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Will China's WTO accession worsen farm household incomes?

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Abstract

Many fear China's accession to the World Trade Organization (WTO) will impoverish its farmers via greater import competition in its agricultural markets. We explore that possibility bearing in mind that, even if producer prices of some (land-intensive) farm products fall, prices of other (labor-intensive) farm and nonfarm products could rise. New estimates, from the global, economy-wide numerical simulation model known as Global Trade Analysis Project (GTAP), of the likely changes in agricultural and other product prices as a result of WTO accession, are drawn on to examine empirically the real income implications of China's WTO accession. The results suggest farm–nonfarm income inequality may well rise within China but rural–urban income inequality need not. The article concludes with some policy suggestions for alleviating any pockets of farm household poverty that may emerge as a result of WTO accession.

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1. Introduction

After 15 arduous years of negotiations, China acceded to the World Trade Organization (WTO) at the end of 2001. During those negotiations, China was continually opening up

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and reforming its economy, and further reforms will be introduced over the next few years to fulfill the legal obligations China has committed to in its WTO Protocol of Accession (WTO, 2001). Such reform necessarily involves structural adjustments by households, firms, and bureaucracies, and while the economy as a whole can gain substantially from those adjustments, losses and even hardship can result for some households unless complementary domestic policies are in place to facilitate adjustment and/or compensate losers. This underscores the importance of first analyzing 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 China's case is that the reforms may cause farm incomes to fall, exacerbating the rise since the mid-1980s in farm–nonfarm and inland–coastal aggregate income inequality and possibly reversing the decline since the late 1970s in rural poverty (reported by Kanbur & Zhang, 2001).

The policy changes still to be made to fulfill its WTO obligations include major changes in China's farm trade policies by 2005—protection cuts that appear far greater, and faster, than any other developing country was required to commit to in the Uruguay Round Agreement on Agriculture. With one quarter of rural households in China living on less than \$1 a day in 1999 (cf. 1% of urban households) such that more than three quarters of all poor Chinese people live in rural areas (Chen, 2003), concerns about the impact of WTO accession on rural poverty are understandable. However, while imports of numerous land-intensive farm products may well increase, reduced protectionism may also boost output and exports of some labor-intensive farm products in which China still has a comparative advantage.² 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. 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 labor-intensive products—both farm and nonfarm—and thereby boost the earnings of unskilled laborers including those currently or recently employed on farms.

To assess the impact on farmer incomes and on rural areas of the remaining reforms required to meet China's commitments to the WTO membership, this article provides some indication of the likely effects on different factor markets and hence on the welfare of different types of farm households of the reforms to be implemented between 2002 and 2007. Even the direction, let alone the magnitude, of some of the effects cannot be discerned from theory (McCulloch, Winters, & Cirera, 2001), so we use the numerical simulation model known as Global Trade Analysis Project (GTAP) to address these issues. The experimental design goes beyond previous studies (see the survey by Gilbert & Wahl,

² The difficulties China has had in exporting food products to, for example, Japan, Korea, and the United Kingdom in recent years because of those countries' quarantine/SPS measures should ease following WTO accession, or at least be challengeable under WTO Dispute Settlement provisions. Since those measures are notoriously difficult to predict, they are ignored in our empirical analysis (as are prospective changes to other nontariff measures that may limit China's access to foreign markets for farm or nonfarm products). So too is the possibility that China itself may use quarantine measures to limit its imports of farm products. These points are taken up in the final section of the article.

2002) in several respects: it focuses just on the liberalization required to meet China's WTO accession commitments from 2002 (by projecting the GTAP database to 2001 with China's prior reforms and all countries' Uruguay Round commitments implemented); it incorporates new estimates of nominal rates of agricultural protection as of 2001 and at the end of accession; it takes account of existing duty drawbacks so as not to overstate the extent of reform; it binds the government budget by adding a uniform consumption tax to offset the loss of tariff revenue (rather than pretend that existing government programs could be financed with less tax revenue); it takes account of differences between farm and nonfarm unskilled labor; and it examines the real income effects on different types of farm households that result from the intersectoral movement of unskilled labor.³ The article concludes by drawing out implications for Chinese policy makers wishing to preempt any decreases in food security or farm incomes as a consequence of WTO accession.

2. The setting: Recent and prospective policies affecting rural areas

As in most developing countries,⁴ 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 (Huang & Ma, 1998). More recently, mandatory grain delivery quotas have been scrapped and policies have favored an increasing number of agricultural industries, but others remain discouraged. As a result, nominal rates of agricultural protection in China (the percentage by which domestic prices exceed prices at the country's border) have been both positive and negative in recent years.

Table 1, which shows new estimates by Huang, Rozelle, and Chang (2004) of nominal protection rates for key agricultural commodities, suggests that rice, meat, fish and fruit, and vegetables have been priced at less than border prices recently while other grains, oilseeds, sugar, cotton, and milk have been priced at one fifth to two fifths above border prices. Maize and cotton also enjoyed export subsidies in 2001 (amounting to one third and one tenth of FOB prices, respectively). That table also shows what China has committed to in its WTO Protocol of Accession: tariff rate quota will apply to grains, sugar, and cotton for which out-of-quota tariffs are quite high, but otherwise, after the phase-in period, the tariffs range between just 1% and 15%—representing substantial liberalizations over 2001 levels. As well, producers of major crops may continue to be affected by commodity-specific policies of government procurement of a portion of the crop at lower than market prices (as in the past—see Sicular, 1988) or at higher than market prices (as in 1998—see Huang, 1998).

³ CGE studies such as this one also go beyond detailed farm sector partial equilibrium studies (e.g., Huang, Li, & Rozelle 2003) that cannot show impacts in nonfarm sectors. A more recent CGE study of China's WTO accession by Wang (2003) provides yet another example of a paper that focus on important national and international consequences but to the relative neglect of intranational distributional effects.

⁴ See Sah and Stiglitz (1992) and Anderson (1995).

Table 1
NRPs (applied tariff or tariff equivalent), agricultural products, China, 1995–2007 (%)

	1995	1997	2001	2007 in-quota tariff	2007 out-of quota tariff	Assumed NRP in 2007 (core scenario)
Rice	–5	–5	–3	1	65	–3
Wheat	25	17	12	1	65	12
Coarse grains	20	28	32	1	65	32
Vegetables and fruit	–10	–8	–4	11	11	–4
Oilseeds	30	28	20	3	3	3
Sugar	44	42	40	15	50	20
Cotton	20	17	17	1	40	20
Meats	–20	–19	–15	12	12	–15
Milk	30	30	30	11	11	11

Source: Based on research subsequently reported in summary form by Huang, Rozelle, and Chang (2004).

What will those reforms mean for agricultural trade? 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, 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. 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 constrained domestic demand, including occasional export subsidies, is a moot point.

In its WTO Protocol of Accession (WTO, 2001), 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 article. Tariff rate quotas will be retained only on wheat, rice, maize, edible oils, sugar, cotton, and wool, domestic production of which in aggregate comprises only about one sixth of China's agricultural GDP. The quota volumes are to grow over the next 3 years at annual rates ranging from 5% to 19%. A further commitment by China is that monopolies previously held by state trading enterprises will be weakened (except for tobacco): although some state trading enterprises will continue to operate, there will be some competition from private firms in the importing and exporting of farm products, at least within the tariff rate quotas.

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 just a few exceptions). Furthermore, for industrial products, China will reduce significantly its nontariff measures and eliminate all quotas, tendering, and import licensing on nonfarm 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 be phased out by end of 2004 (although importing countries will be able to reimpose quotas under a special textile safeguard mechanism until the end of 2008). Commitments to open up services markets in China also have been made.

Over the 1990s, the average scheduled tariff rates for manufacturing initially exceeded but fell more than for agriculture, and by 2010, the manufacturing average will be well below that for agriculture (a simple average of 9%, versus 16% for agriculture—see WTO, 2003, Appendix Table IIB). This does not give a true indication of the extent of change in protection that is taking place, because in the 1990s, many manufactures have been entering China at reduced or zero tariffs via duty drawbacks 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 through smuggling.

What this means for incentives for each industry is difficult to discern precisely, but it provides better information than has been available to date for analyzing empirically the economic effects of the reforms associated with China’s WTO accession, including the impact on factor rewards and consumer prices from which inferences about real income distributional effects can be made.

3. Applying the GTAP model

Version 5 of the computable general equilibrium model of the global economy known as GTAP is used here.⁵ Being an economy-wide model, GTAP describes both the vertical and horizontal linkages between all product markets within the model’s individual countries and regions as well as between countries and regions via their bilateral trade flows. For present purposes, the 1997 data base is aggregated to 25 sectors and 20 regions and projected forward first to 2001 and then to 2007, using World Bank projections of population, income, and endowments of productive factors (agricultural land, other natural resources, unskilled labor, skilled labor, and other capital). To create our base case, a prior step was involved. We initially allowed China to retain its protection policies as of 1995 and Taiwan retains its protection as of 1997, but required all other countries to fully implement their Uruguay Round obligations on schedule before 2005. China’s trade policy changes between 1995 and 2001 are then modeled, and these are analyzed in detail by Ianchovichina and Martin (2004).⁶ In this article, we draw from that study but focus on

⁵ The GTAP model is a multiregional, static, applied general equilibrium model based on neoclassical microeconomic theory including full employment of all factors of production, constant returns to scale, and perfect competition. For a discussion of the prospect of greater unemployment during the accession period, see Zhai and Wang (2002). The numeraire is the world price of exports. See Hertel (1997) for comprehensive documentation. The Version 5 database is described in <http://www.gtap.org>.

⁶ A particularly important feature of their analysis is the inclusion of China’s duty exemptions in the base scenario, because otherwise the model would overstate the gains from tariff reductions. Tariff cuts are from 2001 applied rates to postaccession bound rates (or zero if the latter exceed the former). In this application, the aggregate trade balance and government tax revenue are both assumed to remain a fixed share of GDP. The 2001 trade data are from the UN’s COMTRADE database and the 2001 applied tariffs for China are from CDS Consulting (2002).

just the additional reform commitments to be implemented by China after 2001 (relative to the base case from Ianchovichina and Martin in which China's reforms only up to 2001 are in place and there are no further reforms to 2007). For key agricultural import policies, these remaining reform commitments are assumed to shift nominal rates of protection (NRPs) from columns 3 to 6 of Table 1. As well, the export subsidies in place in 2001 (34% for maize, 10% for cotton) are eliminated, and we assume no new farm production subsidies are introduced.⁷ The choices of new agricultural NRPs fall into three categories: no change if they were negative in 2001 (rice, meats, vegetables, and fruits), a move to part-way between the in-quota and out-of-quota tariffs if the TRQs bite (wheat, coarse grains, sugar, cotton), and otherwise, a move down to the new in-quota tariffs (oilseeds, milk). The sensitivity of the results concerning the first two categories is explored in the results section.

If this reform were to require a movement of unskilled labor out of farm activities, three impediments need to be kept in mind. One is that those farm workers would be less than perfect substitutes for those already in nonfarm pursuits. Econometric work by Sicular and Zhao (2004) suggests that restraints on mobility could be approximated via a CET function with an elasticity of transformation of 1.32.⁸ We have therefore incorporated that in the GTAP model for China. Another impediment to off-farm migration is that urban social welfare benefits, such as subsidies to housing, food, education, and health care, are not available to nonurban people, except by purchasing a residence permit, or *hukou* (Zhao, 1999). The third impediment is that farm workers who permanently cut their ties with agriculture may lose entitlement to returns from their family's land and even the direct support and assistance of family members (Hussain, 2004). These latter two impediments have contributed to the persistence of a large gap in farm versus nonfarm returns to unskilled labor. We model that gap as a "tax" wedge that raises the cost of labor to urban employers, with urban unskilled workers receiving the tax-inclusive wage.

The closure adopted is a long-run one in which, in addition to the above assumptions about unskilled labor, we assume agricultural land is mobile between industries within the agricultural sector, and skilled labor and capital are mobile within and between sectors. It keeps the aggregate trade balance and government tax revenue as a fixed share of GDP (with little change in net international capital flows) and holds aggregate employment of each type of labor constant so that wages adjust endogenously.⁹

⁷ Three nonfarm reforms of importance are worthy of mention. The "voluntary" export restraint on China's textile and clothing exports to the United States and European Union, expressed in the base scenario as taxes on those exports, are removed; restructuring of the motor vehicles and parts industry following WTO accession is modeled as a 20% productivity boost to vehicle assembly, following Francois and Spinanger (2004); the liberalization of China's services trade also follows Francois and Spinanger (2004).

⁸ In a subsequent analysis, Sicular and Zhao (2004) provide estimates of 2.67 for the "push" elasticity of transformation from changes in agricultural returns to changes in the supply of labor out of agriculture but only 0.6 from changes in nonagricultural returns. Ianchovichina and Martin (2004) conduct sensitivity analysis on the implications of changes in these parameters, and find the results are not altered greatly.

⁹ It is often claimed that there is considerable underemployment of unskilled labor on farms in China. Even if that is so, our modeling of that factor market is not unreasonable in so far as those workers share the proceeds of other members of their farm family, because then their migration to a new off-farm job would raise the implicit wage for those remaining.

4. What do the results show?

4.1. The core WTO accession scenario

To begin with the bottom line of the main scenario before revealing the details, the core empirical results suggest WTO accession will increase farm–nonfarm income inequality. The main reason for this is that the relative producer prices of farm products are projected by the GTAP model to fall more than the prices of labor intensive nonfarm products following the completion of WTO accession reforms (Table 2).

The removal of the “voluntary” export restraint on sales of textile products to the United States and European Union is not the only boost to unskilled labor off farms. There is, in addition, a lower cost structure in unskilled labor intensive manufacturing activities, for three reasons: the lower demand for labor on farms lowers the cost of unskilled labor in manufacturing; import taxes on the intermediate inputs used in those manufacturing activities are lower due to the accession process; and the real exchange rate effect of the tariff reductions lowers the cost of nontraded goods and other factors used as inputs into manufacturing production. As a result, the quantity of unskilled nonfarm labor demanded

Table 2
Sectoral volume effects of China’s WTO accession reforms (core case), 2002–2007 (% and 1997 US\$ million)

	Output	Employment	Household consumption	Exports	Imports	Trade balance (\$ million)	Producer prices	Consumer prices
Rice	−2.1	−2.3	−0.1	6.1	−7.1	64	−0.9	0.9
Wheat	−2.0	−2.3	0.0	18.9	−10.1	174	−1.7	0.4
Feedgrains	−2.3	−2.6	−0.1	−77.8	−2.4	−596	−1.9	1.9
Vegetables and fruits	−3.4	−3.7	0.1	14.6	−6.3	214	−1.9	−0.1
Oilseeds	−7.9	−8.4	0.9	29.8	20.9	−789	−2.8	−4.7
Sugar	−6.5	−7.4	0.6	13.9	24.1	−73	−1.9	−3.1
Plant based fibers	15.8	16.4	−0.6	−51.8	7.7	−189	0.1	3.1
Livestock and meat	1.3	1.1	0.0	15.5	−8.9	837	−1.6	0.2
Dairy	−2.0	−2.4	0.0	13.5	23.8	−143	−1.5	0.2
Other food	−5.9	−6.4	0.4	11.4	62.6	−3460	−1.7	−1.8
Beverages and tobacco	−33.0	−33.1	1.5	9.7	112.4	−14,222	−1.8	−6.9
Extractive industries	−1.0	−1.3	−0.2	7.5	−4.4	2088	−0.7	1.2
Textiles	15.6	15.5	0.7	32.7	38.5	−10,366	−1.7	−3.2
Apparel	57.3	56.1	0.5	105.8	30.9	49,690	−0.5	−1.9
Light manufacturing	3.7	3.7	0.0	5.9	6.8	1786	−0.9	0.0
Petrochemical industry	−2.3	−2.3	−0.2	3.1	11.8	−8810	−0.7	0.8
Metals	−2.1	−2.1	−0.3	3.7	6.8	−1893	−0.4	1.3
Autos	1.4	−2.2	1.0	27.7	24.0	516	−3.9	−4.2
Electronics	0.6	0.4	0.5	6.7	6.8	453	−1.3	−1.7
Other manufactures	−2.1	−2.2	−0.2	4.1	18.9	−11,291	−0.5	0.8
Trade and transport	0.0	0.0	−0.3	0.8	−0.4	493	−0.2	1.6
Construction	0.9	0.9	−0.4	2.7	17.5	−436	−0.2	1.7
Communication	−0.5	−0.5	−0.4	−0.5	10.9	−56	0.1	1.9
Commercial services	−2.0	−2.0	−0.5	−0.4	35.4	−1749	0.2	1.9
Other services	−1.7	−1.8	−0.3	1.4	33.6	−1525	−0.1	1.6

Source: Authors’ GTAP results.

Table 3

Change in China's real factor prices and national economic welfare due to WTO accession, 2001–2007 (% welfare in 1997 US\$ billions)

	Core accession case	Alternative 1: greater agricultural protection cuts	Alternative 2: core case plus also removing negative agricultural protection
Farm unskilled wages	-0.7	-0.9	-0.5
Rental price of land	-5.5	-6.4	-4.7
Nonfarm unskilled wages	1.2	1.4	1.1
Skilled labor wages	0.8	1.0	1.5
Rental price of capital	1.3	1.5	1.5
Farm household income ^a			
Type A	-1.6	-1.9	-1.3
Type B	-0.8	-0.9	-0.6
Type C	0.1	0.1	0.1
National economic welfare (\$ billion increase)	9.56	9.57	9.87

Source: calculated from the authors' GTAP results.

^a Farm income from agriculture is made up of 57% from unskilled labor, 26% from land, and 17% from capital, according to the GTAP database. In 1999, on average, 51% of rural household income in China was earned outside agriculture, mostly from unskilled labor; and according to DeBrauw, Huang, Rozelle, Zhang, and Zhang (2002), around 45% of rural laborers had a job off the farm. Therefore, to illustrate the importance of those off-farm earnings, three types of farm households are shown in this table: it is assumed nonfarm unskilled labor contributes 0% of farm household income for Type A, 30% for Type B, and 60% for Type C. We assume all households have the same expenditure pattern and so all changes are net of the CPI change.

is greater (by 0.8%). However, lower farm product prices mean the quantity of unskilled farm labor demanded is less (by 1.7%), resulting in a 0.7% fall in the real wage for unskilled farm labor and a rise in real wages for unskilled nonfarm labor of 1.2% (after adjusting for the change in the aggregate cost of living). Farmers are also made worse off by the lower demand for farm land, the return from which is 5.5% lower in 2007 following WTO accession reforms. Meanwhile, the real wages of skilled labor increase by 0.8%, and the rewards to nonfarm capital are 1.3% higher.

Together, these results suggest that the owners of nonfarm capital gain almost the same in proportional terms as unskilled laborers in nonfarm employment, but the latter do better than skilled workers. Hence, on balance, income inequality may improve slightly among nonfarm households dependent mainly on labor income.¹⁰

However, income distribution can be expected to slightly worsen as between farm and nonfarm households, although the degree depends on the proportion of farm household income earned off the farm. With only 1.7% of (or about 6 million) unskilled farm workers leaving agriculture for nonfarm work, and with land returns depressed by 5.5% in addition to farm labor returns being 0.7% lower, the gap between farm and nonfarm incomes even within rural areas, and certainly between rural and urban areas, looks set to rise slightly unless remedial policy action is forthcoming. For farm households entirely dependent on

¹⁰ Wages of skilled workers might increase more than suggested here, as we do not capture the endogenous productivity growth resulting from the substantial liberalization of the service sectors. For a recent study that does incorporate that effect using a dynamic version of the GTAP model, see Ianchovichina and Walmsley (2003).

earnings from agriculture (Type A in Table 3), income would fall 1.6% on average. This would differ little across the country since product shares for farm output—when fish products are ignored—are reasonably similar in western, central, and eastern provinces; however, if we look at northern and southern provinces in China, differences could be larger since wheat, maize, soybean, and cotton are planted primarily in northern China while rice, horticulture, livestock, and fish are raised mainly in southern China. For farm households earning 30% of their income from nonfarm unskilled work, however, that income fall is only half as large (0.8%); and for farm households earning 60% of their income from nonfarm unskilled work, their incomes would not decline at all (Types B and C in Table 3—see rows 7 and 8).

Sectoral details of the GTAP results are summarized in Table 2. Real consumer prices (relative to the CPI) are lowered most by WTO accession for motor vehicles, oilseeds, and sugar (and for beverages and tobacco, although if China was using import taxes on those items as a form of consumption tax and their decline were to be matched by an increase in domestic sales taxation, those price declines may not materialize). They are also lowered for textile products and to a lesser extent clothing. Among the farm products, consumer prices are raised slightly for livestock products, somewhat more for grains, and significantly for cotton (plant-based fibers).

Producer prices (also shown relative to the CPI) fall more than consumer prices because of a uniform consumption tax of 1.9% that is levied to compensate for the loss of import tariff revenue. However, they are down more for farm products than for most other products except autos. In addition, farm output is down for all but cotton and meat. Moreover, feedgrain exports shrink by three quarters and cotton exports by half with the abolition of export subsidies. The difference in the effects on production and consumption shown in Table 2 reveals that China's food, feed, and fiber self-sufficiency will be reduced at least slightly by these reforms. But the extent is really quite minor: the trade balance column in Table 2 suggests that for all agricultural and food products, net imports would be greater because of the remaining accession reforms by only \$3.96 billion per year by 2007 (in 1997 US dollars), which represents only 1% of total imports.

The above results depend as always on the assumptions in the model. To check the sensitivity of some of those assumptions, two alternative scenarios were run to compare their results with those in the base accession scenario: one with greater agricultural protection cuts and the other removing negative agricultural protection.

4.2. Alternative scenario 1: greater agricultural protection cuts

What if the grain, sugar, and cotton NRPs were to drop to the in-quota tariff levels shown in Table 1, for example? An additional GTAP simulation was run and the differences for factor rewards are not huge in aggregate but they would be in the direction of worsening income inequality: unskilled farm wages would fall 0.9% instead of 0.7% and rewards to farm land would fall 6.4% instead of 5.5% on the one hand, while on the other nonfarm wages would rise 1.4% instead of 1.2% for the unskilled and 1.0% instead of 0.8% for skilled workers (Table 3). These changes would attract only another million workers from farms. But while agricultural incomes would be lower, farm household income would not fall if at least 60% of its income came from wages of nonfarm unskilled labor (see row 8 of

Table 3). Domestic production of grains, sugar, and cotton would be less though, and domestic consumption greater, so self-sufficiency in those products would be slightly lower. Even so, net imports of all food and agricultural products would be greater by only \$1.5 billion per year by 2007 (\$5.43 instead of \$3.96 billion). Such an import increase would be within the tariff rate quotas for those items with the possible exception of maize (depending on the extent to which other feedgrains that are not TRQ-restricted, such as barley, are substitutable for maize). National economic welfare would be only very slightly greater in this case as compared with the core scenario (see bottom row of Table 3).

4.3. Alternative scenario 2: removing negative agricultural protection

If the negative NRPs for rice, meats, vegetables, and fruits were to be raised to zero, the income distributional effects would go in the opposite direction to those in the previous alternative scenario (less inequality between farm and nonfarm households). The changes are not great though, although these products account for nearly 40% of the value of food and agricultural output in China. As can be seen by comparing columns 1, 2, and 3 of Table 3, they would involve about as much improvement in income distribution as the previous alternative scenario would worsen it. This case involves a 3% larger national economic welfare gain than the core case (bottom row of Table 3).

5. Conclusions and policy implications

Our initial analysis suggests rural nonfarm incomes will rise on average absolutely and possibly even relative to urban incomes in the case of households depending just on labor income (assuming urban laborers are more skilled). However, some farm households facing increased import competition may be worse off in this case, *ceteris paribus*, if they are:

- unable to send household members to jobs in expanding industrial and service industries;
- are too poorly served with infrastructure to attract such activities to their own region;
- are unable to diversify into producing farm goods whose relative price has risen; and/or
- do not have relatives able to repatriate nonfarm earnings to them.

Thus, in the core scenario, the incidence of rural nonfarm poverty will fall mainly because of the growth in wages for unskilled workers in rural nonfarm activities, while poverty may well increase in agriculturally based hinterland provinces a long way from markets and in regions poorly served with the necessary infrastructure to attract investment in such expanding activities as textiles and clothing.

The first alternative scenario shows that this situation would be exacerbated slightly if the TRQ-protected items (grains, sugar, and cotton) were to become even less protected than we initially assumed. By way of contrast, the second alternative scenario suggests the situation could be made slightly less extreme by removing the negative protection affecting rice, meats, vegetables, and fruits. However, both of these alternatives only involve small changes to the magnitudes of effects, rather than altering the sign of those effects, and both add only a small amount to the aggregate gains from trade liberalization.

The gain would be even less in the second alternative scenario if China found it more difficult than our model suggests to access foreign markets for its food exports because of quarantine and other technical barriers to agricultural trade (in which case, Chinese trade negotiators would have to work harder to try to open those markets). On the other hand, the gain could be amplified if further foreign investment inflows and infrastructure improvements strengthened China's international competitiveness in horticultural and livestock products.

National self-sufficiency in farm products would decrease slightly, particularly for feedgrains and cotton as demand for livestock products grows with income gains from trade reform and as production of natural fiber-based textiles and clothing expand. Overall, most of the declines in domestic agricultural production as a consequence of the remaining reforms that are required following WTO accession are relatively very small in magnitude, especially when compared with the growth in farm output that would occur as a result of normal economic growth (compare columns 1 and 5 of Table 4).

What should be done if some farmers' incomes are to worsen relative to those of nonfarm households, and if there is concern about the fall in agricultural self-sufficiency? Rather than arguing against trade reform, first-best ways should be sought for dealing with those concerns (and with any transitory unemployment that might follow reform). The most efficient policy responses are likely to involve investments in rural human capital, rural infrastructure and agricultural R&D (Fan, Zhang, & Zhang, 2002), improvements in the land tenure system and rural financial markets, reductions in informal taxes/levies on farmers by local governments, and changes in grain marketing—all of which the government has recently begun to do.

First, the government might consider further investments in basic rural education and health services to reduce the adverse effect of trade reform on poverty incidence and

Table 4
Changes in China's farm output, employment, and trade volumes (a) without WTO accession for the period 1995–2007 and (b) due to China's WTO accession reforms, 2002–2007 (%)

	(a) Changes without WTO accession, 1995–2007				(b) Changes due to WTO accession, 2002–2007			
	Output	Employment	Exports	Imports	Output	Employment	Exports	Imports
Rice	63.8	-11.5	134.7	-8.8	-2.1	-2.3	6.1	-7.1
Wheat	81.4	6.4	-15.2	126.3	-2.0	-2.3	18.9	-10.1
Feedgrains	109.5	23.8	-0.6	95.9	-2.3	-2.6	-77.8	-2.4
Vegetables and fruits	98.2	16.8	-10.8	122.1	-3.4	-3.7	14.6	-6.3
Oilseeds	100.9	18.4	-36	151.7	-7.9	-8.4	29.8	20.9
Sugar	112.5	14.5	109.4	88.7	-6.5	-7.4	13.9	24.1
Plant based fibers	137.2	41.1	-8.5	146.1	15.8	16.4	-51.8	7.7
Livestock and meat	121.9	25.6	12.8	135.3	1.3	1.1	15.5	-8.9
Dairy products	122.5	18.8	60.5	100.3	-2.0	-2.4	13.5	23.8
Other food	110.8	-1.5	76.8	58.5	-5.9	-6.4	11.4	62.6

Source: Authors' GTAP results.

perceived food security. Better education and health for farmers' children not only boosts their farm productivity should they choose to stay on the farm after finishing school; it also increases their capacity to find more lucrative off-farm work and to adjust to nonagricultural employment and living (Schultz, 1975; Zhang, Huang, & Rozelle, 2002). In addition to those longer term benefits, there could also be an immediate poverty alleviating effect if the government were to cut basic school fees and make up the shortfall with a bigger direct grant to rural primary and middle schools.

Second, improvements in rural infrastructure, such as roads and rail, mean that a larger share of the price eventually received at the end of the marketing chain for farm products can be passed back to farmers. Such improvements also lower the barrier for off-farm work by members of farm households, making it easier for them to take advantage of expanding employment opportunities in rural townships.

Third, agricultural R&D can ease both urban and rural poverty (see Fan, Fang, & Zhang, 2001; Hazell & Haddad, 2001). A boost in agricultural productivity could significantly offset the 2–8% drop in agricultural production that is estimated in the core scenario to result from WTO accession. An important policy issue here is whether China should deny itself the use of genetically modified organisms in food production.¹¹

Fourth, improvements in the land tenure system would not only increase the incentive to invest more in land but would also enhance the collateral of farm households. If accompanied by improvements in rural financial markets, investments by farmers back into agriculture would rise. They would rise further if returns were increased via reductions in informal taxes/levies on farmers by local governments.¹²

Fifth, reducing government regulation of grain marketing and in particular compulsory procurement from farmers at less than market prices, reducing the provision of grain to urban consumers at less than market prices, and de-emphasizing the governors' grain responsibility system (provincial self-sufficiency) all will allow more exploitation of comparative advantage within China too.

If all these changes were considered insufficient support for incomes of the poorest farm households, short-term adjustment assistance via inframarginal (and hence not output-inducing) producer price subsidies could be provided as an efficient way to boost their farm incomes without boosting farm output (in an equal but opposite way to that used to tax farmers in earlier decades—see Shea, 2003). Such an intervention could well be deemed WTO-consistent because of its decoupled nature, and in any case, if it was just targeted to poor farmers, it is unlikely to ever exceed 8.5% of the value of China's output of the product concerned (its *de minimis* exemption limit for product-specific support under Article 6.4 of the WTO's Agreement on Agriculture).

Finally, now that China is in the WTO, it has 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 abroad. While not taken into account in the present

¹¹ For an empirical analysis using GTAP of the impact on China, India, and other countries of them not adopting versus adopting genetically modified varieties of first maize and oilseeds and then also rice and wheat, see Anderson and Jackson (2003).

¹² According to Lin, Tao, Liu, and Zhang (2002), such levies amount to as much as one quarter of the net incomes of poorer farmers in the hinterland.

analysis, if WTO membership enhances China's chances of expanding its access to agricultural market more than other markets abroad in the future, that would be a positive benefit of WTO accession for China's farmers and rural areas. Martin (in press) points out that Chinese farm exports face particularly high barriers abroad, so this potential benefit is nontrivial in principle (although in practice it may be difficult to secure, especially if the main barriers are SPS measures). That proposition is tested by Yu and Frandsen (2002), also using the GTAP model. They find that reductions in barriers to agricultural imports and in domestic support to farmers in OECD countries reduce the extent to which China's farm output would fall with WTO accession and, in some cases, leads to outputs expanding instead of contracting. As a consequence, China's agricultural imports are reduced slightly and its agricultural exports are greater: Yu and Frandsen's results show that not only would China's food self-sufficiency be higher with than without agricultural protection in the European Union, United States, and Japan, but the difference in most cases would be more than enough to offset the fall in self-sufficiency that is estimated to result from China's WTO accession. Such reform in the OECD would clearly benefit farm households in China, providing a further pro-poor consequence of trade reform.

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