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China's Agriculture: Drivers of Changes and Implications to China and the Rest of the World

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China's economy has experienced remarkable growth since the reforms were initiated in 1978 and pushed forward by a number of subsequent policy initiatives. Since the mid-1980s, rural township and village-owned enterprises development, measures to provide a better market environment through domestic market reform, fiscal and financial initiatives, the devaluation of the exchange rate, trade liberalization, the expansion of special economic zones to attract foreign direct investment (FDI), state-owned enterprise (SOE) reform, agricultural trade liberalization and many other policy efforts have contributed to China's economic growth. In response, the annual growth rate of gross domestic product (GDP) was nearly 10 percent between 1979 and 2008 (NSBC, 2009).

Rapid economic growth has been accompanied by significant structural changes in the economy. Rising income together with urbanization and other dynamics of the economy have resulted in large changes in demand and consumption patterns (Huang and Bouis 1996; Fan *et al.* 1995). These changes have in turn formed part of the driving force that stimulated structural changes in the economy. The share of agriculture in GDP declined from about 40 percent in 1970 to 11 percent in 2007 (NSBC, 2008). The share of services has risen over time. Within the agricultural sector, considerable structural adjustments have also been observed as a result of changes in the pattern of food consumption.

While past changes in China have been wrenching for both China and the rest of world, changes are expected to continue in the future—and in some cases the pace of the change will accelerate. Continued growth, continued urbanization and continued dynamism in China's economy will affect all segments of the economy and all regions of the nation. And, because of China's size, continued growth, urbanization and marketization will likely have profound impacts on the rest of the world.

In exploring what the driving forces of China's economy might mean for the rest of the world, it is worth observing that China has a large agricultural sector and large food economy. The performance in these sectors is of great significance for future outcomes in the rest of the world. As such, what happens inside China's borders will also affect the actions of policy makers globally.

The overall goal of this paper is to identify major changes in China's agriculture/food economy and their implications to both China itself and, more importantly, to the rest of world. In order to achieve these goals, the rest of this paper is organized as follows. The next two sections first discuss the major drivers of demand and then identify and analyze the major drivers of agricultural supply. The paper's next two sections then describe a framework that we use to predict changes in supply and demand and trade and measure the implications—first—to China, and—second—to the rest of world. The final section concludes.

Consumption Changes and Its Major Drivers

Income and Urbanization

Despite the global economic crisis, China's GDP growth is projected to maintain an 8 percent growth rate in 2009. Moreover, most analysts believe that China will continue to grow at a rate that ranges between 6 and 7 percent annually between 2010 and 2020. Estimates of future growth rates can be even higher. Of course, if such growth continues through 2030 (even at a rate of 5 percent per year between 2020 and 2030), the economy of China will grow by four to five times or more over the coming two decades.

During this time it is expected the urbanization trends will continue. Over the 25 year period between 1980 and 2005, as in every rapidly developing country, there are increasingly more people moving to the cities. From an urbanization rate of less than 20 percent in the early 1980s, by 2005 nearly 45 percent of China's population was living in the cities. China is expected to reach a level in which half of the population is living in cities within the next 5 or so years. By 2025 between 60 and 70 percent of the population is expected to be living in urban areas.

Shifts in Demand; Responses of Supply

Income rises and the shift of the nation's population from countryside to city have resulted in significant changes in China's consumption patterns and these changes will continue as income growth and urbanization continues. Specifically, rising incomes and urban expansion have boosted the demand for meats, fruits and other non-staple foods and have had a defining effect on the agricultural economy as producers have shifted their production to meet demand. For example, the share of livestock output value rose 2.5 times from 14 percent to 35 percent between 1970 and 2005 (Table 1). Aquatic products increased at an even more rapid rate. One of the most significant signs of structural changes in the agricultural sector is that the share of crops in total agricultural output fell from 82 percent in 1970 to 51 percent in 2005. Today (2009) cropping accounts for less than half of agricultural GDP.

Within the cropping sector, the importance of the three major crops, rice, wheat and maize, have waxed and waned. The area share of the major cereal grains increased from 50 percent in 1970 to a peak level of 57 percent in 1990. Since 1990 the share of these three major grains has gradually declined (to 50.2 percent in 2005—Table 2). Most of the fall has been due to the fall of the area sown to rice and wheat. In contrast, the share of maize area grew by more than 56 percent between 1970 and 2005. The rise in maize area, China's main feed grain, is correlated in no small way with the rapid expansion of the nation's livestock production during the same period. In addition to maize, cash crops, such as vegetables and fruit, edible oil, sugar and tobacco, have expanded in area.

Population Growth—a Non-factor

Interestingly, although the size of China's population is what makes China (in part) such an important player internationally, population growth will play an increasingly lesser role in demand changes. The main reason for this is that population growth rates are falling

so fast. In the 1970s the rate of growth of the population was more than 2 percent per year. In recent years the rate of growth of the population fell to about half of one percent. Throughout the coming years, it is expected to fall further and approach zero around 2030. From these figures it is clear that income and urbanization will play a much bigger role than population in shaping the demand side of China's food balance sheet in the future.

Agricultural Production Growth and Its Major Drivers

Although agricultural growth has been lower than the growth in the rest of economy, its performance has been impressive since late 1970s. After 1978, decollectivization, price increases and the relaxation of domestic trade restrictions on most agricultural products accompanied the take off of China's food economy and allowed China's producers to meet the shifts in consumer demand (discussed in the section above). Between 1978 and 1984, grain production increased by 4.7 percent per year; the output of fruit rose by 7.2 percent (Table 3). The highest annual growth rates (between 1978 and 1984) came in cotton, edible oils, livestock and aquatic commodity sectors, sectors that expanded in real value terms from 8 to 19 percent.

Agricultural growth remained remarkable for all agricultural products except for grain and cotton during the period 1985-2005. Fishery production experienced the fastest growth between 1985 and 1995 (13.7 percent annual growth, Table 3). Although its annual growth rate fell in the following period, it still recorded 10.2 percent growth between 1996 and 2000. Over the same period, meat production, vegetable sown area and fruit orchard output expanded at 7 to 9 percent annually. Other cash crops such as, edible oil crops, also grew at rates much higher than population growth.

Overall growth of agriculture sector kept at an average of nearly 4 percent of annual growth rate in 2001-2005 (row 1, Table 3). Comparing the growth rates of individual commodities between the early and late reform periods, it appears that production growth of some individual commodities (measured in quantity terms) fell. One explanation is that China's agricultural production system has been shifting from one that emphasizes total aggregate production to one that is more concerned with creating value-added and quality. During the three year period, 2005-2007, China's agricultural GDP in real terms grew at an annual rate of more than 5 percent.

Driving Forces of Agricultural Growth

Investments

Past studies have already demonstrated that there are a number of factors that have simultaneously contributed to agricultural production growth during the reform period. The earliest empirical efforts focused on measuring the contribution of the implementation of the household responsibility system (HRS), a policy that gave individual farmers control and income rights in agriculture. These studies concluded that most of the rise in productivity in the early reform years was a result of institutional innovations, particularly the HRS (Fan 1991; Lin 1992).

More recent studies show that since the HRS was completed in 1984, technological change has been the primary engine of the agricultural growth (Huang and Rozelle 1996; Fan 1997; Fan and Pardey 1997; Huang et. al. 1999 and Jin et al. 2002). Improvements in technology have by far contributed the largest share of crop production growth even during

the early reform period. When examining the sources of the technology shifts, Jin et al. (2002) empirically demonstrate the cross province differences in investment into R&D by the government have had the largest effects on technological improvements. Between 1990 and 2005, investment in R&D nearly tripled. China is one of the only countries in the world in which agricultural R&D expenditures as a share of AgGDP is rising.

Moreover, China is investing in far more than conventional agricultural technology. Since the late 1990s, China has greatly expanded its investment into plant biotechnology. By the mid-2000s China's public investment into plant biotechnology was the largest in the world. China's agricultural leaders believe that past gains in no small part are from government-supported technologies; they believe their current investments in agricultural R&D will play an important role in driving agricultural output in the future.

Transportation and market infrastructure have also improved remarkable since the early 1990s—which serve to raise the return to farmers at the farmgate. Huang and Rozelle (2006) show that China's food markets have become highly integrated since the late 1990s. Not only do integration measures show that prices in one region are highly linked to prices in other regions, our work also suggests that the efficiency of moving commodities across the nation is improving. In fact, when measuring efficiency in terms of the percentage change in price for every 1000 kilometers of distance from port (between 4 to 7 percent), in efficiency terms China's agricultural marketing is comparable with that in the US.

Irrigation has played a critical role in establishing the highly productive agronomic systems in China (Wang 2000). The proportion of cultivated area under irrigation increased from 18 percent in 1952 to a level at which about half of all cultivated land had been irrigated after the early 1990s (NSBC 2001). However, rising demand for domestic and industrial water uses poses a serious constraint to irrigated agriculture and increasing water scarcity has come to be seen as a major challenge to the future food security and well-being of people especially in the northern region. Wang et al. (2005) shows that the water management reform has been helping increase the efficiency of water use in north China, although the scope for such reform in the long run is somewhat limited.

Subsidies

In 2004 China launched its new path of development. Instead of taxing farmers and charging them fees to provide basic services in their rural homes, the government has taken decisive action to eliminate almost all taxes and fees. In addition, since 2004, the government has begun to subsidize farmers. Since 2004, subsidies have grown fast. In 2004, the government gave out 14.52 billion yuan. In 2008, the amount had climbed to 94.97 billion yuan. While the government initially launched the subsidy program (at least nominally) to increase grain production and enhance food security, as it turns out the implementation has made the program non-distortive. According to a recent study by Huang et al. (2009) demonstrates that changes over time in a farmer's grain subsidy have no impact on grain production. Likewise, so-called input subsidies have no effect on the level of input investment by farmers. As a result, in recent years the government really has begun to rely on the program for an alternative policy target: increasing the welfare of rural households. Because of this neutral effect in terms of affecting agricultural production, we do not include subsidies in our empirical analysis of the effect of policy on the agricultural supply, demand or trade of China or the rest of the world.

China's Agricultural Growth Prospects and Impacts on China's Domestic Economy

Based the above discussions, this subsection provides our prospects of China's economic growth in the first two decades of the twenty-first century. While our prospects are focused on the most likely growth scenario (baseline), we also formulate an alternative higher growth scenario (or high growth scenario) because one of the objectives of this study is to examine the global implications of China's rapid economic growth. The details of both baseline growth scenario and high growth scenario for China in 2006-2020 are summarized in Table 4.

Baseline Scenario

The baseline scenario assumes that the average annual GDP growth rates will slightly fall over the entire projection period. Annual growth rate is assumed to decline to 7.2 percent in 2010-2015 and 6.3 percent in 2016-2020 (Table 4). By 2020, China's economy will be more than four times as large as that in 2000.

In this study, we adopt a population projection conducted by IIASA (Toth et al. 2003). For per capita GDP growth, which is derived by deducting population growth from total GDP growth, the average annual per capita GDP growth rates will remain at about 7-8 percent in 2010s and 6-7 percent in 2020s (Table 4).

Higher Growth Scenario

To meet the objective of this study, we also consider the implications of an even more rapid economic growth of China's economy. Therefore, we assume that China will be able to continue to implement its economic reform agenda and create an even more favorable internal and external development environment than that assumed under the baseline scenario. Under high growth scenario, we assume that annual GDP growth rate will be increased by 10 percent compared to that under the baseline scenario (over the period 2006 to 2020). For example, if the GDP growth rate under baseline is 8.0 percent, the corresponding rate under the high growth scenario will be 8.8 percent (8.0×1.1) (4th row, Table 4).

China's Agriculture and Food Economy and Sustainable Economic Growth

The results of analyses presented in this section are based on the Global Trade Analysis Project (GTAP). A brief introduction to the model, improvements on data and parameters of current GTAP model, and assumptions on macro economic development (e.g. GDP and population growths by country or region, total factor productivity (TFP) changes, and factor endowments) are provided in Huang et al. (2006). The implications of China's rapid economic growth on domestic agriculture and food economy as well as sustainable economic growth are examined through several key indicators (e.g., self-sufficiency, imports, exports, net exports and relative trade shares in China and world economy).

Major results from the baseline scenario

Baseline projections show that self-sufficiency of all land-intensive crops except for rice will fall, but the fall will be very moderate for most commodities in the future. This is what we should expect as many land-intensive crops in China have a less comparative advantage in the world markets.

Under the baseline scenario, the most significant increase in import will be oilseeds. By 2020 oilseed self-sufficiency will further fall from 70 percent in 2001 to 45 percent. Increasing import of oilseeds is mainly because of the rising domestic demand for both edible oils and feed. This should not be surprising given China's experience in soybean import in the past five years. After China liberalized soybean trade by eliminating nearly all its trade distortions (both tariff and non-tariff measures), annual import of soybean surged from virtually zero in the late 1990s to more than 30 million metric tons in 2007.

The production of cotton and other plant-based fibre is projected to expand overtime, mainly through their productivity growth, but it will also fall behind domestic demand. Similar to many other crops, fibre imports will rise with gradually falling self-sufficiency levels. Increasing imported fibres are required to meet demand from China's rapidly expanding textile and apparel sector, which has created and will continue to generate employment for millions of rural people.

Among cereals, most of the imports are for feed grain (Panel A, Figure 1). By 2020, China will import nearly 20 percent coarse grains, mainly maize, to meet increasing demand from the expansion of domestic livestock sector. Wheat import will be minimal because per capita demand for wheat is projected to fall in near future. Rice is the only cereal that will expand its export and maintain a net export commodity in 2001-2020. But rice export is projected to be only moderate.

On the other hand, China will export most relatively labor-intensive products such as vegetables, fruits, fish and processed foods. The largest export will be recorded in processed foods (Panel B, Figure 1). While China may import large value of horticultural products, the exports will exceed the imports.

In sum, China's economic growth and trade liberalization will facilitate domestic agricultural structural changes. China's agriculture will be gradually shifting from land-intensive sectors with less comparative advantage to labor-intensive sectors with more comparative advantage. While self-sufficiency levels of many commodities will fall with economic growth under a more liberalized trade environment, food grain (excluding feed grain) and overall food self-sufficiency will remain high.

Major results from China high GDP growth scenario

The simulations show that the higher growth of China's economy will not have

significant impacts on overall food and agricultural economy in China. Although a higher growth of China's economy is associated with a lower rate of self-sufficiency of nearly all agricultural and food commodities, the changes will not be significant (Table 5). Rising domestic demand resulting from additional income growth in the future will be less than what occurred in the past. Food income elasticities have been falling and will continue to fall with the rapid growth of China's economy. After 2010, all cereal grains will have negative income elasticities. Increases in income will lead to decline in cereal consumption. Table 5 shows that, comparing the columns 1 and 2, the rates of self-sufficiency decline only 1 or 2 percent for nearly all agricultural and foods commodities.

With higher GDP growth, China would further restructure its agricultural and food economy in favor of the commodities with a greater comparative advantage. For example, the export shares of land-intensive food and feed crops sectors in the world trade will decline and their import shares will rise (Table 6). The high GDP growth scenario reduces the export share of animal products (6.1 percent in high GDP growth scenario, comparing to 5.5 percent in the baseline) because of their positive income elasticities. As a whole, the net export (or net import) of food and feed will decline (increase) by about US\$ 4 billion comparing to the baseline in 2020.

Implications of China's Rapid Economic Growth in the Rest of the World

Chinese economy has been increasingly integrated into the world economy since its economic reform. The integration has occurred in both commodity trade and FDI between China and rest of the world. In this section, we examine the impact and implications of China's economic growth on the rest of the world in the future. We will first discuss the implications of China's rapid growth upon the rest of the world from our baseline analysis. Then further implications from higher GDP growth scenarios will follow.

Main conclusions on the implications of China's rapid economic growth from our baseline analysis are that China's growth will provide more opportunities than challenges to the rest of the world, and overall the world will gain from China's economic expansion. As regards food and agriculture, China's economic growth under a more liberalized global economy will help countries with a comparative advantage in land-intensive agricultural products to expand their production and export additional agricultural products to the Chinese markets. China's economic growth will not affect the world's food security.

The Implications of China's High Economic Growth

Under the high GDP growth scenario, China will generate more trade and nearly all countries or regions will gain from the faster growth of China's economy. The signs and sizes of gains for each region from additional growth in China depend on the nature of its economic structure. Those countries that are largely complementary to China's economy will gain more from China's growth. Otherwise, when a country has a similar economic structure as that of China, adverse consequence could occur. Detailed comparisons of

impacts on output, trade, and corresponding welfares due to China's higher economic growth (compared to the baseline) are presented in Table 7.

Table 7 shows that all regions will gain in terms of food and feed production from China's faster growth. A 10 percent increase in the annual growth rate of GDP (e.g. from 8 percent to 8.8 percent) and holding all other factors constant, China's food and feed net imports (exports) will increase (decline) by about US\$ 3 billion in 2020. The rising imports in China will push the world price upwards and increase production of food and feed in all countries, particularly exporting countries (Table 7).

While higher economic growth in China will generate more domestic demand for final consumer goods, it will also result in both higher exports and imports of manufactures and textile and apparel products. The world prices of these commodities are projected to fall accordingly. The consumers in large importing countries or regions (i.e. NAFTA, EU, Japan and Korea, China's Hong Kong and Taiwan) will gain from the lower world prices. For those countries or regions that export manufacturing products to China (e.g. Japan and Korea, South East Asia), their production will rise (Table 7). However, countries with the same export structures to China may be hurt by lower prices. This may explain why India and some other Asian countries will incur slightly negative effects from China's higher economic growth.

Our simulations also show that the production structure in other countries will adjust accordingly as China's economic growth accelerates. This is reflected in the differences of production changes across sectors in each region (Table 7). Whether a country or region can reap gains from China's economic expansion as those presented in this section will depend on how flexible and efficient their economies are in responding to world market changes triggered by China's economic growth.

To have a better understanding of the overall impact of China's rapid economic growth on the rest of the world, welfare analysis is applied. Table 8 shows that global welfare will increase by about US\$ 241 billion in 2020 under China's high growth scenario (comparing to the baseline), of which about US\$ 226 billion (93.7 percent) occurred in China and nearly US\$ 15 billion in the rest of world (6.3 percent). In terms of GDP, the rest of world (whole world excluding China) will have additional annual growth of 0.12 percent in 2020 (comparing with the baseline). Therefore, rapid economic growth in China is an important engine of the world economic development.

Table 8 also shows that nearly all regions could gain from China's economic expansion. The changes of welfare indicate that regions that are complementary with China will gain more from China's higher economic growth (Table 8). For example, the Russian Federation, Australia, South America and the Middle East (including in "rest of world" ROW group) will gain more than many other countries because China will significantly increase its imports of energy and minerals as well as many agricultural products from these regions compared to other regions. The exporting countries gain from increases in

both price and volume associated with China's commodities. This will further expand welfare gains by raising the return of endowments, enhancing efficiency of allocation etc. India and other South Asia nations are exceptions. These countries are also major exporters of textiles and apparels in the world. Moreover, manufacturing products exported from India and some other Asian countries have a high degree of substitutability with those from China. Therefore these countries would encounter increasing competition from China in the world markets in the coming decades.

Concluding Remarks

China has become one of the fastest growing economies in the world since late 1970s. GDP grew at about 10 percent annually in the past 30 years. Over the course of the reform period, both rural and urban incomes have increased noticeably. The rising income has also associated with substantial reduction of poverty and significant improvement of food security.

China's experience shows that the importance of both domestic and external policies in achieving sustainable growth. China's rapid growth would not have been possible without its domestic economic reforms and its "open-door" policy. China's experience also shows that institutional innovation (particularly land tenure), technological changes, and market reform and infrastructure development are critical to the improvement of the nation's food security.

The results from this study provide significant policy implications to many countries that are currently China's major trade partners or those seeking greater economic and trade relations with China. The main conclusions on the implications of China's rapid economic growth are that China's growth will provide more opportunities than challenges to the rest of the world. Overall the rest of the world will gain from China's economic expansion though this general conclusion may not hold for some countries. As China is set to play an increasing role in international trade which should benefit both developed and developing countries.

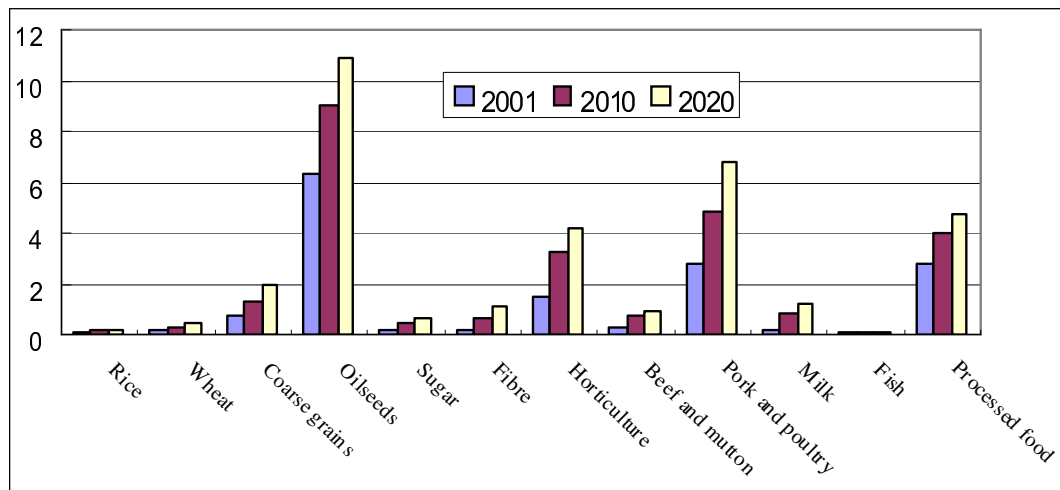
For those countries whose economic structures are complementary to China there will be emerging opportunities offered by China's increasing imports due to its rapid growth and integration into the world economy. While countries that have similar export structures to that of China and are competing for the same export markets will have to put extra efforts to restructure their economies and invest more in domestic infrastructure to lower production and marketing costs.

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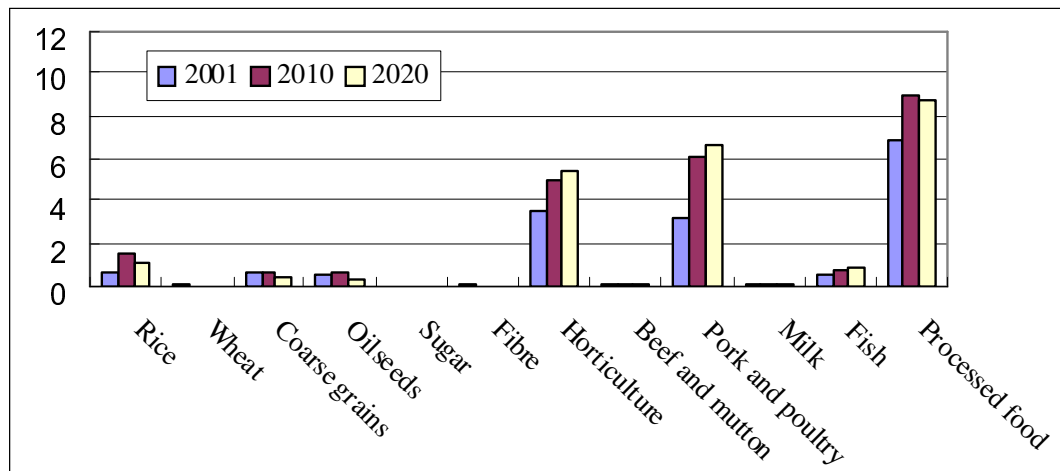
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Figure 1. Agriculture and food trade (US\$ billion) under baseline in 2001-2020

Panel A: imports



Panel B: exports



Panel C: net exports

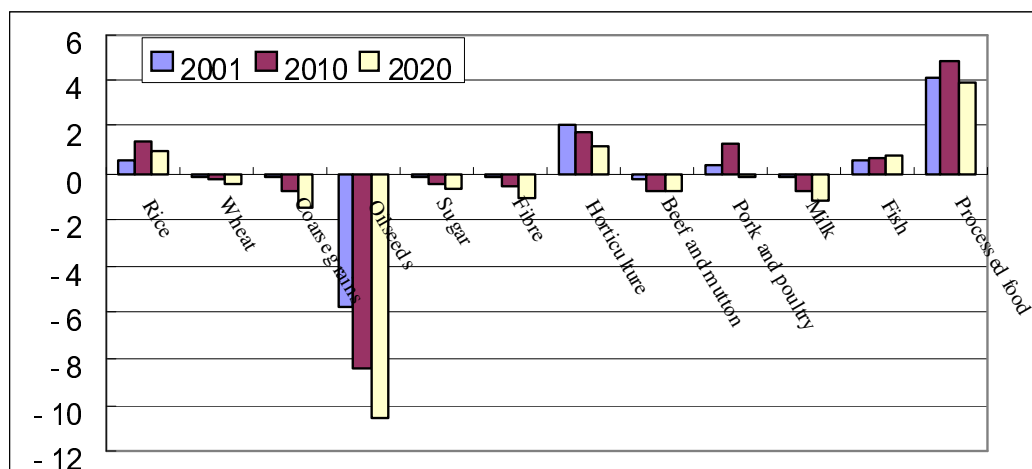


Table 1. Changes in structure (%) of China's agricultural economy, 1970-2005.

	1970	1980	1985	1990	1995	2000	2005
Share in agricultural output							
Crop	82	76	69	65	58	56	51
Livestock	14	18	22	26	30	30	35
Fishery	2	2	3	5	8	11	10
Forestry	2	4	5	4	3	4	4

Source: NSBC, China's Statistical Yearbook, various issues and China Rural Statistical Yearbook, various issues.

Table 2. Shares of crop sown areas, 1970-2005.

	1970	1980	1985	1990	1995	2000	2005
Rice	22.1	23.1	21.9	22.3	20.5	19.2	18.6
Wheat	17.4	19.7	20.0	20.7	19.3	17.1	14.7
Maize	10.8	13.7	12.1	14.4	15.2	14.8	17.0
Soybean	5.5	4.9	5.3	5.1	5.4	6.0	6.2
Sweet potato	5.9	5.1	4.2	4.2	4.1	3.7	3.0
Cotton	3.4	3.4	3.5	3.8	3.6	2.6	3.3
Rapeseed	1.0	1.9	3.1	3.7	4.6	4.8	4.7
Peanut	1.2	1.6	2.3	2.0	2.5	3.1	3.0
Sugarcrops	0.4	0.6	1.0	1.2	1.3	1.0	1.0
Tobacco	0.2	0.3	0.9	0.9	0.9	0.8	0.9
Vegetable	2.0	2.2	3.2	4.3	6.3	9.7	11.4
Others	30.1	23.5	22.5	17.4	16.3	17.2	17.1
Total	100	100	100	100	100	100	100

Source: NSBC, China's Statistical Yearbook, various issues; China Rural Statistical Yearbook, various issues.

Table 3. The annual growth rates (%) of agricultural economy, 1970-2005.

	Pre-reform	Reform period			
	1970-78	1979-84	1985-95	1996-00	2001-05
Agricultural GDP	2.7	7.1	4.0	3.4	3.9
Production:					
Grain	2.8	4.7	1.7	-0.7	1.1
Cotton	-0.4	19.3	-0.3	-1.9	5.3
Soybean	-2.3	5.2	2.8	2.6	1.4
Oil crops	2.1	14.9	4.4	5.6	0.8
Fruits	6.6	7.2	12.7	8.6	21.0
Meats	4.4	9.1	8.8	6.5	4.9
Fishery	5.0	7.9	13.7	10.2	3.6
Planted area:					
Vegetables	2.4	5.4	6.8	6.8	3.1
Orchards (fruits)	8.1	4.5	10.4	1.5	2.4

Note: Growth rates are computed using regression method. Growth rates of individual and groups of commodities are based on production data.

Sources: NSBC, 1985-2005 and MOA, 1985-2006.

Table 4. Projection of China's economy in 2001-2020

	1985-95	96-00	01-05	06-10	11-15	16-20
Annual growth rate (%)						
Baseline						
GDP	9.7	8.2	8.9	8.0	7.2	6.3
Per capita GDP	8.3	7.2	8.2	7.4	6.7	5.9
High growth						
GDP	9.7	8.2	8.9	7.6	6.6	6.7
Per capita GDP	8.3	7.2	8.2	8.2	7.4	7.5
Population	1.37	0.91	0.72	0.61	0.54	0.41
Per capita GDP in						
		2000	2005	2010	2015	2020
Baseline:						
Yuan (RMB)		7086	10528	14974	20612	27454
USD		856	1300	1849	2545	3389
High growth						
Yuan (RMB)		7086	10528	15613	22331	30638
USD		856	1300	1927	2757	3782
Population (billion)		1.267	1.308	1.348	1.382	1.409

Note: values are in 2000 constant prices.

Table 5. Self-sufficient level (%) in different scenarios in 2020.

	Baseline	High GDP
Rice	103	102
Wheat	95	92
Coarse grains	86	84
Oilseeds	45	43
Sugar	72	71
Fiber	93	92
Horticulture	102	100
Beef and mutton	94	93
Pork and poultry	100	99
Milk	81	80
Fish	102	101
Processed food	101	100

Table 6. China's trade shares (%) in the world under different scenarios in 2020.

	Export share		Import share		Net export share	
	Baseline	High GDP	Baseline	High GDP	Baseline	High GDP
Food + feed crops	3.9	3.7	9.8	10.3	-5.9	-6.6
Processed food	4.9	5	2.7	2.7	2.2	2.3
Animal products	6.1	5.5	6.7	7.5	-0.6	-1.9
Fiber	0.1	0.1	9.2	11.4	-9.1	-11.3
Energy	0.2	0.2	7.1	9.0	-6.9	-8.8
Mineral	2	1.6	23.4	29.4	-21.4	-27.8
Textile/apparel	34.3	37	7.5	7.4	26.8	29.6
Manufacture	8.9	9.5	6.9	7.4	2.1	2.1
Service	2	2.2	6.2	6.2	-4.2	-4
Total	8.5	9	6.9	7.4	1.5	1.6

Table 7. Percentage output changes in different regions in 2020 due to China's higher economic growth: high GDP growth comparing to baseline.

	HK + TW	India	SE Asia	Japan + Korea	Other Asia	AusNzl	NAFTA	SAM	Enlarged EU	Russia	ROW
Food+feed crops	0.4	0.1	0.4	0.3	0.1	0.5	0.4	0.5	0.3	0.5	0.3
Processed food	0.1	0.1	0.1	0.2	0.1	0.2	0.1	0.2	0.1	0.3	0.2
Animal products	0.4	0.0	0.6	0.4	0.2	0.6	0.4	0.3	0.3	0.6	0.4
Fiber	-2.0	-0.9	-0.8	0.4	-1.1	-0.5	0.0	-0.5	4.4	-0.7	0.0
Forestry	1.1	0.5	4.0	0.9	1.4	6.6	1.6	1.3	4.8	17.1	5.0
Energy	3.1	2.7	3.3	4.0	3.9	2.9	2.7	2.7	3.0	3.0	3.1
Mineral	1.3	9.1	2.2	1.4	6.7	8.8	1.2	6.8	1.5	1.0	2.8
Textile & apparel	-3.6	-1.0	-3.3	-2.5	-2.0	-3.5	-1.6	-1.6	-2.6	-2.6	-2.6
Manufactory	0.6	0.1	0.2	0.3	0.2	-0.6	0.0	-0.1	0.2	-1.1	-0.4
Service	0.1	-0.2	0.1	0.2	-0.2	0.5	0.0	0.1	0.1	0.8	0.2
Total	0.12	-0.09	0.09	0.17	-0.16	0.49	0.05	0.13	0.10	0.77	0.20

Table 8. Welfare change in different regions in 2020 due to China's higher economic growth: high GDP growth comparing to baseline.

	Aggregate welfare effect (EV) USD billion	Change in welfare (%)
China	226.2	10.6
The rest of world	14.8	0.09
China: HK+TW	1.3	0.22
India	-1.4	-0.15
Japan + Korea	1.4	0.07
SE Asia	0.4	0.07
Other Asia	-0.2	-0.06
AusNzl	1.3	0.51
NAFTA	1.4	0.03
SAM	1.1	0.10
EU15	0.8	0.03
CEEC	-0.2	-0.05
Russia	2.7	0.82
ROW	6.2	0.44
TOTAL	241.0	1.31