Impact of China's WTO Accession on Rural-Urban Income Inequality

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Abstract

Many fear China's accession to WTO will impoverish its rural people, via greater import competition in its agricultural markets. We explore that possibility in two ways. First, we draw on standard Ricardo-Viner general equilibrium theory and adapt it to China's institutional circumstances to show that rural incomes need not fall and the rural–urban income gap may even be reduced. Those outcomes are possible, even if prices of some (land-intensive) farm products fall, because other (labour-intensive) farm products will become more exportable and the easing of restrictions on exports of textiles and clothing will boost town and village enterprises outside urban centres. Second, we plan to draw on new estimates of the likely changes in agricultural prices as a result of WTO accession to examine the above possibility empirically using the global, economy-wide numerical simulation model known as GTAP.

Key words: WTO accession, China's economic reform, rural-urban income inequality

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After fifteen years of negotiations, China is to accede to the WTO at the end of 2001. During those long negotiations China was continually opening up its economy. However, substantial economic policy reform is still needed before the transition from plan to market is complete. Some of those remaining reforms will be introduced by 2005 to fulfil the legal obligations China has committed to in its WTO Protocol of Accession.

Keeping the momentum of growth-enhancing trade reform going requires convincing sceptics that there will not be significant losers. Yet such reforms necessarily involve structural adjustments by households, firms and bureaucracies. While the economy as a whole can gain substantially from those adjustments, losses and even hardship can result for some unless complementary domestic policies are in place to facilitate adjustment and/or compensate losers. That underscores the importance of first analysing the likely distributional consequences of the reforms themselves, and then considering what complementary policies are needed to provide adequate safety nets for potential losers. Of particular concern in many quarters is that rural incomes may fall, exacerbating rural-urban income inequality.

The policy changes still to be made to fulfil WTO obligations will affect all areas of China's economy. Numerous commentators predict a dramatic effect on agriculture and hence rural areas, because the reforms in China over the past 23 years largely ignored the country's trade policies for key farm products. China was required by its trading partners to commit to major changes in those farm trade policies by 2005 – commitments that appear far greater, and faster, than any other developing country committed to in the Uruguay Round Agreement on Agriculture.

Meeting the commitments in agriculture will directly affect China's farm sector plus its food, feed and fibre processors, as well as consumers of food and beverages. Imports of numerous land-intensive farm products are expected to increase, and most observers presume that will put downward pressure on prices received by China's farmers. However, reduced protectionism will boost output and exports of some labour-intensive farm products in which China still has a comparative advantage. [1] In addition, farm households will be affected indirectly by many of the other commitments China has made in its WTO Accession Protocol. Especially important will be the arrangements for phasing out the 'voluntary' export restraints on China's textile and clothing trade, and the reductions in protection of the motor vehicles and parts industry. So too will be the myriad commitments affecting the services sector,

[1] The difficulties China has had in exporting food products to, for example, Japan, Korea and the United Kingdom in the past year or so because of those countries' quarantine/SPS measures should ease following WTO accession, or at least be challengeable under WTO Dispute Settlement provisions.

including state trading enterprises. Those changes, together with the promised increase in a wide range of agricultural imports, will allow China to exploit more fully its strong comparative advantage in unskilled labour-intensive products – both farm and non-farm (Anderson 1990, 1992; Huang et al, 2000).

To assess the impact on rural areas of the remaining reforms required to meet China's commitments to the WTO membership, it is necessary to see those changes in the context of on-going economic growth and structural change. This paper therefore begins with a brief summary of rural developments since the initial reforms began in the late 1970s, of recent and current policies affecting rural households, and of pertinent reforms still to be delivered as part of China's WTO commitments. With that background, the paper then draws on standard trade and development theory to give some indication of the likely effects on the welfare of different types of households of the reforms to be implemented between 2002 and 2005. We use a version of the Ricardo-Viner theoretical model, modifying an earlier economy-wide, general equilibrium analysis by Carter and Estrin (2001). Even the direction, let alone the magnitude, of some of the effects cannot be discerned from theory, however. Hence we plan to turn to the numerical simulation model known as GTAP and extend earlier analyses including by Ianchovichina and Martin (2001). The paper will conclude by drawing out implications for Chinese social policy makers and for China's trading partners.

The setting

Rural developments since the late 1970s

The unilateral decision in December 1978 to open up the Chinese economy was a major stimulus to economic growth: the pre-reform rate of per capita GDP growth of 3.1 per cent per year more than doubled, and has remained above 7 per cent for the past two decades (final row of Table 1). Rapid economic growth is normally accompanied by a relative decline in the farm sector, but in China that was initially tempered by the introduction of the farm household responsibility system (which led to the demise of collective farms), and by the raising of prices received by farmers. So began the process of moving away from the taxing of agriculture relative to other sectors – a process followed by most of the advanced economies in the early stages of their industrialization (Anderson and Hayami 1986; Lindert 1991; Anderson 1995).

Table 1 shows that agriculture grew nearly as rapidly as industry from 1979 to 1984, while Table 2 shows the slowdown in the decline in agriculture's shares of GDP and employment in the 1980s. The one-off efficiency effects of moving to the household responsibility system and raising relative prices for farm products were mostly reaped by the mid-1980s, however, after which agriculture grew at only one-third the pace of industry and less than half that of the service sector as industrialization boomed with the development of Special Economic Zones on the eastern seaboard (Table 1).

Income growth has boosted the demand for foods that are high in protein and nutrients relative to those high in carbohydrates, which has stimulated major structural changes within agriculture as farmers responded to changes in domestic demand. For example, livestock and fish increased their share of agricultural output from less that one-fifth

in the late 1970s to two-fifths by the late 1990s (Table 2), while within the crop sub-sector, fruit and vegetable production grew two to three times as fast as grain output (Table 1). The prices and marketing of grain and oilseed products have continued to be highly regulated, whereas markets for horticultural, livestock and fish products have been greatly liberalized. This has accentuated the growth in output of the latter group relative to grain and oilseed output since the mid-1980s (Table 1). Meanwhile, the direct consumption of grain by rural as well as urban households has virtually ceased growing (Table 3) -- a consequence of not only incomes rising but also population growth slowing to less than 1 percent per year and cuts in the implicit consumption subsidy for foodgrains.

The use of grain for animal feeds continues to grow. To date that has been supplied almost completely by rising domestic production, such that the trend level of grain self sufficiency has remained close to 100 per cent. Table 4 shows that there are nonetheless considerable changes from year to year in grain exports and imports. It also shows that, overall, China has remained a net exporter of food and feed, with meat, fish, fruit and vegetables providing most of the growth in net export earnings.

Recent and current policies affecting rural areas

As in most developing countries,[2] agriculture in China was squeezed at early stages of industrialization with gross fiscal contributions to the sector being more than outweighed by implicit taxation in the form of depressed prices for farm products, neglect of public infrastructure in rural relative to urban areas, and capital outflows via the financial system. One set of estimates of those transfers is provided in Table 5.

Price and other market reforms associated with China's policy shift from a socialist to a market-oriented economy began with non-strategic commodities such as vegetables, fruit, fish, livestock, and oil and sugar crops. The aims of the early reforms were to raise farm level prices and gradually deregulate the market. As the right to private trading was extended to include surplus output of all categories of agricultural products after contractual obligations to the state were fulfilled, the foundations of the state marketing system began to be undermined (Rozelle et al. 1997).

After record growth in agricultural production in 1984 and 1985, a second stage of price and market reforms was announced in 1985 aimed at radically limiting the scope of government price and market interventions and further enlarging the role of market allocation. Other than for grains and cotton, the intention was to gradually eliminate planned procurement of agricultural products, with government commercial departments being required to buy and sell in the market.

Because of the sharp drop in the growth of agricultural production and food price inflation in the late 1980s, however, implementation of the new policy stalled. Mandatory procurement of grains, oil crops, and cotton continued. To encourage farmers to raise productivity and sell to the government, contract prices were raised over time (although by less than the rate of inflation). After agricultural production and prices stabilized in 1990-92, another attempt was made in early 1993 to abolish the compulsory quota system and the sale at low prices to consumers. The state

[2] See Sah and Stiglitz (1992) and Anderson (1995).

distribution and procurement systems were substantially liberalized, but the policy was reversed when food price inflation reappeared in 1994: government grain procurement once again became compulsory. As well, a provincial governors' grain responsibility system was introduced in 1994-95, aimed at encouraging greater grain self-sufficiency at the provincial level. Then in 1998 the central government initiated a controversial policy change prohibiting individuals and private companies from procuring grain from farmers (who must deal solely with the commercial arm of grain bureaus and the grain reserve system), although allowing them to operate in wholesale and retail markets. Grain quota procurement prices were set more than 20 per cent higher than market prices, which meant a transfer in favour of those farmers able to sell at that price (Huang 1998; Lu 1999). Not surprisingly, stocks started to accumulate and procurement and market prices had to come down relative to international prices in 2000.

Despite these periodic cycles in the reform process, the proportion of retail commodities sold at market prices has kept rising. According to Lardy (2001), the share for agriculture was just 6 per cent in 1978 but had risen to 40 per cent by 1985, 79 per cent by 1995 and 83 per cent by 1999.

What have these policies meant for nominal rates of agricultural protection in China (the percentage by which domestic prices exceed prices at the country's border)? Tables 6 and 7 show recent estimates based on quota and negotiated procurement prices and on wholesale market prices since 1985 for selected agricultural commodities. The requirement that farmers submit a mandatory delivery quota at below market prices has represented a lump-sum tax on farmers and lump sum subsidy to the urban consumers lucky enough to get access at below-market value to that procured grain (Sicular 1988). Between 1990 and 1997 the average price they received for compulsorily delivered grains and soybean was between one-eighth and one-third below the border price. In the late 1990s, however, those prices were above the border price. Negotiated procurement prices were somewhat higher of course, but still lower than wholesale market prices. Wheat and cotton, China's main imported farm commodities, have received favourable treatment relative to rice. That is true not only in each price category shown in Table 6, but also in that a higher proportion of rice production is procured at the low quota procurement price. Meat products, by contrast, still appear to receive less than border prices (although price adjustments for differences in quality and degree of processing are difficult to make – see the note below Table 7). More-recent estimates by Huang and Rozelle (2001), however, take quality differences into account more carefully. Their preliminary estimates suggest there is less protection in place than Table 6 implies. In particular, wheat wholesale prices may be no higher and possibly even lower than import prices of similar-quality grain, and soybean prices only 15 rather than 40+ per cent above border prices.

In sum, despite substantial efforts to liberalize the price and market structure of China's agricultural sector, producers of major agricultural commodities continue to be penalized by commodity-specific policies of procurement. When the impact of the overvaluation of the domestic currency is also taken into account, the situation is even worse. It is therefore not surprising that many farm families have invested their surplus funds and labour in non-farm activities rather than back into agriculture (Table 5). Much of that investment has gone to rural township and village enterprises

(REs), whose employment, output and exports have boomed (Table 8). Despite that migration of farm workers to rural industrial and service activities (not to mention the illegal migration to urban jobs such as in construction), the average farm size and the share of farm household income from farming have fallen steadily since the late 1970s (final two columns of Table 8), and the per capita income differences between eastern, central and western provinces, shown in Table 9, have persisted or accentuated (see Kanbur and Zhang 2001).

Reform promises in China's WTO accession commitments

Whether the tendency for inequality to increase is accentuated or reduced by WTO accession depends heavily on the consequent reform's impact on farm relative to non-farm incentives. Many analysts have been expecting China to become ever-more dependent on agricultural imports in the course of the economy's rapid industrialization over the past two-plus decades. Some extremists (e.g., Brown 1995) have even suggested China could seriously deprive other developing countries of food. Yet as reported above, net food import growth has not yet happened, at least not in a sustained way, and China has continued to be a net exporter of meat, fish, fruit and vegetables (Table 4). Indeed on occasions in the latter 1990s, China also was a net exporter of grain and cotton. How much of that is due to government policies that constrain domestic demand, including though import restraints by state traders, is a moot point that has led China's trading partners to insist on two things following China's WTO accession: that there be (a) some imports of key farm products, and (b) some importing firms other than just state trading enterprises.

In its WTO Protocol of Accession, China has agreed to have no agricultural export subsidies, and to limit its domestic support to farmers to 8.5% of the value of production (compared with 10% for other developing countries). The import market access commitments China has made to WTO members look substantial on paper. Tariff rate quotas will be retained only on wheat, rice, maize, edible oils, sugar, cotton and wool, domestic production of which in aggregate comprises about one-sixth of China's agricultural GDP. As shown in Table 10, the in-quota tariff is only 1 per cent in most of those cases, and the quota volumes are to grow over the three years to 1 January 2004 at annual rates ranging from 5 to 19 per cent. Meanwhile, tariffs on out-of-quota sales will drop substantially on accession and fall further over the first three years, but even by 2004 they will still be a prohibitive 65 per cent for grains. In addition, there is to be a tariff-only regime on all other agricultural and food products whereby the tariff rates will be cut on accession and phased down to much-lower bound rates by 2004. Examples of tariff cuts are provided in Table 11.

A further commitment by China is that state trading monopolies will disappear (except for tobacco): even though some state trading enterprises will continue to operate, there will be an increasing degree of competition from private firms in the importing and exporting of farm products from now on.

Farmers and the rural sector more broadly will be affected also by China's commitment to provide improved and WTO-bound market access for industrial products. Mineral and manufacturing tariffs will be bound and generally reduced on a broad basis, with many tariffs falling to 10% or less. Tariffs will be cut on accession and further cuts will be phased in by 2005 (with some exceptions). Furthermore, for

industrial products, China will reduce significantly its non-tariff measures and eliminate all quotas, tendering and import licensing on non-farm merchandise by no later than 2005. Quotas on Chinese imports of automobiles and parts will grow by 15% annually from a level of around US$6 billion in 2000, and these quotas will be eliminated by 2005. For textiles and clothing, however, the current 'voluntary' export restraints will not be completely phased out until late this decade (end of 2008). Substantial commitments to open up services markets in China also have been made.

The changes in sectoral average scheduled tariff rates are summarized in Table 12. Over the 1990s the average for manufacturing initially exceeded but fell more than for agriculture, and by 2005 the manufacturing average will be well below that for agriculture. That does not give a true indication of the extent of change in protection that is taking place, though, for two important reasons. First, for some farm products and motor vehicles, the out-of-quota tariffs will probably be binding and so the extent of protection decline depends on the growth of in-quota imports. And second, in the 1990s many manufactures have been entering China at reduced or zero tariffs, to encourage foreign investment in processing of imported intermediate goods for subsequent export. Some agricultural products also have entered at less than the scheduled rate, including though smuggling.

What all this means for incentives for each industry is difficult to discern precisely, but it provides enough information to begin to analyse the distributional effects of WTO accession. We do so in two stages. First, we use a Ricardo-Viner model involving the minimum number of sectors necessary to get a sense of what will be the determinates of the effects of further trade reform on real factor rewards. This theoretical approach provides a conceptual understanding of what to begin to expect in the second stage, where we plan to use the more detailed GTAP numerical simulation model to put orders of magnitude on those and other effects.

A simple Ricardo-Viner model

In a recent paper, Carter and Estrin (2001) develop a model for examining the impact on China's factor markets of its forthcoming trade liberalization that assumes capital is sector-specific and labour is intersectorally mobile. That model has just two sectors, agriculture and non-agriculture, and the trade reform is assumed to lower the relative price of non-farm goods. If the economy started from equilibrium in the labour market, that price change would lower labour's wage in terms of farm goods and would cause labour to migrate from non-farm to farm activities.

If, however, the economy started from a situation in which farm workers had been constrained from migrating to non-farm employment, the wage in the non-farm sector would have exceeded that in agriculture. In that case, a fall in the relative price of non-farm products would lower (in terms of agricultural goods) the non-farm wage without changing the low farm wage. There would then be an additional gain from trade reform, namely from reducing the distortion in the labour market. If the government were to simultaneously remove the barrier to out-migration of farm labour, yet another welfare gain would accrue to the overall economy. Farm workers would benefit from trade reform alone in so far as they consume non-farm products

whose price is lower after that policy change. They would benefit even more if the restraint on their migration were to be lifted. Non-farm workers, however, would suffer wage cuts in terms of farm products from each of those two policy changes, cuts that may more or less than offset the fall in the price of non-farm products they consume. Carter and Estrin therefore conclude that China's rural-urban income inequality would be reduced from further trade liberalization and more so if the current policies that inhibit off-farm migration were relaxed.

Neat though that analysis is, it ignores several important real-world aspects of the Chinese situation. First, it is all rural residents, not just farm workers, who are disadvantaged when they move to urban areas. They are disadvantaged in at least two ways: they forego the right of access to farmland when they leave agriculture; and they do not get access to subsidized food and housing that registered urban workers receive. The latter is especially important, since those consumer subsidies allow urban employers to pay lower cash wages than otherwise would be needed to ensure comparability with rural wages.

Second, the starting point may not be as distorted as Carter and Estrin assume. This is partly because young rural workers do in fact migrate unofficially to urban jobs, so reducing the rural-urban wage gap. Also, as we saw from Table 5, intersectoral financial capital flows between rural and urban regions have been possible even if labour flows have been constrained. Therefore, the lower rewards to specific capital in urban areas because of the policies inhibiting rural out-migration ensure less investment in those areas than otherwise would have occurred. Nonetheless, an assumption of some gap between urban and rural wages as a result of government policies restricting migration to cities seems reasonable.

Third, labour in the rural areas is mostly unskilled, and so only industries that are intensive in the use of unskilled labour tend to develop there.

And fourth, the forthcoming trade reforms following WTO accession will cause some positive and some negative product price changes. Even if the average price of agricultural goods is taken as the numeraire, some farm product prices will fall as imports are liberalized (so the prices of others will rise relative to the numeraire). As well, the prices of textiles and clothing will rise when China's 'voluntary' export restraints on those items are removed. This is important because much textile and clothing production is intensive in the use of unskilled labour and so is able to be produced competitively in rural areas. Furthermore, while the prices of many tradable services that have been protected from import competition will fall, the demand for nontradables (many of which are services) will rise following the income gains from trade reform.

Does the Carter and Estrin conclusion, that WTO accession will reduce rural-urban income inequality, hold up when account is taken of the above real-world features?

To answer that, think of a model of the Chinese economy that has two regions, rural and urban, both of which employ unskilled labour. Assume also that skilled labour is only available in urban areas, and that physical capital is specific to each of the three sectors: agriculture, rural non-farm industries, and urban industries. The market for unskilled labour can then be depicted as in Figure 1, where the value of the marginal product of unskilled labour in the rural area is VMP_R and is measured on the left-hand

vertical axis: it declines as the quantity of (unskilled) labour employed in that region, measured along the horizontal axis from O_R, rises. Superimposed on that space is a mirror image of the value of marginal product curve for unskilled labour employed in the urban area, VMP_U, with O_U set such that the length of the horizontal axis is the total amount of unskilled labour available in the economy.

The point where the two VMP curves cross, at E, would be the equilibrium in the absence of policy restraints on labour migration. But if only L_QO_U unskilled workers were permitted in urban areas, their wage would be w_U in cities – while the remaining workers would earn only w_R in rural areas. The area beneath the stepped wage line w_RBAw_U is the total wage earnings of unskilled labour as a group; the triangular area above the wage line and below RB is the return to specific capital owners in rural areas, and the triangular area above the wage line and below AU is the return to urban owners of specific capital (including human capital in the case of skilled workers). The sum of those three areas, that is, the total area below RBAU and above the horizontal axis, is the value of gross domestic product for the economy as a whole. It is less than it would be without the labour market intervention to the extent of area ABE.

If the vertical axes are expressed in units of agricultural products, and the marginal physical product of unskilled labour in agriculture is given by MP_A, then $VMP_R = MP_A + MP_{RN}.P_{RN}/P_A$ and $VMP_U = MP_U.P_U/P_A$ where RN refers to rural non-farm. At the initial wage w_R there are O_RL_A unskilled workers employed in agriculture and L_AL_Q employed in rural non-farm industries.

What will happen following the policy changes associated with WTO accession? The discussion in the previous section suggests the key effects on domestic producer prices of tradable products will be a rise in prices of textiles and clothing, and a fall in prices of automobiles, other manufactured goods and numerous tradeable services, all relative to the price of agricultural products. That shifts the VMP_R curve upwards while not changing the MP_A curve. The VMP_U curve could shift either way following those price changes, but is more likely to shift down the smaller the average price rise for textiles and clothing relative to the average price fall for other non-farm tradable products produced in urban areas that will face greater import competition following WTO accession.

Since both the urban and rural regions are also home to numerous industries producing nontradable products, their price changes also need to be considered. Two sets of forces influence them (Corden 1984): one is the effect of the change in wages on costs of production of nontradables in each region; the other is the increase in the demand for nontradables by domestic consumers who spend the gains from trade liberalization. In rural areas where w_R rises, the price of nontradables unequivocally rises which shift VMP_R further upwards. In urban areas, even if w_U falls the price of nontradables could rise because of the positive spending effect of liberalization.

Taking all these forces are taken into account, the impact of WTO accession is less certain than in the Carter and Estrin analysis. Nonetheless, several points can be made.

First, provided the shifted VMP curves still intersect to the left of L_Q in Figure 1, then a gap between urban and rural wages for unskilled labour will remain but it will be less the more the VMP_R curve shifts up and the more the VMP_U curve shifts down (or the less it shifts up). In the case depicted by dashed lines in Figure 1, the wage gap narrows from AB to CD. Returns to specific capital in rural areas also rise in terms of agricultural goods, from RBw_R to $R'Dw_R'$, while returns to owners of specific capital in urban areas, again in terms of agricultural goods, fall from UAw_U to $U'Cw_U'$. How those returns change in terms of non-farm products is an empirical question that depends on the different factor owners' consumption patterns, since some of those product prices rise and others fall (the neoclassical ambiguity – see Ruffin and Jones 1977). But given that rural capitalists (including landholders) tend to be much poorer than urban capital owners (including skilled workers) in China, this result together with the narrowing of the unskilled wage gap would unequivocally reduce rural–urban income inequality (the recent extent of which is evident in Tables 13 and 14).

Second, the overall gain from trade would be greater in this case than if there had been no labour market intervention. This can be seen in Figure 1: instead of a deadweight loss associated with that policy of area ABE, after accession it is only CDF.

Third, notwithstanding the improvement in rural areas, agriculture would be squeezed by these changes. The rise in the rural wage would cause $L_A'L_A$ less workers to be employed on farms and would reduce the total return to agricultural capital (mainly farmland) by $w_R'w_RHG$. Within the agricultural sector, however, there would be industries whose product price had fallen (relative to P_A) because of increased import competition, and others whose product price had risen relative to the average price for the sector (the numeraire). Assuming agricultural capital, like unskilled labour, can be used in any farm pursuit, then a relative price fall for some land-intensive crops facing greater import competition will encourage resources to move to other, more labour-intensive agricultural products. It is possible, therefore, that some farm industries could expand, notwithstanding the Rybczynski-type effects of the out-migration of farm workers to non-farm rural activities, and even though the agricultural sector as a whole shrinks. Moreover, farm households need not be worse off as a consequence of WTO accession. Their lot will have improved the more some of their household members have been able to earn higher rewards in rural non-farm enterprises as workers and/or as owners of specific capital.

Clearly, empirical analysis is needed to ascertain even the directions of some of the effects mentioned above, let alone their magnitudes. The next section describes how we intend to go about that.

Using the GTAP model

For the empirical part of this study, use is to be made of the projections version of the GTAP (Global Trade Analysis Project) applied general equilibrium global model based in Purdue University (Hertel 1997). The GTAP model is a standard, multi-region model that is currently in use by several hundred researchers in scores of countries on five continents. The Version 5 data base builds on contributions from many of these individuals, as well as the national and international agencies in the GTAP Consortium.

Perfect competition and constant returns to scale are assumed for all sectors in the version to be used here.

The model utilizes a sophisticated representation of consumer demands that allows for differences in both the price and income responsiveness of demand in different regions depending upon both the level of development of the region and the particular consumption patterns observed in that region. On the supply-side, differences in rates of factor accumulation within and between countries interact with different sectoral factor intensities to drive Rybczynski-type changes in the sectoral composition of output. The GTAP production system distinguishes sectors by their intensities in four primary factors of production: agricultural land, unskilled labour, skilled labour, and physical capital. Thus in a region such as China where physical capital is accumulating rapidly relative to other factors, we can expect the capital-intensive sectors to expand at the expense of labour-intensive sectors over time in the course of normal economic growth.

The GTAP framework is built on a complete set of economic accounts for 1997 for each of 66 economies/regions spanning the world (see www.gtap.org). It incorporates an exhaustive description of inter-industry linkages between the 57 sectors in the model. In addition to differences in intermediate input intensities, import intensities are also permitted to vary across uses. Since much trade is in intermediate inputs, the distinction between sales to final consumers and sales to other firms can be quite important. Lowering the cost of imported goods to consumers is quite different from lowering the cost of intermediate inputs to domestic firms that may be competing with imports in the final product market.

As well, products are differentiated by place of production. The linkage between the different prices of a product is typically quite strong, but will depend on the degree of substitutability in consumption. In addition to matching up more effectively with reality, this approach has the advantage of permitting bilateral trade to be tracked, as opposed to simply reporting total exports net of imports. The model is solved with GEMPACK software, ~~as~~ described in Harrison and Pearson (1996).

Version 5 of the GTAP model's data base is for 1997. Using estimates of the tariffs in place at the start and conclusion of Uruguay Round implementation and projections of growth in factor endowments, productivity and population to 2005 (based mainly on World Bank numbers), it is possible for the GTAP model to project the world's economies forward to that date assuming China does not join the WTO (in which case we assume China's policies would remain unchanged from 2001). That projection can then be compared with what the world would be like with China fulfilling during 2002-2005 its reform commitments to the WTO. Huang and Rozelle (2001) are currently completing a set of domestic-to-border prices for agricultural products in China in 2001, taking into account marketing margins and quality differences between imported (or exported) goods and domestic goods in various locations within China. Among other things, the price differentials should reflect the impact of any quantitative distortions to farm product trade imposed through the state trading agencies. It should also note the difference between infra-marginal and marginal prices in the cases of rice, wheat, maize and soybean (evident in Table 6) because, while the former affect total farm income, only changes in the latter affect production decisions (Sicular 1988).

The next task is to convert the policy measures that are to come into force by 2005 following WTO accession into cuts in tariff equivalents and to quota restrictions, to concord with the first 26 items (excluding 13-18) in the GTAP Version 5 list of commodities. Earlier analysts (e.g., Ianchovichina and Martin 2001) simply assumed China's agricultural commitments to WTO would have no influence on agricultural prices, pending better information. What does the finalized commitment, as summarized earlier in this paper, suggest about the extent of farm import liberalization that would occur? For some farm products there is a great deal of 'water' in current bound tariffs. For others, alternative trade barriers (such as sanitary and phytosanitary measures) may be put in place as substitutes for the existing barriers to be lowered. For TRQ-restricted items, it may be reasonable to simply assume there will be no out-of-quota imports (not least because China could allocate TRQs to countries unlikely to be competitive enough to fill them). China can also provide domestic price supports up to a limit of 8.5 per cent of the aggregate value of agricultural production (its *de minimus* exemption under Article 6.4(b) of the UR Agreement on Agriculture). And it could perhaps treble the current subsidies to farm inputs if the government so chose (under Article 6.2 of the UR Agreement on Agriculture). All of those options mean that major reductions in agricultural protection should not be expected by 2005.

Together with the projected changes in China's non-agricultural policies it is then possible to generate a new GTAP scenario involving China's WTO accession. The comparison between the changes that take place between 2001 and 2005 in that scenario as compared with the base scenario will then provide the effects of China's WTO accession on its sectoral production, consumption, imports, exports (hence self-sufficiency levels), employment, and product and factor prices, as well as on aggregate economic welfare.[3]

For the next step, the NBS household survey data for rural areas (Chen Shaohua 2001) can be used to estimate the shares of different (say) quintiles or deciles of households' incomes from different factors and government transfers (net of taxes), and the shares of their expenditure on different products. This information potentially could then be used, in conjunction with the GTAP results, to infer the effects of WTO accession on the distribution on income within the rural areas and between rural and urban areas in aggregate, and in particular on the incidence of rural (and urban) poverty (see Hertel 2000; Hertel et al. 2000; and Friedman 2000).[4] Compensating variations in income would be used, taking care ideally to include non-monetary consumption such as owner-occupied housing services, self-produced food and, in the case of some non-farm households, consumer subsidies such as for food, medical and child care, etc.

[3] The importance of taking into account normal economic growth and the structural changes it generates over the period of implementation of WTO commitments is crucial, because earlier empirical studies demonstrate that those normal adjustments dwarf the relatively small changes brought about by trade policy changes. See, for example, Anderson et al. (1997a,b).

[4] That method holds constant the shares of household income from different sources and the household's expenditure shares, thereby providing an upper limit on any detrimental effect of reform and a lower limit on its benefits. That method also does not take into account regional differences in price changes, but rather simply assumes the national average price change for each product applies throughout the country. Also needed would be the shares of each GTAP sector's output that is located in rural areas. That too would have to be assumed constant in the transition, again underestimating the changes that in fact would take place.

Having identified the gainers and any losers from the reform commitments under WTO accession, we need to draw on our understanding of the political economy of economic policy formation in China to anticipate what additional policy changes might be forthcoming in response to implementing WTO accession commitments. In the case of food, especially grain, that response will hinge heavily on the impact of accession and general economic growth on self-sufficiency levels regionally and nationally. The final task is then to analyse the consequences, including for poverty and food self-sufficiency (and thereby food security, drawing on Huang 2001 and Anderson 2001), of two additional sets of policy changes: (i) those responses anticipated because of political economy forces, and (ii) other policy reforms that might be needed to meet society's economic, social and environmental objectives.

Expected findings

This work-in-progress is far from complete, but the following are some of the expected conclusions:

- Real domestic producer and consumer prices of farm products will be affected only modestly by WTO accession;

- Rural incomes will rise on average, both absolutely and relative to urban incomes;

- Some farm households facing increased import competition may be worse off, ceteris paribus, because they are located in areas that are too distant from expanding industrial and service activities to benefit directly from that expansion and are too poorly served with infrastructure to attract such activities to their own region or to diversify into producing farm goods whose relative price has risen, or because they do not have relatives able to repatriate earnings to them;

- The incidence of rural poverty will fall, mainly because of the growth in wages for unskilled workers in rural non-farm activities, but less so in hinterland provinces a long way from markets and in regions poorly served with the necessary infrastructure to attract investment in such activities as textiles and clothing;

- National self-sufficiency in food will not fall overall, given the small degree of reduction in agricultural supports expected by 2005 and the scope for export growth in labour-intensive farming industries that require little land (SPS barriers abroad permitting); and

- National self-sufficiency in feed and fibre will fall as the demand for livestock products grows with income gains from trade reform and as exports of those products and of textiles and clothing expand.

Possible policy implications

If some farmers' incomes are to worsen relative to those of non-farm households, and if there is no improvement (or, worse, a fall) in agricultural self sufficiency, two of the most obvious responses have to do with R&D/infrastructure investments and grain marketing. First, the government might consider further investments in agricultural research and in basic rural education and health services and rural infrastructure to reduce the adverse effect of trade reform on poverty incidence and perceived food security.[5] Second, the government might reduce its regulation of grain marketing and in particular reduce or eliminate compulsory procurement at less than market prices and/or reduce the provision of grain to urban consumers at less than market prices. It might also look to ways to free the mobility of labour, to make it easier for those in depressed rural areas to seek work in urban areas.

As well, once China is in the WTO it will have the opportunity to take part in new rounds of multilateral trade negotiations whereby it can seek increased market access for its exports of farm (and other) products. While not taken into account in the present paper, if WTO membership enhances China's chances of expanding its access to agricultural more than other markets abroad in the future, this is an additional benefit of WTO accession for China's farmers and rural areas. Martin (2002) points out that Chinese farm exports face particularly high barriers abroad, so this benefit is non-trivial in principle (although in practice it may be difficult to secure, especially if the main barriers are SPS measures).[6]

[5] In that connection, an important policy issue is whether China chooses to deny itself the use of GMOs in food production. If our results suggest China would be exporting very little food post-WTO accession and beyond, there is less sense in banning food GMOs in China if such a ban were to be imposed because of fears of otherwise being denied access into food markets abroad (see Anderson and Yao 2001).

[6] There is also the question of how China's membership will alter the relative strengths of liberal versus protectionist forces in the next WTO rounds of multilateral farm trade negotiations. Mathews (2002) argues that China's accession is likely to affect both sides, so the net effect is difficult to discern a priori.

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Table 1: Growth rates of China's economy, 1970 to 2000

(per cent per year)

	Pre-reform	Reform period		
	1970-78	1979-84	1985-95	1996-00
Gross domestic product	**4.9**	**8.5**	**9.7**	**8.2**
Agriculture	2.7	7.1	4.0	3.4
Industry	6.8	8.2	12.8	9.6
Service	na	11.6	9.7	8.2
Food production volume				
Grain	2.8	4.7	1.7	0.03
Oilseed crops	2.1	14.9	4.4	5.6
Fruit	6.6	7.2	12.7	8.6
Red meat	4.4	9.1	8.8	6.5
Fish	5.0	7.9	13.7	10.2
Value of output of non-farm rural enterprises	na	**12.3**	**24.1**	**14.0**
Population	1.80	1.40	1.37	0.90
Per capita GDP	**3.1**	**7.1**	**8.3**	**7.1**

Note: Figures for GDP in 1970-78 are the growth rate of national income in real terms. Growth rates are computed using the regression method. Growth rates of individual and groups of commodities are based on volume of production data, while sectoral growth rates refer to value added in real terms.

Source: SSB, *Statistical Yearbook of China*, various issues; MOA, *Agricultural Yearbook of China*, various issues.

Table 2: The changing structure of China's economy, 1970 to 2000

(per cent, based on current prices)

	1970	1980	1985	1990	1995	2000
Share of GDP						
Agriculture	40	30	28	27	20	16
Industry	46	49	43	42	49	51
Services	13	21	29	31	31	33
Share of employment						
Agriculture	81	69	62	60	52	50
Industry	10	18	21	21	23	23
Services	9	13	17	19	25	27
Share of agricultural output						
Crops	82	76	69	65	58	56
Livestock	14	18	22	26	30	30
Fish	2	2	3	5	8	10
Forestry	2	4	5	4	3	4
Share of population that is rural	83	81	76	72	71	64

Source: State Statistical Bureau, *China Statistical Yearbook*, various issues; and *China Rural Statistical Yearbook*, various issues.

Table 3: China's grain production, consumption and trade, 1980 to 1998

(million tons)

	1980-89	1990-94	1995-98
Production	332	396	442
Net imports	8	-1	6
Change in stocks	1	11	45
Consumption	**339**	**384**	**403**
Food -- urban	*35*	*42*	*44*
Food -- rural	*177*	*190*	*191*
Feed	*64*	*86*	*98*
Other (seed, industrial use, waste)	*63*	*66*	*70*

Source: Huang (2001), based on SSB publications and the CCAP database.

Table 4: Structure of China's food and feed trade (US$ million), 1980 to 1999

	SITC	**1980**	**1985**	**1990**	**1995**	**1999**
EXPORTS:						
Live animals	00	384	304	430	473	374
Meat	01	361	448	791	1,349	1,054
Dairy products	02	71	57	55	61	71
Fish	03	380	283	1,370	2,875	2,969
Grains	04	423	1,065	614	281	1,273
Fruit and veg.	05	746	825	1,759	3,399	3,150
Sugar	06	221	79	317	321	214
Coffee and tea	07	328	435	534	523	561
Animal feeds	08	58	241	623	351	239
Other foods	09	49	66	107	290	541
Oilseeds	22	na	na	na	522	373
Vegetable oils	4	na	na	na	454	132
TOTAL FOOD		**3,021**	**3,803**	**6,600**	**10,899**	**10,951**
IMPORTS:						
Live animals	00	5	18	14	18	22
Meat	01	1	6	54	97	503
Dairy products	02	5	31	81	60	160
Fish	03	13	44	102	609	890
Grains	04	2,458	982	2,353	3,631	574
Fruit and veg.	05	48	52	83	185	384
Sugar	06	316	274	390	935	183
Coffee and tea	07	56	40	30	74	72
Animal feeds	08	14	83	182	423	620
Other foods	09	2	23	46	92	182
Oilseeds	22	na	na	na	110	1,531
Vegetable oils	4	na	na	na	2,596	1,352
TOTAL FOOD		**2,918**	**1,553**	**3,335**	**8,828**	**6,474**
NET EXPORTS:						
Live animals	00	379	286	416	455	352
Meat	01	360	442	737	1,252	551
Dairy products	02	66	26	-26	1	-89
Fish	03	367	239	1,268	2,266	2,079
Grains	04	-2,035	83	-1,939	-3,350	663
Fruit and veg.	05	698	773	1,676	3,214	2,766
Sugar	06	-95	-195	-73	-614	31
Coffee and tea	07	272	395	504	449	489
Animal feeds	08	44	158	441	-72	-381
Other foods	09	47	43	61	198	359
Oilseeds	22	na	na	na	412	-1,158
Vegetable oils	4	na	na	na	-2,142	-1,220
TOTAL FOOD		**103**	**2,250**	**3,265**	**2,071**	**4,477**

Source: Mathews (2002), based on UN COMTRADE statistics.

Table 5: Capital flows (billion yuan in 1985 prices) from agriculture to industry and from rural to urban areas through fiscal, financial and grain procurement systems, 1978 to 1996

	Fiscal system		Financial system		Grain	Net cash flow from	
	Agric to Industry	Rural to urban	Agric to Industry	Rural to Urban	Marketing (implicit tax)	Agric to Industry	Rural to Urban
1978	-15.2	-12.4			17.9	2.6	5.4
1980	-13.8	-10.8	5.0	1.6	16.6	7.7	7.3
1985	-6.6	4.2	8.3	2.5	5.6	7.3	12.4
1990	-11.2	5.8	19.5	11.9	15.5	23.8	33.2
1995	-7.4	44.4	18.3	10.0	18.1	29.0	72.4
1996	-6.5	42.2	15.7	9.8	11.8	21.0	63.8

Note: Note: Net capital flows from agriculture to industry through Agricultural Bank of China, Agricultural Development Bank of China and Rural Credit Cooperative are based on the following formula:
$[(\text{agricultural enterprises' saving})_t - (\text{agricultural enterprises' saving})_{t-1}] + [(\text{farmer's saving})_t - (\text{farmer's saving})_{t-1}] - [(\text{loan to agriculture})_t - (\text{loan to agriculture})_{t-1}]$;

Net capital flows from rural to urban areas are based on the following formula:
$[(\text{TVE's saving})_t - (\text{TVE's saving})_{t-1}] + [(\text{agricultural enterprises' saving})_t - (\text{agricultural enterprises' saving})_{t-1}] + [(\text{farmer's saving})_t - (\text{farmer's saving})_{t-1}] - [[(\text{loan to agriculture})_t - (\text{loan to agriculture})_{t-1}]]$.

Source: Huang and Ma (1998).

Table 6: Nominal protection rates (NPR) for grain, China, 1978 to 2000

	Quota procurement price				Negotiated procurement price				Wholesale market price			
	Rice	Wheat	Maize	Soy-Bean	Rice	Wheat	Maize	Soy-bean	Rice	Wheat	Maize	Soy-bean
NPR at official exchange rate												
1978-79	-42	15	12	2	-6	72	65	22	10	89	92	40
1980-84	-43	-3	-15	13	2	50	28	25	9	58	46	44
1985-89	-30	4	-13	-13	-5	34	17	15	-4	52	37	39
1990-94	-37	-14	-35	-32	-16	14	-7	7	-7	30	12	26
1995-97	-23	-12	-14	-22	-4	6	3	8	-1	19	20	19
1998-00	-3	10	22	33	-16	9	19	39	-6	26	32	49
1998	2	16	33	8	-16	5	26	37	-6	22	40	37
1999	-6	22	30	53	-19	12	20	59	-9	30	33	67
2000	-4	-7	2	38	-13	9	11	21	-2	26	23	44
NPR at “black” market real exchange rate												
1978-79	-61	-23	-26	-32	-37	14	10	-19	-27	26	28	-6
1980-84	-53	-20	-30	-6	-16	23	5	3	-11	30	20	19
1985-89	-46	-21	-33	-32	-29	-1	-12	-12	-27	11	2	5
1990-94	-50	-31	-48	-45	-33	-9	-26	-15	-26	5	-10	0
1995-97	-25	-15	-17	-25	-7	3	0	5	-4	15	16	15
1998-00	-6	6	17	28	-19	5	14	34	-9	21	27	44
NPR at effective real exchange rate												
1978-79	-73	-46	-48	-52	-56	-20	-23	-43	-49	-12	-10	-34
1980-84	-73	-54	-60	-47	-52	-30	-40	-41	-49	-26	-32	-32
1985-89	-69	-54	-61	-61	-58	-42	-48	-49	-57	-34	-40	-38
1990-94	-70	-59	-69	-67	-60	-46	-55	-49	-56	-38	-46	-40
1995-97	-45	-38	-38	-45	-32	-25	-27	-24	-30	-16	-15	-16
1998-00	-26	-16	-7	2	-36	-17	-9	6	-28	-4	1	14

Note: Border prices are averages prices of exports (rice and some time maize) or imports (wheat, soybean and some time maize) for the varieties that are comparable with domestic grains. Data for 2000 are for the first 6 months of that year.

Source: Huang (2001).

Table 7: Nominal protection rates (NPR) for cotton and livestock products, China, 1997 to 1999

	Cotton	Pork	Beef	Chicken
		NPR at official exchange rate		
1997	20	-19	-2	-34
1998	11	-25	-10	-37
1999	4	-17	24	-30
1997-99	12	-20	4	-33
		NPR at "black" exchange rate		
1997	15	-22	-6	-36
1998	7	-28	-13	-39
1999	0	-20	19	-32
1997-99	8	-23	0	-36
		NPR at effective real exchange rate		
1997	-11	-40	-28	-51
1998	-17	-45	-33	-53
1999	-20	-37	-5	-46
1997-99	-16	-40	-22	-50

Note: Export prices of pork, beef and chicken, and import prices of cotton are used as border prices. Domestic prices are prices at urban wholesale markets. The cotton wholesale price is estimated as the state procurement price times 1.25. A factor of 0.9 is used for quality adjustment of chicken meat.

Source: Huang (2001).

Table 8: Farm and rural enterprise (RE) development in China, 1980 to 1999

	RE's share in rural labour (%)	RE's share in total GDP (%)	RE's share in total export (%)	Farm land size (ha/farm)	Non-farm income share (%)
1980	9	4	0	0.56	17
1985	19	9	15	0.51	25
1990	23	14	43	0.43	26
1995	34	25	48	0.41	37
1999	35	30	48	0.40	47

Source: SSB, *Statistical Yearbook of China*, and *China's TVE's Yearbook*, various issues.

Table 9: Income and employment differences across regions of China, 1998

	Income per capita (Yuan)	% of population that is rural	% of labour force that is in agriculture
Eastern Provinces	9,690	71	45
Central Provinces	5,280	75	55
Western Provinces	4,090	81	64

Source: Carter and Estrin (2001).

Table 10: China's market access commitments on farm products subject to tariff rate quotas

	Import volume (MMT)					Out-of-quota tariff (%, as of 1 January)		
	Actual 2000	Quota 2002	Quota 2004	Quota growth (%pa)	In-quota tariff (%)	2001	2002	2004
Rice		3.3	5.3	19	1	114	74	65
Wheat		7.9	9.6	7	1	114	74	65
Maize		5.2	7.2	13	1	114	74	65
Cotton		0.78	0.89	5	1	90	62	40
Wool		0.31	0.37	5	1	42	38	38
Edible oils		5.0	7.9	15	9			9
Sugar		1.7	1.9	8	20	90	72	50

Source: Schedule CLII of China's WTO *Protocol of Accession*, November 2001.

Table 11: Bound tariffs on imports of farm products subject to tariff-only protection in China following its WTO accession

(%, as of 1 January)

	2001	**2002**	**2004**
Barley	114	3	3
Soybean	114	3	3
Vegetables and fruits	30-50	13-29	10-15
Beef	45	32-35	12-25
Pork, sheepmeat	23	20	15
Poultry meat	20	17	12
Dairy products	50	20-37	10-12
Wine	65	45	14
Tobacco	34	28	10

Source: Annex 1 of China's WTO *Protocol of Accession*, November 2001.

Table 12: Scheduled average tariffs on imports, China, 1992 to 2005

(per cent)

	Agriculture		Manufacturing	
	Simply	Weighted	Simply	Weighted
1992	36	22	45	47
1994	32	20	38	41
1996	25	20	23	23
1998	18	20	17	19
2000	22	20	17	13
2005	17		7	

Source: Ianchovichina and Martin (2001).

Table 13: Income and its distribution, rural and urban China, 1980 to 1999

Year	Real per capita income index		Gini coefficient	Real per capita net income (in 1999 yuan)		
	Rural	Poorest 20%		Rural	Urban	Urban/rural ratio
1980	100	100	0.24	616	2062	3.4
1985	189	165	0.26	1193	2605	2.2
1990	218	177	0.31	1380	3217	2.3
1995	272	193	0.33	1702	4713	2.8
1999	349	252	0.35	2210	5854	2.7

Note: The exchange rate was 8.28 yuan/US$ in 1999.

Source: SSB, 1989-2000, and rural household income and expenditure surveys.

Table 14: Rural poverty in China, 1978-99.

Year	Rural Population (million)	Absolute number in poverty (million)	Incidence (% of total rural population)
1978	780	260	32.9
1979	790	239	30.2
1980	790	218	27.6
1981	796	194	24.4
1982	799	140	17.5
1983	802	123	15.3
1984	807	89	11.0
1985	808	96	11.9
1986	811	97	11.9
1987	816	91	11.2
1988	824	86	10.4
1989	832	103	12.4
1990	841	85	10.1
1991	853	94	11.0
1992	848	80	9.4
1993	852	75	8.8
1994	855	70	8.2
1995	859	65	7.6
1996	864	58	6.7
1997	866	50	5.6
1998	869	42	4.8
1999	870	34	3.9

Sources: Huang (2001), drawing on poverty data for 1978—1989 from World Bank (*China: Strategies for Reducing Poverty in the 1990s*, 1992; 1990—1999 data from *China Agricultural Development Report*, various issues, MOA; Rural population from SSB, *Statistical Yearbook of China*.

Table 15 Regional, factor and commodity aggregation

A. Regional Aggregation	C. Commodity Aggregations
1. NAmerica – Canada, U.S. and Mexico	1. Rice – Paddy rice, Processed Rice
2. WEurope – Western Europe	2. Wheat
3. AusNZL – Australia and New Zealand	3. Feedgrains – Other cereal grains
4. Japan	4. Oilseeds
5. China	5. Sugar – Sugar, sugar cane, sugar beet
6. Taiwan	6. Plantfibers – Plant-based fibers
7. OthNICs – Hong Kong, Korea, Singapore	7.Lstkdairy – Livestock, Animal products, Raw Milk, Wool, Silk-worm cocoons, Meat products, Dairy products
8. Indonesia	
9. Vietnam	
10. OthSEA – Malaysia, Philippines, Thailand	8. Othfood – Vegetables, fruit, nuts, Other crops, Vegetable oils and fats, Other food products
11. India	9. Bevtobac – Beverages and tobacco Products
12. OthSoAsia – Pakistan, Sri Lanka, Bangladesh, and Rest of South Asia	10. Extract – Forestry, Fishing, Coal, oil, gas, Other Minerals
13. Brazil	11. Textiles – Textiles
14. OthLatAm – Other Latin America	12. Wearapp – Wearing apparel
15. Turkey	13. Leather – Leather products
16. OthMENA–Other Middle East and North Africa	14. Pchemicals – Petrochemical products
17. EIT – Economies in Transition	15. Metals – Metals and metal products
18. SoAfrCU – South African Customs Union	16. Autos – Motor vehicles and parts
19. OthSSA – Other Sub-Saharan Africa	17. Electronics – Electronics equipments
20. ROW – Rest of World	18. Othmnfcs – Other manufactures: Wood products Paper products, publishing, Transport equipment other than motor vehicles, other manufactures
	19. Tradetrans – Trade and transport
	20. Construction – Construction
B. Endowments	21. Communic – Communication
1. Land	22. Commserv –Insurance, Other financial services, Other business services, Dwellings
2. Unskilled Labor	
3. Skilled Labor	23. Otherserv – Electricity, Gas, Water, Public administration/defence/health/education, recreation and other services
4. Capital	
5. Natural Resource Factor	

Figure 1: The market for unskilled labour in China