Agricultural and Processing Sectors in ASEAN Only: Alone for 14 and 21sectors, respectively and for 21 sectors with additional elimination of all internal tariffs in ASEAN vs. in ASEAN1 (i.e., plus China)

Notes to Tables 5: 1% Hicks neutral technological progress is in 14 agriculture, forestry, fishing sectors denoted in ***Bold Italics*** and in 21 industries, additionally including 7 processing industries denoted in **Bold**. Magnitudes are denoted by algebraic sign, * and number as: approximately US$100 million (+ or -), US$200 million (*) or US$300+ million, e.g., -736 denotes a negative change of $736million, -* a negative change of approximately $200 million and + a positive change of approximately $100 million. Changes of absolute value less than $100 million are ignored. Sectoral abbreviations and descriptions in Table 5.a, apply to all of Tables 5 and 6. Notes to Table 1 also apply.

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Table 5 Technological Change and RTAs: Magnitude (US$ 100 Millions) of Aggregate Sectoral Output Changes in ASEAN

Tradable Goods Sectors of GTAP			14	21	21+ASEAN		21+ASEAN1		
1	***pdr***	***paddy rice***	**+**					**-**	
2	***wht***	***wheat***							
3	***gro***	***cereal grains nec***							
4	***v_f***	***vegetables, fruit, nuts***		**+**	**+**		**+**		***+296***
5	***osd***	***oil seeds***							
6	***c_b***	***sugar cane, sugar beet***		**+**					
7	***pfb***	***plant based fibers***							
8	***ocr***	***crops nec***		**+***	**+**		***+345***		**+**
9	***ctl***	***cattle, sheep, goats, horses***							
10	***oap***	***animal products nec***	**+**	**+***		**+**		**+**	
11	***rmk***	***raw milk***							
12	***wol***	***wool, silk cocoons***							
13	***frs***	***forestry***							**-**
14	***fsh***	***fishing***			**+**		**+**		
15	coa	coal							
16	oil	oil				-		-*	
17	gas	gas							+
18	omn	minerals nec							
19	**cmt**	**meat:cattle,sheep,goats,horses**							
20	**omt**	**meat products nec**	**+**	**+420**		**+***		**+428**	
21	**vol**	**vegetable oils and fats**			**+372**		**+***		
22	**mil**	**dairy products**					**+**		**+**
23	**pcr**	**processed rice**		**+**	**+***		**+**		
24	**sgr**	**sugar**					**+**		**+**
25	**ofd**	**other food products nec**	**+***	**+843**		**+957**		**+418**	
26	b_t	beverages & tobacco products				+388		+	
27	tex	textiles			-				-586
28	wap	wearing apparel			-		-458		-1,183
29	lea	leather products					-299		-922
30	lum	wood products		+	+		-365		-736
31	ppp	paper products, publishing							
32	p_c	petroleum, coal products					+		+*
33	crp	chemical,rubber,plastic products		-		+888		+8,296	
34	nmm	mineral products nec				+345		+428	
35	i_s	ferrous metals					+*		
36	nfm	metals nec				-*		-600	
37	fmp	metal products					+*		
38	mvh	motor vehicles & parts				+905		+778	
39	otn	transport equipment nec					+770		-585
40	ele	electronic equipment	-590	-1,109		-2,414		-2,128	
41	ome	machinery & equipment nec	-	-*		+2,034		+4,041	
42	omf	manufactures nec				_*		-870	

Source: Authors' calculations from GTAP.

Table 7. % Change in Factor Returns, ONLY Technological Change in 21 Sectors

	Unskilled	Skilled	Capital	Land	Resources
China	0.001	0.007	0.008	-0.140	-0.041
Korea	0.004	0.006	0.002	-0.205	-0.225
Japan	0.002	0.003	-0.001	-0.224	-0.213
Xea	0.003	0.006	0.001	-0.338	-0.086
Indonesia	0.234	0.296	0.220	-1.190	-0.611
Malaysia	0.094	0.081	0.162	2.021	0.037
Philippines	0.159	0.383	0.571	-2.452	-1.529
Singapore	0.053	0.050	0.023	4.740	1.64
Thailand	0.290	0.314	0.217	1.001	1.401
Viet Nam	0.761	0.617	0.906	-0.164	-0.635
Xse	0.272	0.367	0.128	-3.168	-1.701
India	-0.014	-0.003	0.003	-0.190	0.026
USA	-0.003	-0.001	-0.002	-0.292	0.02
EU	-0.003	0.000	-0.002	-0.346	-0.02
ROW	-0.008	-0.003	-0.002	-0.278	0.052

Source: Authors’ calculations in GTAP.