Regional and Multilateral Trade Liberalization: The Effects on Trade, Investment and Welfare

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ABSTRACT

This paper explores the impact on economies of trade liberalization under alternative regional and multilateral arrangements: unilateral liberalization; liberalization as part of the ASEAN regional grouping; liberalization as part of the APEC regional grouping; or liberalization as part of a multilateral trade liberalization regime. The paper is based on a Dynamic Intertemporal General Equilibrium model (DIGEM) called the Asia-Pacific G-Cubed Model. It is shown that the long run gains from a country's own liberalization tend to be large relative to the gains from other countries liberalizing although this varies across countries. It is also shown that there is a significant difference between the effects on GDP (production location) and the effects on consumption per capita of the alternative liberalization approaches across countries. The timing of liberalization is also shown to matter. With open capital markets the gains from credibly announced trade liberalization are realized before the reforms are put in place because there is a rise in global investment which raises the global capital stock. In addition there is a reallocation of capital via financial market adjustment. This paper also demonstrates that for some economies, there can be short run adjustment costs to trade liberalization because resources cannot be instantly reallocated across sectors in an economy. These adjustment costs from own liberalization can be reduced if more countries also liberalize. The nature of the dynamic adjustment suggests that other macroeconomic policies may play an important role during the early period of phased-in trade liberalization.

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1. Introduction

When a country reduces barriers to international trade, there are a number of factors that determine the nature of the gains and losses that result in both the short run and the longer run. Some of the key mechanisms through which gains are realized are direct but many others are indirect and require the use of an economy wide model to capture these effects. In addition, the time profile of liberalization as well as the fact that it is not costless to restructure any economy complicate the analysis in the short run. Many studies and the professional debate in general, tend to ignore the short run adjustment issues of trade liberalization. This complicates the political barriers to trade liberalization once the liberalization begins because the gains take a while to materialize and are widely dispersed yet the costs are usually highly visible and incurred in the short term. This of course differs across economies and depends on whether liberalization is being undertaken during a period of rapid or stagnant economic growth. With highly visible short run job losses, the resolve of liberalizers are sorely tested. The nature of these adjustment problems are important to explore empirically because it needs to be recognized in advance that some costs may be incurred while achieving more substantial medium term and long term gains. However, understanding the likely adjustment path is also important for formulating appropriate macroeconomic policy responses in order to ease the transition. It is reassuring to know from many CGE studies that gains will be achieved in the long run from trade liberalization, but it is possibly more important for policy makers to know what the road will look like during the adjustment process.

Computable General Equilibrium (CGE) models have become a popular tool for calculating the various direct and indirect effects of trade liberalization and have given a range of

useful insights. The sorts of mechanisms that these models capture are clear. In the case of unilateral liberalization, a reduction in trade barriers tends to reduce import prices which increases the purchasing power of consumers, thus making consumers directly better off . The change in relative prices induces firms to reallocate resources away from protected sectors towards other more efficient activities which tends to raise economic efficiency in the economy. CGE models are particularly useful for calculating how much the efficiency gains will be and how much consumption will rise a result of these processes in the longer run.

However, there are a number of other gains that many standard CGE models ignore. One aspect is if there is imperfect competition or increasing returns to scale (see Francois et al (1995)). Another occurs if the removal of distortions increases the return to capital and stimulates investment in the economy. These dynamic effects can be much larger than the efficiency triangles many CGE modelers calculate (See McKibbin and Salvatore (1995)). Once allowance is made for the reality that financial capital is mobile internationally and these financial flows are related to the real returns to physical capital then further complications arise. If domestic saving does not rise as the return to capital rises from trade liberalization and these additional investments are made by foreign owners of capital, then additional GDP will be generated in the economy but this won't show up directly as a domestic consumption gain because the returns will be repatriated to foreign owners of capital (see Manchester and McKibbin (1995)) . Thus is it important in evaluating trade liberalization in terms of income or consumption gains rather than changes in production or GDP (see McKibbin (1996)). In all evaluations of trade liberalization, understanding the dynamic path of adjustment is crucial.

The gains to an economy from the liberalization of another economy are also transmitted

through a number of channels. The reduction in trade barriers in foreign economies (ceteris paribus) will stimulate the demand for exports which will raise income in the home economy although not by the full value of increased exports because these exports need to be produced with resources that otherwise would be domestically consumed. Secondly owners of capital in the home economy may be able to invest in the liberalizing economy leading to additional income gains if those investments realize a higher rate of return than in the home economy.

The process becomes more complicated in the case where trade reform is phased in or where an economy exhibits short term Keynesian features either due to wage stickiness or adjustment costs in allocating physical capital or where asset prices adjust quickly in response to international financial capital flows yet other prices are more sticky. In this case overshooting of the exchange rate (e.g. Dornbush (1976)) during the adjustment process can complicate the standard insights.

This paper has a number of goals all of which are aimed at improving our understanding of the magnitude of the above factors. The first goal is to determine the extent to which longer run gains from trade liberalization for particular economies are due to domestic liberalization versus gains from other countries liberalizing. This provides direct evidence for the arguments by economists such as Garnaut (1996) that trade liberalization is a prisoners delight (all participants gain) rather than a prisoners dilemma (where a gain by one country is a loss for another). Trade liberalization under four alternative trade groupings are considered in this paper: **unilateral** liberalization; **ASEAN** liberalization; **APEC** liberalization; and **multilateral** liberalization involving APEC and European economics. In each case the trade liberalization is phased in according to the timetable underlying the APEC Bogor declaration in which industrial economies

reduced barriers to trade to zero by 2010 and developing economies by 2020 (the exception is that Taiwan, Korea and Singapore follow the 2010 timetable)[1]. This type of liberalization assumes the concept of "open regionalism" defined by Garnaut (1996) in which liberalization is non discriminatory. Thus the paper does not focus on regional trading blocs per se. Discriminating and non-discriminating trade reform in ASEAN versus APEC regional groups using an earlier version of the same multi-country model are explored further in McKibbin (1996).

The second goal of the paper is to show the difference between the allocation of production across economies as a result of trade liberalization versus the gain in welfare which we measure by gains in real consumption per capita. It is quite possible for GDP to fall in a country but for consumption to rise because the additional income is generated by shifting production overseas. In the model underlying this study, labor is assumed to be immobile across economies but there is a high degree of financial capital mobility (which over time implies mobility of physical capital in response to arbitrage between financial returns and the real rate of return to physical capital adjusted by the cost of moving physical capital). Therefore to the extent that trade liberalization leads to a reallocation of capital to take advantage of high rates of return from other countries liberalization, there can be a fall in GDP but higher income to domestically owned factors of production and therefore higher consumption generated.

The third goal is to explore the short run adjustment process when there is allowance for Keynesian style rigidities in labor markets; costly to adjust physical capital stocks and exchange rate overshooting from a combination of sticky wages and flexible asset prices.

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[1] Trade in services is assumed not to be liberalized even though we can explore this in the modelling framework. This will be explored in future research.

This study can be distinguished from other studies of trade liberalization such as in Dee and Walsh (1994), Francois et al (1995), Goldin and van der Mensbrugghe (1995), Harrison et al (1995), Hertel et al (1995), Huff et al (1995) Martin et al (1995) or Murtough et al (1994) because the model used in this paper is not from the class of static or period linked CGE models that have been used in these earlier studies. This study follows the alternative Dynamic Intertemporal General Equilibrium (DIGEM) approach focusing on the dynamic adjustment to trade reform as in Manchester and McKibbin (1995), McKibbin (1994) using the MSG2 model; McKibbin and Salvatore (1995) using the GCUBED model; and McKibbin Pearce and Wong (1995) and McKibbin (1996) using the Asia Pacific G-Cubed Model.

The model used in this paper is derived from the G-Cubed model developed by McKibbin and Wilcoxen (1992, 1995). Because of this link, this model is named the Asia-Pacific GCUBED model (AP-GCUBED). As with the GCUBED model, this new model captures simultaneously the macroeconomic and sectoral linkages in a global model with partially forward looking asset market and spending decisions (assuming rational expectations). The AP-GCUBED model has country/regional dis-aggregation of: Korea, Japan, Thailand, Indonesia, China, Malaysia, Singapore, Taiwan, Hong Kong, Philippines, Australia, United States, India, Rest of the OECD, Oil exporting developing countries, Eastern Europe and Former Soviet Union and all other developing countries. Each country/region has an explicit internal macroeconomic and sectoral structure with sectoral dis-aggregation in production and trade into 6 sectors based on data from standardized input/output tables.

Section 2 gives a brief overview of the theoretical basis of the AP-GCUBED model. The alternative scenarios for trade liberalization are analyzed in section 3. The results are examined in

two parts. The longer term outcomes are examined first in order to determine for each economy whether the gains arise from own liberalization or various forms of coordinated liberalization. The dynamic adjustment path is then explored for a subgroup of countries focusing on how economic activity and trade and capital flows adjust to trade liberalization that is gradually phased in.

A conclusion is presented in section 4.

2. The AP- GCUBED model

The AP-GCUBED multi-country model is based on the GCUBED model developed in McKibbin and Wilcoxen (1992, 1995). It combines the approach taken in the MSG2 model of McKibbin and Sachs (1991) with the dis-aggregated, econometrically-estimated, intertemporal general equilibrium model of the U.S. economy by Jorgenson and Wilcoxen (1989). The MSG2 model had one sector per country. The Jorgenson-Wilcoxen model has 35 separate industries, each of which is represented by an econometrically estimated cost function. The AP-GCUBED model has 6 sectors in each of 17 economies.

The GCUBED model was constructed to contribute to the current policy debate on global warming, trade policy and international capital flows, but it has many features that make it useful for answering a range of issues in environmental regulation, microeconomic and macroeconomic policy questions. It is a world model with substantial regional dis-aggregation and sectoral detail. In addition, countries and regions are linked both temporally and intertemporally through trade and financial markets. Like MSG2, GCUBED contains a strong foundation for analysis of both short run macroeconomic policy analysis as well as long run growth consideration of alternative macroeconomic policies. Intertemporal budget constraints on households, governments and

nations (the latter through accumulations of foreign debt) are imposed. To accommodate these constraints, forward looking behavior is incorporated in consumption and investment decisions. Unlike MSG2, the GCUBED model also contains substantial sectoral detail. This permits analysis of environmental and trade policies which tend to have their largest effects on small segments of the economy. By integrating sectoral detail with the macroeconomic features of MSG2, GCUBED can be used to consider the long run costs of alternative environmental regulations and trade policy changes yet at the same time consider the macroeconomic implications of these policies over time. The response of monetary and fiscal authorities in different countries can have important effects in the short to medium run which, given the long lags in physical capital and other asset accumulation, can be a substantial period of time. Overall, the model is designed to provide a bridge between computable general equilibrium models and macroeconomic models by integrating the more desirable features of both approaches. The AP-GCUBED model differs from the GCUBED model because of the focus on the Asia-Pacific region as well as having 6 sectors compared to 12 for GCUBED. The theoretical structure is essentially the same.

The key features of AP-GCUBED are summarized in Table 1. The country and sectoral breakdown of the model are summarized in Table 2. It consists of seventeen economic regions with six sectors in each region (there are also two additional sectors in each region that produce the capital good for firms and the household capital good). The seventeen regions in AP-GCUBED can be divided into two groups: 14 core countries/regions and three others. For the core regions, the internal macroeconomic structure as well as the external trade and financial linkages are completely specified in the model. Our approach for each country is to first model them assuming the theoretical structure we use for the "generic" country but calibrating each

country to actual country data. We then proceed country by country to impose institutional features, market structures, market failures or government regulations that cause certain aspects of these economies to differ from our generic country model. In this paper we have only just begun this process, therefore the countries we represent in the region are endowed with resources, trading patterns, saving and investment patterns etc that are based on actual data for these countries but in many important ways may not be truly representative of these countries because of institutional factors that we are still implementing into the model.

Each core economy or region in the model consists of several economic agents: households, the government, the financial sector and the 6 production sectors listed in table 2. Each of these economic actors interact in a variety of markets, both domestic and internationally.

Each of the six sectors within each country is represented by a single firm in each sector which chooses its flexible inputs (labor, energy, materials) and its level of investment in order to maximize its stock market value subject to a multiple-input production function (KLEM), knowledge that physical capital is costly to adjust once it is in place, and subject to a vector of prices it takes to be exogenous. Energy and materials are an aggregate of inputs of intermediate goods. These intermediate goods are, in turn, aggregates of imported and domestic commodities which are taken to be imperfect substitutes. Due to data limitations we assume that all agents in the economy have identical preferences over foreign and domestic varieties of each particular commodity. We represent these preferences by defining six composite commodities that are produced from imported and domestic goods.

Following the approach in the MSG2 model, we assume that the capital stock in each sector changes according to the rate of fixed capital formation and the rate of geometric

depreciation. The investment process is assumed to be subject to rising marginal costs of installation, with total real investment expenditures in sector equal to the value of direct purchases of investment plus the per unit costs of installation. These per unit costs, in turn, are assumed to be a linear function of the rate of investment. One advantage of using an adjustment cost approach is that the adjustment cost parameter can be varied for different sectors to capture the degree to which capital is sector specific.

The price of labor is determined by assuming that labor is mobile between sectors in each region, but is immobile between regions. Thus, wages will be equal across sectors. The wage is assumed to adjust to varying degrees based on labor market institutions in the different economies. In the long run, labor supply is given by the exogenous rate of population growth, but in the short run, the hours worked can fluctuate depending on the demand for labor. For a given nominal wage, the demand for labor will determine short run unemployment in each industry. This will vary across industries depending on the composition of demand for each sectors good.

The solution of the optimization problem also gives that the rate of gross investment in sector h is a function of "Tobin's q" for that sector. Following the MSG2 model, it is assumed that investment in each sector is a weighted average of forward looking investment and investment out of current profits.

Households consume a basket of composite goods and services in every period and also demand labor and capital services. Household capital services consist of the service flows of consumer durables plus residential housing. Households receive income by providing labor services to firms and the government, and from holding financial assets. In addition, they also receive transfers from the government.

Aggregate consumption is chosen to maximize an intertemporal utility function subject to the constraint that the present value of consumption be equal to human wealth plus initial financial assets. Human wealth in real terms is defined as the expected present value of future stream of after tax labor income of households. Financial wealth is the sum of real money balance, real government bonds in the hand of the public, net holding of claims against foreign residents and the value of capital in each sector. The solution to this maximization problem is the familiar result that aggregate consumption is equal to a constant proportion of private wealth, where private wealth is defined as financial wealth plus human wealth. However, based on the evidence cited by Campbell and Mankiw (1987) and Hayashi (1982)) we follow the approach in the MSG2 model and assume that only a portion of consumption is determined by these intertemporally-optimizing consumers and that the remainder is determined by after tax current income. This can be interpreted as liquidity constrained behavior or a permanent income model in which household expectations regarding income are backward-looking. Either way we assume that total consumption is a weighted average of the forward looking consumption and backward-looking consumption.

Once the level of overall consumption has been determined, spending is allocated among goods and services based on relative prices.

We take each region's real government spending on goods and services to be a fixed share of GDP and assume that it is allocated among final goods (consisting of both domestically produced and imported goods), services and labor in fixed proportions, which we set to 1992 values. Total government outlays include purchases of goods and services plus interest payments on government debt, investment tax credits and transfers to households. Government revenue is

generated from sales tax, corporate income tax and personal income taxes, and by issuing government debt. We assume that agents will not hold government bonds unless they expect the bonds to be paid off eventually. This transversality condition implies that the current level of debt will be equal to the present value of future budget surpluses.[2]

The implication of these constraints is that a government running a budget deficit today must run an appropriate budget surplus as some point in the future. Otherwise, the government would be unable to pay interest on the debt and agents will not be willing to hold it. To ensure that the constraint holds at all points in time we assume that the government levies a lump sum tax in each period equal to the value of interest payments on the outstanding debt.[3] In effect, therefore, any increase in government debt is financed by consols, and future taxes are raised enough to accommodate the increased interest costs. Thus, any increase in the debt will be matched by an equal present value increase in future budget surpluses. Other fiscal closure rules are possible, such as requiring the ratio of government debt to GDP to be unchanged in the long run. These closures have interesting implications but are beyond the scope of this paper.

The seventeen regions in the model are linked by flows of goods and assets. Flows of goods are determined by the import demands described above (based on demand for goods for consumption, investment and government uses).

Trade imbalances are financed by flows of financial assets between countries (except

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[2] Strictly speaking, public debt must be less than or equal to the present value of future budget surpluses. For tractability we assume that the government is initially fully leveraged so that this constraint holds with equality.

[3] In the model the tax is actually levied on the difference between interest payments on the debt and what interest payments would have been if the debt had remained at its base case level. The remainder, interest payments on the base case debt, is financed by ordinary taxes.

where capital controls are in place). We assume that existing wedges between rates of return in different economies are generated by various restrictions that generate a risk premium on country denominated assets. These wedges are assumed to be exogenous during simulation. Thus when the model is simulated the induced changes in expected rates of return in different countries generate flows of financial capital reacting to return differentials at the margin.

Determining initial net asset positions and hence base-case international capital flows is non-trivial. We assume that capital flows are composed of portfolio investment, direct investment and other capital flows. These alternative forms of capital flows are perfectly substitutable ex ante, adjusting to the expected rates of return across economies and across sectors. Within an economy, the expected return to each type of asset (i.e. bonds of all maturities, equity for each sector etc) are arbitraged, taking into account the costs of adjusting physical capital stock and allowing for exogenous risk premia. Because physical capital is costly to adjust, any inflow of financial capital that is invested in physical capital (i.e. direct investment) will also be costly to shift once it is in place. The decision to invest in physical assets is based on expected rates of return. However, if there is an unanticipated shock then ex-post returns could vary significantly. Total net capital flows for each economy in which there are open capital markets are equal to the current account position of that country. The global net flows of private capital are constrained to zero.

The data used in the AP-GCUBED model comes from a number of sources. Unlike the GCUBED model we have not yet estimated the CES production elasticities of substitution. We currently assume the production function are Cobb-Douglas.

The input-output tables for the Asia-Pacific economies are from the Institute of

Developing Economies. The Australian table is from the Australian Bureau of Statistics. In lieu of obtaining input-output tables for the aggregate ROECD region, we currently create the tables for this region based on the U.S. table and adjusted for actual final demand components from aggregate ROECD macroeconomic data. In effect, we are assuming that all countries modeled share the same production technology but differ in their endowments of primary factors and patterns of final demands. This assumption is a temporary necessity while we complete construction of the AP-GCUBED database.

Trade shares are based on the United Nations SITC (Standard Industry Trade Classification) data for 1992 with sectors aggregated from 4 digit levels to map as closely as possible to the SIC (Standard Industry Classification) used in the U.S. input/output data. This data is from the International Economic Databank at the ANU.

The parameters on shares of optimizing versus backward looking behavior are taken from the MSG2 model. These are based on a range of empirical estimates (see Campbell and Mankiw (1987) and Hayashi (1982)) as well as a tracking exercise used to calibrate the MSG2 model to the experience of the 1980s (see McKibbin and Sachs (1991)). It is important to stress that the results in this paper are very sensitive to the range of parameters used in the model. In particular the substitution possibilities in production are important. It is worth stressing that the adjustment cost model of capital accumulation implies that short run changes in inputs for a given relative price change will be lower than the long run substitution possibilities (despite having the same partial substitution elasticities in the short and long runs) precisely because physical capital is fixed in the very short run and therefore substitution possibilities are reduced.

AP-GCUBED is solved using the same software as the MSG2 model The model has

approximately 7,400 equations in its current form with 140 jumping or forward looking variables, and 263 state variables. For further details on the model the reader should refer to McKibbin and Wilcoxen (1995) and McKibbin and Wong (1997).

3. Results for Trade Liberalization

The results for trade liberalization in each country under each regional grouping are presented in this section. Results are first presented for the longer run outcomes focusing on the year 2020. Next the dynamics of adjustment for various countries are examined in some detail. There are a vast number of results and in this section a subset are presented to illustrate various key points.

To generate the results we first solve the model from 1996 to 2070 to generate a model baseline based on a range of assumptions. Table 3 contains the aggregated tariff rates for each sector and each region in the model based on a WTO tariff database supplied by the Centre for International Economics. These tariff rates are assumed to be unchanged for the horizon of the baseline simulation. Other crucial assumption needed for generating the baseline include assumptions about population growth and sectoral productivity growth by country as well as fiscal and monetary policy settings. The issue of projection using a model such as the AP-GCUBED model is discussed in detail in Bagnoli et al (1996).

Once the baseline is generated each simulation is run and results are reported as a percentage deviation from this baseline. For each tariff reduction simulation countries are assumed to reduce tariff rates from the levels shown in table 3 to zero over the period specified. In each case industrial economies are assumed to reduce tariffs in equal increments from 1996

through 2010. Developing countries are assumed to reduce tariffs by 2020. Taiwan, Singapore and Korea are assumed to follow the timetable for non developing economies.

It is important to stress that macroeconomic policy is assumed not to respond to undesirable fluctuations in short run economic activity. Monetary policy is assumed to be targeting a stock of nominal money balances in each economy. Fiscal policy is defined as a set of fixed tax rates (apart from a lump sum tax on households that varies to satisfy the intertemporal budget constraint facing the government) and government spending constant relative to simulated GDP. With higher output, tax revenues rise implying a move towards fiscal surplus in each economy. In McKibbin (1996), higher growth meant lower fiscal deficits. In this paper the higher growth leads to higher government spending and therefore fiscal deficits are relatively constant.

a. Longer Run Results

Tables 4 through 7 show results for GDP, consumption, investment and exports under the four assumptions about the group of countries undertaking the trade liberalization. The results in each table are the percentage deviation from what otherwise would have occurred by 2020 relative to the baseline projection of the model without any trade liberalization.

First refer to the results for real GDP in Table 4. The first column contains the country names. The second column shows that the percentage deviation in US GDP from own liberalization is -0.04% relative to baseline by 2020. This compares to a gain in GDP of 0.23% under both APEC (column 4) and multilateral (column 6) liberalization. For each country, GDP is higher when liberalization is undertaken with other countries in a group than undertaken alone. The highest gains for GDP occur under multilateral liberalization. For some countries (U.S.,

Japan, Philippines, Thailand and Korea) , own liberalization leads to a reduction in GDP. This implies that capital flows out of the liberalizing economy into other economies as a result of the trade reforms. This is not necessarily a negative outcome as can be seen from the results in table 5 for consumption in each economy. All countries have higher consumption by 2020 under unilateral liberalization despite the fact that GDP fell for some countries. This is because the return to capital that is freed up as a result of the liberalization is higher than under baseline but some of this higher return is being earned outside the domestic economy.

The consumption results follow the same pattern as the GDP results as you move across the table from left to right, in the sense that consumption is higher when liberalizing with a group of countries relative to liberalizing alone. This suggests that trade liberalization, at least in the longer run, should be "prisoners delight" in the Garnaut(1996) sense. A country's own liberalization raises consumption and the liberalization by other countries raises your consumption even more. One point to note from the consumption and GDP comparison is that for some countries the gains from own liberalization more than outweigh the gains to the same country from other countries liberalizing. For example the gains to Australia from APEC liberalization increase Australia's gain from own liberalization by 11% and multilateral liberalization increases these gains by 17%. In contrast for the United States, own liberalization gains are small and most of the gains come from other countries liberalizing. These relative differences reflect a number of factors including the amount of liberalization being undertaken domestically relative to the amount being undertaken overseas (i.e. the US does not need to do much). It also reflects the degree to which other liberalizing economies are markets for home country products, the composition of home country production relative to the extent of distortions being removed in similar sectors in

foreign economies as well as each country's initial reliance on international trade for income generation. The asymmetries across economies in many of these factors underlay the dispersion of results in tables 4 and 5.

Table 5 illustrates another important point. For members of APEC, liberalization within this regional grouping captures most of the gains from multilateral liberalization because APEC is so large. It should be stressed that many developing countries are not counted in the multilateral liberalization exercise.

Tables 6 shows the percentage change in real private investment by 2020 relative to what it otherwise would have been in 2020. As indicated in the results for GDP, physical investment in some economies fall as a result of trade liberalization. This fall in domestic investment is more than offset by a rise on home investment in foreign economies. Overall world investment rises.

Table 7 shows the effect of own versus alternative group liberalizations on real exports of each economy by 2020. In each case for each country, international trade expands. When an individual economy reduces tariffs, the nominal exchange rate depreciates which causes a real depreciation and stimulates demand for exports. This also reflects the falling input costs in export sectors from the reduction in tariffs. In the group liberalizations these exchange rate effects are diminished because as more countries liberalize there are less countries to depreciate against. Nonetheless the stimulus to world trade is reinforced by the demand spillover effects of foreign countries reducing their tariffs and raising their demand for home country exports. In each case more countries liberalizing leads a larger expansion of exports for each country.

The results for 2020 accord with results from many studies using CGE models apart from the impact of endogenous capital accumulation and savings behavior incorporated in the AP-

GCUBED model.

b. Dynamic Adjustment

Now turn to the dynamic adjustment from the time the tariff reductions are announced until 2020. There are a vast amount of results for each country. Rather than presenting pages of numbers a few select results will be presented in order to draw out some key insights.

Figure 1 presents the time path of real GDP for 4 countries: Australia, Taiwan, China and Indonesia. These countries are selected to represent a range of experiences. Australia is an industrialized economy liberalizing by 2010, Taiwan is a developing economy liberalizing by 2010, China is a developing economy liberalizing by 2020 and Indonesia is also a developing country but also part of the ASEAN regional bloc.

The first point to note in that GDP rises in each of these countries in the medium term with the increase rising with the more countries participating. The ASEAN liberalization has a tiny impact on non-ASEAN economies and even for Indonesia leads to small gains relative to own liberalization.

Now focus on the results for Australia in figure 1. In the short run, the credible announcement of future tariff reductions leads to a reduction in GDP as firms begin to restructure in the early periods. The gains to tariff reduction only accumulate over time as tariffs are cut although some of these gains are bought forward through access to forward looking asset markets. In the short run from 1996 through 1997 GDP grows less quickly than base but after 1997 grows more quickly than baseline. By the year 2000 GDP is equal to the baseline GDP and after 2000 is permanently above the baseline. For Australia and a range of countries not shown

here, own liberalization is costly in terms of GDP loss in the short term but substantially more beneficial in the medium and long term. Secondly, this figure and other results indicate that the more that other countries liberalize, the smaller the loss in short run GDP and the larger the gain in long run GDP. This is true for all countries in the model. Depending on the discount rate of political leaders this may explain why countries are reluctant to undertake trade liberalization without having foreigners also liberalizing. The problem with this strategy is that although all the short term costs are the result of own liberalization, most of the medium and long term gains are also due to own liberalization. Thus free riding on the liberalization of other countries may be an inferior policy strategy in the medium term. Unfortunately short sighted policymakers would usually choose the no liberalization strategy because of the short term costs of own liberalization.

The results for Australia also apply for each other economy although in some cases such as Taiwan, China and Indonesia, the short run losses disappear quickly. In the case of Indonesia, where there is a lot of growth already in the baseline, the absorption of dislocated resources occurs more quickly.

The results for consumption are shown in figure 2 for the same group of countries. This is similar in many ways to the path of GDP (note the different scales) except that for some countries the large future gains in income, cause consumption to rise more quickly than GDP. These countries are also the countries that experience a trade balance deficit in the early periods of liberalization as consumers borrow from the rest of the world to take advantage of the future income gains. In Australia the pickup in consumption relative to GDP occurs from 2002. Before that year, the Keynesian style business cycle induced by sticky nominal wages leads to a low consumption path for a number of years. Most household consumption is constrained by the

short term slowdown in economic activity and the short term rise in unemployment caused when prices fall but nominal wages are sticky. This effect is dampened in other economies by more rapid labor market adjustment.

Next it is interesting to look at what adjustment occurs in the trade accounts of a representative economy under own liberalization. Results for changes in exports, imports and the trade balance (as a percent of GDP) for own liberalization in Taiwan are contained in figure 3. When the policy of future tariff reductions is announced in 1996, there is a realization that in the future, the real exchange rate will depreciate. Financial markets are rational in this model and therefore the current nominal exchange rate depreciates in anticipation. With sticky nominal wages, the real exchange rate also depreciates in 1996. This reduces imports initially and increase exports. The trade balance improves slightly. Over time as the tariff cuts are implemented, exports continue to rise through reduced input costs and imports also rise due to the fall in home prices for these imports. The trade balance begins to deteriorate as households raise consumption relative to income in anticipation of future wealth gains and as the fiscal deficit marginally worsens due to the loss in tariff revenue. This borrowing against future income is not concentrated in the first few periods because households in this model are relatively myopic and future income only raises perceived wealth over relatively short time horizons. Once liberalization is complete in 2010, note that the trade balance begins to improve again reflecting the fact that debt accumulated pre 2010 to raise consumption and investment levels must be serviced over time. The trade balance improvement reflects this repatriation of borrowing as well as repatriation of returns to equities from direct foreign investment in Taiwan. While the trade balance improves this is reflected in both higher exports and imports.

Similar qualitative results for own liberalization can be found for the other economies although there are quantitative differences across economies.

Results for the trade balance adjustment in Taiwan under the alternative regional groupings is shown next in Figure 4. The case of own liberalization is the same as that shown in figure 3. In the case of both APEC and multilateral liberalization the deterioration in the trade balance is much greater. In this case the expected gains are also much greater and thus households borrow more to raise consumption and domestic firms borrow more to raise investment. Foreign capital also flows into Taiwan to take advantage of the higher expected returns in Taiwan. The real exchange rate depreciation is smaller in the short run because the inflow of capital tends to bid up the price of the Taiwanese dollar in real effective terms. Similar patterns occur for other economies although those economies undertaking the larger liberalization tend to attract greater capital inflows and countries such as the United States and ROECD regions tend to supply the capital to these liberalizing regions.

5. Conclusion

This paper has offered empirical estimates of the long run gains to trade liberalization for a range of countries primarily in the Asia Pacific region under alternative assumptions about the grouping of countries. It is found that in the medium to long term substantial gains are realized from own liberalization AND additional gains emerge for all countries from other countries' liberalization. Multilateral liberalization leads to larger overall economic gains for each country.

It is also found that the adjustment path to a phased liberalization can exhibit short run costs as resources begin to be reallocated before the trade reforms are implemented. To the extent that this is a problem, liberalization by other countries at the same time as own liberalization helps

to reduce the short run adjustment costs. There is an irony for some countries, such as Australia, in that a substantial part of the long run gains are the result of own liberalization however this liberalization is also the source of short run costs. These costs are related directly to the extent of labor market rigidities.

A significant amount of further research is required. The nature of the adjustment path is likely to be importantly affected by the timing of tariff cuts. In this paper a simple linear implementation is assumed but the issue of optimal timing of tariff reductions is not addressed (see Wong (1997)). Also the role for macroeconomic policy adjustment in the short run is suggested by the results for this paper but not directly evaluated. Future papers will explore these issues.

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Table 1: Summary of Main Features of AP-GCUBED

☻ Specification of the demand and supply sides of economies;

☻ Integration of real and financial markets of these economies with explicit arbitrage linkage real and financial rates of return;

☻ Intertemporal accounting of stocks and flows of real resources and financial assets;

☻ Imposition of intertemporal budget constraints so that agents and countries cannot forever borrow or lend without undertaking the required resource transfers necessary to service outstanding liabilities;

☻ Short run behavior is a weighted average of neoclassical optimizing behavior based on expected future income streams and Keynesian current income;

☻ The real side of the model is dis-aggregated to allow for production of multiple goods and services within economies;

☻ International trade in goods, services and financial assets;

☻ Full short run and long run macroeconomic closure with macro dynamics at an annual frequency around a long run Solow/Swan/Ramsey neoclassical growth model.

☻ The model is solved for a full rational expectations equilibrium at an annual frequency from 1995 to 2070.

Table 2: Overview of the AP-GCUBED Model

Regions:	***Sectors***:
United States	Energy
Japan	Mining
Australia	Agriculture
Rest of the OECD	Non Durable Manufacturing
India	Durable Manufacturing
Korea	Services
Thailand	
Indonesia	
China	
Malaysia	
Singapore	
Taiwan	
Hong Kong	
Philippines	
Oil Exporting Developing Countries	
Eastern Europe and the former Soviet Union	
Other Developing Countries	
Agents	***Markets***:
Households	Final Goods
Firms	Services
Governments	Factors of production
	Money
	Bonds
	Equities
	Foreign Exchange

Table 3: Initial Tariff Rates

	Agriculture	Energy	Mining	Durable Manufacturing	Non Durable Manufacturing
United States	6.7	0.5	0.0	8.5	26.2
Japan	148.8	1.1	0.6	4.9	59.4
Australia	1.9	0.7	0.7	13.9	15.2
Indonesia	11.0	1.5	2.4	16.4	11.4
Malaysia	104.0	2.5	3.5	13.7	57.4
Philippines	104.0	5.8	10.2	24.1	63.3
Singapore	9.9	2.1	0.0	0.2	9.6
Thailand	107.6	6.9	10.9	33.4	70.5
China	16.7	14.0	18.7	45.1	43.5
Taiwan	12.6	14.3	23.5	39.3	42.1
Korea	105.0	2.8	4.4	16.0	41.0
Hong Kong	0.0	0.0	0.0	0.0	0.0
India	24.0	0.9	3.2	15.7	20.7
ROECD	6.9	0.4	0.2	8.2	16.5

Source: Centre for International Economics aggregations based on WTO/World Bank data.

Table 4: Percentage Change in real GDP in 2020 from Trade Liberalization

	Own	ASEAN	APEC	Multilateral
United States	-0.04	0.03	0.23	0.23
Japan	-0.95	-0.01	-0.87	-0.86
Australia	0.62	0.01	0.77	0.82
Indonesia	1.58	1.99	6.19	6.93
Malaysia	1.09	1.44	1.77	1.84
Philippines	-0.28	-0.18	1.99	2.26
Singapore	0.64	0.79	0.91	1.09
Thailand	-1.42	-1.14	1.00	1.40
China	0.46	-0.01	0.91	1.01
India	0.24	0.00	0.12	0.49
Taiwan	0.96	0.05	1.80	1.92
Korea	-0.66	-0.04	0.08	0.17
Hong Kong	0.00	0.04	0.16	0.18
ROECD	0.05	0.00	0.07	0.12

Table 5: Percentage Change in Real Consumption in 2020 from Trade Liberalization[4]

	Own	ASEAN	APEC	Multilateral
United States	0.23	0.20	1.89	1.73
Japan	0.35	0.02	0.84	0.89
Australia	1.74	0.06	1.93	2.03
Indonesia	2.86	3.45	9.45	10.34
Malaysia	9.05	10.73	14.61	15.00
Philippines	3.96	4.28	7.09	7.42
Singapore	1.71	3.66	5.86	6.09
Thailand	3.73	4.31	7.10	7.53
China	2.34	0.06	3.88	4.12
India	1.03	0.04	-0.06	1.11
Taiwan	5.06	0.26	10.05	10.74
Korea	1.43	0.02	4.28	4.63
Hong Kong	0.00	0.43	0.09	0.00
ROECD	0.66	0.03	0.30	0.97

[4]Note that results for consumption and exports are now expressed as percentage deviation from baseline. In earlier versions of this paper they were expressed as percent of GDP deviation from baseline.

Table 6: Percentage Change in Real Investment in 2020 from Trade Liberalization

	Own	ASEAN	APEC	Multilateral
United States	-0.14	0.33	2.84	2.66
Japan	-1.92	-0.12	-1.78	-1.85
Australia	3.55	-0.05	4.39	4.51
Indonesia	3.16	3.37	7.01	7.63
Malaysia	0.47	1.26	2.79	3
Philippines	2.37	2.53	3.5	3.58
Singapore	-0.49	-0.22	0.73	0.88
Thailand	0.4	0.49	1.8	2.01
China	0.62	-0.08	0.75	0.8
India	0.8	-0.03	-0.21	0.73
Taiwan	2.94	-0.11	4.37	4.51
Korea	-0.55	-0.16	0.31	0.36
Hong Kong	0	0	0.52	0.48
ROECD	0.99	-0.01	1.06	2.06

Table 7: Percentage Change in Real Exports in 2020 from Trade Liberalization[5]

	Own	ASEAN	APEC	Multilateral
United States	14.49	0.16	14.63	21.90
Japan	10.08	0.66	13.28	15.24
Australia	8.51	1.36	18.76	21.77
Indonesia	3.00	4.76	13.20	15.78
Malaysia	12.57	15.33	19.92	22.13
Philippines	12.67	14.93	30.95	34.46
Singapore	1.88	3.66	10.97	13.25
Thailand	22.30	24.00	34.93	38.31
China	12.17	0.76	19.77	21.93
India	8.65	2.72	14.76	32.40
Taiwan	11.77	0.95	17.24	18.71
Korea	7.57	0.72	14.17	16.00
Hong Kong	0.00	0.90	8.91	10.85
ROECD	5.35	0.49	6.68	12.08

[5]Note that results for consumption and exports are now expressed as percentage deviation from baseline. In earlier versions of this paper they were expressed as percent of GDP deviation from baseline

Figure 1: Effects on GDP of trade Liberalization Under Alternative Regional Groupings 1996 - 2020

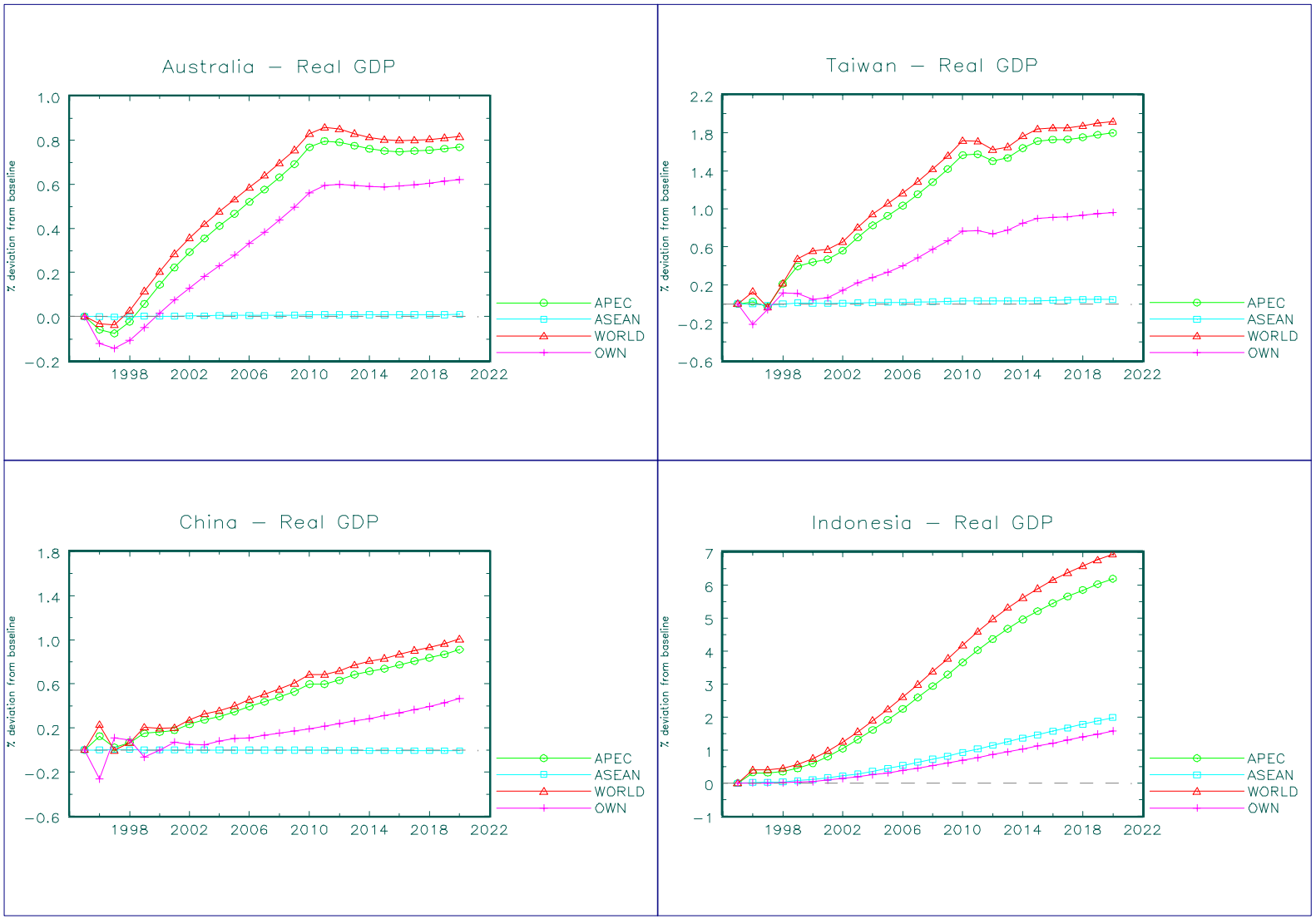

Figure 2: Effects on Private Consumption of Trade Liberalization Under Alternative Regional Groupings 1996-2020

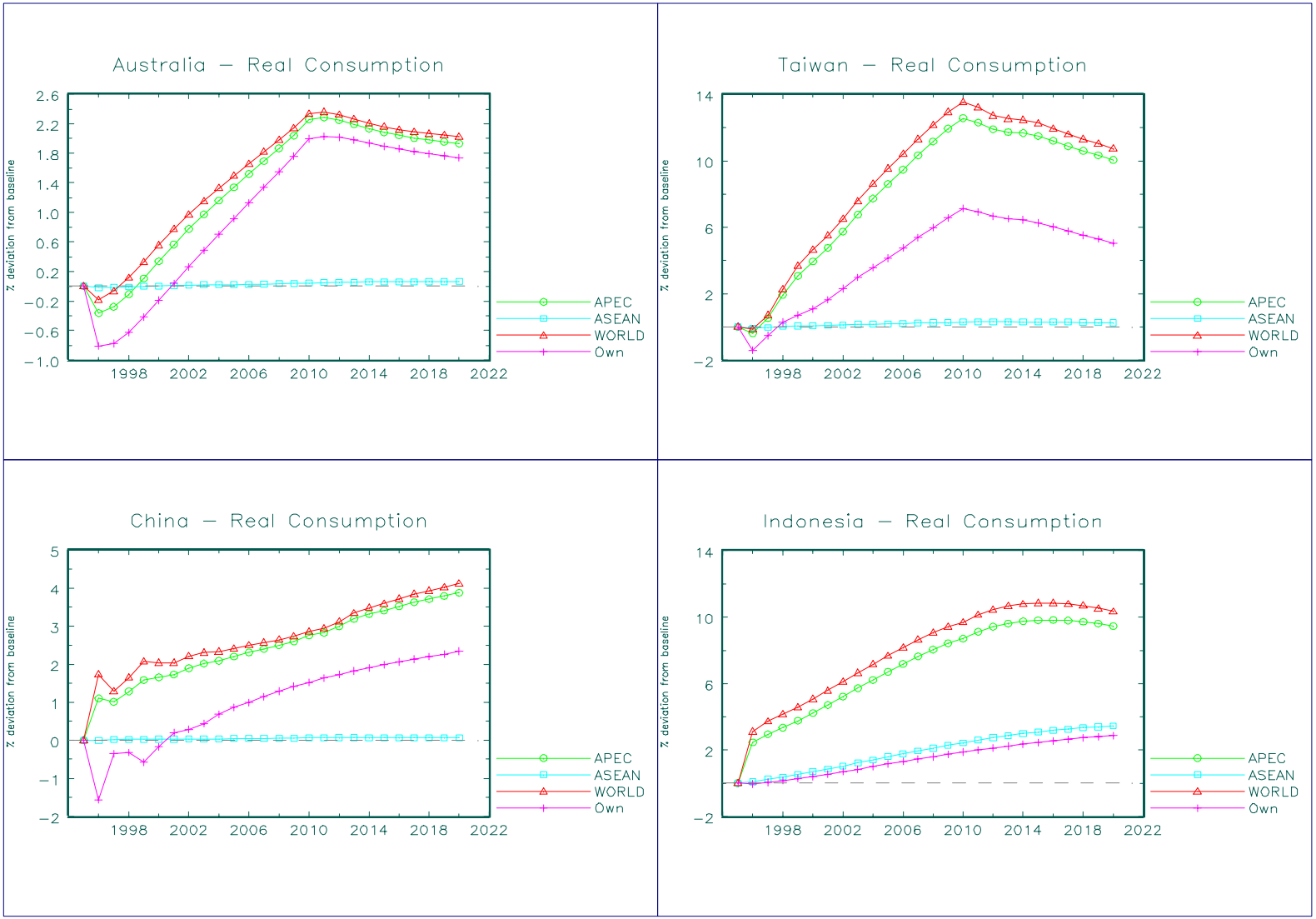

Figure 3: Trade Adjustment in Taiwan During Unilateral Liberalization 1996 to 2010

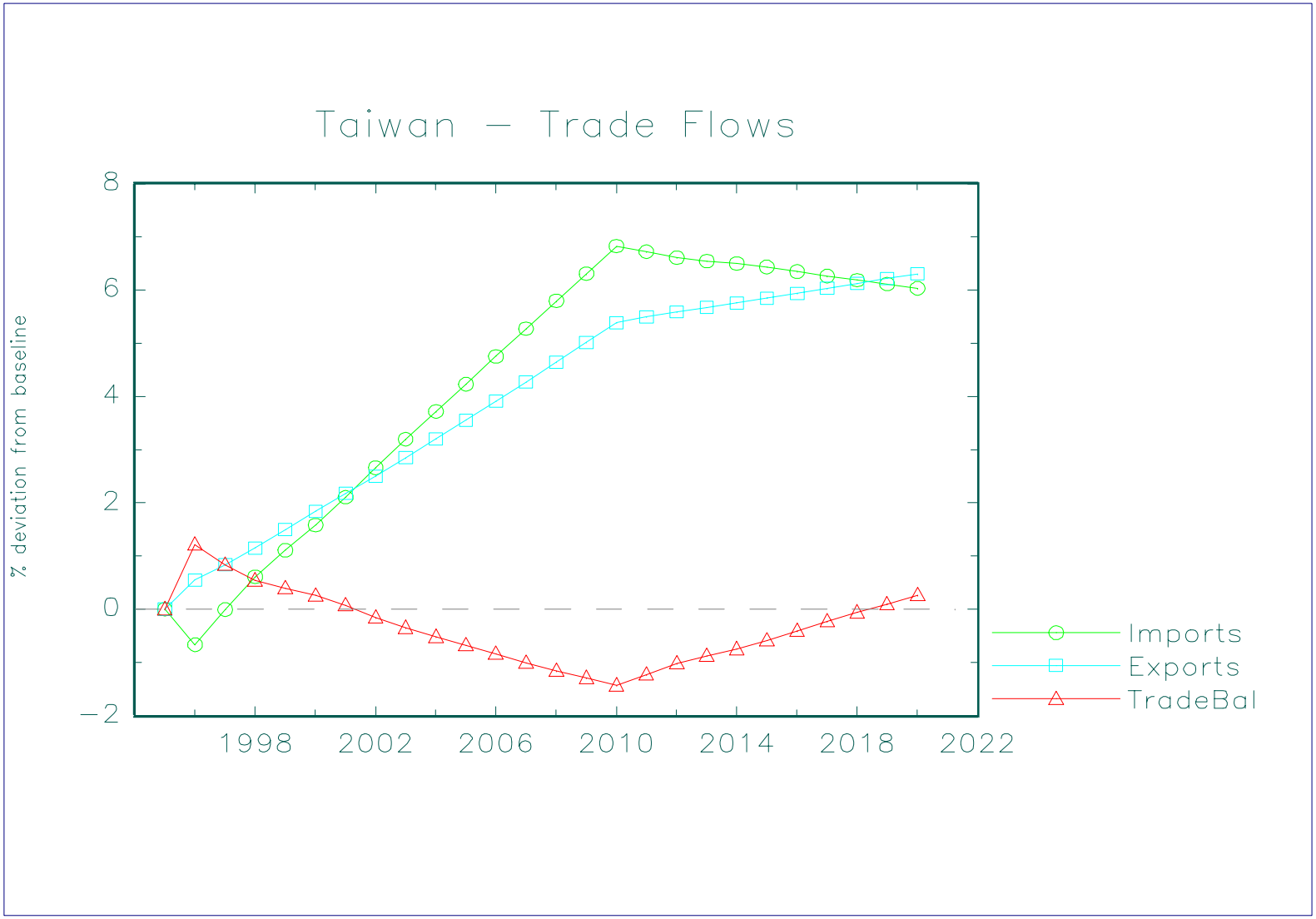

Figure 4: Trade Balance Adjustment in Taiwan Under Alternative Regional Trade Liberalizations