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THE GLOBAL ECONOMIC IMPACTS OF TRADE AND FINANCIAL REFORM IN CHINA

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ABSTRACT

Despite the setbacks from the recent Asian currency crisis, the ascendancy of Asia as an economic centre of world economic activity is likely to continue into the 21st century. A key issue that will shape the role of Asia, and indeed the shape of the world economy in the 21st century, is the economic development of China. To date China has successfully weathered the currency storm in Asia and continues on a program of economic reform. If anything, the problems of Japan and Korea provide powerful lessons for other countries undergoing rapid economic growth and structural change. These lessons include the importance of a well developed financial sector with lending and investment decisions based on market signals rather than government directives. Whether China can further integrate smoothly into global markets and sustain the fast growth of the last few decades will be a crucial development in the world economy. In this paper, we explore the impacts of continued Chinese economic reform with a focus on the role of international financial flows both in the adjustment within China as well as in the transmission of Chinese reforms to the rest of the world.

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1. Introduction

Despite the setbacks from the recent Asian currency crisis, the ascendancy of Asia as an economic centre of world economic activity is likely to continue into the 21st century[1]. A key issue that will shape the role of Asia, and indeed the shape of the world economy in the 21st century, is the economic development of China. To date China has successfully weathered the currency storm in Asia and continues on a program of economic reform. If anything the problems in Japan and Korea in particular, provide powerful lessons for other countries undergoing rapid economic growth and structural change. These lessons include the importance of a well developed financial sector with lending and investment decisions based on market signals rather than government directives. Whether China can further integrate smoothly into global markets and sustain the fast growth of the last few decades, will be a crucial development of the world economy.

In this paper we explore the impacts of continued Chinese economic reform with a focus on the role of international financial flows both in the adjustment within China as well as in the transmission of Chinese reforms to the rest of the world.

There are several factors that highlight the importance of China's deeper integration into the world economy. Firstly, the Chinese economy is large in absolute terms, although it is still quite small in per capita terms. Using purchasing-power-parity measures, China has already bypassed Japan as the second largest economy in the world, constituting half of the Asian economy and 11.1 percent of the world economy respectively in 1996, compared to the 20.7 percent world share of the U.S. (IMF 1997).

Secondly, China has a large and rapidly expanding trade sector. During 1980-96, China's share of global merchandise exports almost tripled, and that of imports also more than doubled (Table 1). In terms of merchandise trade, in 1995, China already ranked as the

[1] See Radelet and Sachs (1997) for support of this view.

eleventh largest exporting and fourteenth largest importing country (World Trade Organization 1996).

Thirdly, despite the fact that the capital account is still not fully convertible, China has already been a prominent participant in the global capital market. In 1996, China absorbed 40 percent of the total foreign direct investment (FDI) flowing to developing countries,[2] making it the second largest host country globally after the United States. It also accounted for 10 percent of international equity flows and 5 percent of international bond flows to developing countries, and 10 percent of cross-boarder commercial debt flows (World Bank 1997b). But China still has a large unexploited absorption capacity. Due to the remaining restrictions on capital account transactions, China's absorption of portfolio investment was limited to less than 0.5 percent of GDP in 1995,[3] much smaller than the average 2 percent of sixteen best performing developing countries (World Bank 1997a).

As well as attracting significant amounts of foreign investment, China has also emerged as an important lender in global capital markets. Without including the flows through Hong Kong, in 1995 China was already the eighth largest capital supplier in the world and the largest one among developing countries, contributing 2 percent to global capital flows (World Bank 1997b). China's role as a capital source is likely to expand as the economy becomes mature and capital controls are gradually relaxed. Important aspects of possible future developments are China's huge absolute economic size and high saving ratio. During 1975-95, China's average saving rate was as high as 37 percent, only second to Singapore (World Bank 1997a).

An important milestone of trade liberalization in China is to conclude its accession to the World Trade Organization (WTO). The resulting reforms will bring opportunities as well as challenges to China. Accession to the WTO will remove significant internal and

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[2] But some of them are 'round-tripping' investments from China itself, in order to take advantages of the concessions enjoyed only by foreign investors.

[3] Portfolio capital inflows to China in 1994 amounted 0.8 percent of GDP, the drop in 1995 was due to the Mexico currency crisis; it recovered soon later (World Bank 1997a).

external trade distortions on the one hand, as well as expose inefficient state-owned enterprises (SOEs) to foreign competition on the other.

The counterpart reform in the financial sector is full convertibility of the capital account. The Asian currency crisis clearly demonstrates the possible problems of having an open financial sector without a fundamentally sound domestic financial system. The endurance of Singapore, and Taiwan in the crisis has largely been the result of their robust economic fundamentals and sound financial systems. China has apparently escaped the financial turmoil to date most likely because its capital account is not yet convertible. A lot of the key problems in the troubled Asian economies can be easily identified in China, such as a fragile banking system, huge policy directed lending, and a buoyant property market. Compared to trade reform, financial liberalization is obviously of much higher risk as well as being the less studied of the reforms being undertaken in China.

Scope of this study

This paper aims to quantify the impacts of three possible developments in China: (1) trade liberalization, (2) financial liberalization, and (3) a financial crisis during the process of financial liberalization.

Trade liberalization is modeled as a gradual reduction of import tariffs representing both actual tariff reductions as well reductions in tariff equivalent quotas, administrative barriers and a range of factors that drive a wedge between Chinese domestic prices and world prices. Financial liberalization is modeled as a decline in the wedge between the return on investing in Chinese assets and assets in the rest of the world. In fact this can be interpreted both as a reduction in official barriers to foreign investment in Chinese assets as well as a market re-evaluation of the perceived risk of investing in Chinese assets. A financial crisis on the other hand is modeled as a financial liberalization of 3 years followed by an abrupt (and unexpected) rise in the risk of investing in Chinese assets.

A number of studies use computable general equilibrium (CGE) models to quantify the impacts of trade liberalization in China (see section 3), but all of these studies only focus

on the real sector, capital is exogenously fixed and the role of financial assets and international financial markets is absent. Given recent experience in Asia, the adjustment on international financial markets is central to understanding the likely adjustment path during a period of significant economic change. As demonstrated in McKibbin (1997b), incorporating financial flows is not only important for studies of financial liberalization, but also for that of trade reform. Moreover, as far as we are aware, there is no attempt to use CGE models to examine the impacts of financial liberalization in China.

A Dynamic Intertemporal General Equilibrium model (DIGEM) called G-Cubed is used for this study (McKibbin and Wilcoxen 1995). A version of the model has been used in a number of quantitative studies of global and regional trade and financial liberalization, e.g. McKibbin (1997a) and McKibbin (1997b). A key feature of the model is that it has well-defined financial markets that are based on valuation of the returns to real economic activities with arbitrage between different activities within and across countries. Further details on the modeling framework are given in section 4.

The rest of the paper is organized as follows. The next section discusses the pace of trade and financial reforms in China, and the pros and cons of further liberalization. Section 3 reviews a number of CGE studies of trade reform in China. Section 4 briefly introduces the features of G-Cubed model. Section 5 provides the results for the three simulations of trade liberalization, financial liberalization and a financial crisis in China. A conclusion is presented in section 6.

2. China's integration into the global economy

In a broad sense, the impact of Chinese economic liberalization depends on a range of factors that require a global modeling framework to disentangle. Some key issues include the size of China in the world economy, the extent of existing distortions both in China and the rest of the world, the extent to which the reforms are credible, and the reactions to the Chinese reforms in the rest of the world.

Trade liberalization

In terms of the external trade environment, accession to the WTO will surely open up more export opportunities for China's products. Most importantly, the quotas of the Multifibre Arrangement (MFA) will be completely eliminated by the year 2005. Other CGE studies suggest that this is a major benefit of the WTO membership for China, as the textile and clothing sectors are where China's comparative advantage lays (Table 2). Because of the generalized system of preferences, China can also avoid annual scrutiny of its Most Favored Nation (MFN) status by the U.S.. Moreover, the agreements on subsidies and dumping can discourage export destination countries from taking anti-dumping or anti-subsidy retaliations unilaterally. Between 1980 and mid 1989, the U.S. has conducted sixteen anti-dumping investigations against the imports from China (Thunberg 1990:92). In 1994 and 1995, 5 out of 16 anti-dumping investigations launched by the European Community were against China (Eeckhout 1997).[4] On the other hand, it is also possible that China's trade partners may make use of the Agreement on Safeguards to prohibit massive inflows of China's labor intensive products.

The benefit of participating in a world trade forum is more than just promoting trade opportunities. The tightening of the use of laws and rules in the trade sector may have spill-over effects on other sectors. For the rest of the world, admitting China into the WTO means that China will be bound by the rules of the game and this will help to continue economic reform. A more open trade regime will allow China to produce more consistently with its underlying comparative advantage. More intensified trade and trade related investment will bring larger spill-over effects to the economy. Improvement in the variety and quality of imported intermediates can raise the quality of output. More intense competition will boost the productivity of local firms. However, during the adjustment phase higher pressure of foreign competition may drive some inefficient local enterprises,

[4] But the European Commission has proposed to reverse the proceedings of investigation of anti-dumping of Chinese (and Russian) enterprises, taking into account its progress into a market economy (Agence Europe 1997).

particularly SOEs, into bankruptcy, with short term implications for unemployment and social unrest.

Using CGE modeling methods, both Bach, Martin et al. (1996) and Yang (1996) show that elimination of trade distortions within China is more important for China than the removal of external trade restrictions (Table 2). This result implies that trade is actually repressed by China's own regime instead of by its trade partners' regimes. In the current paper we focus on the reform process within China.

Harrold (1995:138) describes China's trade regime as 'protected export promotion' which is a "system simultaneously promotes exports via incentives, while offering significant domestic protection". By law, all import substitution regulations in China were eliminated by 1992. Notwithstanding, certain industrial policies are considered as equivalent to import-substitution policies by its trade partners (Department of State 1997). For example, in the automotive industrial policy announced in 1994, it is regulated that a local content requirement has to be fulfilled by foreign investors. China also outlawed direct subsidies for exports since 1994. However, indirect subsidies such as low cost energy and inputs, preferential bank loans, and tax incentive, are still used to support certain industries and enterprises.

China's statutory tariff rates are among the highest in the world, comparable to those of Brazil, India, and Pakistan (World Bank 1997b). However, due to extensive duty exemption and rebates for capital goods and inputs used in exports, the effective tariff rates are much lower than the statutory rate. Since the early 1990s, China has been significantly reducing tariff rates. According to China's commitment to the WTO accession, its weighted tariff will be reduced to 16.2 percent by year 2005, and the variation of tariff rates will reduced by 58 percent (World Bank 1997b). Besides, non-tariff barriers which cover about 30 percent of imports in 1996, will be completely eliminated excepts those on agricultural products if China is admitted to the WTO (World Bank 1997b).

Recently there have been reports that, to promote the chance of accession to the WTO, China has committed to a further cut in the tariffs on industrial products, complete

elimination of tariffs on information technology products by year 2000, elimination of tariff peaks on items with tariffs above 15 percent, and further liberalization of service sectors including banking and legal industries after its admission to the WTO (Kohli 1997; Wang and Hon 1997).

One of the concerns of WTO members about China's trade reform commitments is that, as long as imports in China are still curtailed by administrative measures such as sanitary and phytosanitary standards, the benefit of tariff reduction is marginal (Holliday 1997: 454). The existence of a large state sector also casts some doubts upon the integrity of China's market-oriented trading system. For example, despite the expansion of the number of foreign trade agents, China still restricts the distribution of foreign trade rights.

Financial liberalization

The serious problems that have emerged in several Asian economies in the recent currency crisis highlight the importance of the soundness of financial infrastructure in economic development. The reform of the financial sector in China has lagged significantly behind reforms in the trade sector. The common weaknesses in the financial sectors of its troubled neighbors, such as huge policy directed lending and insufficient prudential provisions, can also be easily identified in China. In as much as China is proceeding towards opening its capital account,[5] without a robust financial system, it could well be facing similar problems as its Asian neighbors.

Despite its active participation in foreign capital markets, China's domestic financial market is still highly underdeveloped. According to the estimates of the World Bank (World Bank 1997a), the size of China's capital market which is dominated by bank credit is only about 100 percent of its GDP, much smaller than that of the Philippines and Thailand. The World Bank (1997a) suggests that the development of the capital market is restrained by the

[5] Despite it is continuously reported that China will open its capital account before year 2000 (HKStandard 1996), the authorities have never announced the precise schedule. It is widely speculated that the crisis has alerted the Chinese authorities about its original pace of opening up the capital account.

authorities under the fear that the resources in the state banks could be extracted by the market.

China has taken steps to reform the banking system, such as the commercialization of state-owned banks. However, the reform of the banking system itself has been dragged by the performance of the state sector. It is estimated that the non-performing loans held by the big four banks in China make up at least 20 percent of their outstanding loans (World Bank 1997a:31; Reuters 1997). The big four banks as a whole accounts for 90 percent of bank assets and two-third of financial assets. Non-performing loans are largely attributed to administrative lending to non-productive SOEs and planned projects. Apart from the bad loans in banks' balance sheets, SOEs also hold a large amount of 'triangular debts' which are estimated to be about 15 percent of nominal GDP (Department of State 1997).

A potential threat of reforming the banking sector is that, a number of SOEs might be extinguished under stringent borrowing conditions. Besides, opening up the domestic market to import competition could lead to collapse of inefficient SOEs, and therefore put pressure on the banking system. The success of trade and financial reforms are intertwined with the success of state sector reform.

While opening up the capital account without sufficient preparations could lead to economic problems on the one hand, delaying reforms could also be costly on the other. Firstly, a heavily distorted financial sector defers improvement of allocation efficiency of domestic as well as international capital. Secondly, it is true that with an open capital account an economy will be more vulnerable to external shocks. Nonetheless, at the same time it can diversify the portfolio of the assets held by local economic agents, and thus buffer their incomes against domestic shocks (Mathieson and Rojas-Suarez 1993). Therefore, whether opening the capital account will destabilize or stabilize an economy depends on the frequency and the size of external shocks relative to domestic shocks. Thirdly, the experience of some developing countries, such as El Salvador and Jamaica, demonstrate that stabilization policies actually can attract foreign capitals to support the fragile banking system during the reform process (Quirk 1994).

Last but not least, empirical research shows that capital controls can delay the response of economic agents to changes in macroeconomic conditions, but can not stop capital flow (Mathieson and Rojas-Suarez 1993; Quirk 1994). Underground movement of capital may have even larger destabilizing impacts than transparent movements. For example, since 1995, the 'error and omissions' item in China's balance-of-payment is more than 36 percent of long term capital inflows; the large amount of missing capital might indicate unofficial capital flight. Gunter (1996) put the figure of capital flight between 1984 and 1994 to something between US$ 50 billion to 75 billion. As stated by the World Bank (1997a) "integrating China financially with the world economy is not a choice for policymakers to make. Markets are making it for them."

In conclusion, a case can be made that instead of delaying the financial liberalization, China should speed up the reform of the state and the banking sector to prepare for a sustainable financial liberalization. Recently the authorities have taken some encouraging steps. For example, as a trial to open the banking sector, nine foreign banks have been permitted to conduct business in yuan in the Pudong economic zone of Shanghai. Moreover, learning from the experience of its troubled Asian neighbors, China has taken several steps to strengthen the management of the banking system. These include setting up a banking supervisory board to oversee the quality of loans, the asset management and the personnel of the big four banks (Wang and Mark 1997), and abandoning credit quotas of state banks (Reuters 1997). The results in this paper suggest that significant gains to financial reform are achievable. The country that gains most from Chinese financial reform is China itself.

3. Modeling Chinese Trade Reform

Most quantitative studies of trade liberalization have relied heavily on computable general equilibrium (CGE) models.[6] Studies of trade reform in China are no exception. The

[6] For surveys of global trade liberalization under the Uruguay Round, see Francois, Nordstrom et al. (1996) and Francois, McDonald et al. (1995).

advantage of this approach to quantifying trade reform is that it enables the many interdependencies in an economy to be captured in the longer term. Some drawbacks are discussed below. A key problem is that these studies can say very little about the adjustment process over a number of years, yet the dynamic adjustment to trade liberalization is a key issue facing policy makers.

Table 2 summarizes the findings of five CGE studies of trade liberalization of China. Among the surveyed studies, perhaps the comparison of Yang (1996) and Bach, Martin et al. (1996) is most intuitive. These two studies use the same model, data set, calibration year, specification of elasticities, technology and market structure, projection of growth of labor, capital and population. Despite the uniformity in assumptions, however, some findings of the two studies are almost exactly opposite. Yang (1996) predicts that, if China gains access to the WTO, the textile sector will be the second largest source of gains even if it is far behind the clothing sector; while in Bach, Martin et al. (1996), the textile sector constitutes the second largest source of losses (case 5)! Secondly, Yang (1996) finds that, in general, agricultural sectors lose; whereas Bach, Martin et al. (1996) suggests a gain of the primary agriculture sector. Nevertheless, both studies predict that, natural resource sectors and heavy industries will lose in the tariff reform.

According to the authors of the two papers, the discrepancies are probably due to the fact that slightly different levels of tariff cut are simulated in the two papers. Bach, Martin et al. (1996) simulates a smaller cut in agricultural sectors but larger cut in textile sectors.[7] The moral of this comparison is that a change in relative tariffs across sectors may be of much larger importance on the results than an across-the-board change of tariffs. Therefore, having 'enough' sectoral dis-aggregation and hence tariff variations could be crucial in modeling trade reform.[8] The comparison also highlights the challenges confronted by modelers. Since most economic models ignore widely but non-uniformly spread distorting administrative trade

[7] Other factors that might contribute to the discrepancies are different levels of sectoral aggregation, and the incorporation of human capital in Bach, Martin et al. (1996).

[8] Actually these are already demonstrated in the case 1 and 2 of Yang (1996), the case 6 of Bach, Martin et al. (1996), and Warr (1997).

practices, such as tariff exemptions and indirect subsidies etc., the effects of trade reforms suggested by those models could be biased by those un-modeled barriers.

Goldin, Knudsen et al. (1993) uses a CGE model called the RUNS model which has much larger dis-aggregation of agricultural sectors than manufacturing sectors. Its findings suggest that China will increase exports of agricultural goods and imports of non-agricultural goods, thus the rural sector gains most in the reform. Xu (1994) uses a much simpler model of only one country and three sectors, but it shares a lot of conclusions with Bach, Martin et al. (1996) in that, the agricultural sector and the light industry gain, and the heavy industry loses. Warr and Zhang (1995) also uses a single country model but with much larger sectoral dis-aggregation. Its findings are very different from those of any others: neither the light industry is a big winner, nor the heavy industry is big loser. It should be noted that, the model was constructed according to the trade regime of China in 1987, both the model specifications and the data are fairly outdated.

Goldin, Knudsen et al. (1993), Xu (1994) and Warr and Zhang (1995) share an important feature that is absent in other two studies. That is, they incorporate unemployment in their models. This assumption during an adjustment period has a firm empirical basis. For example, in 1996, Chinese authorities estimated that the unemployed urban and rural labor stood at 5.52 million and 130 million (Agence France-Presse 1997; Kwan 1997), while employed labors in 1995 were only about 173 million and 450 million respectively. It is widely suspected that official figures have been understating the true situation.

Incorporating unemployment in a CGE model also has policy implications as well as theoretical appeal. It is because a common excuse to defer trade liberalization is to promote domestic job security against the 'flood of imports'. Whether trade liberalization entails adverse impacts on employment depends on whether the creation of job opportunity in

expansionary sectors more than offsets the reduction in contracting sectors, and the efficiency of labor movement.[9]

Whereas the outcome is not pre-determined, incorporating unemployment provides an additional source of gains from trade liberalization rather than a cost as shown in the three studies. In these studies, trade liberalization leads to an expansion of the labor-intensive sectors, which are sectors of China's comparative advantage. Absorbing the pool of unemployed labor can insure a lower cost of expansion than otherwise would be the case. On the other hand the simulation results may be overstating the gains as they do not take into account the costs of labor movement between sectors.

Capital and financial liberalization

A common assumption in CGE models is to fix the capital stocks exogenously according to certain projections, as those in Bach, Martin et al. (1996) and Yang (1996). However, in an economy of constant marginal propensity to save, a change in the level of output will induce a corresponding change of the stock of physical (and human) capital (Baldwin 1992). To accommodate the endogeneity of capital, some studies allow the change of capital stock in the new equilibrium to make it consistent with some steady state conditions, such as a constant capital price. For example, Harrison, Rutherford et al. (1995) and Francois, McDonald et al. (1994) demonstrate that endogenizing the capital stock can boost the global welfare impact of the Uruguay Round by about 70 percent.

However, simply endogenizing the capital stock still can not solve a fundamental problem of these models: they only considers the demand for capital, but ignores the supply side constraints; capital accumulation is like a 'free gift'. In particular, it does not explicitly trace flows of capital between agents both within a country and across countries, and thus the consequence of borrowing and lending. Moreover, fixing the capital price may be sensible in the single small country cases, but it is definitely problematic in the large

[9] Michaely, Papageorgiou et al. (1991) provides empirical records of the correlation between trade reform and unemployment. Wood (1995) accesses the impacts on skilled and non-skilled workers when developed countries trade with developing countries.

country and global cases. In a model without intertemporal budget constraints, fixing either capital stock or capital price is almost an inevitable tradeoff.

Finally, in all the studies surveyed in this paper, as well as most other CGE studies of trade liberalization, the concept of capital is physical capital like machinery. The complex interdependencies between physical capital accumulation and portfolio investment are largely ignored. While it is the former that determines production capacity, it is the latter that induces volatility of exchange rate and interest rates, and thus greatly influences the balance-of-payment and macro-stability of an economy. This current study incorporates the role of financial capital in the adjustment story. Indeed the adjustments in financial markets are shown to be crucial in the adjustment to trade and financial reforms.

4. The G-Cubed model

The G-Cubed multi-country model documented in McKibbin and Wilcoxen (1995). It is a dynamic intertemporal general equilibrium model (DIGEM). It combines the approach taken in the earlier research of McKibbin and Sachs (1991) in the McKibbin Sachs Global model (MSG model) with the dis-aggregated, econometrically-estimated, intertemporal general equilibrium model of the U.S. economy by Jorgenson and Wilcoxen (1990).

The G-Cubed model has been constructed to contribute to the current policy debate on environmental policy and international trade with a focus on global warming policies. Nonetheless, it has many features that make it useful for answering a range of issues in environmental regulation, trade reform, financial reform, and other 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 through trade and financial markets. G-Cubed contains a strong foundation for analyses of both short run macroeconomic policy analysis as well as long run growth consideration of alternative macroeconomic policies. Budget constraints are imposed on households, governments and nations (the latter through accumulations of foreign debt). To accommodate these

constraints households and firms are assumed to use the model to generate forecasts of future economic performance and use these projections in their planning of consumption and investment decisions. 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 (CGE) models that traditionally ignore the adjustment path between equilibria and macroeconomic models that ignore individual behavior and the sectoral composition of economies.

G-Cubed is still in the process of development but it is already a large model. In its current form it contains over 6,000 equations and 110 intertemporal costate variables. The key features of G-Cubed are summarized in Table 3. The country and sectoral breakdown of the model used in this paper are summarized in Table 4. The version used in this paper consists of the United States, Japan, Australia, the rest of the OECD, China, Oil Exporting developing countries (OPEC), Eastern Europe and states of the former Soviet Union (EFSU), and all other developing countries (LDCs), with twelve sectors in each region. There are five energy sectors (electric utilities, natural gas utilities, petroleum processing, coal extraction, and crude oil and gas extraction) and seven non-energy sectors (mining, agriculture, forestry and wood products, durable manufacturing, non-durable manufacturing , transportation and services). Each economy or region in the model consists of several economic agents: households, the government, the financial sector and firms in the 12 production sectors listed above. The behavior of each type of agent is modeled. Each of the twelve sectors in each country in the model is represented by a single firm in each sector which chooses it inputs and its level of investment in order to maximize its stock market value subject to a multiple-input production function (defining technological feasibility) and a vector of prices it takes to be exogenous. For each sector, output is produced with inputs of capital, labor, energy, materials and a sector-specific resource.

Energy and materials are aggregates of inputs of intermediate goods. These intermediate goods are, in turn, aggregates of imported and domestic commodities which are taken to be imperfect substitutes.

The capital stock in each sector changes according to the rate of fixed capital formation and the rate of geometric depreciation. It is assumed that the investment process is subject to rising marginal costs of installation, with total real investment expenditures in each 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.

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. The household decision involves predicting expected future income from all sources (i.e. wealth) as well as current income. This information together with the relative prices of different goods and services then determine the pattern of consumption spending over time and the pattern of spending across the available goods.

It is assumed that the government in each country divides spending among final goods, services and labor according to the proportions in the base year input-output table for each country. This spending is financed by levying taxes on households and firms and on imports.

Households, firms and governments are assumed to interact with each other in markets for final goods and services; financial; and factor markets both foreign and domestic. The result of this interaction, given the desires of each economic entity, determine a set of relative prices than feed back into decision making by the different economic agents.

International capital flows and the link between real economic activity and financial rates of return are an important contribution of the model. 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.

In summary, the G-Cubed model embodies a wide range of assumptions about individual behavior and empirical regularities in a general equilibrium framework. The complex interdependencies are then solved out using a computer. It is important to stress that the term "general equilibrium" is use here to signify that as many interactions are possible are captured, not that the economy is in a full market clearing equilibrium at each point in time. Although it is assumed that market forces eventually drive the world economy to a long run steady state equilibrium, unemployment does emerge for long periods due to different labor market institutions in different economies.

5. Simulation results

The model summarized in the previous section is used to explore the macroeconomic adjustments to alternative scenarios in China. By its nature, a model is an abstraction of reality and therefore the results here should not be viewed as forecasts of what will happen but are really meant to be indicative of the nature of the adjustment process. These results also point to where other policy actions may be desirable.

To produce the results the model is first solved from 1991 to 2070 to generate a model baseline based on a range of assumptions. A key assumption in this section is the initial tariff rates in China. Table 5 contains the aggregated tariff rates for each sector 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 assumptions 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 population projections are based on World Bank projections. Total factor productivity growth is based on a sectoral convergence model in which sectors within countries catch up to the United States productivity growth by sector such that the gap between levels of productivity close at a rate of 2% per year. For the purpose of the exercises presented here the exact baseline path is not of importance because results will be discussed as deviations from the underlying baseline. The issue of projections using a model such as the G-CUBED model and the nature of the baseline path 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 the tariff reduction simulation it is assumed that China announces in 1998 a reduction in tariffs from the levels in table 5 with equal cuts in every year until reaching zero by 2010. In the financial liberalization scenario it is assumed that in 1998, China announced reforms that imply a reduction in the excess returns from investing in Chinese assets by 1% in 1998, 2% in 1999 and 3% from 2000 onwards. In the final simulation in which there is a loss of confidence in the financial reforms, we assume that the financial reforms are believed in 1998 and through 2000 but in 2001 the risk premium on Chinese assets returns to the pre reform level (3% above the level expected in the financial reform simulation).

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 and government spending constant relative to simulated GDP. With higher output, tax revenues rise implying a move towards fiscal surplus in each economy.

A. Reduction in Chinese Tariffs

The results for a reduction in Chinese tariff rates from the assumed levels in 1998 to zero by 2010 are contained in figures 1 through 4. Results are presented as percent deviation from baseline except for interest rates which are percentage point deviation from baseline, and the trade and current account balances which are expressed as percent of baseline GDP deviation from baseline. Results for China are contained in figures 1 and 2 and for the OECD economies in figure 3 and 4.

Consider first the impact of tariff reductions in China. 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 in 1998 GDP grows less quickly than base but after 1998 grows more quickly than baseline. By the year 2010, GDP is around 0.85 percent above baseline GDP. For China trade liberalization is costly in terms of GDP loss in the very short term but substantially more beneficial in the medium and long term. GDP is a measure of the production using domestically located factors of production. GNP is a measure of income to domestically owned factors of production. Note from Figure 1 that GNP rises less quickly than GDP because some of the additional production is being undertaken using capital owned by foreigners. Indeed the adjustment process following the announcement of trade liberalization is driven by the adjustment in financial markets. The change in tariff rates increases economic efficiency in the Chinese economy and raises the overall return to capital. This increase in the return to capital attracts foreign investment into the Chinese economy. This capital inflow tends to appreciate the Chinese yuan and worsen the current account (reflecting the capital inflow) (see figure 1, top right hand panel). Thus we see in figure 1, that the strong yuan leads to a fall in exports and a rise in imports relative to baseline. The rise in investment opportunities is matched in figure 2 by a

rise in net investment and therefore a permanent rise in the Chinese capital stock. Increased wealth due to greater economic efficiency enables permanently higher consumption level as shown in figure 2. The hump shaped path for consumption reflects the presence of Keynesian style multiplier effects that artificially raise consumption during the adjustment period.

The impact of the Chinese trade reforms on OECD regions are shown next in figures 3 and 4. By 2020 all countries gain in terms of income from the greater economic efficiency of China. During the adjustment however, GNP falls in the US reflecting the slow relocation of labor in the US due to global structural adjustments to the Chinese reforms. China has a comparative advantage in labor intensive production which implies an expansion in labor intensive production, particularly of manufactured goods. This has a larger (but very small) negative impact on the United States than for other countries that are modeled.

Capital is shown to flow out of the United States implying a move towards trade balance surpluses. The loss of capital reduces the productive capacity of the United States but not necessarily its income because capital invested in China earns a higher rate of return than in the United States. Thus GDP falls by more than GNP. Nonetheless employment dips slightly in the United States as the marginal product of workers falls through the outflow of capital but real wages are somewhat sticky. The offset to this is that Chinese demand for products from overseas rises significantly. This latter effect is not enough to offset the short run negative effect for the United States but it is in the medium to long term. In Australia, however, both the demand effects for Australian goods (primarily as intermediate inputs) are proportionately larger and the types of products exported to the Chinese economy are quite different. Thus Australia's GDP rises through the period.

B. Financial Liberalization in China

The results for Chinese financial liberalization are shown next in figure 5 through 8. In these figures we also show the results for the financial crisis simulation. These will be discussed in the following section.

Refer first just to the results for the financial liberalization scenario. The consequence of financial liberalization is to initially lead to an arbitrage opportunity for investment funds held in assets outside China. Financial capital flows into China very quickly leading to a large real and nominal exchange rate appreciation of close to 50% (figure 6). This real exchange rate appreciation crowds out net exports and leads to a large deterioration in the current account and trade balance of close to 4% of GDP (reflecting the capital inflow). The capital that flows into China goes into a range of assets but more importantly into physical capital accumulation over time. The marginal product of capital is above the return of government debt when the liberalization is announced. Because of adjustment costs in capital accumulation, arbitrage does not instantly remove this differential because China can't absorb a large quantity of physical capital instantly. Over time, investment continues to be above the steady state rate of investment. In the steady state, real investment is permanently higher.

As the capital stock rises, GDP rises because of the expansion of production possibilities in the economy. GDP continues to rise over time as more investment is put in place. In the long run GDP is permanently higher. An important point to note is that income in China does not rise by as much as production (measured by GDP) because the capital that being put in place is partly owned by foreigners and the return to this investment is repatriated over time. This can be seen by the gradual depreciation of the real exchange rate over time as well as the gradual improvement in the trade balance which is the transfer of real resources through additional net exports for foreigners. Note that consumption rises sharply, reflecting both a rise in expected future income in China as well as short run Keynesian style stimulus from the strong economy. Over time, consumption falls as more of the gains in production are repatriated to foreign consumers. Thus the income gains are smaller for residents than the GDP gains. Note that China is better off as a result of the liberalization because consumption increases are brought from the future in which income is higher to the present through international borrowing. Thus the opening of financial markets enables greater intertemporal substitution of consumption possibilities.

In the rest of the world, the adjustment is the mirror image of the results for China. Financial capital initially flows out of these economies leading to a depreciation of their real exchange rates (figure 8). The outflow of financial capital leads to a decline in the desired capital stock in these economies which leads to a fall in investment (not shown). The lower capital stock reduced GDP and through a multiplier channel reduced private consumption in the short run. Consumption which falls initially gradually rises as incomes rise through the repatriation of the returns to foreign capital investments. The initial effect of the shock is a reallocation of global consumption since the physical capital stock for the world as a whole is initially fixed. However, over time the higher rate of investment enables a rise in the overall level of global private consumption. Thus all countries are eventually able to enjoy higher consumption as a result of the Chinese financial reforms. However, just as in the trade reform scenario the largest gains are realized by China.

C. Loss of Confidence

The final simulation is a loss of confidence in Chinese financial reforms. This is modeled by running the financial reform simulation and then "rolling" the simulation forward to 2001 in which year completely by surprise, financial markets re-impose the risk premium on Chinese assets that the financial reforms had reduced. Thus this simulation is the same as the financial reform simulation until 2001 and then from 2001 the excess returns required on Chinese assets that was expected to be reduced forever, is re-imposed. In reality a loss of confidence would be likely to raise the required rate of return on Chinese assets by more than the reform program reduced it. The likelihood of this is reinforced by recent experience in Asia. Nonetheless this simulation is useful to illustrate the economic costs of significant change in expectations about policy reform.

The results for this simulation are contained in figures 5 and 6 for China along with the financial liberalization scenario. Results for the OECD economies are contained in figure 9 and 10.

As can be seen in figures 5 and 6, the abrupt decline in confidence in China leads to an outflow of financial capital from China to the rest of the world. This leads to a sharp real

exchange rate depreciation of over 50% for China. The currency collapse is accompanied by a sharp rise in real interest rates as financial liquidity dries up as well as a sharp decline in the share market. Consumption and investment drop sharply to be below the level that would have been achieved if no financial reforms had been introduced in the first place. The fact that investment decisions once implemented are costly to unwind means that the capital loss following the confidence drop is larger than if no financial reform process had begun.

In the rest of the world the loss of confidence in China has small but negative impacts on major economies. As with the positive shocks the biggest impacts are on China. Nonetheless the transmission of these shocks to the rest of the world could be larger depending on the policy responses of policymakers in these economies to the large fluctuations in exchange rates and trade balances.

6. Conclusions

In this paper we have used a global modeling framework to examine the impacts within China and the rest of the world of major policy reforms in both international trade and financial flows in China. We have found significant gains to China in terms of efficiency gains as well as increasing the ability to bring forward expected future income rises through access to global capital markets. Associated with each reform simulated is a large movement in financial prices, especially exchange rates which play an important role in the adjustment process

These results demonstrate that financial fluctuations are an important element of the adjustment process which need to be understood by policymakers. The greater integration of global capital markets changes the nature of the adjustment process to economic reform in emerging economies that tends to be captured in standard CGE models of trade reform. A better understanding of this adjustment process is essential if global capital is to be used to enhance the reform process rather than to de-rail it by policy mistakes.

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Table 1 World shares of merchandise trade

	Exports			Imports		
	China	*Other Asian countries*	*Other developing countries*	*China*	*Other Asian countries*	*Other developing countries*
1980	1.00	7.25	28.85	1.01	7.91	22.90
1990	1.87	11.77	22.49	1.70	11.83	21.11
1995	2.92	15.31	25.67	2.31	16.89	28.10
1996	2.92	13.51	25.02	2.38	14.80	27.45

Share is measured as ratio of trade values in US$.
Source: International Economic Data Bank, Australian National University.

Table 2 (1 of 5) CGE modeling of Trade reform in China

model & data base	model specification	simulation	main findings	mechanism
Yang (1996) model & size: • GTAP 1992 version • 32 sectors & 6 regions database: • GTAP 1992 • GATT (1993) • UNCTAD (1995) calibration & benchmark: • calibration 1992 • benchmark 2005 • projection of population, real GDP, labor and physical capital over 1992-2005 (Hertel, Martin et al. 1995) and World Bank (1994a) World Bank (1994b)	• CRTS • perfect competition • imperfect substitution between imports and domestic products • high elasticities	**Baseline** No tariff cut globally but with MFA quota growth. **Case 1** China enters as a developed country. Agriculture subsidy will be cut 20%, export subsidies 36%, tariff 36%, tariff on textile and clothing 16-33%. MFA quotas completely phase out for WTO members. **Case 2** China enters as a developing country, the cut of tariff and subsidy is roughly 2/3 of Case 1. MFA quotas completely phase out for members. **Case 3** On the top of Case 2, China cut tariff to a maximum of 10%---'tariff cut and leveling.' **Case 4** China doesn't participate in the UR.[1] **Case 5.1-5.3** Unilateral liberalization in China with various degrees as in Case 1-3.	**Overall** • In general, agricultural and natural resources sectors, and heavy industries decline in most cases. • The major gain is from the abolishment of MFA and hence light industries. **Case 1/2/3/4** • GDP (%) 4.4/4.0/7.7/-4.1 • GDP deflator (%) -1.3/-0.6/-6.1/n.a. • EV (US$b) 19.1/18.0/27.4/-23.9 • export volume (%) 35.4/29.8/81.2/-30.3 • import volume (%) 45.5/35.9/119.1/-38.0 • terms-of-trade (%) -6.4/-5.9/-10.2/5.0 • trade balance (US$b) 8.8/9.2/4.8/-11.3 • clothing (%) 253/246/335/n.a. • textile (%) 37/35/4/n.a. • machinery & equipment (%) -23/-22/-24/n.a. • non-ferrous metals (%) -21/-21/-18/n.a. • other minerals (%) -21/-19/-22/n.a. **Case 5.1-5.2** The gain (EV) of China is about half in the Case of 1-2 respectively. **Case 5.3** The gain of China is the same as Case 3, i.e. all the gain is from its own liberalization. Case 5.1-5.3: all other countries gain (EV), but North America, EU, Japan and 'Rest of the World' will "suffer" from higher trade deficits with China.	• Case 1 and 2 give similar results because difference in tariff cut is moderate, tariff cuts are proportionate in both cases, so similar changes in relative prices, and fixed endowment supplies. • Gains in Case 3 is the largest, reflecting high variance of tariffs across sectors. • Outputs in heavy industries and natural resource industries fall because of rising capital rent and fixed national capital stock. • Major gain is from clothing and textile sectors reflects that MFA is one of the severest restrictions confronting China's export. • Using high elasticities can help to magnify the volume effect to compensate the negative terms-of-trade effects. • The loss of China from not participating in the UR (Case 4) is mainly due to the competition of other textile and clothing exporting developing countries which are signatories of the UR.

[1] Even if MFA is still binding for China, it can still be benefited from the growth of quota according to the MFA during 1992-2005, and also from most-favored-nation (MFN) tariff reductions under bilateral agreements.

Table 2 (2 of 5) CGE modeling of Trade reform in China

model & data base	model specification	simulation	main findings	main mechanism
Bach, Martin et al. (1996) model & size: • GTAP 1992 version • 10 sectors & 15 regions database: • GTAP 1992 • UNCTAD (1994) calibration & benchmark: • calibration year 1992 • benchmark 2005 • projection of population, labor, human and physical capital, and factor productivity from 1992 to 2005 (Hertel, Martin et al. 1995)	• CRTS • perfect competition • imperfect substitution between imports and domestic products • higher elasticities	**Baseline** • no tariff cut globally but with MFA quota growth • omit China's tariffs on grains • omit NTBs in China's trade regime • except Case 5, all cases use import-weighted tariff rates. **Case 1** Unilateral trade liberalization in China with unweighted average tariff cut from 30.4% to 26.6%. **Case 2** Unilateral trade liberalization with unweighted average tariff cut from 30.4% to 16.1%. **Case 3** Case 2 plus allowing duty exemption. **Case 4** UR without China [2] **Case 5** Full effect of China accessing the WTO: Case 2 plus Case 3. **Case 6** Using uniform tariff equivalent in a single-region, static stimulation.[3]	**Case 1/2/3/4/5** • primary agriculture (%) -0.41/-0.82/0.13/3.7/2.8 • textiles (%) -14.90/-35.64/-22.98/-13.2/-27.3 • wearing apparel (%) 0.46/61.32/23.81/-7.4/213.1 • light manufactures (%) 7.04/32.21/27.76/10.9/21.2 • transportation, equipment, machinery (%) -3.75/-30.45/-29.98/-4.0/-50.6 • heavy manufactures (%) 0.23/-3.34/1.28/-5.7/-20.6 **Others** • Indonesia, Malaysia, Thailand and South Asia lose in Case 1-3, but they gain in Case 4-5. • South Korea, Taiwan, and Hong Kong gain in all cases except Hong Kong in Case 4. • OECD countries gain in all cases, and so is the world as a whole. • China gains more from its own liberalization (Case 1-3) than from the rest of the world (Case 4). Similar conclusion can be drawn for other countries. **Case 6** Disaggregation of tariffs leads to more than 80% jump in gain (EV).	• Light manufactures and wearing apparel sectors gain from cheaper imports of intermediates. But abolishment of MFA actually pulls resources out of the former to the latter. • Overall there is a shift of resources from capital-intensive sectors to labor-intensive sectors. • Allowing tariff exemptions significantly reduce the expansionary impacts on exports, probably because it has 'diluted' the original tariff barriers. • Almost 32% of the gain of China accessing the GATT/WTO is from the complete abolishment of MFA quota (Case 5).[4] • Using high elasticities helps to magnify the volume-effect to compensate the negative terms-of-trade effect. • South East Asian countries' lose from China's liberalization stems from competition of similar products. • Using uniform tariff equivalent pushes up the gain reflects large welfare loss due to high variation of tariffs rate in China (Case 6).

[2] It is the same as Case 4 in Yang (1996), i.e. China still enjoys MFA quota growth and tariff reduction.

[3] The purpose of using uniform tariff equivalent instead of import-weighted tariff is to reflect the welfare impact of variation in disaggregated tariff rates. The larger the variation of disaggregated tariff rates, the larger the welfare loss and uniform tariff equivalent rate.

[4] From figures of columns 3-5, Table 4 of their paper, the total of the sum of gains of China of "2. offer" and "Only UR" is only about 68% of "China+UR", using "Exemption" instead of "2. offer" will increase the share of MFA to 42%.

Table 2 (3 of 5) CGE modeling of Trade reform in China

model & data base	model specification	Simulation	main findings	main mechanism
Warr and Zhang (1995) model & size: • • 22 sectors • 1 country (China) database: • Chinese input-output table calibration & benchmark: • calibration and benchmark year 1987 • no growth projection	• 1987 trade regime: two-tier price & exchange rate system, markets co-exist with plans, coexistence of state and non-state firms, outputs of SOEs above plan quota are sold in market • imperfect substitution between domestic and import goods • CRTS technology for both state and non-state sectors • competitive market • short-run scenario: fixed industry-specific capital stock, fixed real wage and thus excess labor supply.	• only nominal ad valorem tariffs are included, i.e. excluding NTBs • initial import valued weighted average tariff rate=21.8% • across-the-board 50% tariff cut • fixed planned-production	• real GDP (0.29%) • export volume (3.69%) • import volume (1.45%) • GDP deflator (-0.07%) • household income (0.51%) • employment (0.32%) • growing sectors: paper (0.79%) , transport (0.55%), crops (0.39%), animal husbandry (0.36%), and metallurgy (0.35%) etc. • declining sectors: 'other manufactures' (-1.12%), construction (-0.23%), education and sport (-0.25%), building materials (-0.18%), wood (-0.13%), administration (-0.09%), processed food (-0.05%),	• Trade liberalization leads to an increase in imports and thus depreciation of exchange rate. • Under exchange detention scheme, export becomes more profitable. • Export sector which is in general more labor intensive than import sector expands. • Fixed real wages facilitates the expansion of exports. • Domestic outputs in general fall as imports become cheaper. • Expansion in exports outweighs contraction in imports, therefore output rises. • Plan is fixed, so all the responses to tariff cut are from the market sector

Table 2 (4 of 5) CGE modeling of Trade reform in China

model & data base	model specification	simulation	main findings	main mechanism
Xu (1994) model & size: • self-constructed model • 3 sectors (agriculture, heavy and light industries) & 1 country (China) database: • Statistical Yearbook of China. calibration & benchmark: • both 1992	• agriculture sector uses labor input only, and exhibits DRTS[5] • two manufacturing sectors use both capital and labor inputs, and exhibit CRTS • both agriculture and light industry are net exporters; heavy industry is next importer • imperfect substitution between domestic and imported products • exogenously fixed capital inflow, capital stock • nominal exchange rate adjusts to maintain zero balance of payment • sticky nominal wage in agriculture and thus rural unemployment	**Case 1** To estimate the effect of endogenizing nominal wage in manufactures to clear labor market. **Case 2** 50% across-the-board tariff cut with fixed wage in manufactures[6] **Case 3** 50% tariff cut with endogenous wage in manufactures[7] **Case 4** To estimate the amount of tariff cut that is enough to eliminate rural unemployment.	**Case 1** Absorption of rural surplus of labor requires 55.9% drop in real wage in manufactures, and 68.4% depreciation of nominal exchange rate.[8] **Case 2/3** Changes in variables (%): • GDP: 10.3/14.4 • nominal exchange rate: 20.1/51.9 • utility: 8.0/11.8 • agriculture output: 2.1/4.9 export volume: 0.0/0.0 import volume: 52.5/60.7 • heavy industry output: -2.4/-3.1 export volume: -2.6/-4.7 import volume: 23.5/31.8 • light industry output: 19.7/26.5 export volume: 45.5/56.3 import volume: 27.4/29.6 **Case 4** To eliminate rural unemployment, it requires a tariff cut of 64.5%, compared to 50% cut in Case 2-3.	• Tariff cut leads to a depreciation of real exchange rate which leads to rise of domestic output prices. • In Case 2, since rural nominal wages are fixed, real wages fall. • More labors are employed in all three sectors as they are cheaper, thus rural unemployment falls. • Capital rent rises because of higher labor input. It leads to the heavy industry substitutes labor for capital, i.e. a flow of capital from the heavy to the light industry which is relatively more labor intensive. • The expansion in agriculture and light industry is more than to offset the contraction of heavy industry, thus total output rises. • About half of the gain in Case 2 is due to absorption of part of rural labor surplus.

[5] The diminishing return-to-scale property is due to limited arable land.
[6] When the wage of both agriculture and manufacturing sectors are fixed, the wage differential can be considered as a reflection of rigidity of labor market that lead to labor imperfect labor mobility across sectors.
[7] This case mainly serves for the purpose the purpose of illustrating the importance of allowing rural unemployment. Case 2 is considered as the main concern.
[8] It implies that the presence of rural unemployment is partly due to over-valuation of exchange rate.

Table 2 (5 of 5) CGE modeling of Trade reform in China

model & data base	model specification	simulation	main findings	main mechanism
Goldin, Knudsen et al. (1993) model & size: • RUNS model • 20 sectors (15 agriculture) • 22 regions database: • TCM database for tariff and NTBs of non-agriculture • OECD & USDA database for agriculture calibration & benchmark • calibration 1985-1990 • benchmark 2002	• only agricultural products are perfect substitutes • CRTS • perfect competition • two types of households: rural and urban • rural-urban labor migration is a function of income ratio • flexible rural real wage/no rural unemployment • zero balance-of-payment • current consumption is a function of future consumption and thus savings • exogenously determined growth in population, labor force and productivity • growth in capital is based on savings • investment does not incorporate rational expectation • rural investment is a sum of rural savings plus share of foreign investment • loss in tariff revenue is compensated by rise in income tax	**Baseline** • Trade barriers in services and NTBs are excluded. • Average import tariff rate is used. **Case 1**[9] Tariffs or its equivalents or subsidies of all sectors cut 30%, with flexible urban real age/urban full employment **Case 2** Same as Case 1 but of complete elimination of all distortion. **Case 3** Same as Case 1 but with partial real wage rigidity/unemployment in urban sector. **Case 4** Same as Case 2 but of labor market rigidity which will be eliminated as part of complete liberalization.	**Case 1//2/3/4** change in real income (%): • China: 2.5/4.5/4.3/6.5 • upper income Asia: 2.6/8.2/7.2/13.4 • Indonesia: -0.7/-2.6/2.3/4.5 • US: 0.2/0.3/0.7/4.3 • Japan: 0.9/2.7/2.3/4.4 • EC: 1.4/2.8/3.6/9.0 **Case 1** Percentage of non-agricultural exports of China drops from 48% to 46%, that of imports rises from 48% to 58%. **Case 2** Percentage of non-agricultural exports of China further drops to 32%, that of imports rises to 80%. **Others** • Complete liberalization basically magnifies the results of partial liberalization: winners gain more, losers lose more. • Allowing labor market rigidity basically improve the gains in partial liberalization and eliminates all the losses in full liberalization. • Rise in rural income reduces rural-to-urban migration. • Multilateral is more beneficial than unilateral reform for China' rural sector.	Agricultural sector: • Trade reform in heavily protected OECD countries leads to a fall in domestic price and hence supply. • World price rises because of lower supply and higher demand. • China and Low Income Asia gain because of i/ lower agricultural tax, and ii/ large rural sectors. Non-agricultural sector: • Under zero balance-of-payment assumption, higher demand for imports from OECD leads to depreciation of currencies in developing countries. • Urban sectors of developing countries lose from lower price and real depreciation. But rural sectors increase output because of lower input price. The rise in rural income induces larger demand for urban products. • For those countries with large rural sectors, the gain outweighs the loss. Others: • Gain in Case 4 is much larger than other cases because of the additional gain from liberalizing the labor market.

[9] The paper also explores the impacts of individual reforms in agricultural and non-agricultural sectors respectively. Those results are omitted here.

Table 3: Summary of Main Features of G-CUBED

- Specification of the demand and supply sides of economies;
- Integration of real and financial markets of these economies;
- Intertemporal accounting of stocks and flows of real resources and financial assets;
- There is extensive econometric estimation of key elasticities of substitution from dis-aggregated data at the sectoral level;
- 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 and ad-hoc "liquidity constrained" behavior;
- The real side of the model is dis-aggregated to allow for production and trade of multiple goods and services within and across economies;
- Full short run and long run macroeconomic closure with macro dynamics at an annual frequency around a long run Solow/Swan/Cass neoclassical growth model.
- The model is solved for a full rational expectations equilibrium at an annual frequency with an horizon of more than a century.

Table 4: Overview of the G-Cubed Model

Regions

- United States
- Japan
- Australia
- China
- Rest of the OECD
- Oil Exporting Developing Countries
- Eastern Europe and the former Soviet Union
- Other Developing Countries

Sectors

Energy:

- Electric Utilities
- Gas Utilities
- Petroleum Refining
- Coal Mining
- Crude Oil and Gas Extraction

Non-Energy:

- Mining
- Agriculture, Fishing and Hunting
- Forestry/ Wood Products
- Durable Manufacturing
- Non-Durable Manufacturing
- Transportation
- Services

Table 5: Effective Tariff Rates by sector in China (1997)

Sector:	Tariff Rate:
Electric Utilities	0
Gas Utilities	0
Petroleum Refining	0
Coal Mining	35%
Crude Oil and Gas Extraction	0
Mining	0
Agriculture Fishing and Hunting	56%
Forestry and Wood Products	40%
Durable Manufacturing	42%
Non-Durable Manufacturing	65%
Transportation	0
Services	0

Source: G-Cubed model from the World Bank/ Centre for International Economics

Figure 1. Trade Liberalization: Real GNP, Real GDP, Trade and Current Account Balances, Real Exports and Real Imports of China

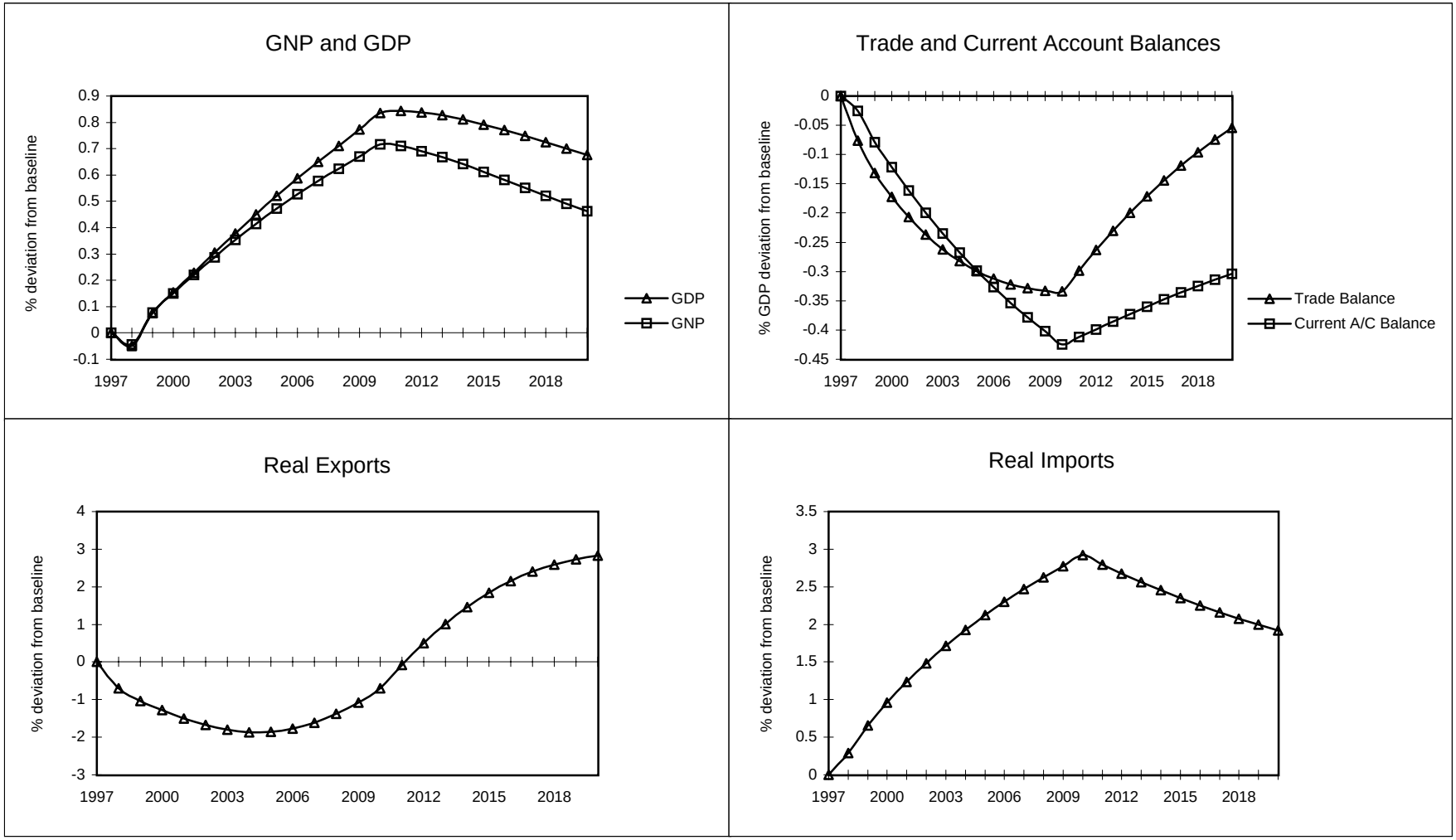

Figure 2. Trade Liberalization: Consumption, Investment, Real Effective Exchange Rate, and Real Interest Rate of China

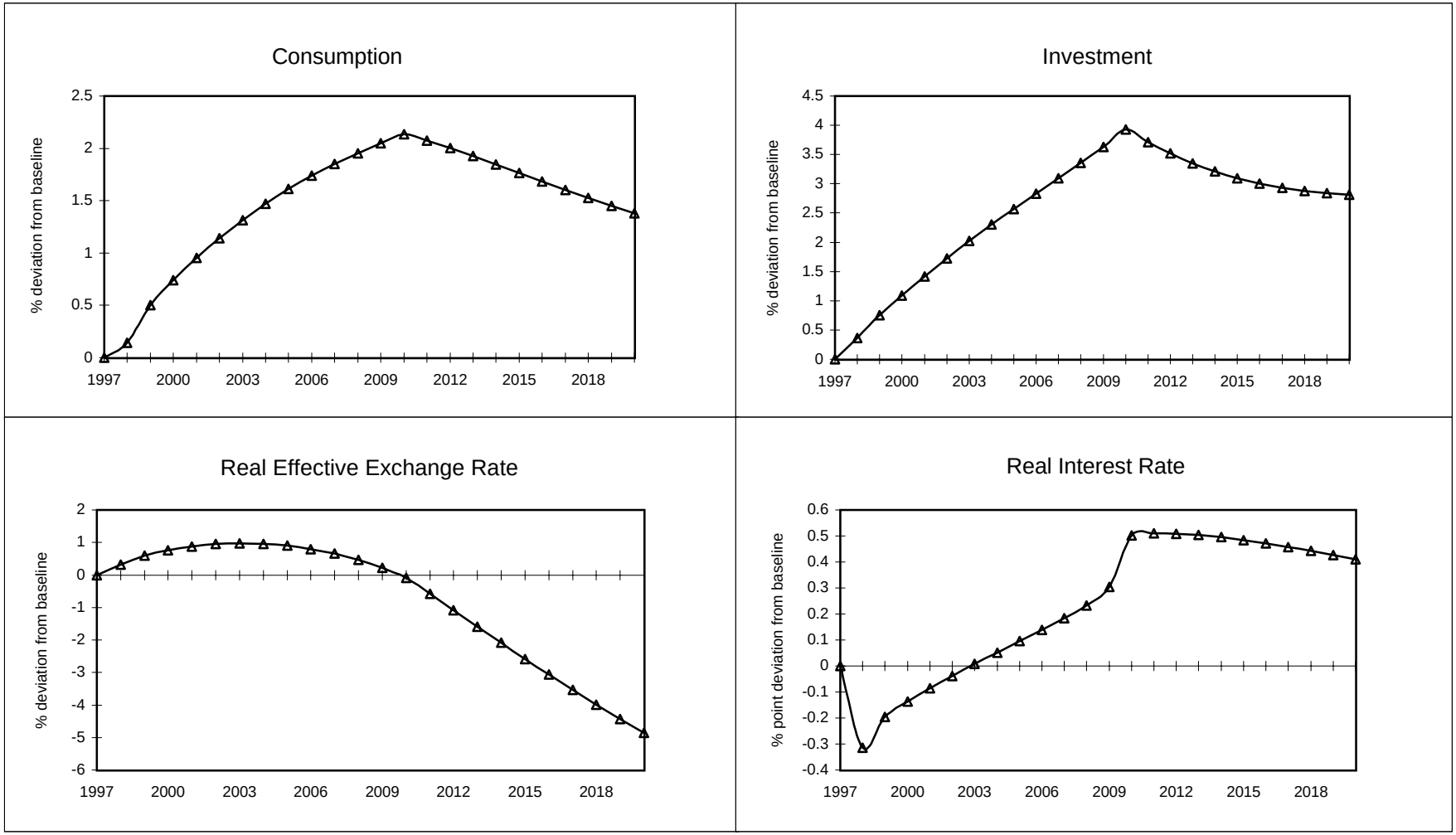

Figure 3. Trade Liberalization: Real GNP, Real GDP, Trade and Current Account Balances of OECD Countries

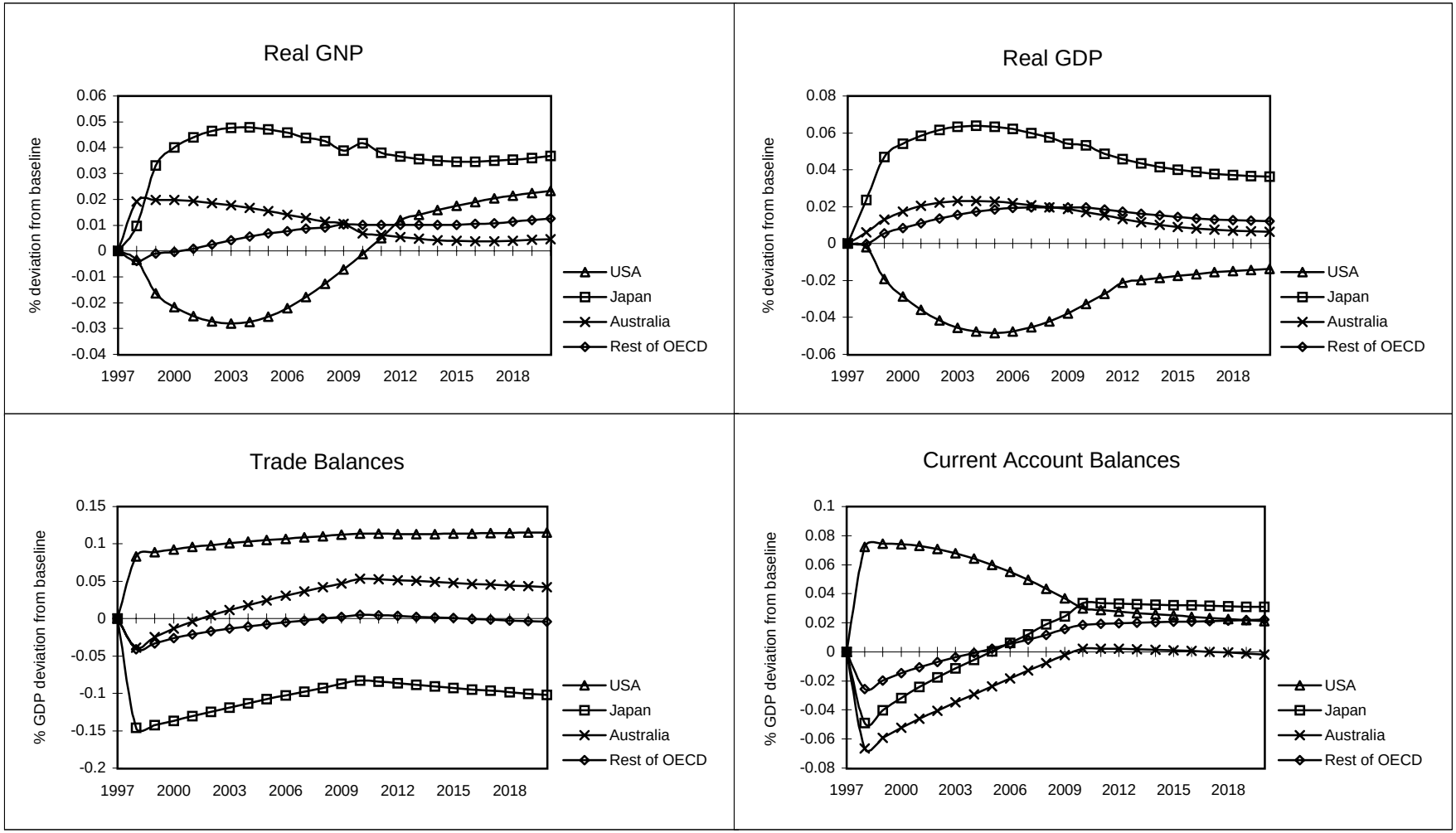

Figure 4. Trade Liberalization: Real Exports, Real Imports, Real Effective Exchange Rates, and Real 10 Years Bond Rates of the OECD Countries

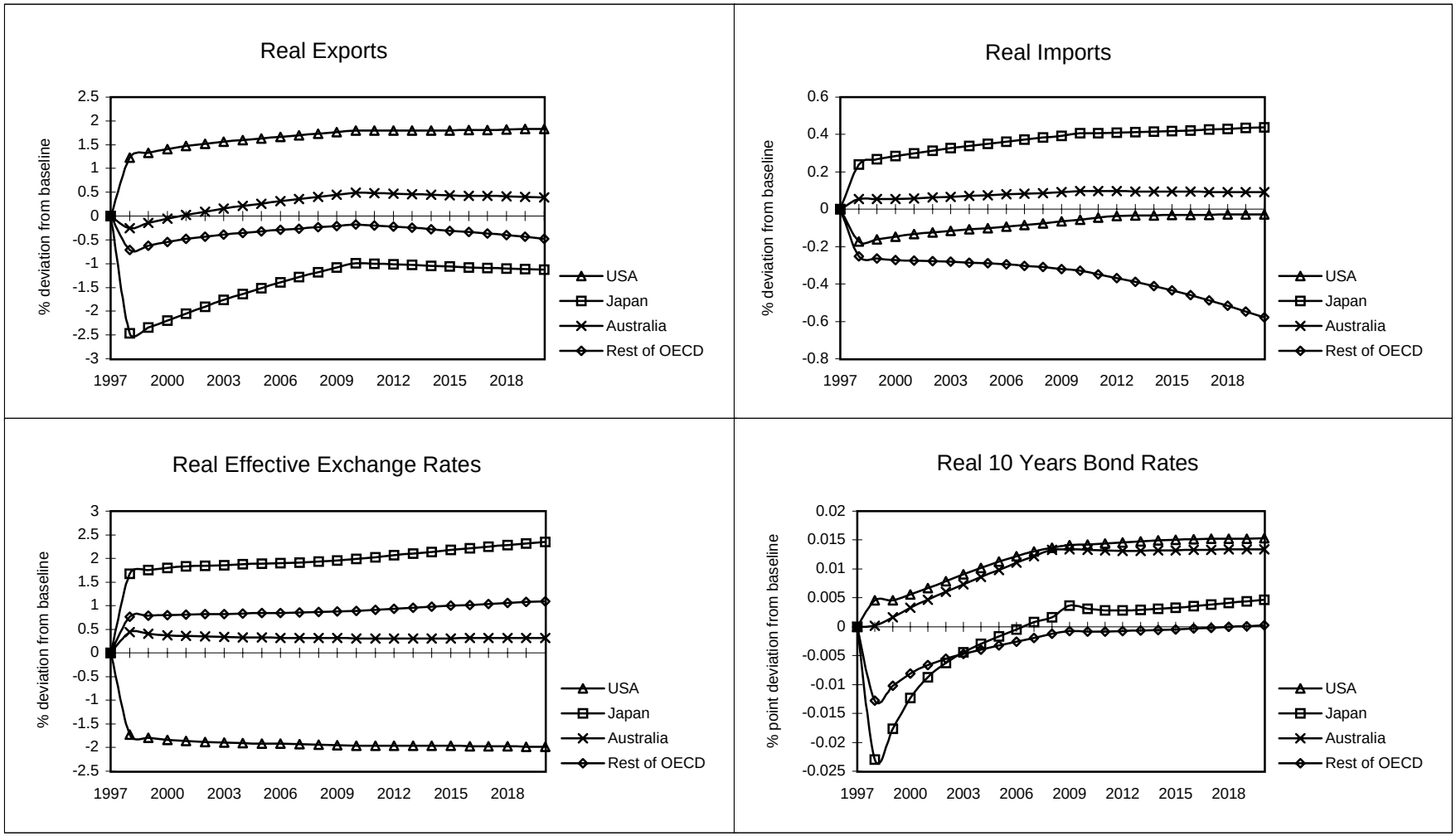

Figure 5. Financial Liberalization and Crisis: Real GNP, Real GDP, Trade and Current Account Balances, Real Exports and Imports of China

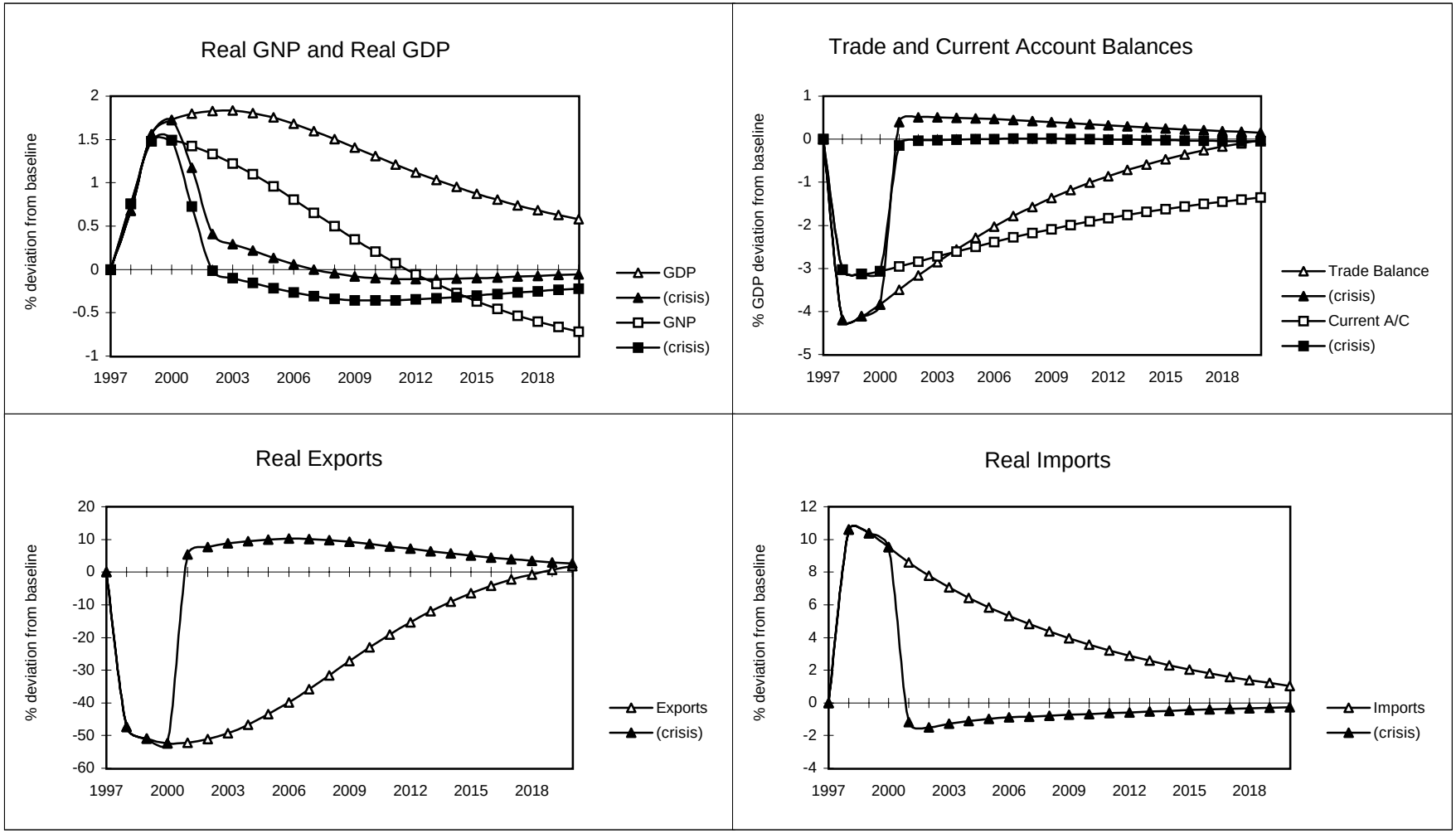

Figure 6. Financial Liberalization and Crisis: Consumption, Investment, Real Effective Exchange Rate, and Real Interest Rate of China

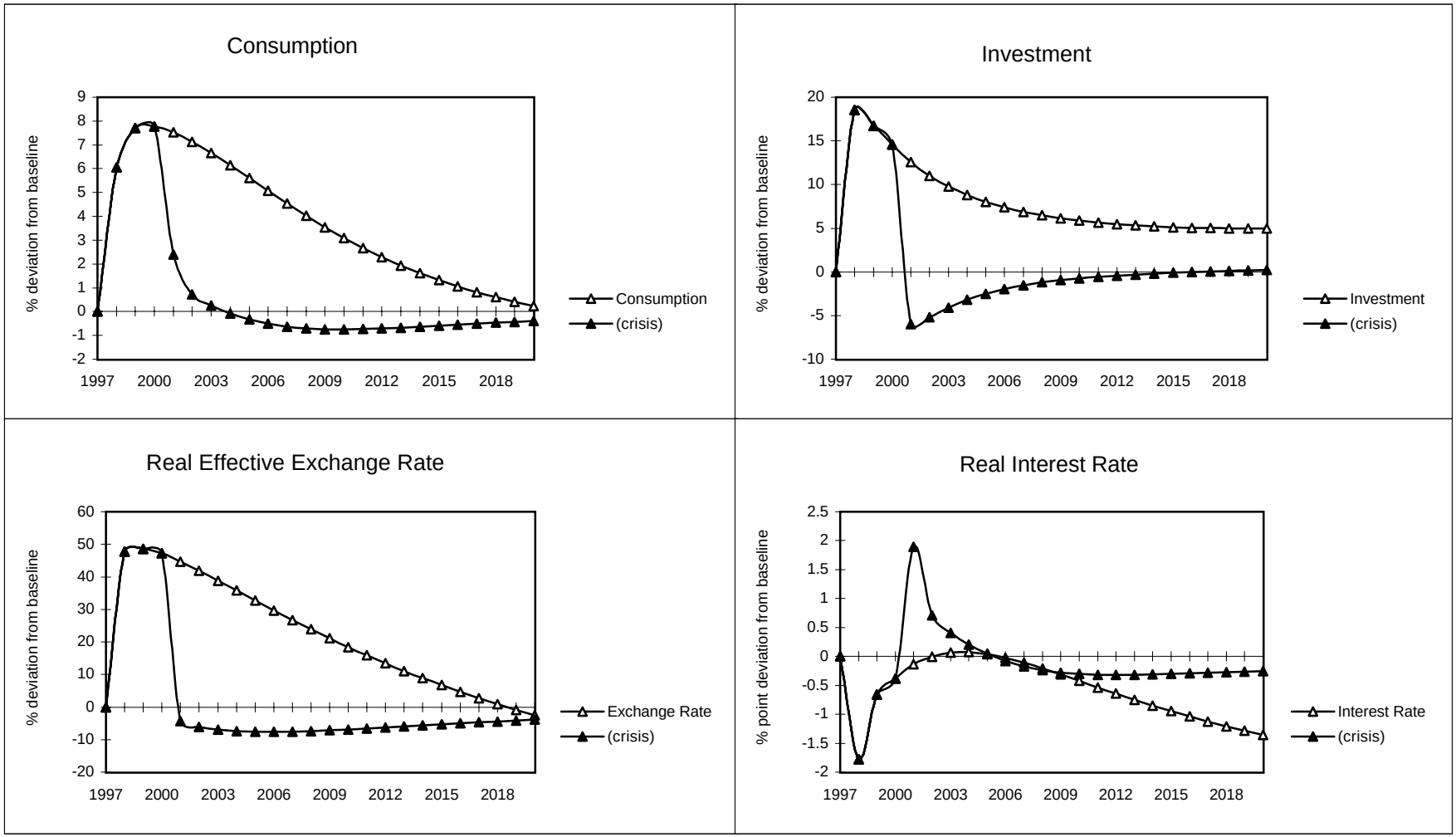

Figure 7. Financial Liberalization: Real GNP, Real GDP, Trade and Current Account Balances of OECD Countries

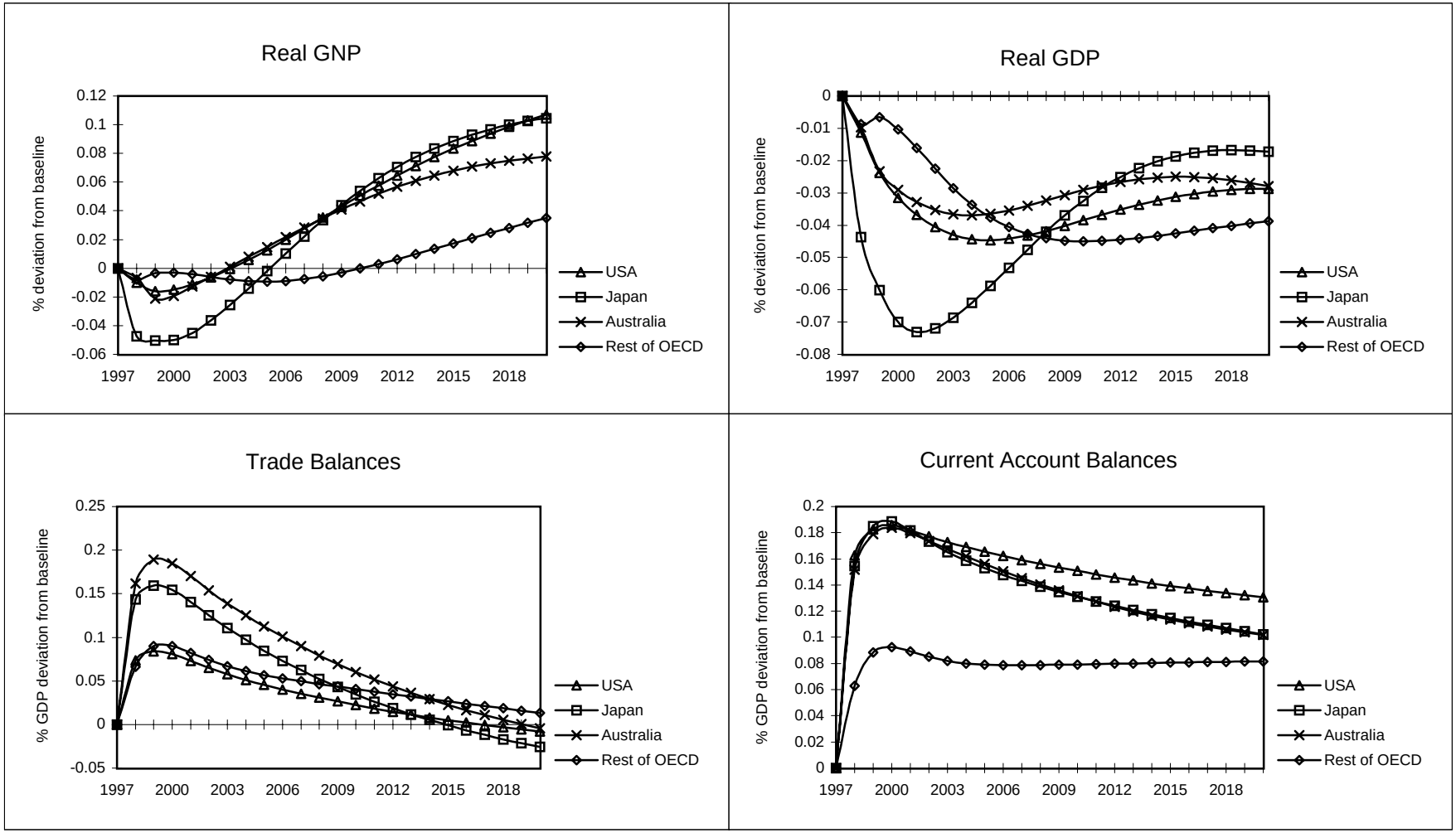

Figure 8. Financial Liberalization: Real Exports, Real Imports, Real Effective Exchange Rates, and Real 10 Years Bond Rates of the OECD Countries

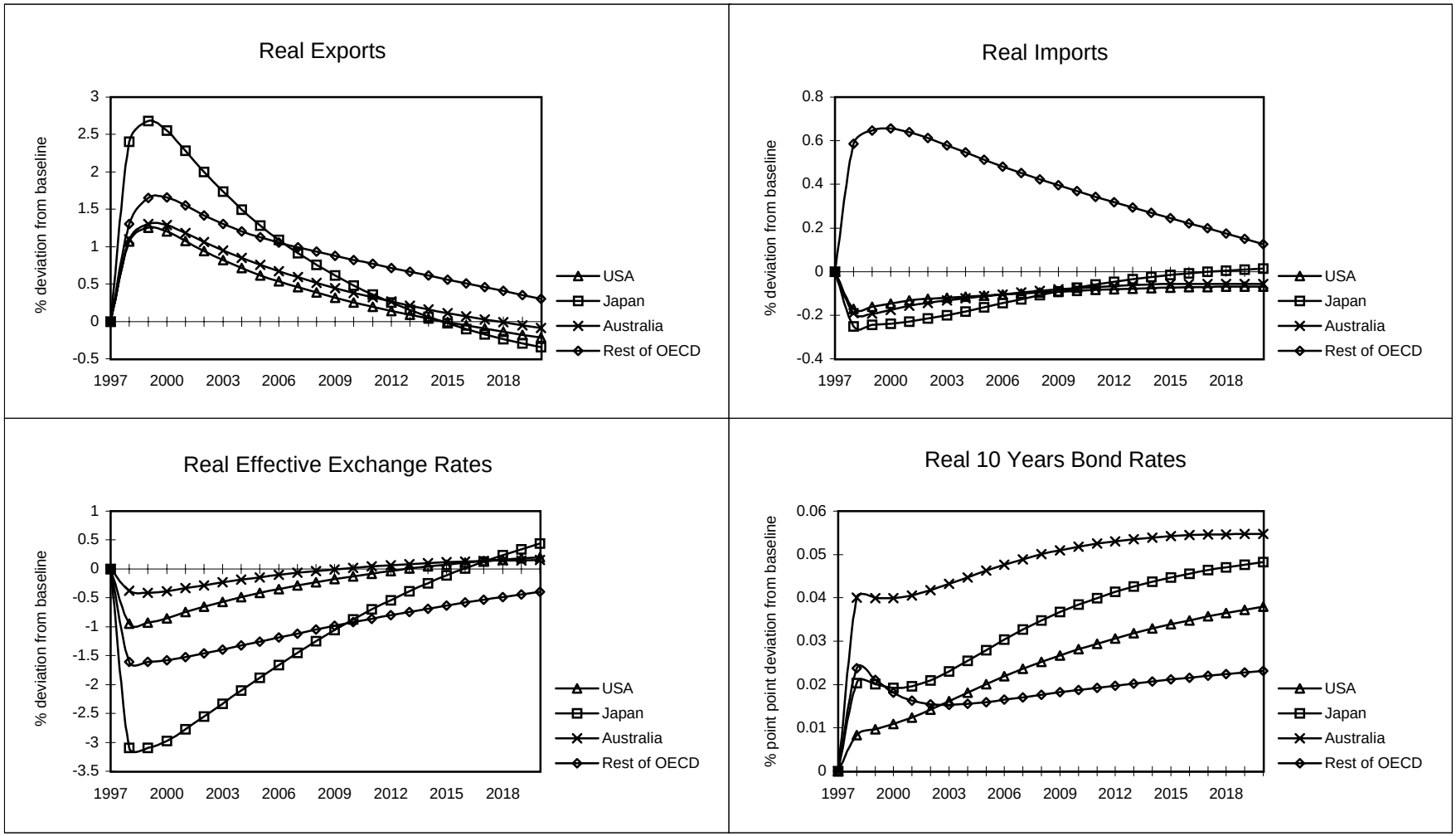

Figure 9. Financial Crisis: Real GNP, Real GDP, Trade and Current Account Balances of OECD Countries

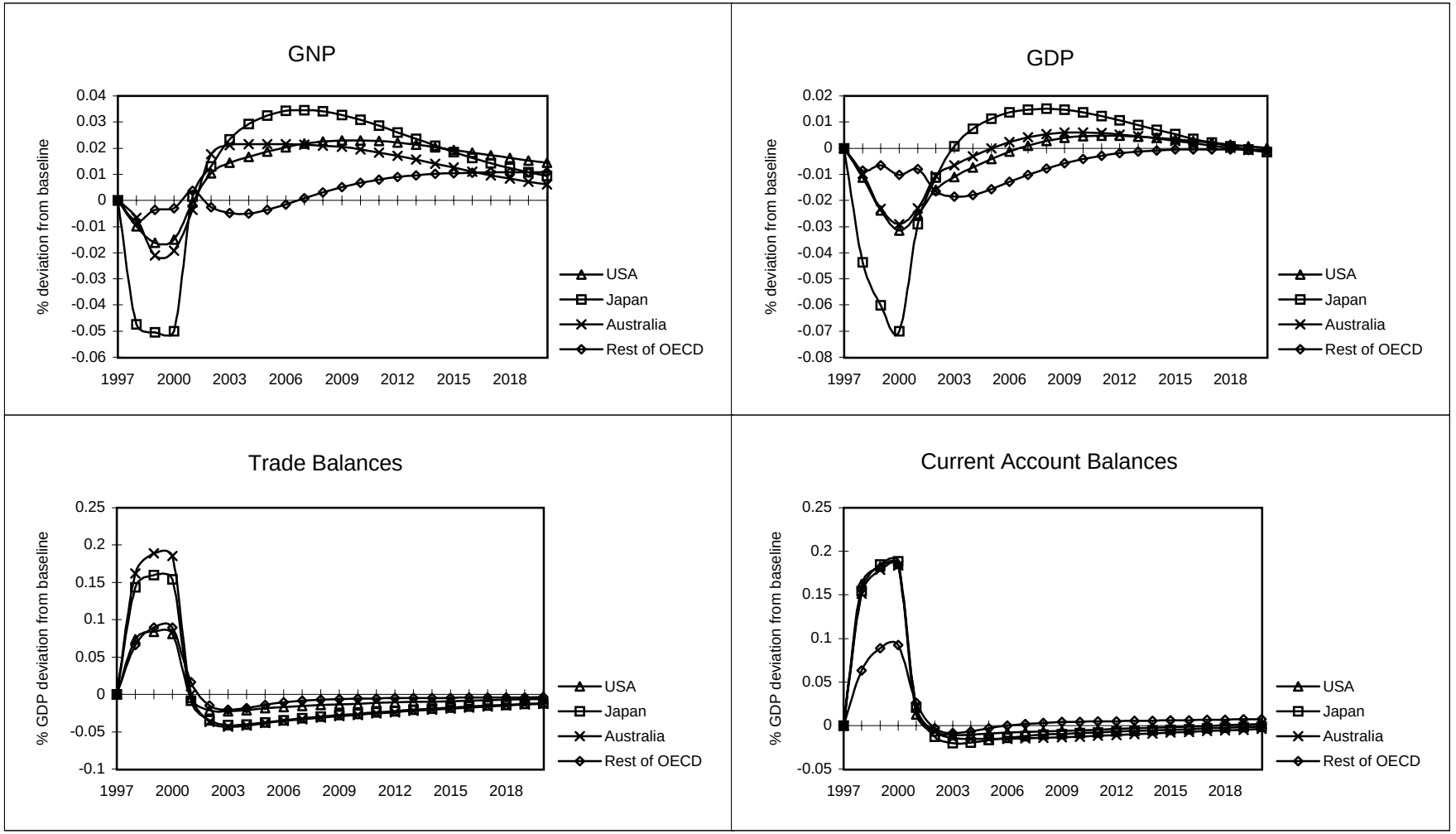

Figure 10. Financial Crisis: Real Exports, Real Imports, Real Effective Exchange Rate, and Real 10 Years Bond Rates of the OECD Countries