CENTRE of POLICY STUDIES and the IMPACT PROJECT

Eleventh Floor, Menzies Building
Monash University, Wellington Road
CLAYTON Vic 3800 AUSTRALIA

Telephone:
(03) 9905 2398, (03) 9905 5112

from overseas:
61 3 9905 2398 or
61 3 9905 5112

Fax:
(03) 9905 2426

61 3 9905 2426

e-mail: impact@buseco.monash.edu.au

Internet home page: http//www.monash.edu.au/policy/

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Removing border protection on wheat and rice: effects on rural income and food securities in China

by

YINHUA MAI

Centre of Policy Studies
Monash University

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The Centre of Policy Studies

Centre of Policy Studies
Building 11E
Monash University
Clayton, Victoria 3800
Australia
Web address: http://www.monash.edu.au/policy/

ABN No 12 377 614 012

Contact:

Dr Yinhua MAI
Tel: 61-3-99055482
Fax: 61-3-99052426
yinhua.mai@buseco.monash.edu.au

Abstract

In this paper, I use the Monash Multi-Country (MMC) model – a dynamic CGE model of China, Australia and the Rest of the World – to analyse the effects of removing border protection on wheat and rice in China. The analysis points to the possibility that removing border protection on wheat and rice may lead to an increase in rural income in China. This is due mainly to the following two factors. First, while removing border protection on wheat and rice leads to a contraction in agricultural activities, it also leads to an expansion in manufacturing and services activities. Second, on average, rural households in China obtain over half of their income from manufacturing and services activities.

Key Words: China, Wheat and rice, CGE modelling, rural income
JEL classifications: C68, F14, Q17

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1. Introduction

In per-capita term, China is not richly endowed with resources for agricultural plantation. China has about one-fifth of the world's population, but only 10 per cent of the world's arable land. Per capita water resource is about 2,200 m^3 – 30 per cent of the world average. Per capita arable land is about 0.1 ha – 40 per cent of the world average (Zhou 2002).

Since China moved towards globalisation in the late 1970s, the manufacturing sector has expanded rapidly due to China's abundant endowment in labour. The relative importance of the agricultural sector, on the other hand, has declined from 33 per cent of GDP in 1984 to around 15 per cent in 2004 (Chinese Ministry of Agriculture 2006).

Imports of agricultural products have been growing faster than exports in the past ten or so years leading to a consistent trade deficit for agricultural products since 1995. The deficit has widened sharply since the early 2000s (Figure 1).

The rapid growth in agricultural imports has been driven by rapid growth in demand for high protein food by households, and that for raw materials by the manufacturing sector. Table 1 listed some of the fast growing items for agricultural imports, such as soybeans, oil of palm, oil of soybeans, fish meal, animal fats, cassava dried, meat meal, barley, rubber, wool, and cotton (Table 1).

Cereal grains, however, are much less traded (except barley). Rice is the largest staple grain in China. The total quantity of rice traded (exports plus imports) has been under 2 per cent of total domestic production. Furthermore, China has been a net exporter in rice in most years. For wheat and corn, shares of trade in production have occasionally gone up to 10-14 per cent depending on domestic harvest. While, on average, China is a net importer in wheat, it's a net exporter in corn (Table 2).

On the trade policy front, border protection on agricultural trade has been lowered especially since China's accession to the World Trade Organisation (WTO). However, the level of border protection on agricultural products is higher than that for manufactured goods. In 2005, the simple-average tariff rate for agriculture products was 15.3 per cent, higher than that for industrial products of 9 per cent (DFAT and MOFCOM 2005).

While state control on international trade of most manufactured goods has more or less been abolished[1], trade of agricultural products (especially staple grains) is still subject to substantial state influence. For example, only 10 per cent of the Tariff Rate Quota (TRQ) for Wheat is allocated to non-state traders.

Like many other industrialised and industrialising countries, China faces the challenge of choosing a direction for its policy regarding trade in agricultural products. Should China liberalisation agricultural trade, especially for staple food? Will this lead to significant reduction in rural income? How would that impact on China's food self-sufficiency?

The aim of this study is to contribute to the understanding of the above questions. Issues concerning grains are quite different from issues concerning other agricultural products, they therefore warrant separate analyses. This paper focuses on the effects of removing border protection on wheat and rice, the main staple food for China.

The methodology employed in this study is using a dynamic Computable General Equilibrium model (the Monash Multi-Country model – MMC) to simulate the effects of removing border protection on wheat and rice. A verbal description of the MMC model is contained in Appendix A (For a more technical description of the model, see Mai 2004).

While trade liberalisation in China has been analysed intensively using CGE models, not as much efforts have been devoted to issues related to agricultural trade. Furthermore, most of the analyses on agricultural trade focus on China's WTO commitments (for examples, Hertel, Anderson, Francois and Martin 2000; Carter and Li 2002; Kuiper and Tongeren 2004; and Yu and Frandsen 2005). This paper contributes to the body of CGE analyses by analysing specifically unilateral liberalisation issues concerning staple grains in China.

This paper contains seven sections. Section 1 is this introduction. Section 2 describes the simulation of removing border protection on wheat and rice. Section 3 contains a discussion of macroeconomic effects of the simulated policy change. Section 4 contains a discussion of the industry effects. In section 5 I explore the impact on food self-sufficiency. In section 6 I discuss how different the simulation results are if the reduction in border protection on wheat and rice leads to a change in preferences. In

[1] except for key energy products.

section 7 I discuss the impact of the policy change on the income of rural households. Section 8 highlights the main findings and further areas of research.

2. Simulating the removal of border protection on wheat and rice

Post China's WTO entry, imports of wheat and rice into China are subject to TRQ. For wheat the in-quota rate is 1-10 per cent while the out-quota rate is 65 per cent. Ten per cent of the wheat TRQ is to be allocated to non-state traders. For rice the in-quota rate is 1-9 per cent while the out-quota rate is 65 per cent. Fifty per cent of the rice TRQ is to be allocated to non-state traders.

If all quota imports were conducted by non-state traders or determined by market forces, imports of wheat and rice into China would be subject to only the in-quota rate; because the amount of quota is much higher than the current level of imports. However, assuming the quota allocation is not effectively determined by market forces, the effective rate of border protection on wheat and rice should be approaching the out-quota rates of 65 per cent.

To estimate an upper bound impact of removing border protection on wheat and rice, a reduction of 65 percentage points in border protection on both wheat and rice is simulated in this paper. The reduction in tariff equivalents of 65 per cent is assumed to be implemented in five years from 2006-2010.

To analyse the effects of the policy change, I compare the policy scenario (the economic growth path with the policy change in-place) with a baseline or a business-as-usual scenario from 2005 to 2015 (Figure 2). The baseline shows how the economies in the model are likely to evolve without the removal of border protection on wheat and rice.

The modelling starts from the Global Trade Analysis Project (GTAP) database (Dimaranan and McDougall 2002) which is a snapshot in 1997 of the economic structures of various economies in the world and the economic linkages between them[2]. In the baseline simulation, I inform the model how the Australian, Chinese and the Rest of the World (ROW) economies evolved from 1997 to 2003 using historical data; and how the three economies are likely to evolve from 2003 to 2015 using

[2] In the MMC model, I aggregate the database to three country/regions: Australia, China and the ROW region.

forecast data. The main sources of the historical and forecast data are Access Economics (a private consulting firm located in Australia), the Australian Bureau of Statistics, the World Bank, the International Monetary Fund, Economist Intelligence Unit, the China National Bureau of Statistics, FAO, Chinese Ministry of Agriculture, and the Chinese Academy of Social Sciences.

The growth rates of key economic indicators in the baseline, expressed as average annual growth rates between 1997 and 2015, are presented in Table 3. These indicators include real GDP, consumption, investment, exports and imports at the macroeconomic level, and industry output for aggregated sectors. Features of the baseline include:

1. Rapid growth in Chinese real GDP at a rate twice that of Australia's real GDP;

2. Growth in trade volumes in both countries in excess of growth in real GDP; and

3. Continued shifts from manufacturing to services in Australia and declining shares of agriculture and mining in Chinese real GDP.

I assume that real GDP of ROW grow at an average annual rate of 2.4 per cent between 1997 and 2015.

The baseline serves as a business-as-usual scenario, or reference case, against which scenarios containing policy changes are compared. The effects of removing border protection on wheat and rice is measured as deviation of each economic variable from its baseline growth path (Figure 2).

3. Macroeconomic effects

Figure 3 shows that, at the macro level, the reduction in tariff equivalent leads to lower import prices that, in turn, leads to a higher level of imports as users substitute domestic goods for imports. The lower import prices also lead to a real depreciation and thus a higher level of exports compared to the baseline. The efficiency gains following the reduction in tariffs leads to, in the short-run, higher rate of return on capital and, in the long-run, a higher level of capital stock. The efficiency gains plus the higher capital stock lead to a higher level of real Gross Domestic Product (GDP).

Overall, the reduction in tariff equivalent on wheat and rice leads to a positive change in real consumption and GDP. The size of the changes is small because the share of

wheat and rice in total GDP is small in China. Figure 4 shows that, if a border protection of 65 per cent on wheat and rice was removed, China's real GDP would be 0.02 per cent higher by 2015, and real consumption 0.04 per cent higher compared to the business-as-usual scenario.

In the policy simulation, I assumed that the removal of border protection on wheat and rice did not lead to improvement in productivity in wheat and rice production in China. If the endogenous productivity growth induced by more intensive import competition is taking into account (see Mai 2005), the macro-economic effects are likely to be bigger than those presented in this paper.

4. Industry effects

The removal of border protection on wheat and rice leads to a lower output for China's wheat and rice industries relative to the baseline (Figure 5). This is because the policy change lowered the price of imported wheat and rice, users therefore substitute domestically produced wheat and rice for imports.

The manufacturing and services sectors, on the other hand, expands as a result of the removal of border protection on wheat and rice. The reduction on tariff equivalent leads to real depreciation. This benefits the more export oriented manufacturing sector. The more efficient resource allocation following the removal of border protection on wheat and rice also benefits and manufacturing and the services sectors (Figure 6).

Figure 7 shows that, while agricultural output falls following the removal of border protection on wheat and rice, the output of the manufacturing and services sectors rise relative to baseline.

5. Impacts on food self-sufficiency

The indicator used for food self-sufficiency in this study is defined as the share of imports in total domestic consumption. The total domestic consumption is defined as the sum of domestic production and imports subtracted by exports:

Domestic consumption = Domestic production + Imports – Exports.

Figure 8 shows that, as a result of the removal of border protection on wheat and rice, wheat imports are likely to rise to over 12 per cent of total domestic consumption in 2015, 2 percentage points higher than the baseline. Similarly, rice imports are likely to

rise to over 3 per cent of total domestic consumption, 1.5 percentage points higher than the baseline.

Notice that, in the baseline simulation, I assumed that wheat imports grow steadily so that the TRQ for wheat is filled by 2015. Wheat imports in the baseline therefore account for about 10 per cent of the total domestic consumption in 2015 (Figure 8). Rice imports, on the other hand, are assumed to remain low at about 1-2 per cent of total domestic consumption.

The simulation results seem to suggest that a 65 per cent reduction in tariff equivalents for wheat and rice does not lead to a significant rise in the share of imports in total domestic consumption. In other words, removal of border protection on wheat and rice is not likely to lead to a sharp reduction in food self-sufficiency in China.

Is this result believable? To shed light on this question, it is necessary to examine key assumptions made in this simulation.

First, there is the issue whether or not the effective rate of border protection is 65 per cent for wheat and rice. If the effective rate of protection is higher than 65 per cent, the simulation results tend to under-estimate the impact on food self-sufficiency. A higher or lower reduction in tariff equivalents can be simulated to further investigate this issue.

Second, the simulation results are influenced by the assumption on the purchasers' response to changes in relative prices. This is governed by the value of the Armington elasticities used in the model. This issue can be further investigated by conducting sensitivity analysis of the model parameters.

Third, in this simulation, I assumed that the wheat TRQ is to be filled by 2015. A different assumption can be made in the baseline to see whether or not this affects the simulation results.

Fourth, as mentioned before, I assumed that the reduction in tariff equivalents does not lead to endogenous productivity improvement. The extent to which this affects the simulation results can be investigated by assuming that a reduction in tariff equivalents does lead to productivity improvement in the wheat and rice industries in China.

Fifth, in this simulation, I assumed that the increased consumption of imported wheat and rice does not lead to a change in consumer tastes. In reality, however, once consumers and manufacturers have access to imported wheat and rice, there is a possibility that they develop a preference towards imported varieties.

Investigating all the above issues is beyond the scope of this paper. However, the next section presents a set of simulation results with the assumption that the reduction in tariff equivalents leads to a user preference change in favour of imported wheat and rice.

6. What if reducing tariff leads to a change in preferences?

When the reduction in tariff equivalents leads to a change in user preferences in favour of imported wheat and rice, the negative impact on the output of wheat and rice is larger (Figure 9). In particular, the output of the wheat industry is nearly 5 per cent lower compared to baseline. The impact is much larger compared to the situation when no preference changes are assumed (1 per cent, figure 9). The manufacturing and the services sectors, on the other hand, also expand more (Figure 10).

Figure 11 shows the difference in the impact on food self-sufficiency with and without changes in user preferences. For rice the difference is moderate. However, for wheat, imports may account up to over 15 per cent (instead of just over 12 per cent) of total domestic consumption if the reduction in tariff equivalents leads to a change in user preferences in favour of imported varieties.

7. Impacts on rural income

The simulation results show that the removal of border protection on wheat and rice leads to a positive change in rural income:

- the deviation of rural income from baseline in 2015 is 227 million yuan; and
- on average, the income of each rural labour increase by 0.46 yuan in 2015 compared to baseline.

This result is rather un-expected. When output of agricultural sector fall relative to baseline, we would typically expect rural income to fall as well. So why did the simulation results show a rise in rural income?

The key reason lies at the share of rural income by source. In the model baseline, I assumed that the share of rural income by source in 2015 is the following:

- Agriculture 19%
- Manufacturing 56%
- Services 22%
- Others 3%

This assumption is based on the Chinese Ministry of Agriculture data presented in Tables 4 to 6. Table 4 shows that 56 per cent of total rural income comes from the manufacturing sector. Agricultural plantation, on the other hand, only contributes to 10 per cent of total rural income. Table 5 shows that, on average, each family has about 2.5 numbers of economically active people and only 1.4 of them are employed in agricultural activities. The rest are mainly employed in manufacturing and services sectors. Table 6 shows that the share of rural labour force employed in non-agricultural activities has been increasing rapidly over the past two decades. From 1983 to 2003, the share of rural labour force employed in non-agricultural activities increased from 9 to 36 per cent.

Since the manufacturing and services sector expands following the removal of border protection on wheat and rice, and non-agricultural income has become a dominant source for rural households, the policy change may lead to a positive rather than negative change to total rural income.

Figure 12 shows the effects when the reduction in tariff equivalents on wheat and rice leads to a change in user preferences in favour of imports. The effects on rural income are still positive, but smaller.

It is important to note that the simulation results are based on national-average data for China. For different regions, the results can be quite different. Further analysis using regional models is therefore necessary to enhance the understanding of the effects on rural income in different regions in China.

8. Concluding comments

Using a dynamic CGE model, I simulated the effects of a 65-percent reduction in tariff equivalents for wheat and rice in China. The results show that the policy change

does not lead to a dramatic change in the share of imports in total domestic consumption of wheat and rice. The impact of the policy change on rural income may turn out to be positive.

However, further simulations based on different assumptions to those used in this analysis are necessary to enhance the understanding to these issues. Important assumptions to review are the following:

- What if the effective rate of border protection is higher or lower than 65 per cent?
- What if purchasers' response to changes in relative prices (represented by the values of the Armington elasticities used in the model) is different?
- What if wheat TRQ will not be filled by 2015?
- What if the reduction in tariff equivalents leads to endogenous productivity improvement in wheat and rice production?
- What are the effects on different regions in China?

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Appendix A The Monash-Multi-Country model

The analytical framework used in this study is the Monash-Multi-Country (MMC) model. The MMC model is an advanced dynamic Computable General Equilibrium (CGE) model of the Australian, Chinese and the Rest of the World economies. It was used to analyse the effects of an Australia-China FTA for the joint feasibility studies conducted by the Australian Department of Foreign Affairs and Trade (DFAT) and Chinese Ministry of Commerce (MOFCOM).

The core CGE theory of the MMC model is based on that of a single country model of Australia, the ORANI model (see Dixon et. al. 1982 and Horridge 2001). The dynamic mechanism of the MMC model is based on that of a single country dynamic model of Australia, the MONASH model (see Dixon and Maureen 2002). MMC uses a multi-country CGE database, the Global Trade Analysis Project (GTAP) database (See Hetel 1997 and Dimaranan and McDougall 2002). The MMC model recognises bilateral investment flows between countries by sector and is useful in analyzing investment liberalization of a particular industry (see Mai 2004). The rest of this section provides a non-technical description of the model.

The model is a large system of linearised equations. The equations are mathematical representation of demand and supply conditions in goods, services and factor markets. The demand and supply equations are derived from the behaviour of various economic agents: producers, consumers, governments, exporters, importers, and investors. Such behaviour (described in more details below) determines the reaction of the economic agents to changes in relative prices and economic environment. The model assumes that all the goods, services and factor markets start from an equilibrium represented in the model database. A change in economic policy (such as a tariff reduction) or economic environment (such as a drought) leads to a new equilibrium in which demand equals to supply for all goods, services and factor markets. The model serves to calculate changes to equilibrium quantities and prices of goods, services and factors (and other economic indicators) caused by the change in economic policy or environment.

The model recognises up to 57 industries each produces a category of goods or services such as greasy wool, textiles, wearing apparel, and construction. In each industry **producers** use 3 production factors (land, a combination of skilled and

unskilled labour, and a combination of capital owned by Australian, Chinese and the Rest of the World economies) and up to 57 goods and services as inputs to produce its output. In their production, producers mix material inputs and a combination of all production factors in fixed proportions. They determine the combination of production factor according to the relative prices of the production factors. If labour becomes relatively more expensive than capital, producers substitute labour for capital. In determining their demand for material inputs and production factors, producers exhibit optimisation behaviour of minimising costs to produce a certain level of output. Once the level of a material input is determined, producers chose to buy the material input from domestic or foreign sources according to relative prices. When tariff on wool is reduced in China, Chinese textile producers choose to use more imported wool because it becomes less expensive relative to domestically produced wool. Technological change happens when producers can produce the same level of output using less of one (or all) material input(s) or production factor(s). The output produced by each industry is sold either domestically or exported.

Consumers in the model purchase various categories of goods from different sources (imported or domestically produced). They consume a bundle of necessities and luxury goods. The luxury part of their consumption is linked to their income. They exhibit optimisation behaviour in their choice of luxury consumption by maximising their utility subject to budget constraints. Consumers choose between imported and domestically produced goods according to their relative prices. When tariff on wearing apparel is reduced, consumers choose to buy more imported clothing because it becomes less expensive relative to domestically produced clothing.

Governments in the model collect direct and indirect taxes (including tariffs) and have budget expenditures. **Investors** minimise costs when they purchase various goods (imported and domestically produced) and services (mainly construction) for capital creation. Governments and investors exhibit similar behaviours to producers and consumers in their purchasing choice of imported versus domestically produced goods.

Once the level of imports for a commodity is determined by the choices of users (producers, consumers, governments and investors), **importers** can then determine which country/region to import from, again, according to relative prices. When Australia reduces its tariff on clothing imports from China under a bilateral FTA,

importers choose to import more clothing from China because it becomes relatives less expensive compared to clothing produced in the Rest of the World region.

The dynamic aspect of the model enables us to analyse the effects of a policy change under a growth perspective. Under this perspective, the effects of a policy change are viewed as a change in the way the economies evolve into the future. This is achieved by producing a business-as-usual scenario from 1997 (the year of the model database) to a future year (2015 in this study). The business-as-usual scenario contains our view on what would happen to 2015 without the policy changes. It forms a bench mark with which we compare the growth path of the economies with the policy changes implemented (in this case, elimination of border protection on wool in China).

In other words, under a dynamic perspective, the calculation of the effects of a policy change depends on our view of future. For example, for an industry with a shrinking output, a negative policy impact on the industry means negative growth in output. However, for a rapidly expanding industry in the business-as-usual situation, a negative policy impact could merely mean a slower rate of positive growth rather than a negative growth in the level of output.

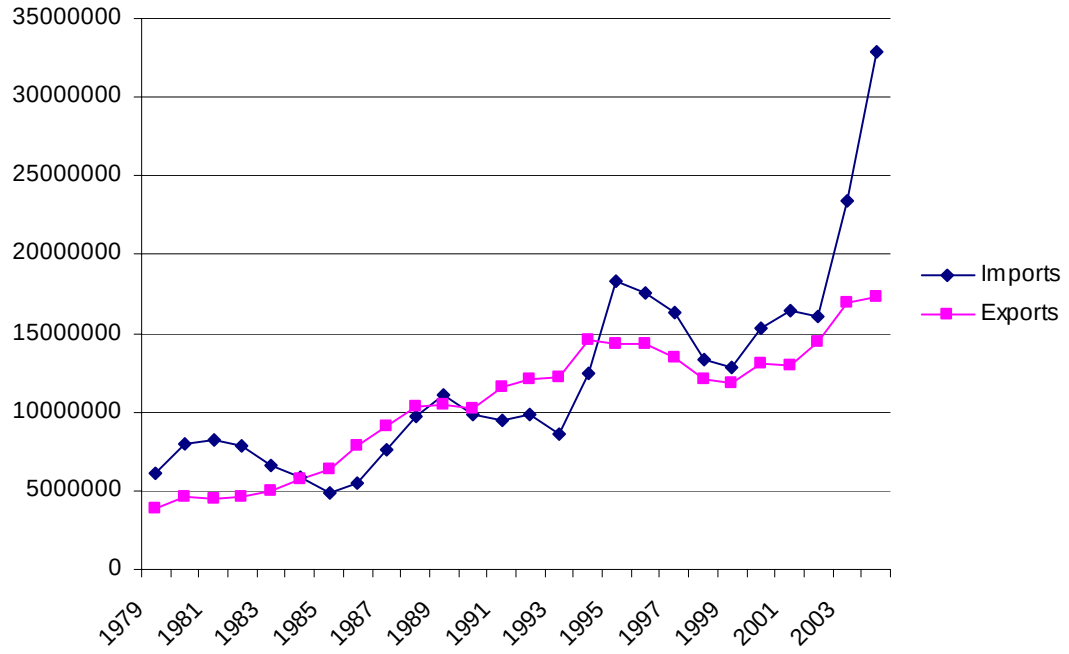
The business-as-usual scenario is obtained by simulating year-to-year changes happened from 1997 to 2015 to the three economies in the model, such as, growth of macroeconomic indicators, industry output and employment, and trade in wool (more detailed assumptions are listed in section three). This is made possible through the **dynamic mechanisms** in the model determining accumulation of physical capital and foreign assets and liabilities over time. The accounting of the accumulation of foreign assets and liabilities allows the accounting of GNP that is GDP plus return from foreign assets net of interest paid on foreign liabilities.

The accumulation of physical capital allows investment (net of depreciation) in a previous year be added onto the productive stock of capital in the current year. Investment in a particular industry by a particular country/region is determined by a reverse logistic function linking growth in capital stock with expected rate of return. In the current version of MMC, the expected rate of return is determined under static expectations. Under static expectations, investors only take account of current rentals and asset prices when forming current expectations about rates of return.

Figure 1

China: value of imports and exports of agricultural products

1979-2004, $US1,000



Source: FAO, FAOSTAT 2006.

Figure 2

History, baseline forecasts and policy simulations

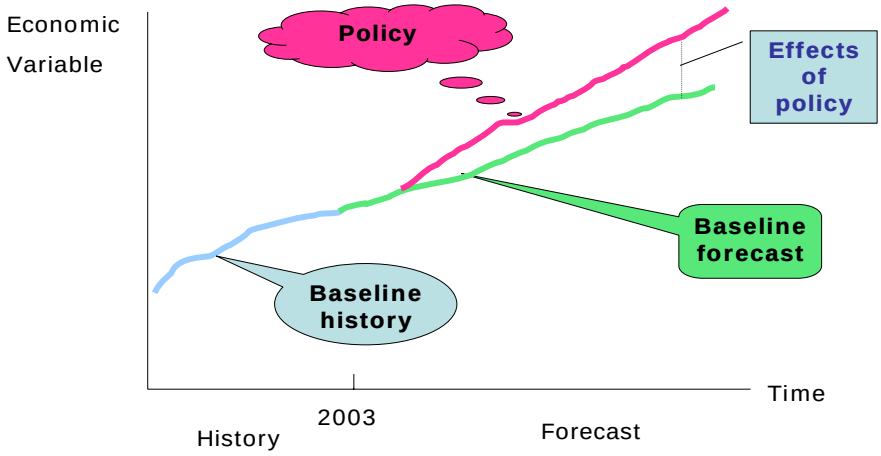


Figure 3

Removing border protection on wheat and rice: macroeconomic effects

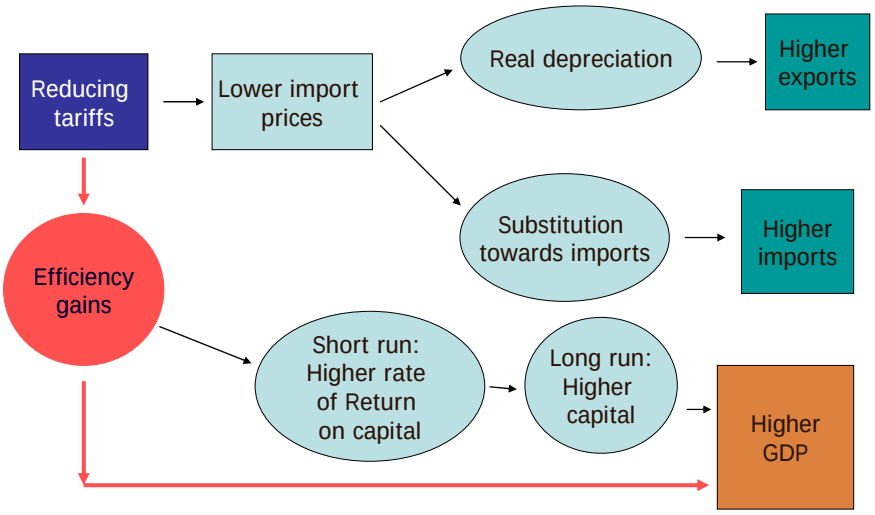
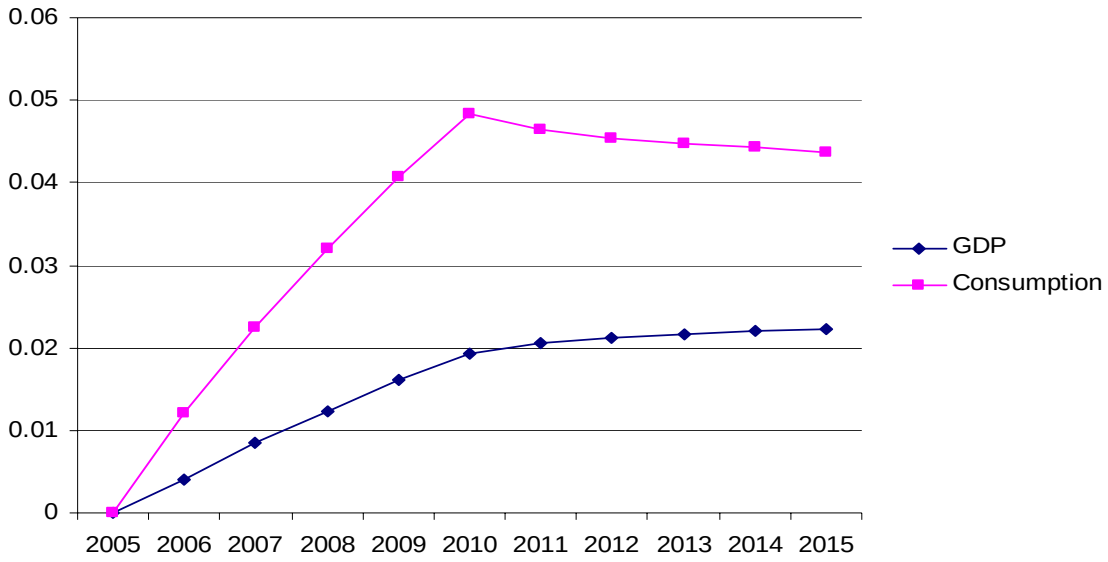


Figure 4

Removing border protection on wheat and rice: macroeconomic effects

Deviation from baseline 2005-2015, per cent

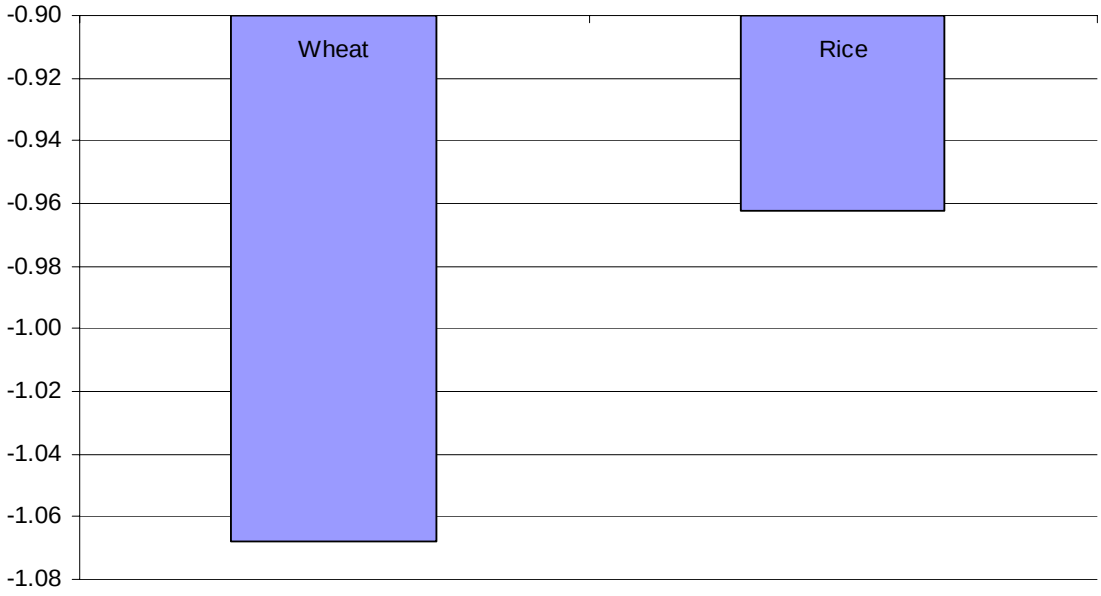


Source: simulation results.

Figure 5

Effects of removing border protection on wheat and rice: The output of the wheat and rice industries

Deviation from baseline in 2015, per cent



Source: simulation results.

Figure 6

Effects of removing border protection on wheat and rice: industry effects

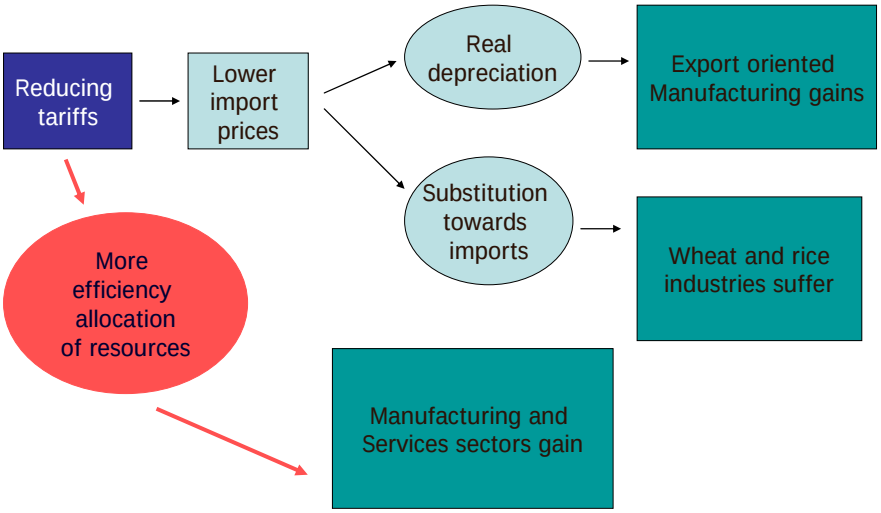
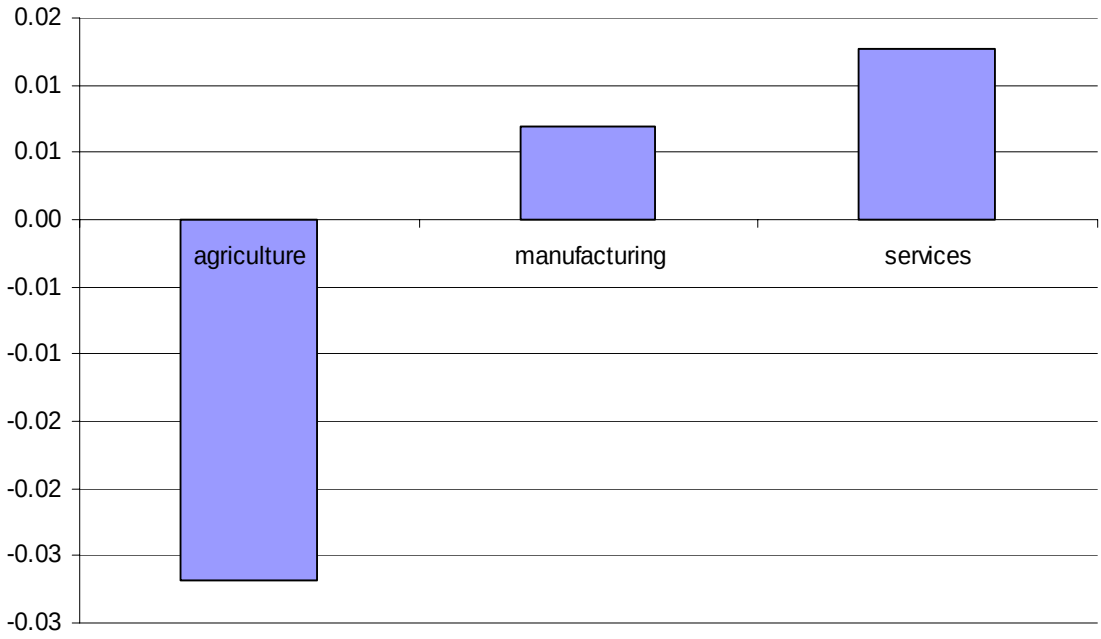


Figure 7

Effects of removing border protection on wheat and rice: Industry results

Deviation from baseline in 2015, per cent

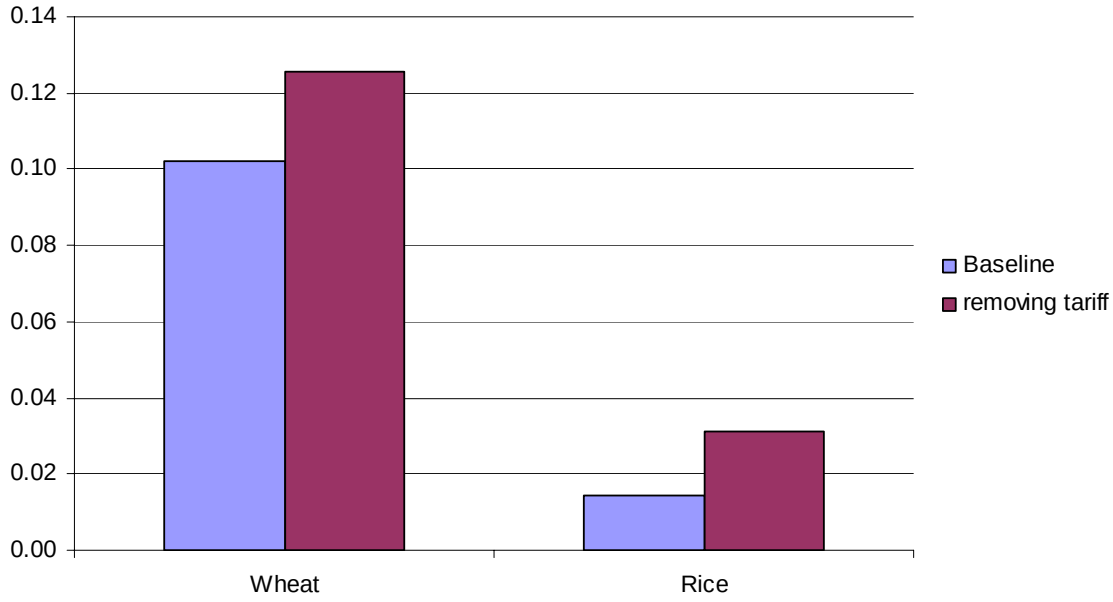


Source: simulation results.

Figure 8

Effects of removing border protection on wheat and rice: Food securities

Ratio of imports to domestic consumption in 2015



Domestic consumption = production + imports – exports

Source: simulation results.

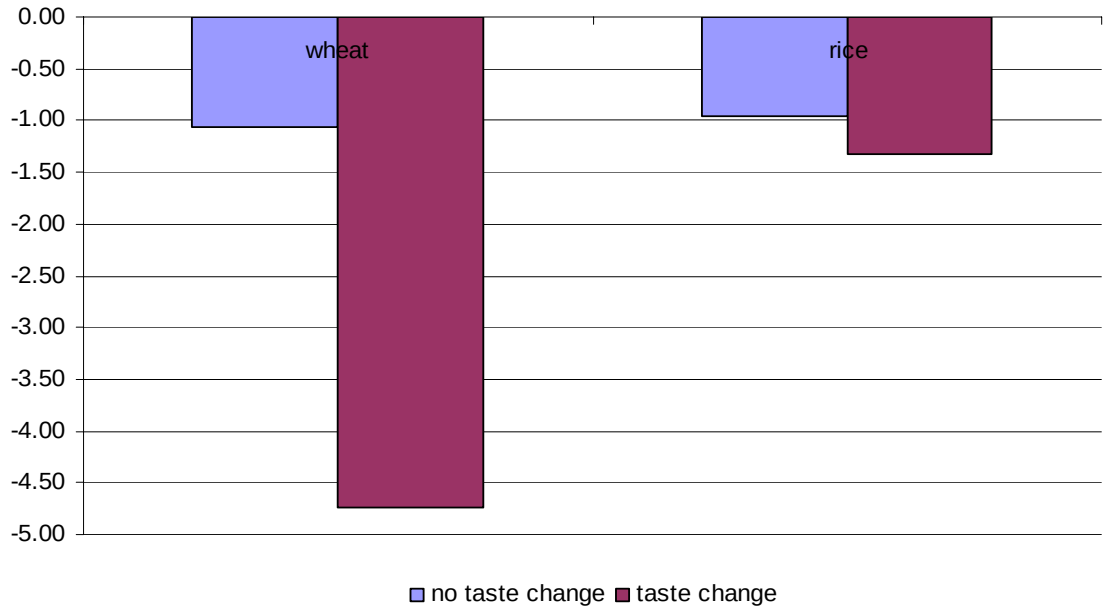
Figure 9

Effects of removing border protection on wheat and rice:

The output of wheat and rice industries

What if it leads to changes in consumer preference in favour of imports

Deviation from baseline in 2015, per cent



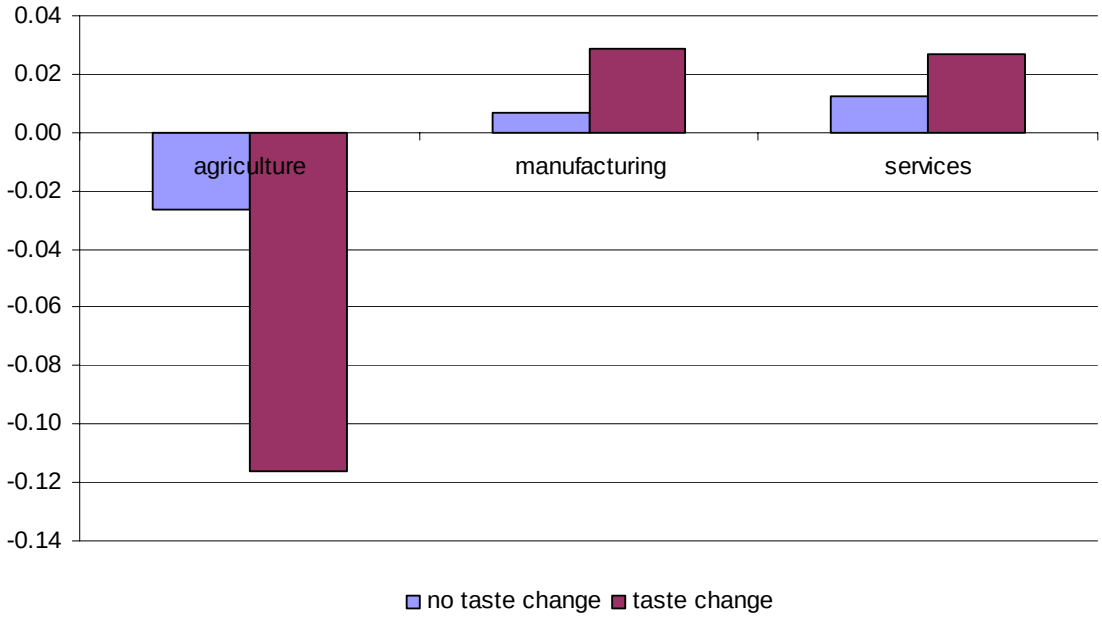
Source: simulation results.

Figure 10

Effects of removing border protection on wheat and rice: Industry results

What if it leads to changes in consumer preference in favour of imports

Deviation from baseline in 2015, per cent



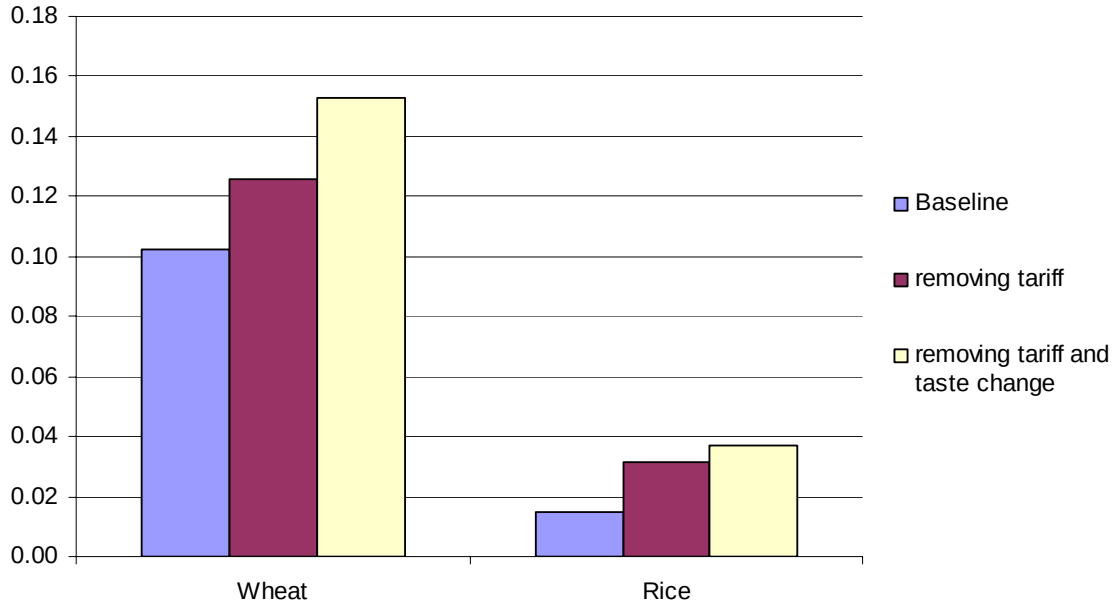
Source: simulation results.

Figure 11

Effects of removing border protection on wheat and rice: Food securities

What if it leads to changes in consumer preference in favour of imports

Ratio of imports to domestic consumption in 2015



Domestic consumption = production + imports – exports

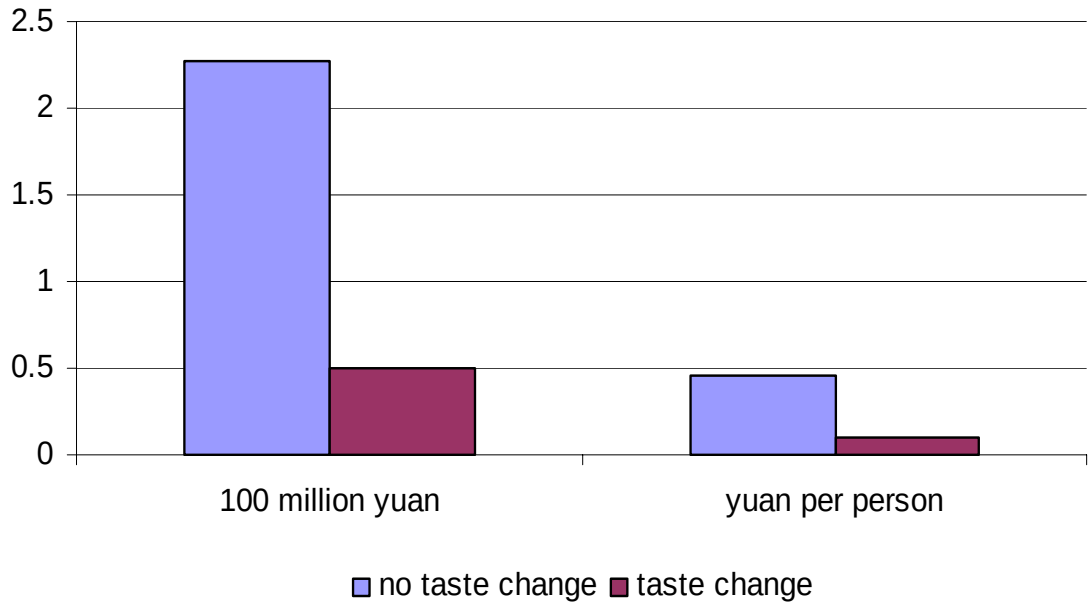
Source: simulation results.

Figure 12

Effects of removing border protection on wheat and rice: Rural income

What if it leads to changes in consumer preference in favour of imports

Deviation from baseline in 2015



Source: simulation results.

Table 1

China: quantity and value of major agricultural imports

1985-2004

	Average 1985-1994 (1)	Average 1995-2004 (2)	Ratio of (2) to (1)
	Soybeans		
Quantity, Mt	2107688	11257563	5.3
Value, $US1,000	536231	2931464	5.5
	Oil of Palm		
Quantity, Mt	709007	1880130	2.7
Value, $US1,000	288424	863528	3.0
	Rubber Natural Dry		
Quantity, Mt	380054	745487	2.0
Value, $US1,000	359538	690443	1.9
	Oil of Soybeans		
Quantity, Mt	344214	1161673	3.4
Value, $US1,000	171147	672248	3.9
	Wool, Greasy		
Quantity, Mt	130248	189552	1.5
Value, $US1,000	385059	659147	1.7
	fish meal		
Quantity, Mt	414271	860522	2.1
Value, $US1,000	193520	518171	2.7
	Barley		
Quantity, Mt	809408	1930952	2.4
Value, $US1,000	113235	331577	2.9
	Animal Oil, Fats & Greases		
Quantity, Mt	158894	350146	2.2
Value, $US1,000	62095	148417	2.4
	Cassava Dried		
Quantity, Mt	297673	1137750	3.8
Value, $US1,000	19333	104459	5.4
	Meat Meal		
Quantity, Mt	63358	153095	2.4
Value, $US1,000	20459	45580	2.2
	Cotton Carded Combed		
Quantity, Mt	7910	19491	2.5
Value, $US1,000	10409	35032	3.4
	Butter of Cow Milk		
Quantity, Mt	9221	13791	1.5
Value, $US1,000	16939	24685	1.5

Source: Calculated by author from FAOSTAT data, 2006.

Table 2

China: production and trade of selected agricultural products

1994-2004, 10,000 tonnes, per cent

	Production	Imports	Exports	Share of trade in production
	Rice			
1994	17,593	51	154	1.2
1995	18,523	165	6	0.9
1996	19,510	77	28	0.5
1997	20,073	36	95	0.7
1998	19,871	26	376	2.0
1999	19,849	19	272	1.5
2000	18,791	25	296	1.7
2001	17,758	29	187	1.2
2002	17,454	24	199	1.3
2003	16,066	26	262	1.8
2004	17,909	77	91	0.9
	Wheat			
1994	9,930	733	27	7.7
1995	10,221	1,163	23	11.6
1996	11,057	830	57	8.0
1997	12,329	192	46	1.9
1998	10,973	155	28	1.7
1999	11,388	51	16	0.6
2000	9,964	92	19	1.1
2001	9,387	74	71	1.5
2002	9,029	63	98	1.8
2003	8,649	45	251	3.4
2004	9,195	726	109	9.1
	Corn			
1994	9,928	0	875	8.8
1995	11,199	526	12	4.8
1996	12,747	45	24	0.5
1997	10,430	0	667	6.4
1998	13,295	25	469	3.7
1999	12,808	8	433	3.4
2000	10,600	0	1048	9.9
2001	11,409	4	600	5.3
2002	12,131	1	1166	9.6
2003	11,583	0	1639	14.2
2004	13,029	0	232	1.8
	Barley			
1994	442	151	5	35.3
1995	428	157	5	37.9
1996	431	215	6	51.3
1997	431	215	6	51.3
1998	340	179	5	54.1
1999	330	253	6	78.5
2000	265	217	9	85.3
2001	289	261	10	93.8
2002	332	213	11	67.5
2003	272	148	13	59.2
2004	n.a.	n.a.	n.a.	n.a.

Source: Chinese Ministry of Agriculture 2006. FAO, FAOSTAT 2006. **n.a.** not available.

Table 3

Baseline: macroeconomic indicators

Average annual growth rates 2005-2015, per cent

	Baseline case		Potential case	
	Australia	China	Australia	China
Macroeconomic indicators				
Real GDP	3.3	6.7	3.3	6.7
Real Consumption	3.4	5.8	3.4	5.8
Real Investment	2.9	6.6	2.9	6.6
Export volumes	3.9	9.2	3.9	9.2
Import volumes	3.7	8.2	3.7	8.2
Output of aggregated sectors				
Agriculture	2.4	2.6	2.4	2.7
Mining	3.2	6.3	3.2	6.3
Manufacturing	2.1	7.4	2.1	7.4
Services	3.4	6.7	3.4	6.7

Source: Baseline simulation.

Table 4

Sources of rural income

2003

	Total	Of which: family operation	Total	Of which: family operation
	100 million yuan	100 million yuan	%	%
Total rural income	131,719	64,909	100.0	100.0
1. Agriculture	14,542	14,044	11.0	21.6
of which：plantation	13,175	12,808	10.0	19.7
other agriculture	1,367	1,236	1.0	1.9
2. Forestry	902	808	0.7	1.2
3. Animal husbandry	7,155	6,844	5.4	10.5
4. Fishing	1,974	1,645	1.5	2.5
5. Manufacturing	74,115	22,589	56.3	34.8
6. Construction	7,892	4,098	6.0	6.3
7. Transportation	5,734	4,674	4.4	7.2
8. Trade and hotel	12,046	6,086	9.1	9.4
9. Other services	3,326	2,103	2.5	3.2
10. Other income	4,033	2,018	3.1	3.1

Source: Chinese Ministry of Agriculture, http://www.agri.gov.cn, accessed October 2005.

Table 5

Rural employment by activities

2003, persons per household

	China	East	Middle	West
Family total	2.50	2.48	2.45	2.59
Agriculture	1.40	1.12	1.48	1.60
Manufacturing	0.25	0.38	0.21	0.17
Construction	0.10	0.09	0.11	0.11
Transportation	0.06	0.07	0.05	0.06
Trade, hotel and restaurants	0.20	0.23	0.17	0.19
Other activities	0.49	0.59	0.42	0.46

Source: Chinese Ministry of Agriculture, http://www.agri.gov.cn, accessed October 2005.

Table 6

Rural labour force

1983-2003, 10,000 persons

	Total rural labour force	Agriculture	Shares (%)	Non-agriculture	Shares (%)
1983	34,690	31,645	91.2	3,045	8.80
1993	44,256	33,258	75.2	10,998	24.8
2003	48,971	31,260	63.8	17,711	36.2

Source: Chinese Ministry of Agriculture, http://www.agri.gov.cn, accessed October 2005.