

**Trade Reform, Macroeconomic Policy
and Sectoral Labour Movement in China**

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Abstract:

In developing countries with fixed exchange rate regimes the real depreciations that follow trade reforms and productivity growth shocks require contractionary domestic deflations. In the short run, associated allocative efficiency and productivity gains can be offset by this contraction, slowing the rate at which workers relocate from agriculture to manufacturing and services. This paper documents China's overall performance and worker relocation experience since the Asian financial crisis, noting slowdowns that appear to be associated with deflation. General equilibrium analysis is used to test the hypothesis that restrictive macroeconomic policy has contributed to these slowdowns. While WTO accession merchandise trade reforms are found to be net contractionary, adding services liberalisation and associated productivity improvements makes the reforms net expansionary in the short run. When either capital controls or exchange rate rigidity are relaxed, improvements of at least a per cent per year are predicted in GDP growth and of several per cent per year in the uptake of workers by the manufacturing and services sectors.

I Introduction

Although the Chinese economy continues to grow rapidly, since the Asian financial crisis of the late 1990s there is evidence of a slow-down, most prominently in per capita rural income growth. One explanation for this is that the relocation of labour from agriculture to manufacturing and services, essential in any growing developing economy has been retarded. This could be due to policy disincentives designed to control urban congestion, such as the household registration or *hukou* system (Ianchovichina and Martin 2002a) or information asymmetries and transaction/infrastructural costs (Sicular and Zhao 2002). A further hypothesis attributes comparatively poor performance in China's rural sector to economic reforms, and in particular to trade reform commitments in the lead-up to and associated with WTO accession (Anderson et al. 2002).

It is the central hypothesis of this paper that this comparative decline in rural performance is due, at least in part, to a combination of China's adherence to a de-facto fixed exchange rate regime and to shocks that have tended to depreciate its real exchange rate. Most significant amongst these shocks was the surge of (largely illegal) outflows on the capital account and the associated private investment slowdown during the Asian financial crisis (Yang and Tyers 2001). Since then, however, numerous trade reforms have been implemented all of which have tended to encourage Chinese consumption to shift toward foreign goods, so reducing home relative to pre-tariff foreign goods prices and hence further

depreciating the real exchange rate (Rees and Tyers 2002). By definition, a real depreciation must be accompanied either by a nominal depreciation, a domestic deflation, or a combination of both. The *de-facto* peg to the US dollar has therefore necessitated China's deflation. When prices are falling there is downward pressure on wages. Even if wages fall only slightly more slowly than prices, however, other things equal, employment growth in the wage sectors of the economy can be expected to decline.¹ In the Chinese case this appears as high real wage growth in the modern sector but reduced labour demand growth there and hence a "bottling up" of workers in the rural sector and reduced rural income per capita.

The relevance of this story to China's comparatively poor recent per capita rural income growth performance is here examined using short and long run comparative static analysis. The shocks considered are China's WTO accession commitments and the model used is a development of that introduced by Yang and Tyers (2000). It is a multi-sector, multi-country comparative static macro model, the microeconomic components of which have their origins in GTAP.² All countries have open capital accounts and forward-looking investor behaviour is represented in the short run via expectations formed from long run simulations. The focus here, however, is on labour relocation and the short run consequences of trade reform shocks for the uptake of labour in the manufacturing and services sectors.³ We examine the pace of such labour relocation historically and compare this with simulated changes in labour demand following the WTO accession.

We observe a reversal in the rate of relocation of workers from agriculture to manufacturing after 1998 and a glut of workers in the rural sector (Dolvan 2003). Our simulations suggest that the retardant effect of the commonly cited system of internal migration restrictions, known as the *Hukou* or Household Registration System (HRS), have been enhanced by China's broader macroeconomic policy regime. Indeed, the exchange rate regime, combined with capital controls, appears to have restricted the flow of workers into manufacturing and services by at least a full per cent per year and into services by at least two per cent per year.

The causes and pattern of internal migration in China are briefly surveyed in Section II. Then Section III offers a review of associated recent trends in the performance of the broader Chinese economy and Section IV presents the model used to simulate the effects of

¹ The contractionary effects of deflation do not end there. See Svensson (2003) and Bordo and Redish (2003).

² See Hertel (ed., 1997) for the original specification.

³ Ianchovichina and Martin (2001, 2002b) also examine the effects of WTO accession on labour relocation demand and they offer an explicit analysis of the HRS. Their analysis is strictly long run, however, ignoring the short run contractionary effects of macroeconomic policy emphasised here.

trade reforms on worker relocation demand. Section V then offers a discussion of the simulation results, including a comparison of simulated with historical worker relocation rates. Conclusions are offered in Section VI.

II Urban-rural inequality and worker relocation in China

The pace of rural per capita income growth depends on the rate at which surplus labour is generated by agricultural change and the corresponding rate at which workers are accommodated in the manufacturing and services sectors. It is a common view that the economic reform of the early 1980s, which brought de-collectivisation and the household responsibility system, along with associated increases in agricultural labour productivity, created a substantial rural labour surplus.⁴ Moreover, prior to that reform, wages were not market-determined and there is evidence of considerable underemployment. This was due, in part, to the seasonal nature of agricultural activity, which meant that many workers were left idle in the off-peak parts of the agricultural cycle yet unable to take full employment elsewhere (Bannister and Taylor, 1989).

An exacerbating factor on the supply side in the Chinese case was rapid rural population growth in the pre-reform period. Even though the rate of rural population growth slowed in the 1970s and 1980s, the growth of the rural labour supply continued strongly, due to the aftermath of the ‘baby boom’ periods of the 1950s and 1960s.⁵ And, on the demand side, China’s pre-reform economic strategy promoted relatively capital-intensive heavy industries. These two effects tended to raise underemployment in the rural sector in the post-reform period, where, although rural communes were disbanded, all workers were still technically employed.⁶ The post-reform period therefore carried considerable potential for worker relocation from agriculture into other sectors. The subsequent volume of internal migration would depend, then, on economic incentives in the form of urban-rural income inequality and on both policy induced and natural barriers to migration.

Urban-rural inequality in China:

Income inequality in China exists between urban and rural residents as well as within both urban and rural areas. It also has a strong regional pattern, particularly as between inland

⁴ See Banister and Taylor (1989); Chai and Chai (1997); Hui (1989); Seeborg, Jin and Zhu (2000); and Multinational Monitor.

⁵ See Banister and Taylor (1989); Hui (1989); Seeborg, Jin and Zhu (2000).

⁶ See Banister and Taylor (1989); Hong Kong Liaison Office (IHLO). China’s unemployment statistics measure only the urban unemployed.

and coastal provinces. Of overall income inequality, Lozada (2002) estimates that 75-80 percent is due to the urban-rural divide. Official estimates of the trends of rural and urban household incomes are displayed in Figure 1. These indicate a general upward trend in income for both areas while urban income has experienced comparatively sharp increases in the 1990s. The corresponding proportional difference between urban and rural household income is plotted in Figure 2. The comparatively rapid growth of rural incomes in the early 1980s, and the associated decline in urban-rural inequality, coincided with the major reforms of that period that first impacted on the rural sector. Since then, however, urban incomes have grown more rapidly, most prominently in the early to mid-1990s leading up to the Asian crisis in 1997-98, and in the post crisis period.

Internal migration

Were there no costs or barriers to internal migration workers would be expected to respond to the widening income gap between rural and urban areas by migrating until wages were equalised. Indeed, rural labour markets that facilitate this relocation of workers have been essential to overall growth in the more advanced countries (Burgess and Mawson 2003). Although the estimated number of Chinese internal migrants has grown (100m since 1980s) these relocations have been insufficient to stem the growing inequality (Dolven, 2003). Some of this apparent growth in inequality is due to a rise in skilled employment in urban areas. A more controversial portion is due to reduced urban labour demand associated with real wage growth and to official migration barriers. Together, appear to have left an expanding labour supply “bottled up” in the rural sector. The key official barrier has been the HRS.

Introduced in major cities in 1951 and extended to rural areas in 1955, the HRS was intended to deal with the escalating urban influxes of rural migrants at the time of the Great Famine of 1959-1961 (Chan and Zhang 1999). The associated food shortages continued into the 1970s, only ending in the 1980s (Zhao 2000). Each citizen is required to register in their place of regular residence, often their birthplace. Moving from rural to urban requires a complex and costly application for a transfer to a local *hukou*. Prior to the reform in the 1980s this was a huge barrier, as without a proper *hukou* one would not qualify for government job assignment. Workers who ignored this requirement were denied social security benefits such as housing and other necessities, even food.

Decollectivisation in rural areas allowed income inequality to soften a little and non-farm rural industries to develop. This, and the household responsibility system that accompanied it, had the effect of increasing productivity in the agricultural sector. Thus,

while rural incomes grew, so also did the proportion of workers considered redundant.⁷ The government began rewarding collective farms and cooperatives for production rather than quantified labour, so excess workers could be free to look for other jobs (Seeborg, Jin and Zhu 2000). The marketisation of food also meant that migrants were no longer restrained entirely by the need to obtain a local *hukou* to survive. Combined with the development of special economic zones and the increase in urban private and informal sectors, the cities were on a path of rapid development with growing demand for labour. Yet the HRS created ambiguous incentives for migrants. On the one hand it constrained people with access to land from migrating, since each was now responsible for their own land, which most saw as a form of social security (Chan 2000). On the other, individuals with little or no access to land or who had specialised in what were to become low productivity rural activities were now less constrained.

Through the 1980s and 90s the HRS was gradually weakened by policy reforms and less stringent enforcement. Previously prohibited ‘spontaneous’ migration to jobs in urban centres was tacitly facilitated and tolerated, conditionally opening urban residency to rural workers and relaxing some of the strict controls. There has therefore been an increase in temporary urban migrants: workers going to cities and towns without official residential status, known as the ‘floating population’. Figures from the late 1980s indicated that transients made up over one-fifth of the population of such major cities as Beijing, Shanghai, and Guangzhou (Canadian Immigration and Refugee Board 2002). Many official restrictions remained, however, including the link between *hukou* status and welfare eligibility, the denial of education for migrant children and state job availability. In 1995, to re-assert control over internal migration, Zhao (1995) notes that tighter controls were imposed over the legality of urban residency and housing subsidies.⁸

As part of China’s urbanisation strategy for the 10th Five-Year plan, Central Party Document Number 11 of November 2000 allows a person and his or her immediate family to obtain urban *hukous* if he or she has fixed accommodation, stable work (in a job for more than one year) in the urban area. Urban *hukou* was also offered to those who would purchase a local commercial housing unit (so as to attract outside investment) and to holders of graduate degrees (attracting professionals). The focus of these reforms was still mainly small urban

⁷ In 1984, it was estimated that about 40% of workers in the countryside were redundant. See Chai and Chai (1997).

⁸ The effect of these restrictions was to tend to leave marginal urban residents underqualified for their jobs while migrants from rural areas tend to be overqualified. Meng and Zhang (2001) estimate these rates of under and over qualification at 22% for urban residents and 6% for migrants from rural areas.

towns and small cities, however. Nonetheless, according to China's Committee to Restructure the Economy (SCORES), during 2001 about 600,000 rural residents acquired urban *hukou* in these small urban centres. More recently still, a State Council directive indicated that rural migrants have a legal right to work in cities. It prohibits job discrimination based on residency and orders that urban residency documents are to be provided to any workers who find employment. A further recent directive indicates that businesses should stop delaying wage payments to workers. This is a significant improvement for migrant workers as they often find that they are taken advantage of due to their uncertain legal status.

Official barriers to migration therefore appear to have had an ever diminishing effect in China and the least effect in the period since the Asian crisis of 1997. Other things equal, then, we would expect an acceleration in the relocation of workers into jobs in the modern sector in that period. This is not what the evidence suggests, however.

Sectoral relocation of workers

The trends in employment by major sector are indicated in Figure 3. The early 1990s was a period of rapid industrial expansion during which workers relocated from the rural sector to the industrial and services sectors. Significantly, while the expected long term rise in the share of services in total employment is borne out, industrial employment fell substantially during the Asian crisis period and then failed to expand thereafter. Indeed, the farming and forestry sector shows annual declines in employment that peaked in 1993 and continued until 1996. In this period the Chinese economy grew at its greatest historical rates. During the Asian crisis and in the period thereafter, however, relative declines in the growth rates of activity in manufacturing and services appear to have driven workers back to the rural sector. And in the post-crisis period this back-flow appears to have continued.

III Aggregate Performance since the Asian Crisis

Good weather and improved farming incentives had brought a resurgence of the rural economy in 1995 and the reform of state-owned industrial enterprises (SOEs) was accelerated, precipitating substantial lay-offs (Meng 1998). These changed saving incentives, leading to a sudden increase in the private saving rate (Yang and Tyers, 2000, 2001). The contractionary effects of these internal shocks were then worsened by the arrival of the Asian financial crisis in 1997, which saw the mostly illegal flight of a substantial part of China's additional private savings from the country, leading to a fall in private investment. At the

same time, the slow-downs and currency depreciations in other Asian economies made their exports relatively competitive, so that the dollar value of China's exports grew more slowly compared with 1990-1996 (Yang 1998).

Our macroeconomic policy story begins with the crisis and China's reaction to it. The shocks of that period – the rise in the domestic saving rate, the increased outflow on the capital account and the adverse change in the terms of trade – depreciated the real exchange rate. This can be seen from the following definition of the real bilateral exchange rate, for region i with region j , as the common currency ratio of the price of a basket of region i 's goods and the price of a corresponding basket of region j 's goods:

$$(1) \quad e_{ij}^R = E_{ij} \left(\frac{P_i^Y}{P_j^Y} \right) = \frac{P_i^Y}{\left(\frac{P_j^Y}{E_{ij}} \right)},$$

where E_{ij} is i 's nominal exchange rate with j , measured as foreign currency units per local unit and the price index used is the GDP price, P^Y .⁹ This depreciates when the price of the basket of home goods falls relative to the corresponding basket of foreign goods. The crisis period real depreciation, combined with the fixed nominal exchange rate of the period, necessitated a monetary policy sufficiently restrictive to bring about a decline in the home price level relative to that in the US – a deflation. This was the first in a series of deflations in the crisis and post-crisis periods.

Shocks that cause real depreciations also include the other elements of the China's domestic reforms program. By raising productivity, these reduce domestic costs relative to foreign costs and hence they tend to reduce relative domestic prices. Similarly, trade reforms divert domestic demand away from home produced goods toward imports and so they also tend to reduce the prices of domestic goods relative to the import prices of foreign goods. In the period 1997-2001 China embarked on some quite substantial trade liberalisations, a major part of which included the introduction of a duty drawback system on the imported inputs of export firms (Rees and Tyers 2002). Real depreciations due to such shocks are robust to China's macroeconomic policy regime. But it is that regime which distributes the nominal

⁹ Often quoted is the real effective exchange rate, which is a weighted average of bilateral real rates: $e_i^R = \sum_j E_{ij} \left(\frac{P_i^Y}{P_j^Y} \right) \left(\frac{X_{ij} + M_{ij}}{X_i + M_i} \right)$, where X_i and M_i are region i 's total values of exports and imports, respectively.

effects of the real depreciations between falls in the home price level, or deflations, on the one hand and depreciations of the nominal exchange rate on the other.

The declines in China's official measures of the domestic price are indicated in Table 1.¹⁰ Other things equal, such deflations are contractionary. This is because, even in the most flexible of industries, wage rates are renegotiated more rarely than product prices are adjusted. Lags in wage adjustment mean that deflation applies a profit squeeze that retards both employment growth and investment in the private sector. Consistent with this, real wage growth in China's modern sector has been extraordinarily high since 1996, as Figure 5 shows, suggesting some deterrence of labour demand growth and hence overall growth in this sector. Weaker overall performance of the Chinese economy is indicated by its official GDP growth rates (Figure 4). These bottomed out in the crisis period at between seven and eight per cent per year, but have not recovered since.

Since 2001 China has embarked on a still more dramatic set of trade reforms as part of its commitments associated with WTO accession. By themselves, these reforms will cause further real depreciations. Should there be no change in macroeconomic policy, growth and the relocation of workers into China's modern sector will continue to be retarded by deflation. In the remainder of the paper we investigate the relationship between growth, labour relocation and macroeconomic policies in the aftermath of the WTO accession reforms.

IV Modelling Effects of China's Trade Policy Reforms

Here we simulate the short run effects of trade reforms in China while accounting for the implications of services trade commitments as well as productivity changes associated with these reforms. As in Rees and Tyers (2002) and Ianchovichina and Martin (2002a), we make allowance for idiosyncratic trade policies, such as the duty drawbacks on imports used in the manufacture of exported goods. And, as befits a short run analysis, we also allow for labour market rigidity and associated departures from full employment.

Following Yang and Tyers (2000), we use a comparative static global macroeconomic model, within which the microeconomic (supply) side is adapted from GTAP¹¹, a multi-region comparative static model in real variables with price-taking households and all industries comprising identical competitive firms. To this microeconomic base is added independent representations of governments' fiscal regimes, with both direct and indirect

¹⁰ The analysis by Yang and Tyers (2000, 2001) suggests that the magnitudes of China's crisis period deflation might be understated by official statistics.

¹¹ A detailed description of the original model is provided by Hertel (1997).

taxation, as well as separate assets in each region (currency and bonds) and monetary policies with a range of alternative targets.

The Model

The microeconomic side of the model is a modified version of that by Hertel (1997). It offers the following useful properties: (1) a capital goods sector in each region to service investment, (2) explicit savings in each region, combined with open regional capital accounts that permit savings in one region to finance investment in others, (3) multiple trading regions, goods and primary factors, (4) product differentiation by country of origin, (5) empirically based differences in tastes and technology across regions, (6) non-homothetic preferences, and (7) explicit transportation costs and indirect taxes on trade, production and consumption. All individual goods and services entering final and intermediate demand are constant elasticity of substitution (CES) blends of home products and imports. In turn, imports are CES composites of the products of all regions, the contents of which depend on regional trading prices. Savings are pooled globally and investment is then allocated between regions from the global pool. Within regions, investment places demands on the domestic capital goods sector, which is also a CES composite of home-produced goods, services and imports in the manner of government spending.

To expand the model for macroeconomic analysis, the standard code is modified to make regional governments financially independent, thus enabling explicit treatment of fiscal policy. Direct taxes are incorporated at the observed average income tax rates for each region. Marginal tax rates are therefore assumed constant (say at τ). Regional households then receive regional factor income, Y_F , and from this they pay direct tax τY_F . The disposable income that remains is then divided between private consumption and private saving. Government saving, or the government surplus, $S_G = T - G$, is then simply revenue from direct taxes, τY_F , and from the many indirect taxes already incorporated in the microeconomic part of the model¹², T_I , less government spending, G , which could be exogenous or fixed as a proportion of GDP. Thus, $S_G = T_I + \tau Y_F - G$. The private saving and consumption decision is represented by a reduced form exponential consumption equation with wealth effects included via the dependence of consumption (and hence savings) on the interest rate. Each region then

¹² T_I includes revenue from taxes on production, consumption, factor use and trade, all of which are accounted for in the original GTAP model and database.

contributes its total domestic (private plus government) saving, $S_D = S_p + S_g$, to the global pool from which investment is derived.¹³

For each region, the above relations imply the balance of payments identity, which sets the current account surplus equal to the capital account deficit: $X - M = S_p + S_g - I$.¹⁴ From the pool of global savings, investment is allocated across regions and it places demands on capital goods sectors in each region. In the short run considered, however, investment does not add to the installed capital stock. Also at this length of run, nominal wages are sticky in some regions (the industrialised regions of the US, the EU, Canada and Australia, and those developing countries with heavily regulated labour markets: China and Vietnam) but flexible elsewhere. In the spirit of comparative statics, although price levels do change in response to shocks, agents represented in the model do not expect any continuous inflation and so there is no distinction between the real and nominal interest rates.

In allocating the global savings pool as investment across regions, we have opted for the most flexible approach, implying a high level of global “capital” mobility.¹⁵ Where controls exist on international capital flows we introduce these explicitly. In the absence of capital controls, then, the allocation to region j (net investment in that region) depends positively on the expected long run change in the average rate of return on installed capital, r_j^e , which, in turn, rises when the marginal product of physical capital is expected to increase.¹⁶ This allocation falls when the opportunity cost of financing capital expenditure, the region’s real interest rate, r_j , rises. This rate depends, in turn, on a global capital market clearing interest rate, r^w , calculated such that global savings equals global investment: $\sum_j S_j^D = \sum_j I_j(r_j^e, r_j)$. Here I_j is real gross investment in region j .¹⁷ The region’s home interest rate is then $r_j = r^w(1 + \pi_j)$ where π_j is a region-specific interest premium, thought to be driven by risk factors not incorporated in this analysis. The investment demand equation for region j then takes the form:

¹³ Private saving is derived as the difference between disposable income ($Y - T$) and consumption expenditure, where real consumption is determined in a Keynesian reduced form equation that takes the form:

$C = \gamma r^\delta [Y - T]^\mu$, where r is the real interest rate.

¹⁴ Note that there is no allowance for interregional capital ownership in the starting equilibrium. At the outset, therefore, there are no factor service flows and the current account is the same as the balance of trade.

¹⁵ By which it is meant that households can direct their savings to any region in the world without impediment. Installed physical capital, however, remains immobile even between sectors.

¹⁶ r_j^e is the expected rental rate on physical capital (which, when physical capital is sector-specific, varies across sectors and so is averaged), adjusted for depreciation and divided by the price of capital goods to yield a unitless net rate of return.

¹⁷ Before adding to the global pool, savings in each region is deflated using the regional capital goods price index and then converted into US\$ at the initial exchange rate. The global investment allocation process then is made in real volume terms.

$$(2) \quad I_j = \delta_j K_j + I_j^N = \delta_j K_j + \beta_j K_j \left(\frac{r_j^e}{r_j} \right)^{\varepsilon_j} = K_j \left[\delta_j + \beta_j \left(\frac{r_j^e}{r_j} \right)^{\varepsilon_j} \right]$$

where K_j is the (exogenous) base year installed capital stock, δ_j is the regional depreciation rate, β_j is a positive constant and ε_j is a positive elasticity. Critically, investment in any region responds positively to changes that are expected to raise the sectoral average of a region's marginal product of physical capital and hence the regional average return on installed capital.¹⁸ Other things equal, then, improvements in trans-sectoral efficiency, such as might stem from a trade reform, are thought to raise capital returns permanently and hence they raise r_j^e . If such a shock also causes the rate of unemployment to fall this raises total labour use and hence the current return on installed physical capital. When the shock is a trade reform, such employment effects are also considered permanent and so they add positively to the expected future return on installed capital, r_j^e .

Investment decisions are made by forward-looking agents with access to a long run version of the model. Thus, the expected change in the (long run) rate of return on installed capital in each region, r_j^e , is exogenous in short run simulations. It is calculated by first simulating the effects of the same shock but under long run closure assumptions. These differ from the short run closure in the following ways: 1) there are no nominal rigidities (no rigidity of nominal wages), 2) larger production and consumption elasticities are used to reflect the additional time for adjustment, 3) physical capital is no longer sector specific; it redistributes across sectors to equalise rates of return, and 4) capital controls are ignored, and 5) in China, irrespective of short run fiscal policy assumptions, in the long run any loss of government revenue associated with tariff changes is assumed to not be made up via direct (income) tax with the result that the fiscal deficit expands; so that the ratios of government revenue and expenditure to GDP are endogenous while the average direct tax rate is exogenous.

Note that the short run comparative static analysis does not require that the global economy be in a steady state. When shocks are imposed, any change in the counterfactual return on installed capital, r_j^e , need not be the same as the corresponding change in the opportunity cost of capital expenditure, r_j . Most often, in the short run shocks change income and savings and, therefore, expected returns in directions that differ from corresponding short run changes in the global interest rate, particularly considering that physical capital is fixed in quantity and sectoral distribution at this length of run. Even in long run simulations, the

¹⁸ This investment relation is similar to Tobin's Q in the sense that the numerator depends on expected future returns and the denominator indicates the current cost of capital replacement.

global distribution of physical capital at the outset does not equalise rates of return across regions and redistribution through the regional allocation of one year's global savings is insufficient to redress such imbalances.

To include asset markets, region-specific money and homogeneous nominal bonds are introduced. Even though there is no interregional ownership of installed capital in the initial database regional bonds are traded internationally, making it possible for savers in one region to finance investment in another.¹⁹ Cash in advance constraints cause households to maintain portfolios including both bonds and non-yielding money and the resulting demand for real money balances has the usual reduced form dependence on GDP (transactions demand) and the interest rate. This is equated with the region's real money supply, where purchasing power is measured in terms of its GDP deflator, P^j . Since all domestic transactions are assumed to use the home region's money, international transactions require currency exchange. For this purpose, a single nominal exchange rate, E_j , is defined for each region. A single key region is identified (here the US) relative to whose currency these nominal rates are defined. For the US, then, $E=1$ and E_j is the number of US dollars per unit of region j 's currency. In essence, we are adding to the real model one new equation per region (the LM curve linking the real money supply to GDP and the interest rate) and one new (usually endogenous) variable per region, E_j .²⁰

The bilateral rate between region i and region j is then simply the quotient of the two exchange rates with the US, $E_{ij} = E_i/E_j$. Quotients such as this appear in all international transactions. The most straightforward of the international transactions in the original model are trade transactions. There the bilateral exchange rate is simply included in all import price equations, along with *cif/fob* margins and trade taxes. In the case of savings and investment, the global pool of savings is accumulated in US dollars. Investment, once allocated to region j , is converted to that region's currency at the rate E_j (US\$ per unit of local currency). The third, and most cryptic, set of international transactions in the original model concerns international transport services. Payments associated with *cif/fob* margins are assumed to be

¹⁹ Since the initial database (GTAP Version 5) incorporates no "net income" or factor service component in its current account, the initial equilibria must do likewise. This implies the assumption that, although there are no interregional bond holdings initially, the shocks implemented cause interregional exchanges of bonds and hence a non-zero net income flow in future current accounts not represented.

²⁰ More precisely, since for the US $E=1$, there is one less (usually endogenous) variable. Where nominal exchange rates are to be endogenous and nominal money supplies exogenous, one additional variable must be made endogenous. This could, for example, be balanced by making one price level exogenous, such as by having US monetary policy target the change in the US CPI, P^C .

made by the importer in US dollars. The global transport sector then demands inputs from each regional economy and these transactions are converted at the appropriate regional rates.

Without nominal rigidities the model always exhibits money neutrality, both at the regional and global levels. Firms in the model respond to changes in nominal product, input and factor prices but a real producer wage is calculated for labour as the quotient of the nominal wage and the GDP deflator, so that $w=W/P^Y$. Thus, money shocks always maintain constant w when nominal rigidities are absent – as expected, money is then neutral. To make possible some rigidity in the setting of the nominal wage, W , a parameter, $\lambda \in (0,1)$ is inserted, such that

$$(3) \quad \frac{W}{W_0} = \Lambda \left(\frac{P^C}{P_0^C} \right)^\lambda$$

where W_0 is the initial value of the nominal wage, P_0^C is the corresponding initial value of the consumer price index (CPI) and Λ is a slack constant. Whenever Λ is exogenous and set at unity, the nominal wage carries this relationship to the CPI and the labour market will not clear except in the unlikely event that equation (3) happens to yield a market clearing real wage. The case where the labour market is fully flexible is represented by setting Λ as an endogenous slack variable and thereby rendering (3) ineffective. At the same time, labour demand is forced to equate with exogenous labour supply to reflect the clearing market.

The representation of capital controls:

Savings are assumed perfectly mobile between regions and that the allocation of investment between them depends on region-specific interest premia and, if they are present, capital controls. In the absence of capital controls a region's domestic capital market might be represented as in Figure 6. Net inflows on the capital account (KA), which comprise the net inflow of foreign savings, S_{NF} , less the net outflow associated with the accumulation of official foreign reserves, ΔR , depend on the domestic bond rate which deviates from a global capital market clearing interest rate by the risk premium factor $1+\pi$.²¹ The KA curve slopes upward slightly in spite of the assumed perfect capital mobility because larger net inflows to the focus region drive up the global market clearing interest rate.

²¹ The scope of monetary policy includes alterations in the rate at which official foreign reserves are accumulated. When there are no capital controls, however, the perfect capital mobility assumption implies that changes in reserves have no effect on net capital account flows. Where they are important is in the case where capital controls are effective. Because the manipulation of reserves offers only a short term approach to exchange rate management that is only available if reserves are sufficient in the first place, ΔR is held exogenous throughout the analysis in this paper.

The actual scale of net inflows depends on the net demand for foreign investment, $NFI = I - S_D$, where the relationship between NFI and r is shifted to the right by an increase in the expected future return on installed capital, r^e , via equation (2), or by an increase in government spending, G , via its effect on domestic saving. It is shifted to the left by an increase in GDP (Y), via its effect on consumption and tax revenue and hence on domestic savings, S_D . In the figure, net inflows on the capital account are determined by the intersection of the two curves shown. For a balance of payments, these inflows must then equate to net outflows on the current account, CA , and prices, and therefore real exchange rates, adjust to ensure that this is the case.

In this analysis, capital controls take the form of a rigid level of net outflows on the capital account. This case is illustrated in Figure 7. Where net outflows are the norm, as in China, a rigid ceiling is imposed on these outflows, severing the link between the home and global interest rates unless net foreign investment rises sufficiently for the controls to cease binding. To capture this in model simulations, the interest premium, π , is made endogenous while net flows on the capital account, KA , or, equivalently, on the current account, CA (where $BoP = KA + CA = 0$), are set as exogenous.

Data and parameters:

The regions, primary factors and sectors identified in our analysis are listed in Table 2. Considering regions first, we draw on the now well-known GTAP Version 5 global database for 1997, which divides the world into 66 countries and regions. Although this database separates mainland China from Taiwan it amalgamates Hong Kong with the mainland.²² Our further aggregation of mainland China with Taiwan does overlook effects that are internal to these regions but such effects are not our focus. Instead, we seek to illustrate the strong interaction between trade reforms and macroeconomic policies, and, particularly, foreign exchange regimes. These interactions are important for all the economies of East Asia and particularly for those with regulated foreign exchange regimes. China is the largest developing economy to maintain, at least *de facto*, fixed US dollar parity and, in this respect, the macroeconomic policy regimes of Hong Kong and Taiwan have been compatible with that of the mainland.

²² Detailed descriptions of the GTAP database's content and sources as they relate to China are available in Gehlhar (2002), which describes the integration of the data for Hong Kong with that of the mainland and discusses the entrepot nature of some of Hong Kong's trade, Lin et al. (2002) for Taiwan and Wang et al. (2002) for the mainland.

Turning to primary factors, skill is separated from raw labour on occupational grounds, with the “professional” categories of the International Labour Organisation (ILO) classification included as skilled.²³ The structure of factor demand has skill and physical capital as complements. This enables the model to represent the links between skill availability, capital returns and investment that are important in China, which has large skilled and unskilled labour forces that are increasingly mobile between sectors.²⁴ Finally, the sectoral breakdown we have chosen aggregates the 57 sectors in the database to our more manageable 14, offering the most detail in agricultural and marine products. This is because, amongst China’s merchandise trade commitments for WTO accession, a key liberalisation is in the processed food sector, to which these commodities are inputs.

Because the length of run is short, the real part of the short run model incorporates smaller-than-standard elasticities of substitution in both demand and supply. These are set based on a short run calibration exercise on the Asian crisis, described in Yang and Tyers (2000). For further details of the model, its parameters and its structure, see Yang and Tyers, *op cit*, and Tyers and Yang (2000, 2001).

Representing China’s post-crisis trade policies and reforms

An important aspect of the trade policies is the introduction since 1997 of duty drawbacks offered to firms on the component of their imports that is used for export production. The approach taken is detailed in Tyers and Rees (2002). Table 3 presents the pattern of equivalent trade taxes and subsidies as of 2001 and as anticipated post-accession. To obtain the rates in Table 3, the industry classification used in the WTO list of tariff concessions was concurred with the cruder subdivision used in our model and average rates constructed for each sector. The information contained in the database was supplemented by details of the accession tariff rates provided by Ianchovichina and Martin (2001). To represent the behavioural impacts of the changes in equivalent tariff rates as accurately as possible, emphasis was placed on preserving changes in the “powers of the tariffs” rather than in the rates themselves.²⁵

The equivalent Chinese tariff rates of the 1990s vary by country of origin. This means that the application of the same shock to the powers of these equivalent tariffs might have led

²³ See Liu et al. (1998) for the method adopted.

²⁴ For further discussion of the role and representation of skill-capital complementarity, see Tyers and Yang (2000).

²⁵ Consequently, the rates in Table 3 tend to reflect the proportional changes in powers of tariffs implied by Ianchovichina and Martin and the magnitudes as detailed in the protocol.

to negative post-accession rates for some trading partners. The accession shocks to the equivalent bilateral tariff rates were therefore calculated so as to harmonize the post-shock tariff rates across countries of origin. The proportional changes in “powers of equivalent tariffs” are the same as those implied by the changes in rates detailed in Ianchovichina and Martin (2002a: Table 3). For our present purpose, these shocks are the same for both the long run and the short run. As indicated in the WTO database, China is committed to undertaking many of the tariff concessions immediately on accession.²⁶

V Simulated Effects of Accession Policy Reforms

The long run outlook is required in order that the expectations of investors can be formulated for short run analysis - investors are assumed to take changes in long run returns on installed capital into account in determining short run changes in their investment behaviour. Long run results are also of interest in their own right.

Recapping the key elements of the long run closure:

- 1) there are no nominal rigidities (no rigidity of nominal wages),
- 2) production and consumption elasticities of substitution are chosen at “standard” levels to reflect the additional time for adjustment in the long run over the short run (Tyers and Yang 2001),
- 3) physical capital is no longer sector specific; it redistributes across sectors to equalise rates of return,
- 4) capital controls are ignored, and
- 5) in China, irrespective of short run fiscal policy assumptions, in the long run any loss of government revenue associated with tariff changes is assumed to not be made up via direct (income) tax with the result that the fiscal deficit expands.

The key point of difference between our long run analysis and that of Rees and Tyers (2002) is that we represent the effects of trade reforms on productivity. There is a substantial literature identifying this association (Chand et al., 1998, Chand, 1999 and Stoeckel et al. 1999). These studies use Australian data on the long run effects of trade reforms to identify elasticities of total factor productivity to protection level by industry. We applied these elasticities to China’s intended reforms, albeit with discounts for China’s lower starting protection levels in some industries and adjustments to account for services sector reforms (Dee and Hanslow 2000, Verikios and Zhang 2001), to yield the one-off long run productivity

²⁶ To the extent that some of the tariff reductions may in fact be phased in over several years, our analysis will tend to overstate the economic impacts in the short run.

shocks listed in Table 4. Although these shocks are applied only in the long run, they are important for short run behaviour (our object here) because they raise the return on installed capital and hence they stimulate investment.

The results from the long run simulation are provided in Table 5. They show the expected allocative efficiency gains, reflected here in a rise in GDP, aided by increased returns on installed physical capital that induce greater investment and therefore larger net inflows on the capital account in the long run. Home consumption switches away from home produced goods, the relative prices of home produced goods fall yielding the predicted real depreciation. The principal downside of the reforms is the long run shift of activity out of agriculture into manufacturing and services and the associated decline in land rents. Associated with this shift substantial relocation of workers from agriculture to the modern sector will therefore be required.

Although the trade policy regime of 2001 advantaged food processing, “other crops”, fisheries and light manufacturing, apart from the smaller “beverages” industry, it is the manufacturing sectors that are the robust beneficiaries of the unilateral trade liberalisation. This is surprising given that the protection of the manufacturing sectors is also set to decline. It is because both manufacturing sectors commit approximately half their total costs to inputs in the same product category and about ten to fifteen percent of those to imports and competing imports, even though they are from the same sector, are differentiated from home products (Rees and Tyers 2002). Under these conditions the tariff reductions on imported intermediates have a direct effect on home industry total cost. Reductions to tariffs on competing, but differentiated, imports have only an indirect effect the magnitude of which depends on the elasticity of substitution between the two. Indeed, for manufacturing, it turns out that the input cost effect of tariff reductions is considerably greater than that of the loss of protection against competing imports. Cost reductions of similar origin are the reason for similar gains accruing to the domestic transport services sector.

The reforms cause the most substantial reductions in protection to China’s food processing sector and therefore lead to long run contractions in that sector and in the local supply of its inputs (especially rice and “other crops”). The more income elastic and lightly protected agricultural sectors, the “beverages” group and livestock, actually expand, however. Labour is assumed to be perfectly mobile between sectors, so that our results indicate the labour movement needed in order to achieve the maximum gain from the reforms. In the long run employment in food processing falls by seven per cent, in rice production by four per cent

and in “other crops” by two per cent. Workers lost from these sectors are re-employed primarily in manufacturing and services.

When reform-driven productivity improvements are included in the long run analysis, even though the assumed productivity changes are one-off and modest the economic effects of the reforms are greatly amplified. The GDP increase is almost ten-fold larger, domestic investment is four times larger as is the return on installed capital, which will drive short term investment. Increases in sectoral expansions are largest in manufacturing and services with services productivity having widespread effects through their role as intermediates. The overall contraction in the agricultural sector is much reduced, with the beverages, livestock and fisheries sectors now showing robust expansions.

Simulated short run effects

In the short run, for all the regions represented, the standard closure is as indicated in Table 6. Monetary authorities in China, Vietnam and the Rest of the World are assumed to maintain fixed exchange rates against the US\$. The other regions identified adopt price level (CPI) targeting. Capital controls are assumed rigid in China and Vietnam, but they are non-existent in the other regions. In the labour markets of China and Vietnam nominal wages are assumed to be “sticky”. Full short run rigidity is assumed in the industrial countries, while nominal wages are assumed to be fully flexible elsewhere in Asia and the developing world. As to fiscal policies (not shown in the table) government spending in all regions is assumed to absorb a fixed proportion of GDP and the rates of direct and indirect tax are constant, so that government deficits do vary in response to shocks.

As indicated in Table 6, three alternative macroeconomic policy regimes are considered:

1. The “standard”: rigid capital controls, a fixed exchange rate and fixed direct and indirect tax rates.
2. No capital controls, a fixed exchange rate and fixed direct and indirect taxes.
3. No capital controls, a floating exchange rate with monetary policy targeting the GDP price, and fixed direct and indirect tax rates.

In addition, two alternative assumptions are made about investment and the services capital stock. In a pessimistic alternative, investors do not see the long run benefits of productivity gains that would accompany trade reform, and there is no immediate effect from reforms in services trade. In an optimistic counterpart, investors are motivated by the long run return on installed capital listed in the second column of Table 5. Moreover, drawing on the

conclusions from studies by Dee and Hanslow (2000) and Verikios and Zhang (2001), service trade reforms are assumed to result in the short run bolstering of the capital stock in finance and communications indicated in Table 4. Not surprisingly, the short run effects of China's WTO commitments prove to be heavily dependent on her macroeconomic policy regime and these associated productivity and capital stock changes. Indeed, the effects range from the contraction alluded to in the introduction through to a substantial short run expansion.

The effects of capital controls and the choice of monetary policy target:

The broad behaviour of the model in the short run with rigid capital controls retained can be represented as in Figure 8. The upper diagram represents the domestic capital market and the lower one the domestic market for foreign products. These markets are linked by the requirement that, for a balance of payments, net flows on the capital account must mirror those on the current account. Net demand for foreign products (the downward sloping line in the lower diagram, $NM=M-X$) depends on the relative price of foreign goods. For this purpose define the real exchange rate as in equation (1) as the common currency ratio of the price of home goods to the price of foreign goods. Net imports depend positively on this real exchange rate and negatively on its inverse (the common-currency foreign to home product price ratio). This excess demand curve is shifted to the right by an increase in GDP, Y , or a reduction in protection, τ . The real exchange rate is then determined by the balance of payments requirement that net inflows on the capital account must equal net outflows on the current account, $KA=-CA=NM=M-X$.²⁷

The trade liberalisation reduces τ and shifts NM to the right. With tight capital controls, the current account balance cannot change. The shock therefore raises the relative price of foreign goods in the home market and thus depreciates the real exchange rate. If the nominal exchange rate is the target of monetary policy and the home economy is small by comparison with its trading partners (P^* is unaffected) then, from (4) a fall in P^Y (a deflation) is required. This must be brought about by a monetary contraction in defence of the exchange rate. To the extent that wages adjust more sluggishly than product prices, the deflation causes the real wage to rise. Were the real depreciation the only consequence of the liberalisation

²⁷ The net factor income component of the current account is zero at the outset because that is the assumption embodied in the construction of the original database.

shock its effects would therefore be contractionary. Fortunately, this need not be the case. The trade reform brings gains in allocative efficiency.²⁸

When capital controls remain rigid and the exchange rate fixed, however, in the Chinese case these allocative gains are insufficient to offset the contractionary effects of the deflation. This can be seen from the first column of Table 7. The real depreciation is substantial and the deflation required is of the order of two per cent per year. The production real wage rises by half this and employment falls. In Figure 8, investment demand responds to the expectation of higher real returns to installed capital in the future by shifting outward. The loss of tariff revenue drives the government deficit higher, reducing domestic saving, further reinforcing the outward shift of the net foreign investment demand (*NFI*) curve. But the rigidity of the capital controls causes this to simply push up the domestic interest rate and so real investment actually falls. Output falls in all sectors except beverages, energy, manufacturing and transport. Manufacturing gains in the short run for the same reasons it gains in the long run – cheaper imported inputs. Under these policy circumstances, then, the overall net gains from trade reform are not robust in the short run, at least when pessimistic assumptions are made about productivity effects and services reform.

If the capital controls are removed, the corresponding liberalisation shock is as depicted in Figure 9 and results are shown in column 2 of Table 7. Here reduced protection also yields a gain in allocative efficiency but this time this is large enough to generate a net gain in GDP, reinforcing the rightward shift in the net imports curve in the lower diagram. In this case, however, the absence of capital controls allows investment to flow in, responding to the increase in the expected long run return on installed capital. The increased inflow on the capital account relaxes the balance of payments constraint in the lower diagram and allows a shift toward net imports. The net effect on the real exchange rate depends on whether the capital account shift, which raises the net supply of foreign goods, is larger or smaller than the increase in net demand for them due to the tariff reduction and the rise in domestic income. In the case of China, the rise in net demand is dominant and the real exchange rate still depreciates, albeit to a lesser extent than in the presence of capital controls. Thus, when capital controls are weak or nonexistent, the trade liberalisation is seen to attract increased inflows on the capital account and hence to mitigate the real depreciation and associated GDP price deflation that are its inevitable consequences.

²⁸ To see these at least partially offsetting gains in allocative efficiency it is necessary to use a multi-commodity general equilibrium framework such as that in this paper.

In the third column of Table 6 the target of monetary policy is the GDP price, so that the nominal exchange rate is allowed to depreciate. This removes the deflation that must accompany a fixed exchange rate and hence reduces the rise in the production real wage due to the reforms. The GDP gain is therefore almost doubled and now only the processed food sector contracts in the short run. Interestingly, the additional investment and greater employment generated with the policy regimes of columns 2 and 3 ensure that real land rents actually rise in the short run.

Finally, the three right-hand columns of Table 6 indicate the short run effects of the WTO accession reforms under the same three Chinese policy regimes but with the more optimistic ancillary effects of those reforms (Table 4) included. There are two key differences. First, investors are motivated by the effects of increased productivity in response to the reforms in the long run and, second, services reforms see a short run increment to the capital stocks in the financial and communications sectors. These changes cause substantial rises in investment and, in association, they cause larger net inflows on the capital account, they boost the construction sector and they reduce the cost of service inputs to other sectors. Overall expansions are therefore consistently larger in these cases as is the demand for the sectoral relocation of workers. These are due, in part, to rises in overall employment which occur because of sticky nominal wages. The upward movement in nominal wages is slower than that in labour productivity, expanding aggregate labour demand by up to two per cent.

Short run sectoral impacts

The key determinants of the sectoral mix of changes in the economy are the tariff reductions themselves, which reduce product prices in affected sectors, and the size of the resulting short run real depreciation, which reduces non-traded (largely services) prices relative to traded goods prices. When capital controls are tight the real depreciation is comparatively large. Traded sectors, such as light manufacturing, are advantaged, while non-traded services sectors, such as construction and dwellings, are disadvantaged. When capital controls are ineffective, on the other hand, manufacturing gains are smaller and the non-traded services sectors gain. Processed food suffers because of the decline in its protection and other agricultural industries contract as that sector demands fewer local inputs. When the macroeconomic policy regime is expansionary, however, only the processed food sector contracts. And, when the optimistic ancillary effects are included, the decline in the processed food sector becomes trivially small, ensuring gains to the agricultural sector as a whole. This result is quite important since, sensing losses due to reduced protection, the farm

sector opposes the reforms. Yet, if the reforms were embraced along with expansionary macroeconomic policy, the farm sector would be a net gainer.

Worker relocation demand in the short run

The sectors defined for the purpose of our simulations (Table 2) are here aggregated for ease of comparison with the classification of employment by China's National Bureau of Statistics. In facilitating this comparison it has occasionally been necessary to aggregate sectors in both classifications. The result is the seven sectoral groupings in Table 8. Also listed are the maximum and average annual changes in employment by sector, drawn from official statistics since 1978. The detailed official record of annual changes in employment by sector is provided in the Appendix. These changes include some of extraordinary magnitude, most especially the growth in employment in the services sectors in 1984. We discount these as due to changes in measurement in that year. There have, however, also been some extraordinary employment growth periods since then, including the service employment expansions of 1993 and 1994. Of course, the services sectors were considerably smaller then than they are now, and so the numbers of workers relocated to achieve those employment growth numbers were smaller than would now be required. Even so, these statistics suggest that China's capacity for the rapid sectoral relocation of workers has been considerable.

In the same table we show the range of simulated short run worker relocation demands associated with China's WTO accession reforms. In interpreting these it must be borne in mind that overall employment in China is endogenous in these simulations. From Table 7, depending on the macroeconomic policy settings, it either contracts a quarter of a per cent or expands by almost two per cent. This opens the possibility that, at least in the short run, rural activity can expand at sufficient pace to retain its workers. When we combine the most expansionary policy scenario with the ancillary effects of productivity and services reform (Table 4), the expansion in overall employment permits employment in each sector to increase, as indicated in the final column of Table 8. Of course, there remains considerable redistribution of employment in these results, since the services sectors expand their labour use much more rapidly than does agriculture. And since we focus on the short run, we take no explicit account here of technical change in Chinese agriculture. In other countries at the same stage of development this change has been labour saving, enabling the agricultural sector to shed workers at a considerable rate (Anderson et al. 2003).

Our contention that the macroeconomic policy environment is important in determining the pace of worker relocation demand is borne out in these results. In all sectors

there is a stark contrast between employment growth under tight capital controls and a fixed exchange rate regime on the one hand and an investment policy that renders the capital controls ineffective, combined with a flexible exchange rate, on the other. When the ancillary shocks to productivity and services capital are included, this gulf widens further. In the case of this most optimistic of scenarios, employment growth exceeds the average since 1990 in all but two sectors and the excess is largest in construction and dwellings and transport services. These strong worker relocation demands nonetheless fall short of the maxima achieved in a single year in all sectors, even since 1990.

Yet the WTO accession reforms are but a small part of the pantheon of China's overall reform program, the bulk of which is growth-enhancing. We not only exclude the trend of technology and associated organisational changes, as mentioned previously, but we take no account of the on-going financial sector reforms and the continuing transformation of urban activity from the public to the private sector. Even in the case of China's WTO accession, we take no account of commitments by China's trading partners to reduce protection against her labour-intensive exports. These changes will improve China's terms of trade and further stimulate its growth. Considering such omissions, worker relocation demand in a more expansionary policy environment could well approach, or even exceed, the high rates of change observed in the early 1990s.

Finally, our simulations rest on the assumption that production and skilled workers in one sector are perfectly transformable into corresponding workers in other sectors. Because some workers have narrowly sector-specific education and training and because sectoral relocation attaches high transaction costs, particularly for rural families, the actual transformability of production workers will remain imperfect (Sicular and Zhao, 2002). Our results therefore place upper bounds on the overall economic performance results from the WTO accession reforms and, more importantly for our purpose, upper bounds on worker relocation demands in the short run.

VI Conclusion

Our chronicle of changes in economic performance, income distribution and internal migration in China suggests a recent slowing of employment growth in the modern sector and the "bottling up" of labour in rural activities, widening the income gap between urban and rural workers. This has happened in spite of what our review suggests is a considerable relaxation of the worker registration, or *hukou*, system which has constrained internal migration in the past.

To examine the hypothesis that the slowdown in overall growth, and the pace of worker relocation in particular, is due at least in part to a restrictive macroeconomic policy regime, we adapt a comparative static multi-product, multi-region macroeconomic model. We use the model to compare the economic effects of a key element of China's current economic reform program, namely its commitments associated with its accession to the WTO, under a variety of alternative macroeconomic policy regimes. These range from very restrictive capital controls combined with a fixed exchange rate to a regime with no capital controls (or the equivalent in FDI flexibility) and a flexible exchange rate. The results suggest these regimes make a difference of at least a per cent per year in overall GDP growth and at least two per cent per year in employment growth in the economy's modern sector. They therefore support our hypothesis, at least to the extent that the macroeconomic policy regime has contributed to a slowdown in the pace of expansion and worker relocation. Indeed, with an expansionary macroeconomic policy and optimistic assumptions about productivity effects associated with the WTO accession reforms and intersectoral worker transformability, simulated worker relocation demands from these reforms alone exceed the average of China's recent experience.

While we are confident about our conclusion that China's macroeconomic policy regime has reduced economic performance relative to its theoretical potential, it does not follow that we advocate the immediate elimination of capital controls and the adoption of a floating exchange rate. The latter has been advocated recently by government representatives in Japan and the US, including such significant players as the Chairman of the US Federal Reserve.²⁹ We are more inclined to caution on the issue of the exchange rate, recognising that a float would be premature considering China's underdeveloped financial sector, its partially reformed banking industry and its still-vulnerable state-owned enterprises.³⁰ The fact that more flexibility would enhance China's growth should be taken as advocating the acceleration of the reform processes needed before a floating rate regime can be implemented.³¹

²⁹ Interestingly, this pressure has tended to be for a revaluation of the RMB, which would benefit both Japan and the US in the short run. The shocks we examine yield real depreciations, however. Were these shocks dominant, we believe the fundamentals are more likely to support a devaluation of the RMB. A revaluation would be justified only in the event of Chinese investment demand taking on "bubble" characteristics, capital controls notwithstanding.

³⁰ See the discussion on this point by Edwards (2003).

³¹ See both Roberts and Tyers (2003) and Edwards and Levy-Yeyati (2003).

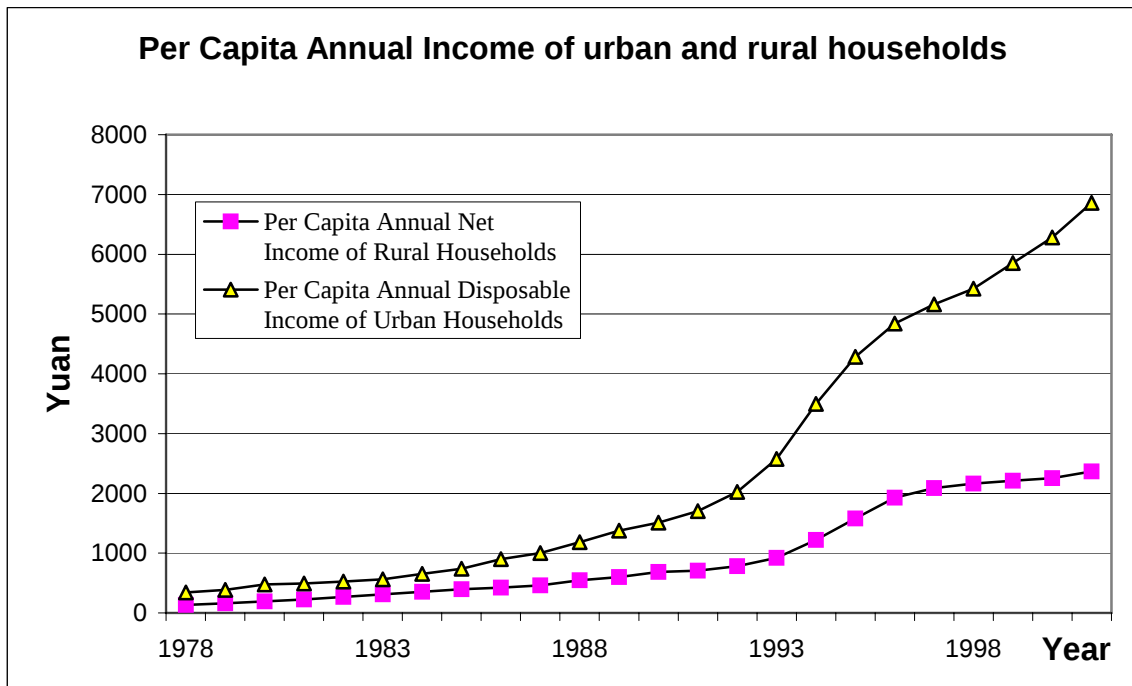
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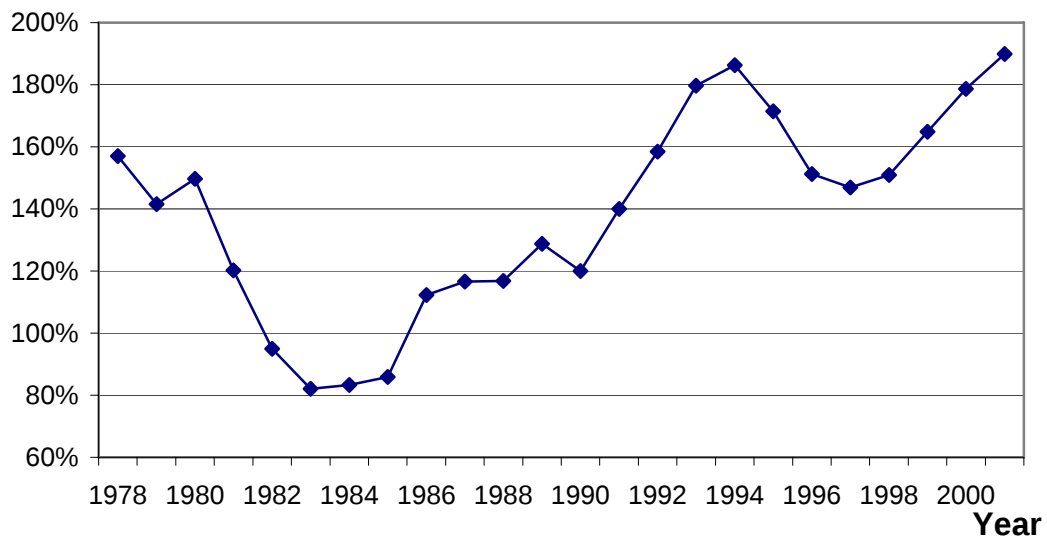
Figure 1



Source of data: *China Statistical Yearbook, 2002*, Table 10-3

Figure 2

Gap between Urban and Rural Incomes

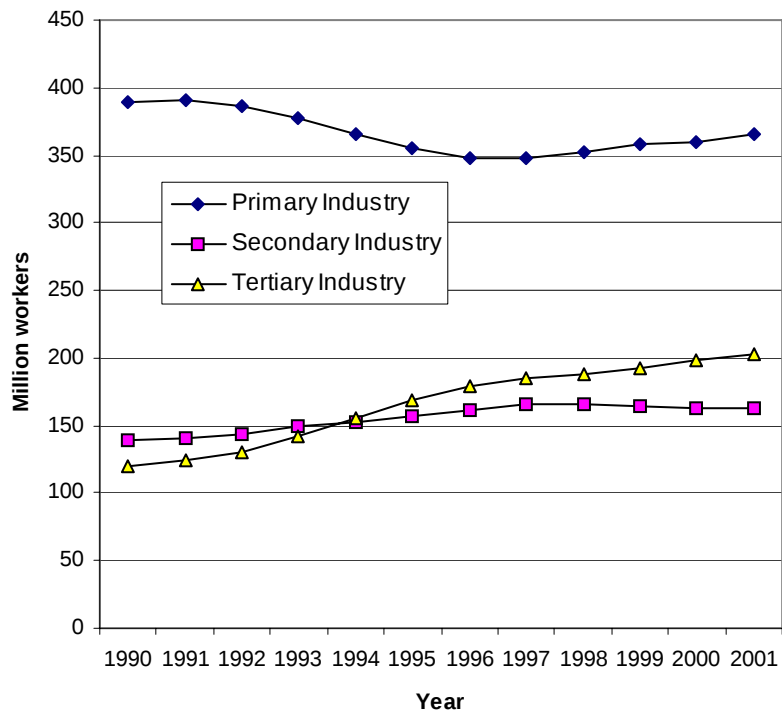


of data: *China Statistical Yearbook, 2002*, Table 10-3

Source

Figure 3

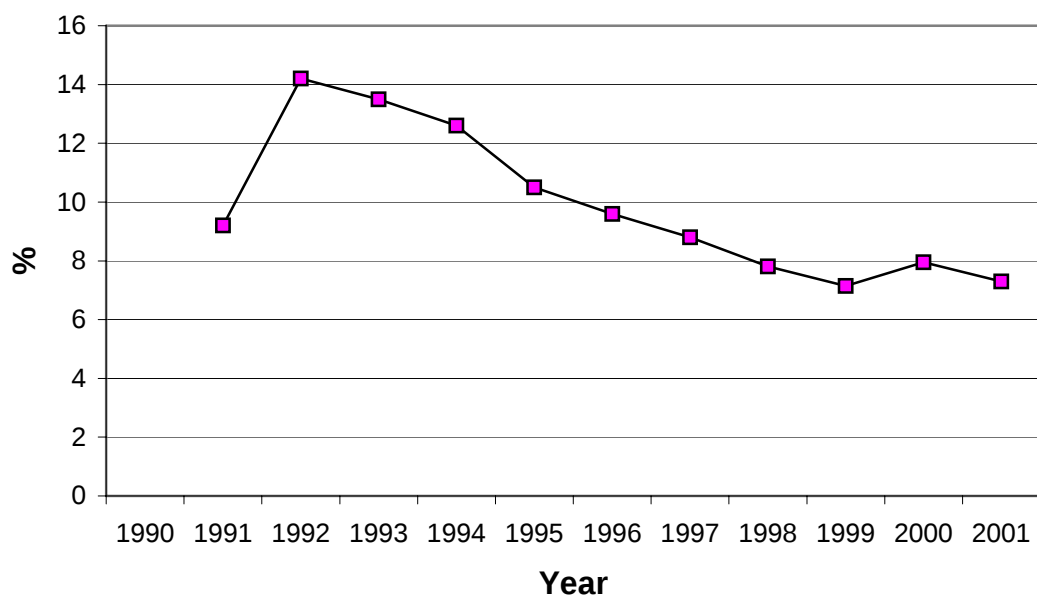
Employment by Industry Group



Source: China Statistical Yearbook (2002), Table 5-2. Primary industry: farming, forestry, animal husbandry and fishery; secondary industry: mining, manufacturing, electricity, water, gas, construction; tertiary: all other industries.

Figure 4

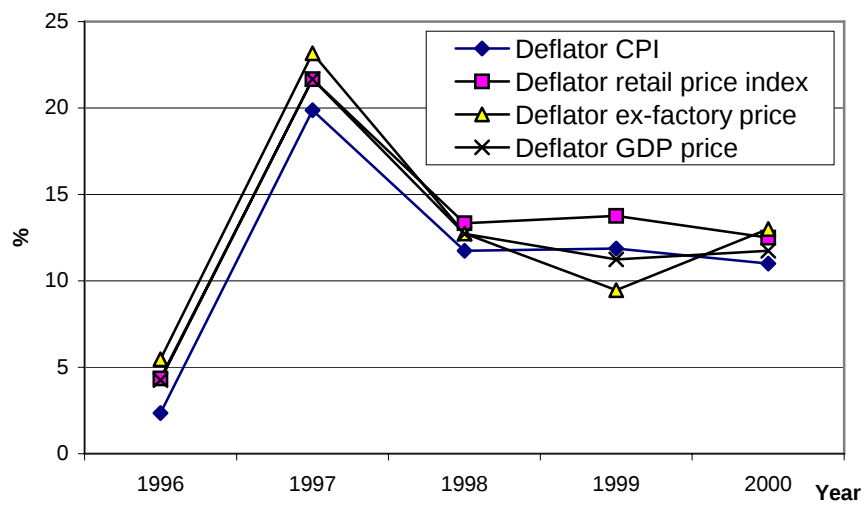
Official Growth Rate of Real GDP, %/yr



Source of data: China Statistical Yearbook, 2002, Table 3-3

Figure 5

**Official Growth Rate of Average Real Manufacturing
Wage %/yr**



Source: *China Statistical Yearbook* 2002 Table 5-22 and 9-1

Figure 6: The domestic capital market without capital controls

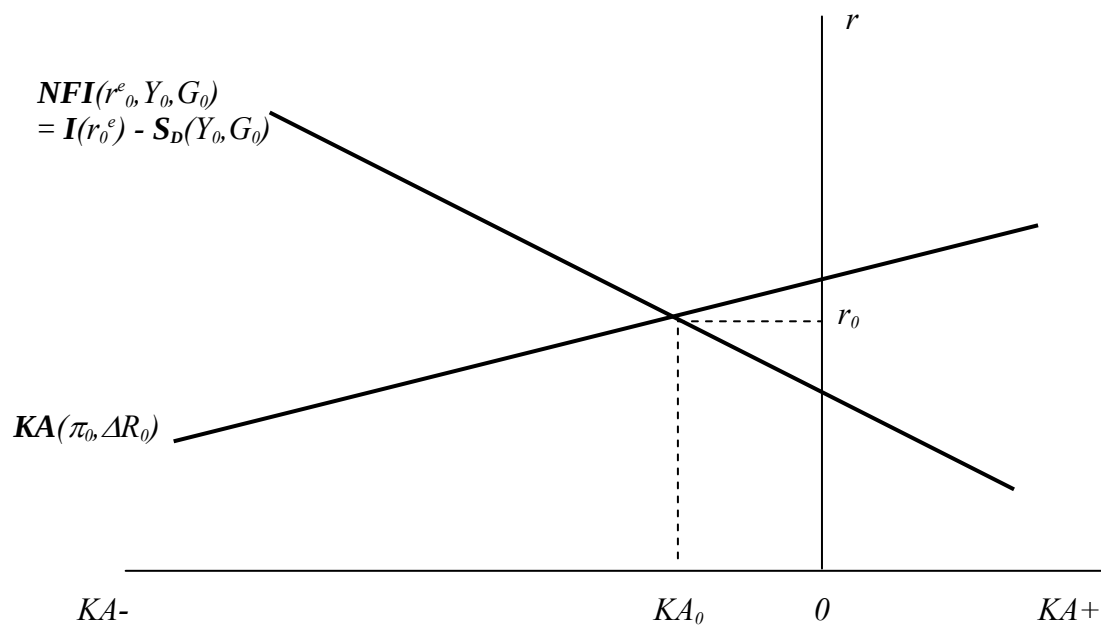


Figure 7: The domestic capital market with capital controls

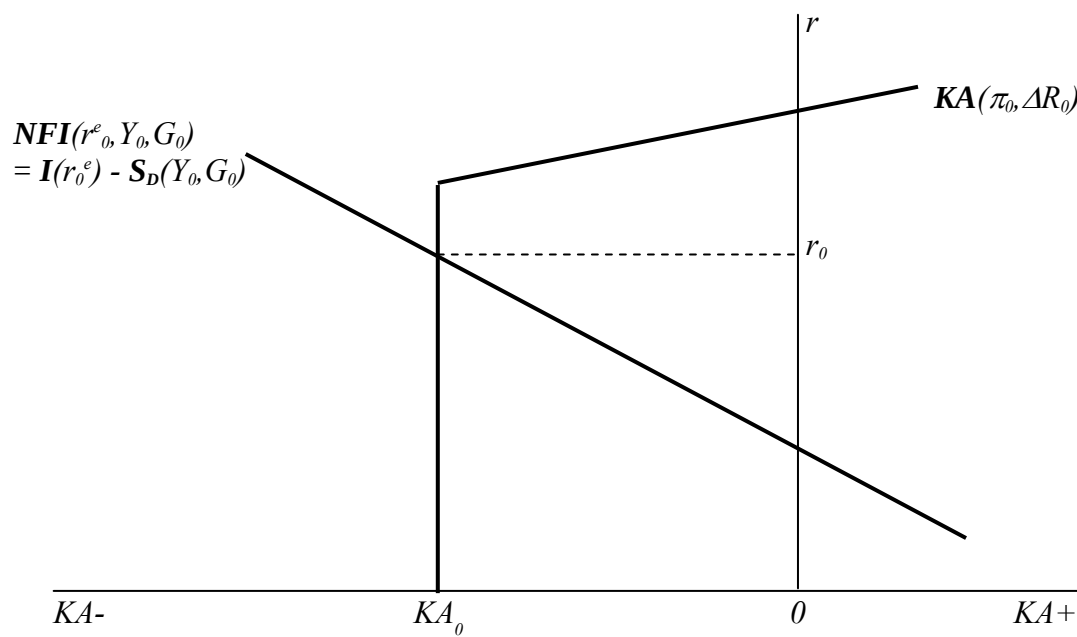


Figure 8: Trade reform with capital controls

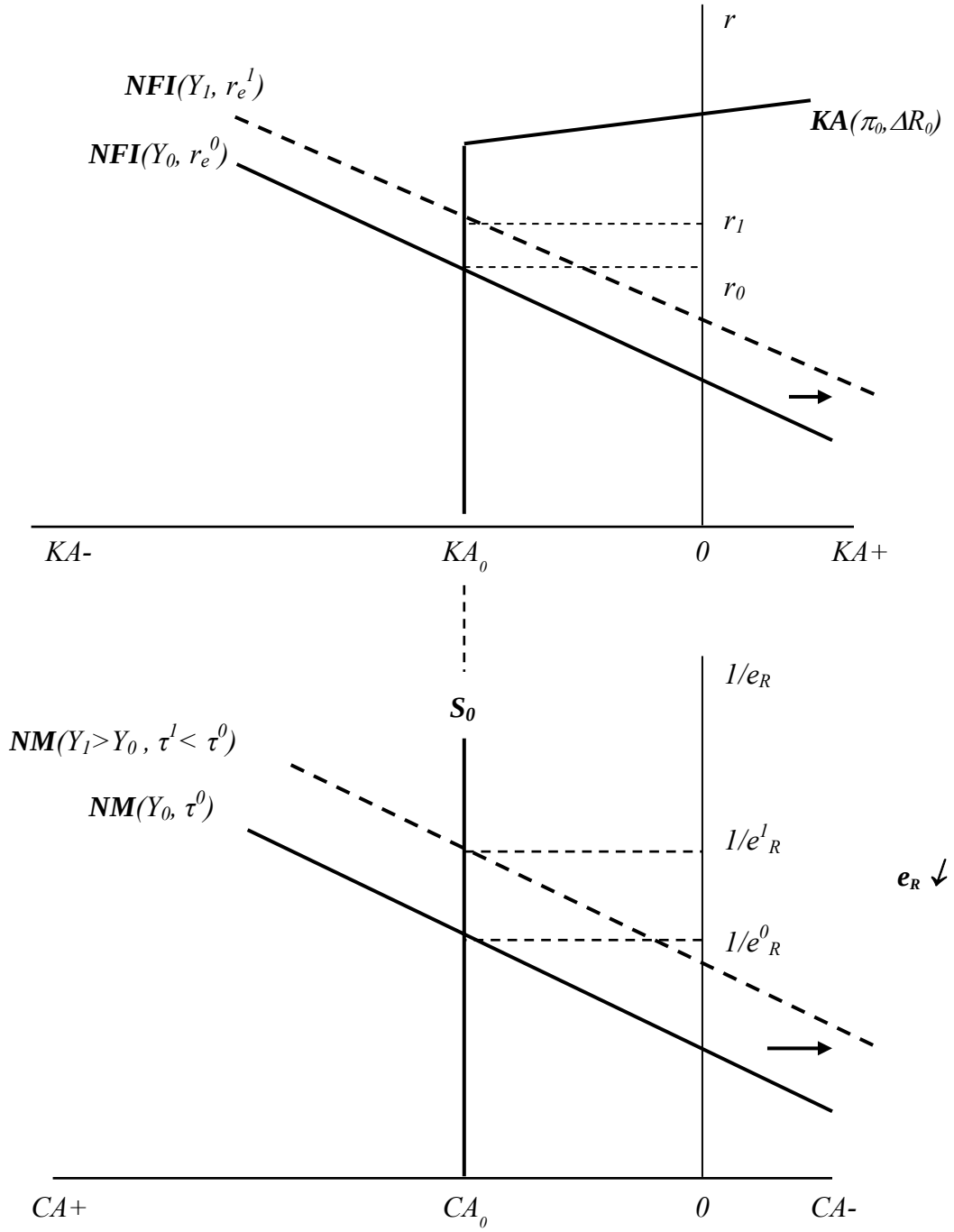


Figure 9: Trade reform with no capital controls

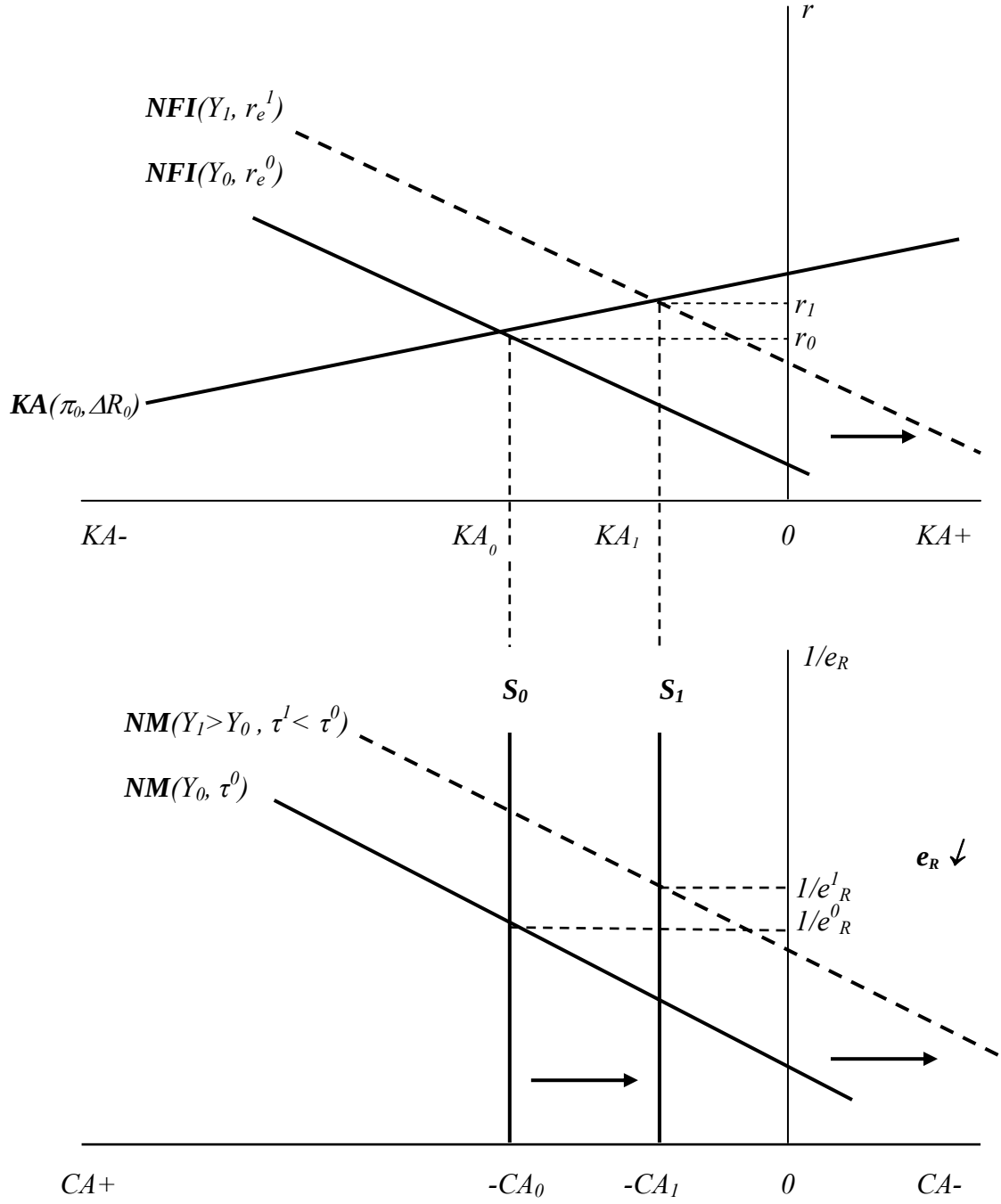


Table 1: Official Price Level Changes Since the Asian Crisis

	Consumer prices	Retail prices	Ex-factory prices	GDP deflator
1997	2.8	0.8	-0.3	0.9
1998	-0.8	-2.6	-4.1	-2.6
1999	-1.4	-3.0	-2.4	-2.4
2000	0.4	-1.5	2.8	1.0
2001	0.7	-0.8	-1.3	0.0

Source: *China Statistical Yearbook* 2002, Tables 3-3 and 9-1.

Table 2: Model structure

Regions	
	1. China, including Hong Kong and Taiwan
	2. Vietnam
	3. Other ASEAN
	4. Japan
	5. Korea
	6. Australia
	7. United States
	8. European Union ^a
	9. Rest of World
Primary factors	
	1. Agricultural land
	2. Natural resources
	3. Skill
	4. Labour
	5. Physical capital
Sectors^b	
	1. Paddy rice
	2. Beverages (product 8 OCR, “crops nec”)
	3. Other crops (wheat, other cereal grains, vegetables, fruits, nuts, oil seeds, sugar cane and sugar beet, plant based fibres and forestry)
	4. Livestock products (cattle, sheep, goats, horses, wool, silk-worm cocoons, raw milk, other animal products)
	5. Fish (marine products)
	6. Energy (coal, oil, gas)
	7. Minerals
	8. Processed food (meat of cattle, sheep, goats and horses, other meat products, vegetable oils and fats, dairy products, processed rice, processed sugar, processed beverages and tobacco products)
	9. Light manufacturing (textiles, wearing apparel, leather products and wood products)
	10. Other manufacturing (paper products and publishing, petroleum and coal products, chemicals, rubber and plastic products, other mineral products, ferrous metals, other metals, metal products, motor vehicles and parts, other transport equipment, electronic equipment, other machinery and equipment, other manufactures)
	11. Transport (sea transport, air transport and other transport)
	12. Infrastructure services (electricity, gas manufacturing and distribution, and water)
	13. Construction and dwellings
	14. Other services (retail and wholesale trade, communications, insurance, other financial services, other business services, recreation, other private services, public administration, defence, health and education)

a The European Union of 15.

b These are aggregates of the 57 sector GTAP Version 5 database.

Table 3: Chinese equivalent import tariff and export tax rates^a

	Equivalent import tariff, %		Equivalent export tax ^b , %
	Pre-Accession	Post-Accession	
Rice	0.04	0.04	-0.13
Beverages	11.00	11.00	-0.11
Other crops	22.00	16.00	-0.25
Livestock	5.00	4.00	-0.02
Food	16.00	6.00	-0.13
Fish	8.00	8.00	-0.19
Minerals	0.40	0.40	-0.32
Energy	3.00	3.00	-0.32
Light manufacturing	14.00	8.00	2.63
Heavy manufacturing	8.00	4.00	-1.01

a All tariff and tax equivalents are ad valorem. They are intended to encompass both tariff and non-tariff barriers, though the accounting for non-tariff barriers is incomplete. Services distortions are not generally included in the database. See text of a discussion of their representation in the analysis.

b Negative export taxes rates indicate export subsidies. These incorporate the export subsidy equivalents of the duty drawbacks available on imported inputs by exporting firms, calculated as explained in the text.

Sources: The original 1997 numbers are aggregated from the 57 commodity categories in the GTAP Version 5 global database (as published in 2000). They are then modified using model simulations, as described in the text and based on the work of Ianchovichina and Martin (2002), to obtain pre-accession estimates for 2001. Finally, the post-accession rates are based on the protocol for China's accession, as obtained from the WTO website at <http://www.wto.org>.

Table 4: Ancillary Effects of WTO Trade Reforms^a

	Long run total factor productivity rises associated with reduced protection, ^b %	Short run effect of reduced services protection on capital accumulation in financial and communications ^c , %/year
Rice	1.0	
Beverages	1.0	
Other crops	1.0	
Livestock	1.0	
Food	2.0	
Fish	0	
Minerals	0	
Energy	0	
Light manufacturing	1.5	
Heavy manufacturing	3.0	
Transport services	1.0	
Infrastructural services (electricity, gas, water)	1.0	
Construction and dwellings	2.0	
Other (including financial and communications)	5.0	2.0

a These are supplementary exogenous shocks applied, where indicated, along with the tariff reductions. They incorporate the findings of other research, particularly on the effects of services reform.

b Estimates based on the results from research by Chand et al. (1998), Chand (1999) and Stoeckel et al. (1999).

c Estimated one-year effect, based on the results from research by Dee and Hanslow (2000) and Verikios and Zhang (2001).

Sources: As specified in the notes, above.

Table 5: Simulated *long run* effects of a *unilateral* liberalization of China's 2001 trade policy regime^a

Change in:	No ancillary effects on productivity or services capital	With ancillary effects on productivity and services capital ^b
Terms of trade (%)	-1.25	-1.52
Real effective exchange rate, e_i^R (%)	-1.98	-2.56
Real exchange rate against USA, e_{ij}^R (%)	-1.81	-2.37
Global interest rate, r^w (%)	0.10	0.05
Investment premium factor, $(1+\pi)$ (%)	0.00	0.00
Home interest rate, r (%)	0.10	0.05
Return on installed capital, r^c (%) ^c	1.30	4.98
Real domestic investment, I (%)	0.95	3.85
Balance of trade, $X-M = -KA = -(I-S_D)$ (US\$ bn)	-10.87	-5651
<i>Real gross sectoral output (%)</i>		
Rice	-3.29	-2.54
Beverages	2.77	3.33
Other crops	-1.25	-0.36
Livestock	0.03	1.32
Food	-5.41	-4.32
Fish	-0.17	0.35
Minerals	0.88	2.38
Energy	0.78	0.95
Light manufacturing	1.49	2.26
Heavy manufacturing	1.08	4.60
Transport	1.44	2.87
Infrastructure services	0.34	2.25
Construction and dwellings	0.73	3.46
Other services	0.76	4.96
Real GDP, Y	0.41	3.31
<i>Unskilled wage and employment (%)</i>		
Nominal (unskilled) wage, W	-0.42	1.85
Production real wage, $w=W/P^Y$	1.51	4.53
Employment, L^D	0.00	0.00
<i>Unit factor rewards CPI deflated (%)</i>		
Land	-2.65	-1.39
Unskilled Labour (those employed)	1.27	4.08
Skilled Labour	1.38	4.22
Physical capital	1.24	4.04
Natural Resources	1.20	2.65

a All results in this table are based on the adoption of Fiscal policy 1: government spending is held constant as a share of GDP and the revenue lost from tariff reform is not made up in other taxes, so the fiscal deficit expands. Key exogenous variables are highlighted as per the long run closure discussed in the text.

B For these additional shocks, see Table 4.

Source: Model simulations described in the text.

Table 6: Short run closure^a

Region	Monetary policy target ^b	Labour market closure: nominal wage ^c	Capital controls: capital account net inflow $I-S_D$ ^d
China (1)	Nominal exchange rate, E	Sticky ($\lambda=0.5$)	Rigid
China (2)	Nominal exchange rate, E	Sticky ($\lambda=0.5$)	Flexible
China (3)	GDP price, P^Y	Sticky ($\lambda=0.5$)	Flexible
Vietnam	Nominal exchange rate, E	Sticky ($\lambda=0.5$)	Rigid
Other ASEAN	Consumer price level, P^C	Flexible ($\lambda=1$)	Flexible
Japan	Consumer price level, P^C	Sticky ($\lambda=0.5$)	Flexible
Korea	Consumer price level, P^C	Flexible ($\lambda=1$)	Flexible
Australia	Consumer price level, P^C	Sticky ($\lambda=0.5$)	Flexible
United States	Consumer price level, P^C	Sticky ($\lambda=0.5$)	Flexible
Europe (EU)	Consumer price level, P^C	Rigid ($\lambda=0$)	Flexible
Rest of World	Nominal exchange rate, E	Flexible ($\lambda=1$)	Flexible

a The

expected future return on installed capital is exogenous in the short run, determined in a separate long run solution. There are three macroeconomic policy regimes for China, with (1) the most restrictive and (3) the most expansionary.

- b The nominal money supply is endogenous in each case, the corresponding exogenous variable being the listed target.
- c When the nominal wage is assumed flexible it is endogenous and the corresponding exogenous variable is the employment level. When it is sticky or rigid, equation 2 of Section 2 is activated and the employment level is endogenous.
- d Capital controls are assumed to maintain a rigid net inflow of foreign investment on the capital account. When $KA = I-S_D$ is made exogenous to represent this, an interest premium opens between the domestic and international capital markets. This premium becomes endogenous. Effectively, the home and foreign capital markets are separated and clear at different interest rates. Where the capital account is flexible (open), this implies that private flows on the capital account are permitted at any level. $KA = I-S_D$ is then endogenous and the home interest premium is exogenous (unchanged by any shock). This means that the home interest rate then moves in proportion to the rate that clears the global savings-investment market.

Table 7: Simulated *short run* effects of a *unilateral* liberalization of China's 2001 trade policy regime: by macroeconomic policy regime^a

Change in:	No productivity and services reform effects			With productivity and service reform effects		
	Capital controls, monetary policy targets E^b	No capital controls, monetary policy targets E	No capital controls, monetary policy targets P^Y	Capital controls, monetary policy targets E^b	No capital controls, monetary policy targets E	No capital controls, monetary policy targets P^Y
Nominal exch rate (US\$/•), E_i	0.00	0.00	-1.36	0.00	0.00	-1.07
Domestic CPI, ^b P^C	-1.73	-0.79	0.34	-2.12	-0.68	0.20
Domestic GDP deflator, P^Y	-2.15	-1.03	0.00	-2.51	-0.80	0.00
Price of capital goods, P^I	-1.80	-0.89	0.18	-1.81	-0.42	0.42
Terms of trade	-1.41	-0.85	-1.06	-1.48	-0.62	-0.79
Real effective exchange rate, e_t^R	-2.30	-1.19	-1.53	-2.70	-1.02	-1.29
Real exchange rate vs USA, e_{ij}^R	-2.16	-1.03	-1.37	-2.53	-0.80	-1.07
Global interest rate, r^w	-0.04	0.08	0.06	-0.01	0.17	0.16
Interest premium factor, $(1+\pi)$	3.58	0.00	0.00	5.54	0.00	0.00
Home interest rate, r	3.54	0.08	0.06	5.53	0.17	0.16
Exp long run capital return, r^{e^c}	1.30	1.30	1.30	4.98	4.98	4.98
Short run capital return, r^c	0.83	1.99	2.44	-0.57	1.19	1.54
Real domestic investment, I	-1.76	0.98	0.99	-0.43	3.78	3.79
Balance of trade, $X-M$, US\$m	0.00	-9520	-8250	0.00	-14600	-13600
<i>Real gross sectoral output</i>						
Rice	-0.43	-0.14	0.01	-0.39	0.04	0.16
Beverages	0.47	0.49	0.66	0.52	0.55	0.68
Other crops	-0.30	0.02	0.20	-0.26	0.23	0.38
Livestock	-0.10	0.49	0.67	-0.04	0.86	1.00
Food	-0.63	-0.37	-0.22	-0.62	-0.23	-0.11
Fish	-0.01	0.32	0.45	0.00	0.50	0.60
Minerals	-0.15	0.30	0.56	0.33	1.01	1.21
Energy	0.06	0.08	0.18	0.15	0.17	0.25
Light manufacturing	0.46	0.19	0.64	0.85	0.45	0.80
Heavy manufacturing	-0.05	0.14	0.52	0.46	0.74	1.04
Transport	0.23	0.56	0.90	0.60	1.11	1.38
Infrastructure services	-0.07	0.32	0.59	0.23	0.83	1.04
Construction and dwellings	-1.48	0.94	0.99	-0.31	3.40	3.44
Other services	-0.05	0.49	0.77	0.58	1.41	1.63
Real GDP, Y	-0.09	0.42	0.70	0.41	1.19	1.41
<i>Unskilled wage and employment</i>						
Nominal (unskilled) wage, W	-0.87	-0.40	0.17	-1.06	-0.34	0.10
Production real wage, $w=W/P^Y$	1.31	0.64	0.17	1.49	0.47	0.10
Employment, L^D	-0.28	0.65	1.15	0.11	1.53	1.92
<i>Factor rewards CPI deflated</i>						
Land	-0.98	1.65	2.56	-0.38	3.70	4.42
Production labour	0.88	0.40	-0.17	1.08	0.34	-0.10
Skilled labour	0.81	0.75	0.41	1.60	1.51	1.23
Capital	0.53	1.33	1.59	-0.10	1.12	1.32
Natural resources	1.00	2.77	4.17	3.03	5.84	6.98

a Variables fixed as exogenous are shown in bold letter. All results in this table are based on the adoption of a fiscal policy wherein government spending is held constant as a share of GDP and the revenue lost from tariff reform is not made up in other taxes, so the fiscal deficit expands.

b P^C is the domestic consumer price level; the CPI. Note that this is an index of the prices of both home and imported goods.

c The expected long run return on capital motivates investment in these simulations. It is exogenous and its values are from Table 5.

Source: Model simulations described in the text.

Table 8: Comparing simulated trade reform-driven labour relocation demand with historical experience^a

	Agriculture and fishing	Minerals	Manufacturing	Electricity, gas and water	Construction and dwellings	Transport services	Other services, incl finance & communication
Official record of historical annual employment changes, %:							
1978-2001							
Maximum +ve (year)	3.6 (1982)	4.8 (1990)	8.2 (1986)	11.6 (1993)	28.6 (1984)	19.9 (1984)	16.8 (1984)
Maximum -ve (year)	-2.4 (1993)	-16.9 (1998)	-13.5 (1998)	-0.4 (2000)	-3.3 (1989)	-3.0 (1998)	-
Average ^b	0.68	-0.50	1.92	4.44	6.74	4.54	5.95
1990-2001							
Maximum +ve (year)	2.5 (1991)	3.8 (1993)	3.4 (1994)	11.6 (1993)	14.8 (1993)	10.4 (1994)	10.9 (1994)
Maximum -ve (year)	-2.4 (1993)	-16.9 (1998)	-13.5 (1998)	-0.4 (2000)	-3.3 (1998)	-3.0 (1998)	-
Average ^b	-0.3	-3.84	-0.48	3.81	4.02	2.47	5.13
Simulated WTO accession effects: annual employment changes, %							
Restrictive macro policy ^c							
Skilled workers	0.12	-0.13	0.02	-0.03	-0.9	0.21	-0.02
Production workers	-0.33	-0.37	0.02	0.01	-2.75	0.52	-0.14
Expansionary macro policy ^d							
Skilled workers	0.33	0.47	0.13	0.57	0.36	0.48	0.51
Production workers	0.62	1.46	1.12	1.92	1.90	2.18	2.07
Expansionary policy + ancillary shocks ^e							
Skilled workers	0.34	1.02	0.17	0.88	1.53	0.53	1.23
Production workers	0.98	3.21	2.11	3.26	6.61	3.42	1.49

a The sectoral aggregation used in this table concords the model sectors defined in Table 2 with those defined in the official statistics. Agriculture and fishing includes model sectors rice, beverages, other crops, livestock products and fish and the official sector farming, forestry, animal husbandry and fisheries; Minerals includes the corresponding sector and, from official statistics, mining and quarrying; electricity, gas and water corresponds with the official sector and it includes the model sectors energy and infrastructure services; construction and dwellings is the official sector construction and real estate; transport services corresponds to the model sector and includes official sectors transport, storage, post and telecommunications services; other services is the corresponding model sector and includes the remaining sectors from the official list.

b Arithmetic average of annual proportional changes.

c Rigid capital controls are maintained, monetary policy targets the exchange rate, there are no exogenous productivity effects, nor any boost in the capital stock in finance and communications (per Table 4).

d Capital controls are removed and monetary policy targets the GDP price. These results coincide with the third column of Table 7.

e To the expansionary policy environment is added the effects of ancillary productivity and services capital shocks, the results coinciding with the final column of Table 7.

Source: China Statistical Yearbook 2001 and 2002, along with model simulations described in the text.

Appendix: Chinese Labour Relocation: the Official Record Since 1978

(Employment change, %/year)

Year	Agric and fishing	Minerals	Manufact uring	Electricity gas and water	Construction and dwellings	Transport services	Other services, incl finance & communicatns
1978-79	1.12	2.76	3.45	4.67	7.34	4.13	6.16
1979-80	1.70	4.03	6.94	5.36	8.42	3.07	7.52
1980-81	2.25	4.45	3.78	5.93	3.50	4.84	7.95
1981-82	3.63	2.61	3.38	2.40	10.69	4.03	2.19
1982-83	0.95	1.47	2.83	2.34	11.78	6.61	8.87
1983-84	-0.91	1.19	8.01	2.29	28.58	19.87	16.83
1984-85	0.85	3.65	5.45	5.97	22.11	13.99	7.04
1985-86	0.40	1.76	8.19	7.04	9.80	7.58	5.01
1986-87	1.31	1.24	4.24	7.89	6.55	5.60	6.84
1987-88	1.85	1.59	3.51	7.93	4.54	4.68	5.95
1988-89	3.03	1.20	-1.21	1.69	-3.28	0.07	2.28
1989-90	2.68	4.75	0.90	6.67	0.73	2.89	3.82
1990-91	2.46	2.61	2.49	5.73	2.51	3.26	4.71
1991-92	-0.46	-0.77	3.02	5.91	7.27	3.53	7.74
1992-93	-2.38	3.79	2.08	11.63	14.81	0.84	9.51
1993-94	-1.71	-1.82	3.42	2.50	4.69	10.43	10.93
1994-95	-1.10	1.86	1.98	4.88	4.29	4.18	6.96
1995-96	-0.33	-3.22	-0.41	5.81	2.65	3.66	3.49
1996-97	0.56	-3.77	-1.55	3.66	1.26	2.43	5.35
1997-98	0.41	-16.94	-13.45	0.00	-3.25	-3.01	1.24
1998-99	0.79	-7.49	-2.52	0.71	2.54	1.10	0.14
1999-00	-0.41	-10.49	-0.81	-0.35	4.10	0.35	4.24
2000-01	-1.14	-6.03	0.50	1.41	3.40	0.39	2.10
Average	0.68	-0.50	1.92	4.44	6.74	4.54	5.95

Source: *China Statistical Yearbook*, 2002, Table 5-5.