How China's Farm Policy Reforms Could Affect Trade and Markets:

A Focus on Grains and Cotton

Wusheng Yu

ICTSD

International Centre for Trade and Sustainable Development

Issue Paper

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LIST OF ABBREVIATIONS

AMS	aggregated measure of support
CCCCP	Central Committee of the Chinese Communist Party
CGE	computable general equilibrium
DDGS	dried distillers grains with solubles
GTAP	Global Trade Analysis Project
ICTSD	International Centre for Trade and Sustainable Development
MOFCOM	Ministry of Commerce, China
MPS	market price support
NDRC	National Development and Reform Commission, China
PSD	Production, Supply and Distribution, USDA
PSE	producer support estimates
OECD	Organisation for Economic Co-operation and Development
TRQ	tariff rate quota
TY	trade year
USDA	United States Department of Agriculture
WTO	World Trade Organization

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FOREWORD

In recent years, China has made huge progress in reducing poverty and hunger, with more than 130 million fewer people undernourished than at the start of the 1990s. The country's historic achievements in this area augur well for the ability of governments around the world to achieve the ambitious objectives they have set themselves under Agenda 2030, set out in the seventeen Sustainable Development Goals that were agreed at the United Nations in September 2015.

Beijing's flagship annual policy statement, known as Policy Document no. 1, and issued by the Central Committee and State Council following the start of the Chinese New Year, was in 2017 once again devoted to agriculture, farmers and rural development—a clear sign of the importance that Chinese policymakers continue to attach to progress in this area. The new policy document sets out a comprehensive vision for the agricultural sector, which in many respects seeks to respond to the challenges that the international community has identified in Agenda 2030.

Chinese policymakers are now looking at options to improve environmental sustainability, to make the farm sector more innovative, and to revitalise rural areas so as to ensure that farming remains an attractive option for young people in future years. Reforms to improve how agricultural markets function are also part of the new vision that Beijing has set out in this area, and again echo aspects of the Agenda 2030 framework—which for example commits to "correcting and preventing distortions in world agricultural markets" as part of the goal of ending hunger, achieving food security and improved nutrition, and promoting sustainable agriculture.

The Chinese government has, in recent years, initiated a number of reforms to the country's food and agricultural policies, with a view to improving the market orientation of the agricultural sector and achieving a number of broader public policy goals. These reforms have included new policies on cotton, rapeseed and maize in particular. They have been designed to reduce the fiscal burden associated with previous policies on public procurement and stockpiling for key farm products, especially in the context of falling international commodity prices, and taking into consideration the relatively low market access barriers that China agreed to as part of its WTO accession commitments.

This paper, by Wusheng Yu, explores the implications of recent reforms for prices, production and trade for a set of five key agricultural products, and looks at how different scenarios could affect both domestic and international markets. As such, we hope that it represents a useful contribution to the ongoing debate over how farm policy reforms in key farm importing and exporting countries could support efforts to move towards a more equitable and sustainable global food system.

Ricardo Meléndez-Ortiz
Chief Executive, ICTSD

EXECUTIVE SUMMARY

China's efforts to secure self-sufficiency in grains and other important agricultural products have resulted in continuously rising domestic agricultural outputs; however, recent rises in domestic outputs have been associated with higher domestic market costs and prices as compared to the corresponding world market prices, which has led to higher (and rising) imports and, more seriously, high domestic stocks of major agricultural products at significant storage costs. The coexistence of *high domestic outputs, high imports, and high domestic stock,* dubbed the *"triple-high"* phenomenon in agricultural policy debates in China, is a major challenge facing Chinese policy makers, not only because of the ballooning fiscal costs associated with this phenomenon but also due to the compatibility of the country's agricultural domestic support with its World Trade Organization (WTO) commitments. Moreover, the rising pressure to import more food grains is not consistent with the country's long-held goal of high self-sufficiency rates.

In responding to this unprecedented situation, the Chinese central government announced that its farm policy would be modernised, with a gradual movement towards more market-oriented policies and more differentiated policies on different commodities. For rice and wheat, the minimum procurement prices are to be maintained and "perfected;" for cotton (mainly in the Xinjiang region) and soybean in Northeast China, the new target price systems are to be further implemented so that compensation payments will be made to farmers when market prices fall short of the declared target price. This replaces the government procurement and stockpiling programme responsible for the large stockholding; for maize, the procurement and stockpiling policy was also formally repealed and replaced by market pricing and producer subsidies, the latter of which is to be formally delinked from maize price formation. For all five products considered in this paper, the Chinese central government declared (see CCCPC and State Council of China 2016) that the size of state reserve stocks needs to be "scientifically" determined and that stock build-up and release mechanisms are to be "perfected."

Whether and to what extent these farm policy reforms will be able to alleviate the symptoms of the "*triple-high*" phenomenon has tremendous implications for not only the Chinese agriculture sector and related upstream and downstream industries (e.g. input producers and processors) but also for global agricultural markets and trade. The purpose of this paper is therefore to provide an initial analysis of the above-mentioned policy changes in China, focusing on the likely implications of its recent policy reforms for production, domestic stock and trade in relation to grains (rice, wheat, maize and soybean) and cotton, as well as the potential implications of further policy options affecting the markets of these products. Such an analysis—based on detailed data analysis and descriptions of most recent policy developments and where possible drawn from recent literature—should be useful for relevant policy audiences to understand the trade and market effects of China's recent policy development and future directions in relation to policy goals of food security and sustainable development.

For rice and wheat, maintaining or effectively reducing minimum prices (as the main policy instrument recently used by China) would help curb the rising market price support for these two products. Additionally, if the new strategy presented in the 2016 Policy Document no. 1 of "using domestic and international resources and utilizing domestic and international markets" covers these two products, then a more open attitude to their imports may also be expected, which may result in full utilisation of the rice and wheat import quotas. It is also possible that China may temporarily withdraw marginally productive land from active production through new land management plans. Lastly, recent consolidation of various direct payments into the single agricultural support payment seems to further decouple these payments from actual production and input use decisions and has

the potential to reduce its distortionary effects; and the delinking of these payments from various inputs could be a signal to limit future rise of these payments in the face of increasing input prices.

In the case of cotton and soybean, the most notable change is the implementation of the target price system. This change is more significant for cotton than for soybean, as the "*triple-high*" symptom is most evident for the former product. By applying a target price that is set at a lower level and by repealing stockpiling, it is understandable that the target price system for cotton implies smaller government spending on supporting production, in addition to the savings from not having to increase its already sizable stockholding. Nevertheless, the target price system—as a price-based intervention instrument—will still expose the Chinese government to uncertain compensation spending arising from price fluctuations. In particular, relative decreases in the world market price would lead to rising compensation spending under the target price system; to avoid such an outcome, trade policy coordination in the form of increases in the sliding scale tariff rate or tightening the supplementary quota may be needed. On the reverse side, a rising world market price, while helpful in controlling compensation spending, can be similarly troublesome due to the need to control the impact on China's textile and apparel industry. In that case, reductions of the sliding scale tariff of cotton or effective expansion of the cotton quota may be needed. Of course, adjustment of the target price itself could be another option, although this would require prior announcement for purposes of maintaining the credibility of the system itself.

The pilot target price system for soybean, on the other hand, likely poses smaller uncertainties in relation to government budgetary considerations and market outcomes. The reason is that domestic production of soybean is relatively small compared to its domestic consumption, and import tariff barriers are almost non-existent. Therefore, it is expected that the target price system will not generate drastically different market outcomes.

Among the four major grains, maize is perhaps the one that is currently undergoing the largest policy adjustment as maize policy transitions to "market procurement" and direct producer subsidies. While the exact details of the new system have yet to emerge, it is clear that dealing with the huge stock (estimated to be as high as 250 million tons) and ever increasing planting area is the top priority. In the short run, such adjustment would not necessarily lead to larger imports into China because initial spending on producer subsidies is expected to be substantial enough to moderate the shocks to producers and the domestic market. In the longer term, reduced outputs and planting areas are expected. After these domestic adjustments and as maize stock returns to lower and stable levels, it is possible that China would start to import more.

Moving away from costly policy instruments is a very positive development towards reducing swelling government stocks and controlling expansions of high-cost domestic production, which would also be beneficial in terms of sustainable development in agriculture. Regardless of whether these changes would lead to an immediate rise in imports, it is expected that they would lead to lower levels of market price support which would improve China's position in relation to its WTO agricultural domestic support commitments. On the other hand, whether China is truly fully embracing the recently declared strategy to "*rely on both domestic and international markets and resources*" to realise grain security still remains to be seen, as the decoupling between price formation and income/subsidy transfer roles of the new policy instruments remains incomplete.

The consolidated direct domestic subsidies can be another major positive step in China's farm policy reform, if such payments are totally delinked from considerations of input price changes, are given on a per unit of land basis and become uniform across Chinese regions and across different commodities. In that case, these direct payments will have minimal production and trade distortion effects, thereby improving China's position in relation to its WTO agricultural domestic support commitments.

In the long run, assuming continually rising costs (especially labour costs) in Chinese agriculture, the implied further declining comparative advantages in agriculture, particularly in land-intensive products such as grains, suggest a sustained fundamental conflict between the pursuit of high self-sufficiency ratios in grains and other important agricultural commodities and the constraints on government assistance to agriculture imposed by China's fiscal resources and by its commitments at the WTO. Direct government interventions using market price tools and stockpiling have proven costly and inefficient in recent years, as well as causing complaints from China's trading partners on exceeding its WTO support ceilings. In view of this long-run consideration, recent policy reforms should be considered as interim steps to alleviate the immediate concerns, whereas longer-term solutions in view of sustainable development would require further farm policy reforms such as possibly converting current market price support into true income transfers.

1. INTRODUCTION

Over the past two decades, agricultural production has increased notably in China, sparked in part by government policies to promote self-sufficiency in grains. But as production has increased, so has government stockpiling. For instance, China's rice and wheat stocks are estimated to have been about 160 million tons by 2015; its maize stock at the end of the 2016 crop year is expected to reach 113 million tons, representing over half of the world supply; and its cotton stock was nearly twice as much as its domestic consumption in 2014 (USDA PSD online).[1] In connection with rising grain and cotton stockpiles, the price differentiation between domestic and international market prices has also increased, leading to increased pressure to import more (see e.g. Gale et al. 2014). Support prices for commodities such as maize, wheat and rice have resulted in large stocks and suppressed demand, especially industry/processing demand, with some estimates indicating the country's policies have artificially increased domestic grain prices by 30 percent or more above the price of imported grains (see e.g. OECD 2016). The coexistence of *high* and growing domestic production, *high* and increasing imports and *high* and rising domestic stockholding is commonly referred to as the "*triple-high*" phenomenon in domestic agricultural policy discussion in China (see e.g. *People's Daily* 2016 and Zhu 2015). Despite the ability to maintain the food self-sufficiency targets, the ballooning fiscal costs associated with the "*triple-high*" phenomenon are certainly unsettling for Chinese policy makers. At the same time, China's increased spending on agricultural support could have implications for the country's compliance with its World Trade Organization (WTO) commitments in agriculture, such as limits on trade-distorting agricultural domestic support and import restrictions, and could potentially influence the country's position in multilateral trade negotiations.

In responding to this unprecedented situation, in the country's annual government white paper such as the recent No. 1 documents (CCCPC and State Council of China 2015 and 2016) the Chinese central government announced that its farm policy would be modernised, with a gradual movement towards more market-oriented policies and more differentiated policies on different commodities. For rice and wheat, the minimum procurement prices are to be maintained and "perfected;" for cotton (mainly in the Xinjiang region) and soybean in Northeast China, the new target price systems are to be further implemented so that compensation payments will be made to farmers when market prices fall short of the declared target price. This replaces the government procurement and stockpiling programme responsible for the large stockholding; for maize, the procurement and stockpiling policy was also formally repealed and replaced by market pricing and producer subsidies which are to be formally delinked from each other, as reported on the website of the Ministry of Finance on 20 June 2016[2]. For all five products, the government has declared that the size of state reserve stocks needs to be "scientifically" determined and that stock build-up and release mechanism are to be "perfected."

Whether and to what extent these farm policy reforms will be able to alleviate the symptoms of the "*triple-high*" phenomenon has tremendous implications not only for the Chinese agriculture sector but also for global agricultural markets and trade. The former point is self-explanatory: the high fiscal costs of supporting the current levels of production and stocks make changes of course necessary in the short run; in the longer run, how to make use of its agricultural resource in a sustainable manner while ensuring long term food security is of paramount importance to Chinese policy makers, as China is also dealing

1 Systematically gathered official stock data from China are not available but alternative unofficial estimates exist. For example, a report which appeared on the 21st Century Economic Report (21世纪经济报道) suggests China's maize stock to be around 250 million tons, which is more than twice the size of the USDA estimate (source: http://finance.sina.com.cn/roll/2016-03-29/doc-ifxqsxic3509126.shtml, accessed 12 November 2016).

2 www.mof.gov.cn/zhengwuxinxi/caijingshidian/zgxww/201606/t20160620_2332612.html, accessed 8 January 2017.

with challenges to its agricultural resource base such as water pollution and shortage and land degradation arising from current agricultural practices. Globally, how the new policies influence China's domestic production and stockholding will have implications for China's imports from its trading partners. Due to the dominant positions of China in these markets in terms of production, consumption and trade, any significant changes in production or stock levels in these products will be transmitted to the world market through changing trade flows as well as through changed world market prices. As China transitions from a net agricultural exporting country at the time of joining the WTO to an important net agricultural importing country today, its long-term policy orientation will also help shape the world agricultural trading system.

To ensure that trade negotiators and other relevant policy actors are able to draw on an informed assessment of the likely implications of China's recent and upcoming policy reforms, and with a view to informing policymaking that will enhance food security and sustainable development, the purpose of this paper is to provide an initial analysis of recent and upcoming agricultural policy changes in China, focusing on the likely implications of China's recent policy reforms for production, domestic stock and trade in relation to grains (rice, wheat, maize and soybean) and cotton, as well as the potential implications of further policy options affecting markets for these products.

The paper is organised as follows. In the next section, recent trends in China's agricultural production, trade and price development are reviewed to characterise the unsettling "*triple-high*" phenomenon within the Chinese agricultural sector. Section three provides a description of China's agricultural policy and its main instruments concerning grains and cotton and presents recent agricultural policy reforms for these products. In section four, detailed analysis of the production and trade effects of recent policy reforms and future policy options for each of the five products are provided. Section five synthesises the major findings of the paper, evaluates the overall policy trends in China's agricultural sectors and discusses China's overall agricultural trade policy options and the uncertainties associated with these options.

2. RECENT TRENDS IN CHINA'S AGRICULTURAL PRODUCTION, TRADE PATTERNS AND PRICE DEVELOPMENT

This section provides a review of recent production and trade trends of major agricultural commodities in China (including rice, wheat, soybean, as well as maize and cotton) and characterises the phenomenon of rising production at high production costs and rising domestic prices, high government stockholding of key commodities, and high and rising imports, known as the "*triple-high*" phenomenon intensively debated in China (see for example *People's Daily* 2016).

2.1. Rising Production of Rice, Wheat and Maize and Stagnating Production of Soybean and Cotton

China's grain security has been assured in the past decades mainly through consistent output growth in rice, wheat and maize for all years since 2005 (see Figures 1–5; detailed data sourced from USDA PSD online database are compiled in Appendix Table A). During the 2005–2015 period, the combined outputs of rice, wheat and maize have increased from 363.2 to 500.5 million tons, representing an increase of nearly 38 percent. Expansion of grain outputs has been most visible for maize (from 139.4 to 224.6 million tons, or an increase of 61.1 percent), followed by wheat (from 97.4 to 130.2 million tons, representing a 33.6 percent increase) and rice (from 126.4 to 145.8 million tons, representing a 15.3 percent increase). Compared to China's large domestic outputs in rice, wheat and maize, the country's imports and exports of these products have been relatively modest. As shown in Figure 1, China had some net exports of rice initially, but became a net importer in 2010 and has since increased its net imports, eventually reaching the level of 4.7 million tons of net imports in 2015 (see also Appendix Table A). For wheat, China's status as a net exporter lasted until 2008 and has since changed to that of a net importer, with peak net imports being reached in 2013 at 5.9 million tons (see Figure 2). In the case of maize, China was initially a significant net exporter, having exported as much as 15.2 million tons in 2002; however, in more recent years, China has also become a net maize importer (see Figure 5). Overall, although rising domestic outputs of rice, wheat and maize have successfully limited the extent of imports of these products and resulted in very high levels of self-sufficiency ratios, it is also evident that China became a net importer around 2009–2010 as imports started to surge.

In contrast to the rising trend of rice, wheat and maize production, China's soybean and cotton production has been either on a downward trend or has stagnated in the past decade (see Figures 3 and 4). Soybean, which is also considered a food grain in China,[3] has experienced a gradual output decline from 16.4 million tons in 2005 to 11.6 million tons in 2015, despite a rapid surge in domestic consumption. The shortage in domestic soybean supply has been met with a massive surge of imports, which already amounted to 28.3 million tons in 2005 and reached the level of 82.4 million tons in 2015, positioning China as the world's dominant soybean importer. It is quite apparent that even though soybean is listed as a food grain in China, the same stringent self-sufficiency requirement has not been imposed on this product.

In the case of cotton, China is among the world's most important producers and importers. China's domestic production increased from 4.4 million tons in 2000 to the peak level of 8.1 million tons in 2007; after that, domestic cotton production levelled off until 2010, before rebounding during the 2011–2013 period, and finally dropped quite sharply in 2015 to only 4.8 million tons (Figure 3). During the same period, China has imported sizable amounts of cotton, particularly during the periods of 2005–2007 and 2009–2013,

3 Soybean production is included in the official statistics of total food grain production in China. See classification used in the *Chinese Statistics Yearbooks* (www.stats.gov.cn).

when cotton imports amounted to between 30 percent and 70 percent of domestic outputs in those years respectively (see Figure 3).

2.2. Rising Domestic Stockholding

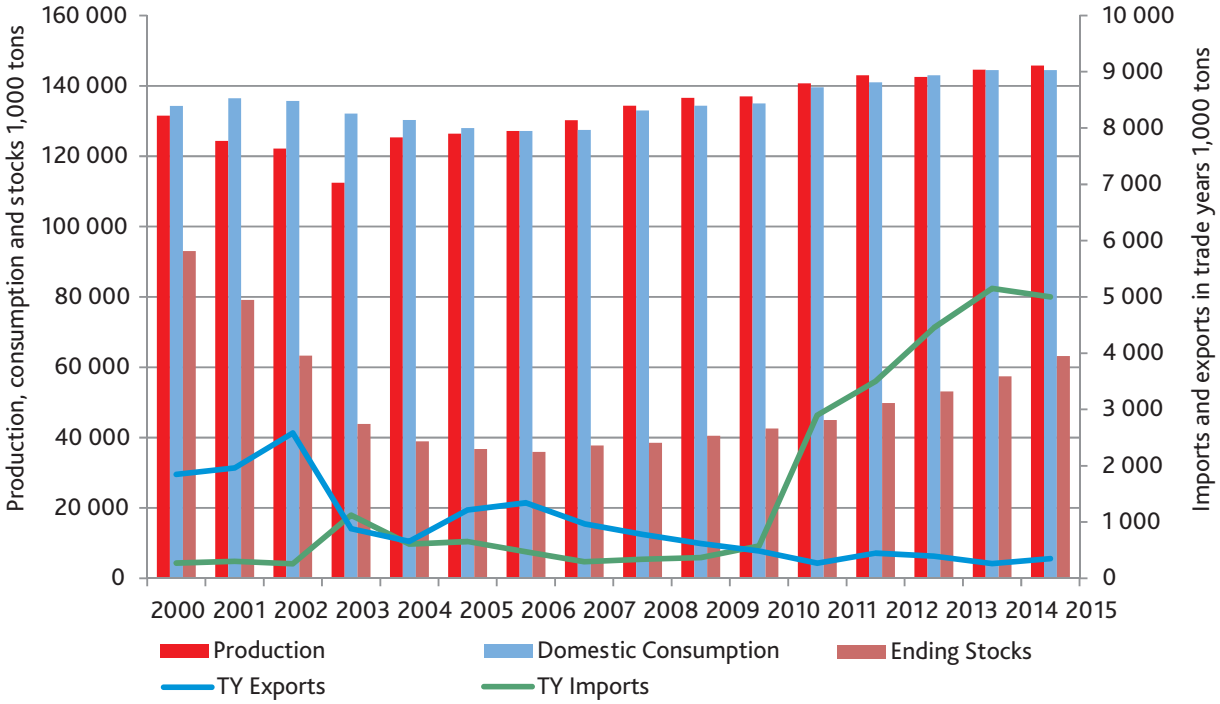
Maintaining high levels of domestic stocks of grains and other commodities of importance has been part of China's food security strategy. In the early 2000s, according to estimates from the USDA PSD online database (see Appendix Table A), China's stock-to-use ratios for rice, wheat and maize have been mostly between 25 and 40 percent, with wheat stock being higher than that of rice and maize. During the 2013–2015 period, however, there has been a quick build-up of domestic stocks of these commodities, resulting in notably higher stock-to-use ratios. For instance, China's rice stock in 2015 was estimated to be 63.2 million tons, equivalent to 44 percent of its domestic use for that year; similarly, maize stock in 2015 was 110.7 million tons, about half of its domestic use and domestic production. For wheat, domestic stock was similarly high in 2015 at around 97 million tons, representing 87 percent of its domestic use. The situation for soybean is quite different, as domestic production has been on a decline and imports have become the main source of China's total domestic supply. In the past few years, China's soybean stock-to-use ratio has stabilised at between 17 and 22 percent.

These seemingly excessively high levels of domestic stocks are certainly reflective of continuous growth of domestic production, as discussed earlier. What is interesting is that these large domestic stocks in the last three years have been accumulated at a time when China has increasingly become a net importer of these products, possibly suggesting that large portions of rising domestic production have entered the state reserve stocks as they were not as competitively priced as the rising imports sourced from world markets. Regardless of the reasons, maintaining such a high stock level places a heavy fiscal burden on the Chinese government and managing these stocks has become a pressing concern.

For cotton, there has also been a very large build-up of domestic stock during the last four years. Higher levels of domestic production, coupled with substantial amount of imports, have resulted in a sudden jump in cotton stockholding in 2011, which continued until 2014 when domestic stock approached 14.6 million tons, equivalent to almost twice the size of China's domestic use in that year. In 2015, domestic production was notably lower and imports also receded, resulting in a drawdown of domestic stock by nearly 2 million tons. Still, this represents an estimated stock-to-use ratio of 166 percent.

To sum up, out of the five products covered in this study, four have experienced large surges of domestic stockholding over recent years, aided by increased domestic production and also increased imports.

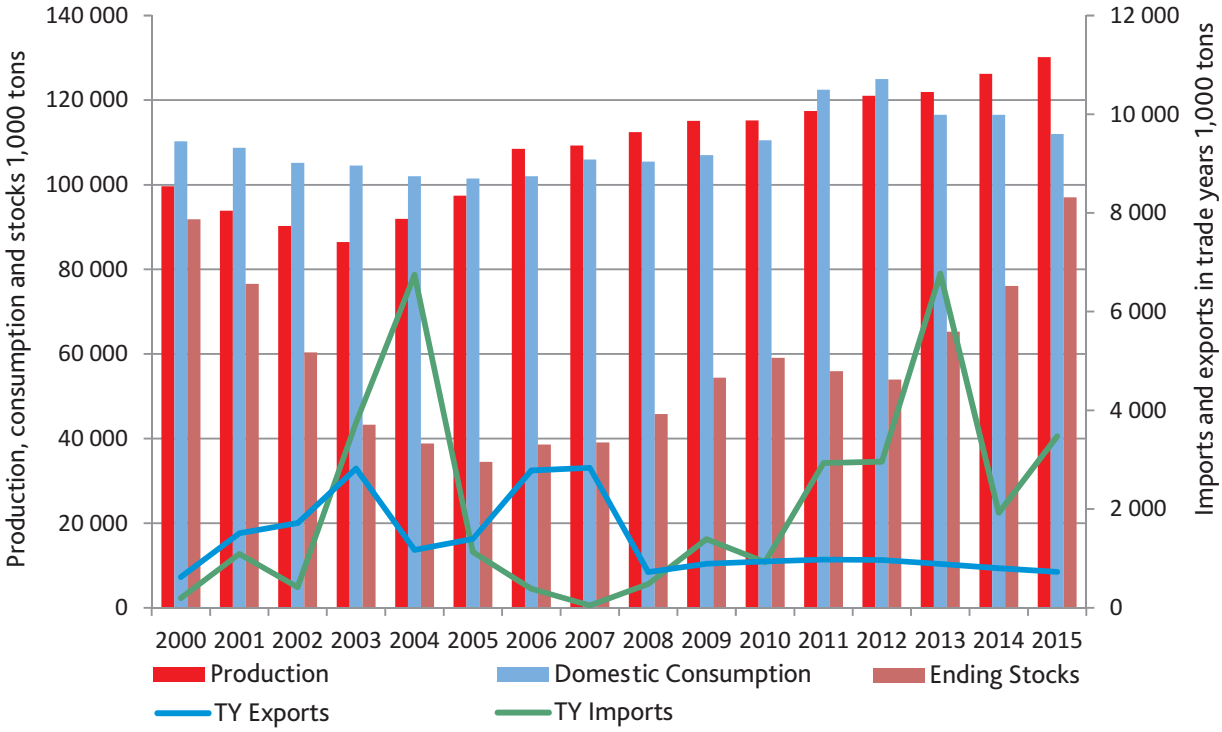
Figure 1: Rice: rising production, increasing stock and rising net imports



Source: USDA PSD online.

Note: numbers are in 1,000 tons. TY imports and TY exports refer to imports and exports in trade years (TY), respectively.

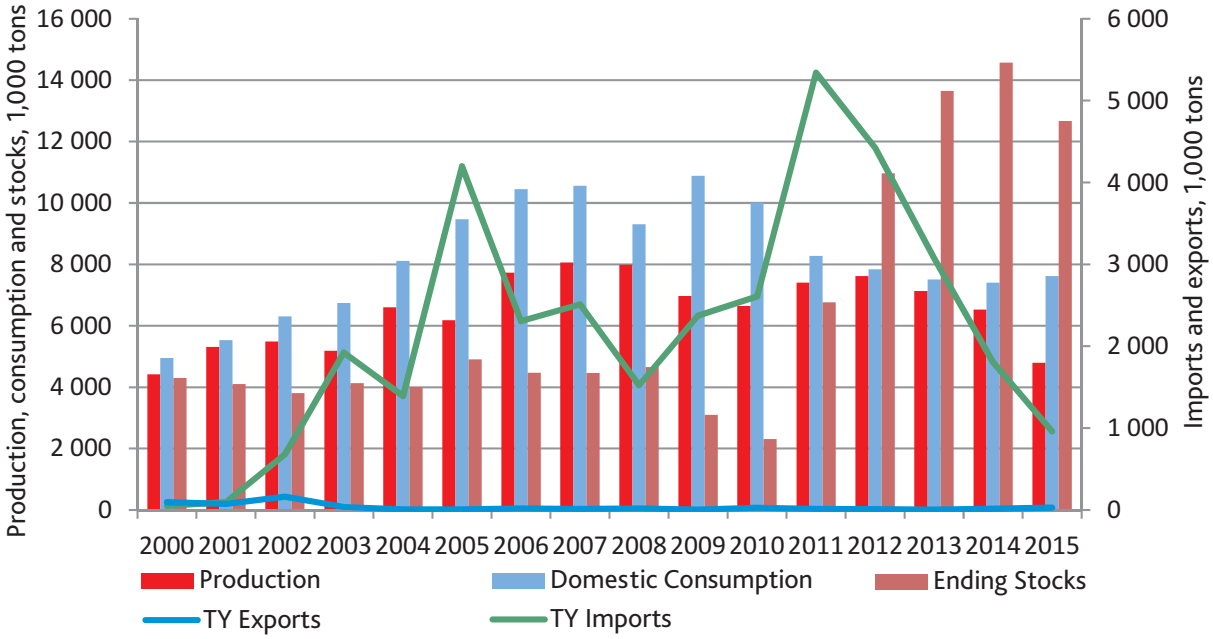
Figure 2: Wheat: rising production, increasing stock and rising net imports



Source: USDA PSD online.

Note: numbers are in 1,000 tons. TY imports and TY exports refer to imports and exports in trade years, respectively.

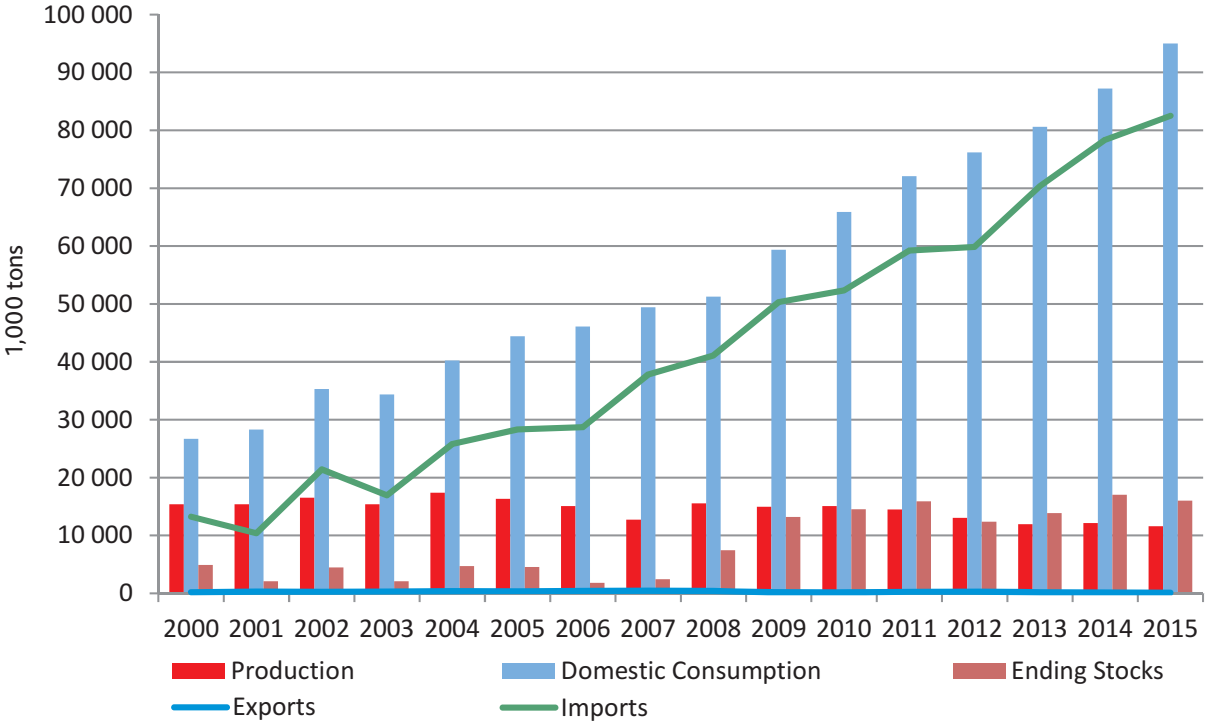
Figure 3: Cotton: stagnating production and sharply rising stock



Source: USDA PSD online.

Note: numbers are in 1,000 tons.

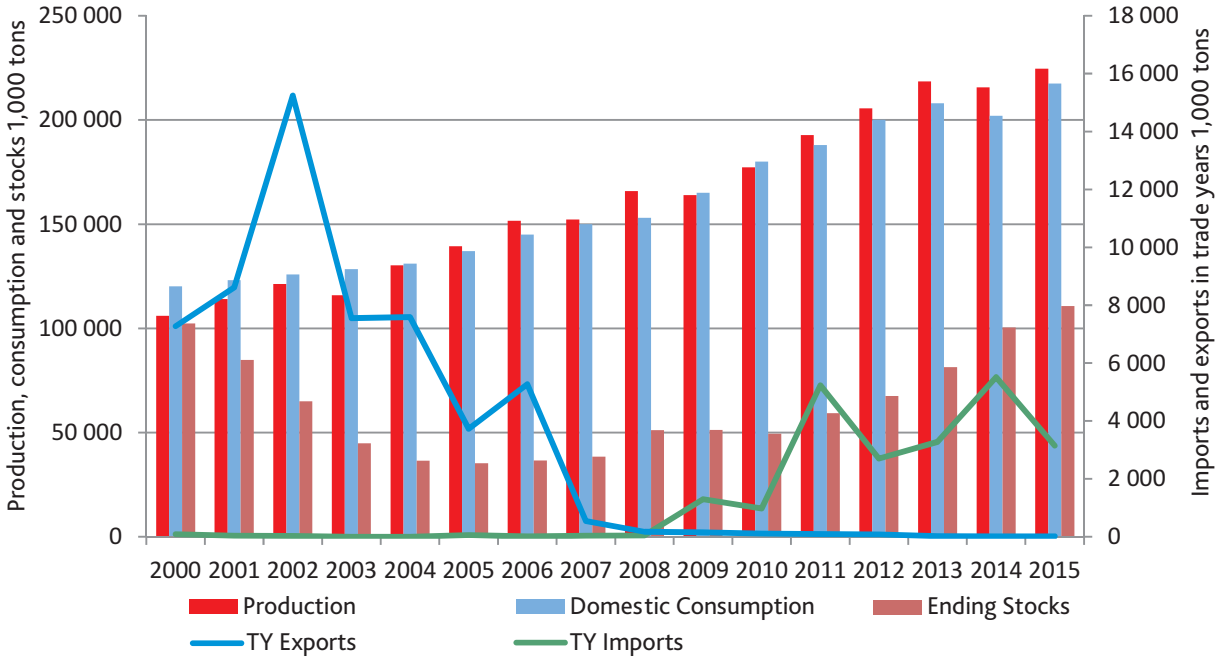
Figure 4: Soybean: China as the world's dominant importer due to rising consumption



Source: USDA PSD online.

Note: numbers are in 1,000 tons.

Figure 5: Maize: rising production and increasing imports leading to large stock



Source: USDA PSD online.

Note: numbers are in 1,000 tons. TY imports and TY exports refer to imports and exports in trade years, respectively.

2.3. Widening Domestic-World Market Price Gaps

To make sense of the coexistence of growing domestic stocks and rising imports, it is worthwhile to review the domestic and world market price movements during the past decade for the five products, as presented in Table 1 and illustrated in Figures 6-10, based on data from the World Bank, *China Agricultural Price Survey Yearbooks* and *National Compilation of Cost and Revenue in Agricultural Production*.

Measured in current US dollars, domestic rice prices in China increased consistently during the 2002-2015 period, having risen from 0.23 US$/kg in 2002 to 0.87 US$/kg in 2015; while during the same period, the world market price initially increased from 0.19 US$/kg in 2003 to the peak level of 0.65 US$/kg in 2008, before receding to 0.39 US$/kg in 2015. As such, China's domestic price was already higher in 2002 than the corresponding world market price by about 20 percent; however, this difference was reversed for the 2008-2009 period when world market prices spiked as part of the world food price crisis; since then, the Chinese domestic price premium continued and widened, particularly during 2013-2015 due to rising Chinese prices and lower world market prices. In 2015, the domestic price of rice in China was more than twice as high as the corresponding world market price, a development that explains rising imports and growing rice stocks.

Similarly, domestic prices for wheat in China also experienced consistent increases, starting from 0.12 US$/kg in 2000 and reaching the level of 0.42 US$/kg in 2014. From 2000 to 2008, these domestic prices were not too different from the corresponding world market prices; however, after 2008, as world market prices fell and relatively stabilised, rising domestic prices in China led to widening price gaps which in 2015 saw domestic prices in China being about 100 percent higher.

Table 1. Domestic and world market prices for major commodities (USD/kg; annual average)

	Rice			Wheat			Maize		
	Domestic	World	Domestic /world ratio	Domestic	World	Domestic /world ratio	Domestic	World	Domestic /world ratio
2000	-	0.20	-	0.12	0.11	1.08	0.11	0.09	1.20
2001	-	0.17	-	0.13	0.13	1.04	0.13	0.09	1.45
2002	0.23	0.19	1.21	0.13	0.15	0.86	0.12	0.10	1.25
2003	0.24	0.20	1.23	0.14	0.15	0.94	0.14	0.11	1.30
2004	0.34	0.24	1.44	0.18	0.16	1.17	0.17	0.11	1.51
2005	0.36	0.29	1.25	0.18	0.15	1.21	0.16	0.10	1.61
2006	0.38	0.30	1.25	0.18	0.19	0.96	0.17	0.12	1.40
2007	0.43	0.33	1.30	0.21	0.26	0.82	0.21	0.16	1.26
2008	0.49	0.65	0.75	0.26	0.33	0.79	0.25	0.22	1.12
2009	0.53	0.55	0.96	0.28	0.22	1.26	0.26	0.17	1.55
2010	0.62	0.49	1.28	0.30	0.22	1.36	0.30	0.19	1.62
2011	0.74	0.54	1.36	0.35	0.32	1.10	0.35	0.29	1.20
2012	0.80	0.56	1.43	0.37	0.31	1.19	0.38	0.30	1.27
2013	0.84	0.51	1.66	0.40	0.31	1.29	0.39	0.26	1.49
2014	0.87	0.42	2.05	0.42	0.28	1.48	0.40	0.19	2.10
2015	0.87	0.39	2.23	0.40	0.20	2.00	0.38	0.17	2.24

	Soybean			Cotton		
	Domestic	World	Domestic /world ratio	Domestic	World	Domestic /world ratio
2000	0.30	0.21	1.44	1.25	1.30	0.96
2001	0.29	0.20	1.50	0.91	1.06	0.86
2002	0.29	0.21	1.35	1.16	1.02	1.13
2003	0.36	0.26	1.35	1.80	1.40	1.29
2004	0.47	0.31	1.53	1.32	1.37	0.96
2005	0.44	0.27	1.59	1.60	1.22	1.31
2006	0.44	0.27	1.62	1.52	1.27	1.20
2007	0.54	0.38	1.40	1.75	1.40	1.25
2008	0.80	0.52	1.53	1.50	1.57	0.96
2009	0.71	0.44	1.63	1.95	1.38	1.41
2010	0.76	0.45	1.70	3.66	2.28	1.60
2011	0.86	0.54	1.59	2.79	3.33	0.84
2012	0.93	0.59	1.57	2.89	1.97	1.47
2013	1.00	0.54	1.87	3.01	1.99	1.51
2014	1.03	0.49	2.10	2.77	1.83	1.51
2015	0.99	0.39	2.54	1.75	1.55	1.13

Sources: domestic prices (except for cotton) are sourced from China Agricultural Price Survey Yearbooks (中国农产品价格调查年鉴). World market prices are from World Bank. For cotton, domestic prices are the farm gate prices as reflected in the Producer Support Estimates (PSE) table of the Organisation for Economic Co-operation and Development (OECD).

For maize and soybean, despite their very different trade orientations, domestic prices in China have been consistently higher than the corresponding world market prices. By 2015, domestic prices of both products were more than doubling the corresponding world market prices. In the case of cotton, except for 2004, 2008 and 2011, farm gate prices in China have been higher than the corresponding world market prices, and during 2012–2014 domestic farm gate prices were about 40 percent to 50 percent higher. In 2015, however, China's cotton notably dipped so that the domestic-world market price difference also reduced.

2.4. Summary

The consistent increases in Chinese domestic prices have been a universal phenomenon for most of the products covered in this analysis. These rising prices have generally diminished the international competitiveness of these products, thereby creating ever-increasing pressure for China to import more. However, as will be discussed in the next section, increasing domestic agricultural support and border protection policies have generally maintained producers' incentive for production and have helped maintain a steady output growth, particularly for rice, wheat and maize. Due to the widening gaps between domestic and world market prices, this has increasingly resulted in large amount of grains and other commodities being put in public stocks. Growing stockpiling has prompted policy makers in China to rethink their agricultural policy. In the next section, a review of China's agricultural policy and its recent development is provided.

3. RECENT DEVELOPMENT OF CHINA'S AGRICULTURAL POLICY

3.1. Overview of China's Domestic Support Programme

China's current domestic support and market price support system focuses on grain production but also covers other crops such as cotton, oil seeds and sugar. It mainly includes direct payments attached to either contracted or actually planted land,[4] subsidies to specific inputs and market price support in the form of minimum purchase prices, and more recently pilot projects of the target price system. Price-based instruments are sometimes tied to other forms of government interventions such as procurement and *ad hoc* interventions, which are often backed by government stockholding. Together with trade policy instruments implemented at the border, such as import tariff and tariff rate quotas, these policy instruments are designed for maintaining producers' incentives for production, stabilising prices and enhancing farm incomes.

The most comprehensive, regularly maintained and updated and publicly available data source on China's agricultural domestic support is the Producer Support Estimates (PSE) compiled by the OECD. Table 2 presents China's total PSE estimates during the 2006–2015 period, as well as a breakdown of relevant policy instruments/programmes. China's total PSE is estimated to be ¥435 billion in 2006 and has since been on a general upward trend (except in 2008 when rising world food prices resulted in negative market price support for China in that year), reaching the level of ¥1,931 billion in 2015. Measured as a percentage of its total gross farm receipts, China's PSE rose from 12.4 percent in 2006 to 21.3 percent in 2015, thus exceeding the average level of percentage PSE in the OECD countries (at 17.1 percent). In comparison, the same measure for the EU, US and Japan in 2015 was respectively 9.4 percent, 18.9 percent and 43.1 percent.

In most years, the bulk of China's total PSE is the so-called market price support (MPS), which for each commodity is calculated as the product of the gap between domestic and world market prices and the quantity of production for that product. As domestic prices in China have been on an uninterrupted upward trend, the gap between domestic and world market prices has widened, especially in more recent years, resulting in increasing market price support. In reality, increasing market price support due to rising gaps between domestic and world market prices and rising domestic production reflects higher government assistance to agricultural production. This assistance is provided through policy instruments such as import protection realised through import tariffs and tariff rate quotas and the various domestic price interventions and government stockholding.

Other important elements of China's producer support estimates include various direct payments either based on input use or on current planting areas that require production in order to be eligible for support payments. As relevant to the products covered in the current analysis, this includes insurance fee subsidies for crops, direct payments to grain farmers, comprehensive agricultural subsidies and new variety extension payments, among other programmes. More recently, pilot projects on the so-called target price system were initiated to replace the temporary stockholding programme for cotton. This programme also extended partially to soybean producers in Northeast China. Finally, a consolidated agricultural support payment was introduced to replace the three direct subsidies mentioned above.

4 Rural land in China is owned collectively while individual farmers hold long-term leases/contracts to use collectively owned farm land. Certain agricultural subsidies in China are distributed to individual farmers on the basis of either contracted land or actually planted land area, the latter of which requires much higher implementation costs due to the possibility that farmers may choose to let their contract land idle.

3.2. China's Domestic Market Price Support Instruments

China's domestic market price-based policy instruments and the embodied government assistance typically differ from one commodity to another. In the case of rice and wheat, the minimum procurement prices set by the government and announced by the National Development and Reform Commission (NDRC) are used to regulate these markets (see discussions in OECD 2016, as well as in ICTSD 2016c). When rice and wheat market prices fall below these minimum prices, government intervention purchases are triggered so as to provide support to producers. On the converse side, government-held stock of rice and wheat is auctioned when market prices are high or when market supply is tight relative to demand. For a few other products including maize, soybean and cotton, temporary purchases for government stocks have also been conducted at government-administered prices, for encouraging production and domestic supply. The level and extent of assistance provided through combinations of these price and storage mechanisms depend not only on the domestic market situation but also on the world market price situation. Therefore, these domestic instruments are also used in coordination with trade policy instruments to ensure the desired domestic market outcomes.

According to the PSE estimates (Table 2), China's MPS for rice was initially negative during 2006–2011 due to lower domestic prices but turned positive thereafter and has since increased rapidly to the level of ¥232 billion, or nearly 40 percent of China's rice production value (at farm gate price) in 2015. In the case of wheat, the increase in MPS is more steady and gradual but still reached ¥111 billion in 2015, or about 35 percent of wheat production value for that year. For maize, the temporary stockholding policy in recent years has resulted in large spikes of MPS during 2013–2015, with maize MPS in 2015 being nearly three times as high as in 2012. The situation of soybean appears to be better, as soybean MPS has been much smaller due to lower domestic production and much greater trade openness. Similarly, cotton was subject to the temporary stockpiling policy during the 2011–2014 period and cotton MPS as a percentage of its production value was as high as 58 percent in 2010. The historically high world market price of cotton in 2011 reduced cotton MPS to 10 percent, but receding world market prices thereafter and rising domestic prices again pushed cotton MPS to high levels in more recent years.

The steadily growing domestic outputs of rice, wheat and maize,[5] as shown in Figures 1, 2 and 5, as well in Appendix Table A, are certainly indicative of the contemporaneous effects of these high levels of MPS, which themselves were due to government interventions and world market price movements. For instance, import barriers such as tariffs or quotas typically raise domestic market prices above the corresponding world market prices, thereby encouraging domestic production at the expense of reduced imports. As increasing domestic outputs of these products are supported by the MPS for these products and their prices are held artificially high, it is not always the case that all the outputs can be consumed domestically in the same year. Indeed, as shown in Appendix Table A, much of the increased outputs (particularly those in the more recent years supported by higher MPS) entered into public stocks. As a matter of fact, temporary stockholding was an integral component of the market price-based programmes for all five products considered in this study at various points of time in the past decade. Therefore, the costs of these MPS programmes are larger than the direct contemporaneous fiscal costs, when considering warehousing costs and other related costs for holding these stocks.

5 In the case of cotton, outputs would also be lower in the absence of the MPS.

3.3. China's Agricultural Trade Policy

China's agricultural domestic support instruments are often used in conjunction with border measures such as import tariff and tariff rate quotas to help maintain desirable domestic market prices and targeted domestic self-sufficiency ratios for important agricultural products such as rice and wheat. As part of China's WTO accession agreement in 2001, rice, wheat, maize, sugar, wool and cotton are all subject to the Tariff Rate Quota (TRQ) system, with high out-quota tariff rates and low in-quota tariff rates (see Table 3). For rice, the final quota implemented in 2004 is 2.66 million tons for both short and medium grain rice and for long grain rice, with imports within these quotas receiving the low tariff of 1 percent and imports outside these quotas receiving the high tariff of 65 percent. These in-quota and out-quota tariffs are the same for wheat and maize; however, final quotas for wheat and maize are set at higher levels, at 9.636 million tons and 7.2 million tons respectively. For cotton, the quota level is set at a relatively low level (0.894 million tons from 2004 onwards) as compared to recent import quantities. The out-quota cotton tariff is set at 40 percent.[6] The notable omission from the TRQ coverage is soybean, which only faces an import tariff and has been imported in large quantities by China since its WTO accession in 2001.

Imports of rice, wheat and maize in recent years have not exceeded their respective final quotas and therefore the high out-quota tariffs of 65 percent have yet to be triggered. However, judging from the recent rising trends of imports (see Table 1), it is possible that in the future these quotas may be exceeded and the high out-quota tariff rates may apply. For cotton, the import quota has already been exceeded for all years since 2003. Instead of charging the high out-quota tariff of 40 percent, the Chinese government instead installed a sliding-scale tariff between 0 and 40 percent on over-quota imports, and for some years also added a supplementary import quota, thereby effectively reducing import protection on cotton.

3.4. China's Domestic Agricultural Subsidies

The first direct payment to agriculture introduced by the Chinese government since the abolition of agricultural taxation was that for grain production. This payment has been distributed according to either contracted, registered or actual planted areas of land, typically in the range of ¥10–15 per mu (see Yu and Jensen 2010).[7] The total national spending on this subsidy has been kept quite stable in recent years at ¥15.1 billion per year (Table 2).

The other main direct payment is the so-called "comprehensive subsidy on agricultural inputs," intended to reduce the cost to farmers of purchasing agricultural inputs such as fertilisers, fuels, pesticides and plastic films. Spending on this central government-funded subsidy programme had increased quite rapidly in its first years of existence, especially when grain prices and energy prices (hence agricultural input prices) were at very high levels, reflecting the government's intention to use this subsidy to offset the rising input costs for farmers at national level. In fact, the central government followed a "dynamic adjustment system" that ties the changes in fertiliser, diesel and other agricultural input prices to the amount of overall spending on this subsidy programme. Therefore, at the national level this subsidy has indeed been tied to input prices (see discussions in e.g. Yu and Jensen 2014). However, at farm household level, the subsidy has been dispensed as a payment per unit of land, thereby seemingly making it an income transfer to individual farm households. In the more recent years, the total spending on this subsidy has stabilised and by the end of 2014, the central government allocated around ¥107.1 billion to this subsidy, roughly the same amount as in the immediately preceding years.

6 According to ICTSD 2016a, China is the only major cotton importer that imposes tariffs or quotas on cotton imports.

7 1 mu =666.667 square meters (or 1 hectare = 15 mu).

Improved seed variety subsidy is another major input-based support policy that is implemented either as a direct payment per unit of land (for rice, maize and rapeseeds) or through direct payments or reduced seed prices that are decided by provincial governments (for wheat, soybean and cotton). In 2014, the spending on this subsidy amounted to ¥21.4 billion.

A fourth type of subsidy concerns the purchase of agricultural machinery, which is available to both individual farmers and agricultural operation entities such as specialised mechanisation providers when they purchase agriculture machinery. In 2015, buyers of 11 categories (including 43 sub-categories) of agricultural machinery can effectively receive a 30 percent subsidy of the purchase prices. In addition, provinces included in the *National Agricultural Mechanisation Implementation Plan for Subsoiling and Cultivating Operation* can provide subsidies to these operations. In total, this programme cost the government ¥21.8 billion in 2013. In 2015, subsidies were also planned for renewing and replacing existing agricultural machinery, although the budgetary outlays are not publically available.

Table 2. China's Producer Support Estimates for major commodities2006-2015 (million CNY)

	2006	2007	2008	2009	2010
Producer Support Estimate (PSE)	**435,915**	**437,037**	**138,989**	**617,602**	**920,558**
Market Price Support	243,872	193,700	-93,032	343,165	681,490
Wheat MPS	78,587	55,270	64,533	65,167	64,404
Maize MPS	43,587	32,898	-36,120	40,476	49,986
Rice MPS	-11,193	-2,310	-240,358	-168,580	-2,301
Soybeans MPS	5,925	3,730	-4,668	12,211	10,063
Cotton MPS	33,427	44,435	10,642	45,761	86,104
Payments based on input use	**122,341**	**148,136**	**82,397**	**115,495**	**87,394**
Insurance fees subsidy for crops and livestock commodities	0	0	0	0	11,125
Fixed capital formation	50,865	60,289	57,455	83,725	57,940
Payments based on current A/An/R/I, production required	**48,474**	**72,624**	**120,531**	**123,435**	**117,770**
Direct payments to grain farmers	14,200	15,100	15,100	15,100	15,100
Agricultural input comprehensive subsidies	12,000	27,600	71,800	79,500	72,472
New Variety Extension Payment 2006-12 - Crops	3,970	6,380	9,855	17,440	20,400
Target price payments (Cotton)	0	0	0	0	0
Target price payments (Soybean)	0	0	0	0	0
Agricultural support payments	0	0	0	0	0
Percentage PSE (percent)	**12**	**10**	**3**	**12**	**15**

Table 2. *Continued*

	2011	2012	2013	2014	2015
Producer Support Estimate (PSE)	**729,880**	**1,382,687**	**1,621,984**	**1,697,605**	**1,931,653**
Market Price Support	451,286	1,058,676	1,281,943	1,344,766	1,579,163
Wheat MPS	29,964	73,383	76,613	97,048	110,982
Maize MPS	6,552	64,228	110,380	125,433	172,343
Rice MPS	-50,739	167,440	181,499	190,673	232,677
Soybeans MPS	5,500	12,637	10,925	9,614	17,160
Cotton MPS	12,101	40,301	53,293	13,710	6,554
Payments based on input use	**99,886**	**124,715**	**129,158**	**137,396**	**118,135**
Insurance fees subsidy for crops and livestock commodities	12,713	17,191	22,548	24,473	22,686
Fixed capital formation	67,734	86,912	84,150	87,730	76,121
Payments based on current A/An/R/I, production required	**148,413**	**167,727**	**176,435**	**179,465**	**197,260**
Direct payments to grain farmers	15,100	15,100	15,100	15,100	0
Agricultural input comprehensive subsidies	86,000	107,800	107,100	101,921	0
New Variety Extension Payment 2006–12 - Crops	22,000	20,900	26,105	21,445	0
Target price payments (Cotton)	0	0	0	7,022	19,804
Target price payments (Soybean)	0	0	0	0	2,950
Agricultural support payments	0	0	0	0	143,491
Percentage PSE (percent)	**10**	**18**	**19**	**19**	**21**

Source: Producer and Consumer Support Estimates database, OECD Agriculture statistics.

Table 3. China's Tariff rate quota on grains and cotton

	Wheat	Maize	Rice, short and medium grain	Rice, long grain	Cotton
Initial quota in 2001 (ton)	7,884,000	5,175,000	1,662,500	1,662,500	780,750
Final quota in 2004 and onwards (ton)	9,636,000	7,200,000	2,660,000	2,660,000	894,000
In-quota duty (percent)	1	10	1	1	1
Out-quota duty (percent)	65	65	65	65	40

Source: WTO.

3.5. Recent Agricultural Policy Reforms

The phenomenon of the coexistence of high domestic production, increasing pressure to import due to higher domestic prices and the heavy burden of maintaining the large domestic stockholding of major commodities has prompted a rethinking of China's agricultural policy, as reflected in the latest white papers known as No. 1 documents jointly issued each year by the Central Committee of the Chinese Communist Party and the State Council of China. In these documents (CCCPC and State Council 2015 and 2016; also see ICTSD 2016b for discussion), it is recognised that both domestic and international resources and markets are to be utilised to realise food grain security targets, and that the price formation and farm income transfer roles of domestic agricultural policy instruments are to be separated. The documents also declare that during times of lower world market prices, it should be possible to set aside land resources so long as food grain production capacities are effectively maintained. In the longer run, the capacity of grain supply should ultimately be secured by means of progress in agricultural technology.

Following the guidelines outlined in the No. 1 documents, several changes have already been implemented. For rice and wheat, minimum prices in 2015 were fixed at 2014 levels, and in 2016 these minimum prices were either maintained at the levels of the previous two years or slightly adjusted downward (OECD 2016). In the case of stable border prices, falling or flat minimum prices for the two products would imply reduced effective government assistance and smaller MPS.

For maize, in 2014 the floor prices used for implementing the temporary procurement and stockpiling programme in Northeast China were kept unchanged at the 2013 level, and in 2015 these prices were lowered by more than 10 percent as compared to 2015 (Fan et al. 2016). This downward adjustment in procurement price was followed by the abolition of the maize temporary procurement and stockpiling programme in 2016 to control the MPS for maize and the ballooning maize stock.

Aside from maize, major policy change in relation to cotton has also been undertaken in recent years. The temporary stockpiling policy for cotton was replaced by the so-called "target price system" in 2014. Under this new target price system, cotton farmers receive subsidies equivalent to the differences between market price and the pre-declared target price, should the former fall below the latter. Additionally, as the government essentially provides direct compensation, no government stockpiling is required; therefore, the new policy should help ease the pressure on further build-up of the already exceptionally high level of cotton stock. The cotton target price system is also designed mainly to favour cotton producers in the Xinjiang region with a higher target price where the subsidy is distributed mainly according to certified production delivered to the market, whereas in the rest of the country cotton producers receive a smaller direct subsidy. A pilot target price system on soybean has also been in place since 2014 in Northeast

China, whereby soybean producers receive the differences between a predetermined target price and the market price based on planting areas as opposed to actual production or market deliveries.

Another notable policy change is the consolidation of the three domestic subsidies (direct payments to grain producers, comprehensive agricultural input subsidies and new variety seed subsidies) into the uniform "agricultural support payments" in 2015 in five provinces (OECD 2016); by 2016, this unification of domestic subsidies was to be implemented nationwide. According to the latest PSE estimate (Table 3), the unified agricultural support payment in 2015 was roughly the same as in the years immediately beforehand, at around ¥143.5 billion. The bulk of the new unified subsidy is paid out on a per unit of land basis, as for other individual payments in recent years, so it appears that little has changed regarding how these direct subsidies would affect producers' production decisions. However, by consolidating the three existing payments into one uniform payment that is not tied to any particular inputs, it reveals the intention of the Chinese government to make these payments less coupled to actual production decisions such as the choice of crops and the use of particular inputs. Furthermore, by formally delinking the majority of these payments from the use of inputs such as fertilisers, it is possible that the size of these payments will be kept more stable and less responsive to future changes in input prices. If this proves to be the case, then it will be a major departure from how the comprehensive input subsidy was adjusted at the national and provincial levels in the past.

3.6. Summary

China's market price support has been on the rise in recent years and reached substantial levels as measured in shares of gross farm receipts for China's major agricultural commodities. This reflects increasing government assistance through price-based instruments and government stockholding on the one hand and rising domestic costs on the other hand. In addition, China's spending on direct subsidies has also become an important budgetary item. The resulting burden of rising domestic production, increasing pressure to import and exceptionally high costs associated with holding large stocks has prompted changes in China's agricultural policy. The government is moving towards less government stockholding, separation of the price formation and the income transfer role of market price support and stabilisation of government spending on direct subsidies. In the next section, we discuss the possible effects of these recent reforms as well as future policy options for individual agricultural products in the context of increasing production costs in China.

4. RECENT AGRICULTURAL POLICY REFORMS IN CHINA AND FUTURE POLICY OPTIONS

4.1. Rice and Wheat: Reducing Minimum Prices and Other Policy Options

Rice and wheat are two of the most important agricultural products which feature prominently in China's food security strategy. While successfully pursuing national self-sufficiency in these two products, the challenge facing policy makers (as reviewed above) concerns growing rice and wheat production at high costs, resulting in high levels of market price support and large and expensive government stocks. Although China's market price support as calculated by the OECD (see Table 2) is designed for monitoring the development of agricultural support but not for determining whether such support is compliant with its WTO agricultural domestic support commitments, the large calculated MPS in recent years may still be a cause of concern. This is especially the case if other countries consider China's domestic support level as calculated according to the WTO methodology to be in excess of the *de minimis* level allowed in its WTO accession agreement.[8] Indeed, the US has recently challenged China's "excessive" support for rice, wheat and corn (USDA 2016) and requested the establishment of a panel by the WTO to look into this case (WTO 2016).

In responding to these challenges, recent policy statements made by China seem to point to a more open attitude towards imports in the future. The recent statement in the No. 1 documents regarding "utilizing domestic and international resources and domestic and international markets" is particularly relevant for the rice and wheat market, where up to now the TRQs for the two products (5.32 and 9.636 million tons for rice and wheat respectively) have never been fully utilised. So within these quotas, there are certainly possibilities for China to increase its rice and wheat imports. At the same time, it appears that China may also be willing to limit its market price support by refraining from further increasing the minimum prices for rice and wheat in the presence of continuously rising product costs. The following analysis discusses domestic and trade policy options along these directions and analyses possible outcomes given alternative price trends on the world rice and wheat markets.

As shown in Figures 6 and 7, during the 2000–2015 period, there was a consistent increase in the unit cost of production for both rice and wheat. An important driver for this was the rising unit labour costs. Rural–urban migration in China has reduced the size and changed the structure of the rural labour force available for agriculture production. With a diminishing number of young male farmers and a reduction of the number of farmers working exclusively in agriculture, the overall agricultural production labour force is expected to further decline in the next two decades (Carter, Zhong and Zhu 2012). At the same time, the labour force dedicated to agriculture will also become older. All these have contributed to rapidly rising labour costs for agriculture production. Cost hikes have been associated with rising domestic market prices for rice and wheat. Domestic prices in China for the two products followed the rising world market prices prior to the 2008–2011 food price spikes, but fell behind during this period. As world market prices retreated after the crisis, Chinese costs and prices continued their upward movements, thereby resulting in

8 It should be noted that while the MPS as calculated by the OECD in its PSE estimates measures the support granted to producers through a myriad of government policies such as domestic subsidies and trade policies, it is not the same as the so-called Aggregated Measure of Support (AMS) for measuring a country's domestic support in relation to its agricultural domestic support commitments under the WTO. The two measures, while related, are based upon different reference border and domestic prices, output volumes and base periods. For detailed discussions on China's agricultural domestic support calculated in both the OECD MPS and the WTO method, readers are referred to a recent paper by Brink and Orden (2017).

higher Chinese than world prices. While border protection measures (i.e. tariffs and quotas associated with the TRQs), minimum prices and domestic subsidies contributed to sustained output growth, rice and wheat imports have jumped sharply since 2010, as have the levels of rice and wheat stocks (see Figures 1 and 2).

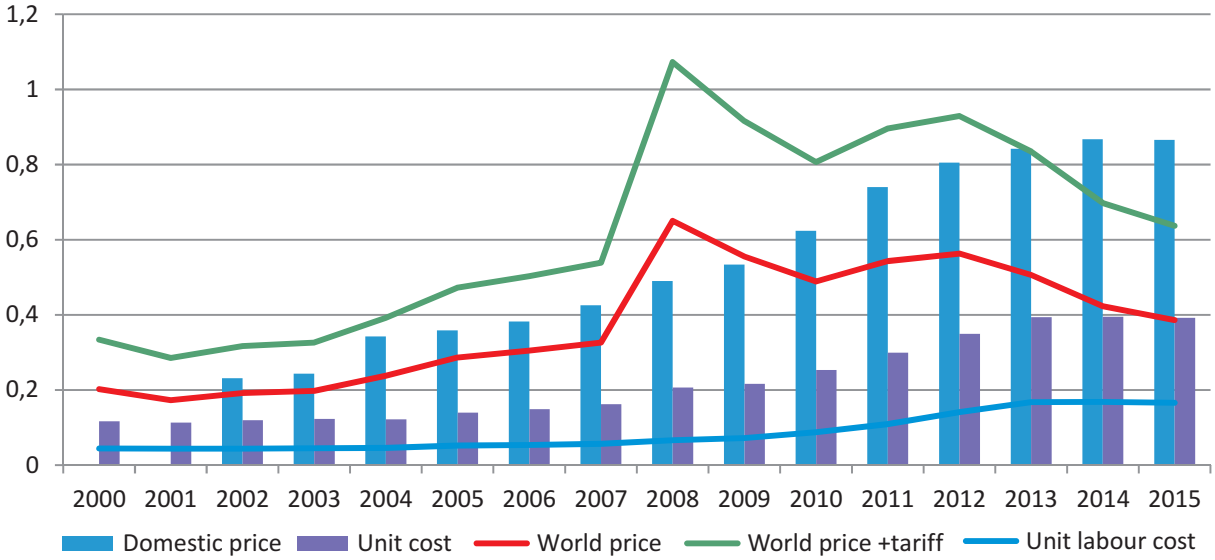
Flat or decreasing minimum prices relative to the levels in 2014–2015 for the two products would imply effective reductions of market price support, if world market price levels stabilise at recent levels. In that case, domestic market prices may be lowered in the near future, resulting in output levels of rice and wheat that are likely to be lower than recent trend levels, thus reducing the pressure for further build-up of rice and wheat stocks. Regarding imports, the situation for rice and wheat markets is slightly different. As the domestic price of rice has already been above the corresponding tariff-inclusive world market price since 2014, it is likely that China's rice imports will rise; however, the filling rate of the rice quota depends on how the rice quota is administered and how the quota is divided between private and public entities, as the latter tend to have lower filling rates of allocated rice quota. In the case of wheat, as the recent domestic price has just exceeded the tariff-inclusive world market price, the chances of the wheat TRQ being exceeded are therefore likely lower (see Figures 6 and 7). In the event of world market prices falling, the domestic-world market price gap would increase further. In that case, significantly lower domestic minimum prices would be needed to ease pressures which otherwise could lead to a large surge in imports and further build-ups of rice and wheat stock. However, should world market prices for rice and wheat rise (contrary to recent price trends on the world markets), pressures to reduce the minimum price and to import more would ease a little.

Reduced minimum prices, coupled with more effective utilisation of the TRQs for the two products, would likely result in higher import volumes and likely would also ease the pressure for the stock build-up as they decrease the incentives for production at higher costs. A lower level of market price support would also allow China to better face the pressure from its trading partners regarding its domestic support commitments. Given the high out-quota tariffs for rice and wheat, and the relatively small quotas (as compared to the domestic production of rice and wheat), the above scenario would not result in noticeable changes in self-sufficiency ratios for the two products.

Reduced minimum prices can also be used in combination with China's new policy initiatives on consolidating the various direct payments. As these direct payments are further decoupled from producers' production decisions (since 80 percent of these payments are now formally paid on a per unit of land basis as one single payment), it is expected that the production-stimulating role of these payments diminishes, so as not to conflict with the objective of reducing minimum prices. Yu and Jensen (2010) conducted the first analysis of the potential impacts of decoupling China's agricultural domestic support, which lends support to these expected benefits of decoupled domestic payments. The numerical results from that study show that in the hypothetical scenario of increasing domestic support spending up to China's WTO *de minimis* limits using instruments tied to outputs and input uses for grains, there would be large increases of grain production over the baseline, a changing trade pattern seemingly contrary to China's comparative advantage, increased rural employment, significantly higher farm income (over 12 percent) and a large negative allocation efficiency effect. While the baseline for conducting this hypothetical scenario is 2005, it nonetheless appears to resemble the actual policy development after that time, and the simulated effects of production and trade patterns seem to parallel what has actually happened. Alternatively, if this additional domestic agricultural support up to China's WTO *de minimis* was given as a single decoupled arable land-based payment, agricultural outputs and trade in China would remain unchanged, and rural employment would stay stable; however, as a way of transferring income, these decoupled payments are shown

to have higher income transfer efficiency and would cause virtually no production distortions to the economy (and hence have no welfare implications). More recently, preliminary results from a partial equilibrium model (Kimura and Yu 2016) show that in the case of wheat China's market price support does boost production with the side effect of more intensive input use. Shifting from the market price support to more decoupled and WTO-compatible direct payments can support farm incomes at lower cost, while mitigating environmental pressures associated with intensive input use.

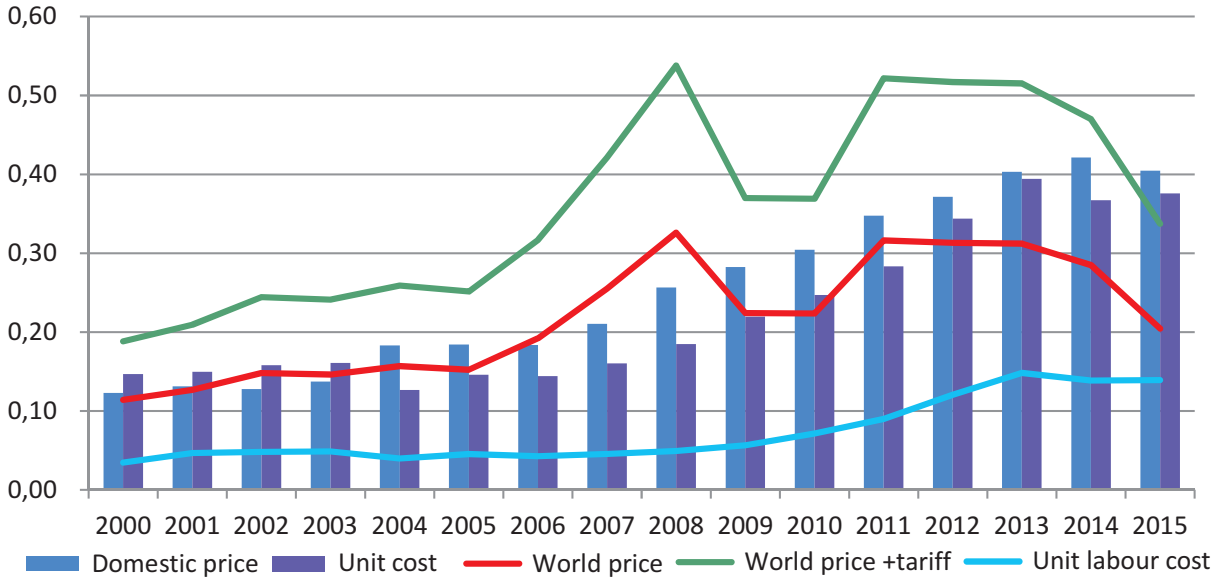
Figure 6: Rice: rising domestic costs leading to higher domestic prices (US$/kg)



Source: domestic prices are sourced from China Agricultural Price Survey Yearbooks (中国农产品价格调查年鉴). World market prices are from World Bank. Unit cost refers to production cost per kilogram of outputs and unit labour cost refers to labour cost per kilogram of outputs; both are sourced from National Compilation of Cost and Revenue in Agricultural Production (全国农产品成本收益资料汇编).

In summary, recent policy changes which reduce minimum prices for rice and wheat, together with changes to the design of the direct payments, seem to be positive steps for combating widening gaps between domestic and world market prices, and may also help to ease the pressure on stock build-up. Additionally, if China becomes more open to rice and wheat imports by facilitating the full utilisation of the rice and wheat TRQs, more of these products may be imported as a result. Additional imports beyond the quota levels for rice and wheat, however, depend on the subsequent evolution of the domestic-world price gaps, as the out-quota tariffs (at 65 percent), freight costs and value-added taxes can together still act as a major barrier preventing these products from being imported on a larger scale.

Figure 7: Wheat: rising domestic costs leading to higher domestic prices (US$/kg)



Source: see note to Figure 6.

4.2. Cotton and Soybean: The New Target Price System and Domestic and Trade Policy Coordination

Compared to food grains, cotton production in China is even more labour-intensive and has been affected by labour costs rapidly rising with double-digit growth rates annually in recent years (see Figure 8). Rising labour costs have eroded the competitiveness of China's exports of textile and clothing products, thereby threatening the growth prospects of domestic cotton consumption. They also raise the production cost of cotton, leading to further decline in the domestic cotton sector even in the presence of government support. To slow down the decline of domestic cotton production and to maintain a desirable level of self-sufficiency, a temporary procurement and stockpiling programme was implemented by the Chinese government during the 2011–2013 period to allow the state-run cotton reserve system to stockpile cotton procured above world market prices. However, as world market prices receded from historically high levels in 2011 but domestic costs continued to rise, an expanding gap between China's domestic price and international price was observed in the latter part of that period, leading to an upsurge in cotton imports as well as a rapid growth of cotton reserve stock. Financing this large stock placed a big fiscal burden on the Chinese government, as the downstream industries preferred cheaper imported cotton. Facing these challenges, China replaced the temporary procurement and stockpiling policy by the target price system in 2014.

After its implementation in the first year, the target price system seemed to have succeeded in bringing down domestic market prices (although production costs remained at levels far higher than both domestic and world market prices), and domestic production and imports also dropped in both 2014 and 2015. Consequently, ending stock levels in 2015 decreased from the historical levels of 2014 (Figures 3 and 8). As this new policy has only been implemented for two full years, it is not clear to what extent this policy will help alleviate the problems associated with high levels of public stocks in the cotton sector in the long run. China's cotton policy also faces potential international challenges as it relates not only to its price setter position but also to China's obligations under the WTO, especially if continued government support and the potential draw-down of its public stock lead to depressed world cotton prices.

To provide some insights into these questions, Yu (2016) investigates market and price effects of the target price system in the cotton sector under alternative world market price scenarios

within a global computable general equilibrium modelling (CGE) framework known as the Global Trade Analysis Project (GTAP, see www.gtap.org) where the target price system is explicitly represented. Using the most recent GTAP database (version 9; see Aguiar et al. 2016), two sets of hypothetical numerical experiments are conducted to explore the implied market outcomes and fiscal implications of the target price system under rising and falling domestic prices. Additionally, coordination between domestic agricultural policy and agricultural trade policy is also considered under these scenarios.

In the first scenario, in which world market prices are assumed to drop from recent high levels by 40 percent, simulation results as reported by Yu (2016) show that the domestic price of imported cotton would drop by a similar extent, which would also force down domestic market prices for cotton (see Appendix Table B). Consequently, cotton imports would rise. Against a predetermined target price, government compensatory payments would jump by over 50 percent, resulting in increased cotton subsidies of nearly US$6 billion. As producers are guaranteed the target price, domestic production stays almost flat. This is certainly not a desirable outcome, as the design of the target price system is to limit the extent of government subsidies to the cotton sector. Plausible alternative policy options would be either to increase the sliding scale tariff to curb imports exceeding the quota of 894,000 tons and hence transmission of the lower world market price, or effectively to reduce the pre-announced target price.[9] In the former case, a hypothetical 20 percent increase in the sliding scale tariff of cotton is considered as an option, whereas in the latter case, a hypothetical 20 percent "discount" is applied to the target price which normally triggers compensation to cotton producers.

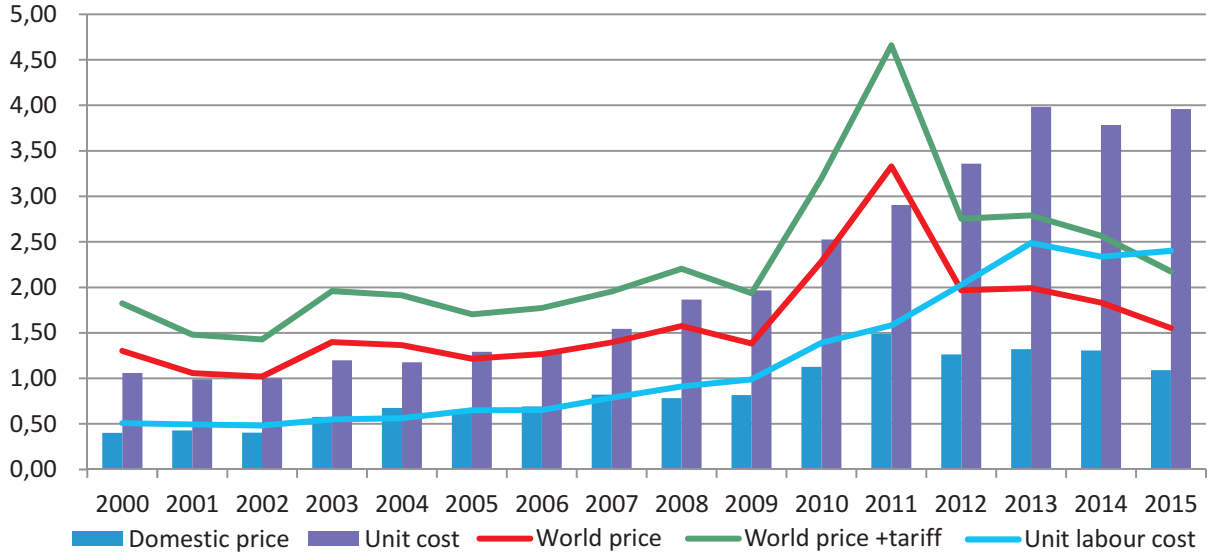
Under the scenario of increasing the cotton sliding scale tariff by 20 percent, imported cotton prices and domestic market prices would drop by less, and increases in imports would be much smaller, due to increased import protection, leading to smaller increases in cotton subsidies. Under the scenario where the target price itself is effectively reduced, the price of imported cotton would drop substantially but domestic producer prices would also be reduced, due to the reduction of the target price: hence imports would surge while domestic cotton production would be reduced substantially. As the numerical simulation results show, cotton subsidies triggered by the target price would remain nearly unchanged, due to the reduced target price and reduced domestic cotton production.

On the other hand, should the world market price rise by 40 percent and the target price remain unchanged, the rising price of imports would drastically reduce import volumes and push up domestic cotton prices, thereby slightly reducing the fiscal burden on the target price system and raising domestic cotton production. Rising prices for imported cotton and domestic cotton can, however, be costly for the downstream textile and clothing apparel industry (which is still one of the main export sectors for China). If that consideration takes precedence, then policy makers may opt for the opposite, namely, either reductions of cotton sliding scale tariff or increasing the target price.

In summary, it does not appear to be the case that the target price system would easily be able to solve all aspects of China's cotton problems. On the contrary, if future world market prices fluctuate, and particularly when world market prices continue to drop relative to Chinese prices, the target price system set at current price levels would face the risk of running up government spending on cotton subsidies. This outcome can only be avoided if the target price itself gradually falls—but that essentially implies lower levels of government assistance to the cotton sector.

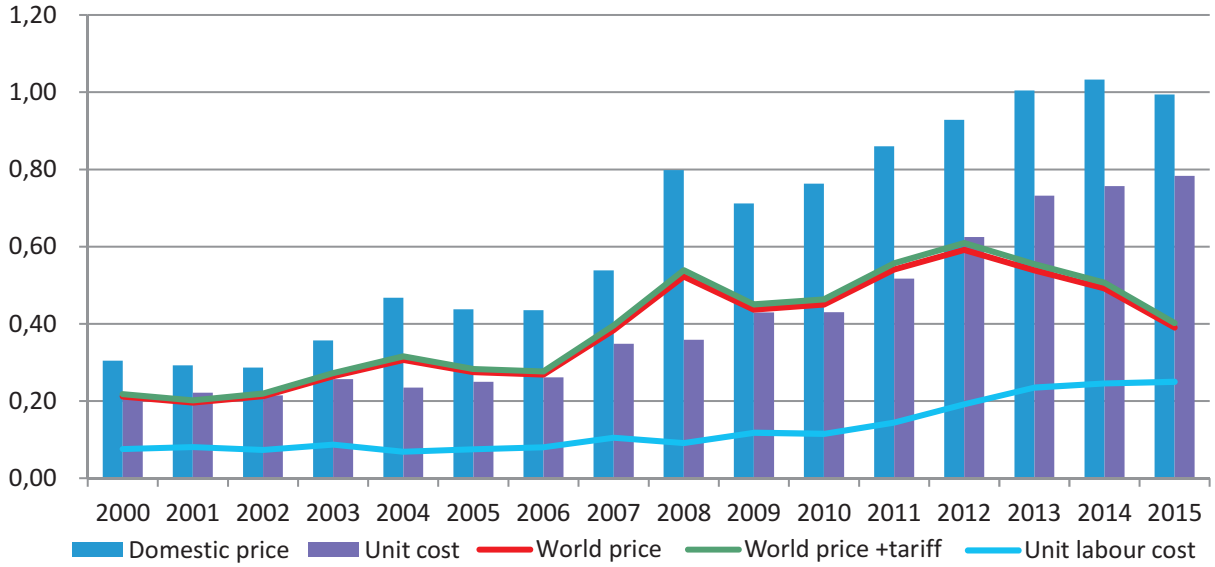
9 One possible way to limit the fiscal burden in this case would be to discount either the price gap or the quantities for which cotton producers can be compensated.

Figure 8: Cotton: rising labour costs pushing domestic prices above world market prices (US$/kg)



Source: see note to Figure 6, except for the source of cotton prices which are the farm gate prices obtained from the PSE table of the OECD.

Figure 9: Soybean: domestic prices higher than world market prices by wide margins (US$/kg)



Source: see note to Figure 6.

In the case of soybean, minimal import protection has allowed for massive imports into China. Domestic production, on the other hand, has been paltry compared to imports. So China is essentially relying on the world market to meet its ever-increasing demand for this commodity (Figure 4). As Chinese costs and domestic prices of soybean have been consistently higher than the prevailing world market prices, mass imports have generally led to shrinking domestic soybean production (Figures 4 and 9). The recent announcement of applying the target price system in Northeast China is therefore unlikely to revitalise soybean production in the absence of policy space to increase import protection. However, recent discussion on reducing support for maize may, to some extent, redirect land resources in Northeast China towards soybean production, which may have some effects on the total production of soybean.

4.3. Policy Changes in the Maize Sector and Future Policy Options

China's maize sector has similarly experienced major issues in recent years in terms of rising costs and domestic prices, high domestic production and increasing imports, which have resulted in large quantities of stocks being held (Figures 5 and 10). China's maize stock is estimated to have been more than 110 million tons at the end of 2015 according to USDA estimates, which is about half of China's total maize production in that year. Fan et al. (2016) put China's net increase in maize stock during 2012–2014 alone at 150 million tons, whereas others suggest the total maize stock was much higher at around 250 million tons as of the beginning of 2016 (as reported in various media outlet such as www.ce.cn), which would have exceeded China's annual production in 2015.

According to Fan et al. (2016), most of China's current maize stock was accumulated during 2012–2014 due to the maize temporary procurement and stockpiling policy. This involved accumulated purchases of nearly 180 million tons, with the costs of procurement, interests and warehousing estimated to be ¥43 billion per year; however, the actual costs are likely higher if China decides to sell the stock at current prices. Other reports (e.g. *China Finance and Economic News* 2017) put the storage costs to be much higher at around ¥65 billion per year for the reported total stock of 250 million tons. With world market prices for maize and other coarse grains remaining at lower levels, and maize imports being constrained by the maize TRQ at 7.2 million tons and the high out-quota tariff of 65 percent (Table 4), China imported record amounts of substitute products such as sorghum, barley and dried distillers grains with solubles (DDGS), which further worsened the maize stock situation.

Facing these challenges, the Chinese government reversed recent policy trends by first freezing the temporary procurement and stockpiling price in 2014, and then in 2015 dropping this floor price by about 10 percent (from 2.26 to 2.00 ¥/kg). It was announced in March 2016 by the NDRC that the temporary procurement and stockpiling programme for maize would be formally repealed in 2016 and be replaced by "market procurement" and subsidies to maize producers, as reported by various media outlets such as 中国经济网[10]. Details about the exact meaning of "market procurement" have yet to emerge; however, with government procurement and stockpiling being repealed, there will be no point issuing any floor price, as maize producers will be directly subsidised. Although the amount of subsidies to be paid to maize producers has not been released, it is reasonable to expect that these payments will at least partially offset the differences between production costs and the (likely lower) market price for maize.

The net outcome of recent reforms is likely to be: reduced maize planting areas and production in Northeast China and Inner Mongolia, slowing build-up of maize stock, continuing imports within China's TRQ and possibly faster release of existing stock at subsidised prices, especially to the maize processing industry. In the immediate short run when planting decisions cannot be easily adjusted, it is expected that direct subsidies will become quite substantial to compensate for the loss to producers due to the repeal of the procurement and stockpiling policy. In the longer run, however, substantial reductions in maize planting area will be expected to reverse the increasing trend induced by the procurement and stockpiling policy (during the period of 2008–2014, the maize planting area increased by 25 percent to reach the level of 55.685 million ha), resulting in reduced outputs.

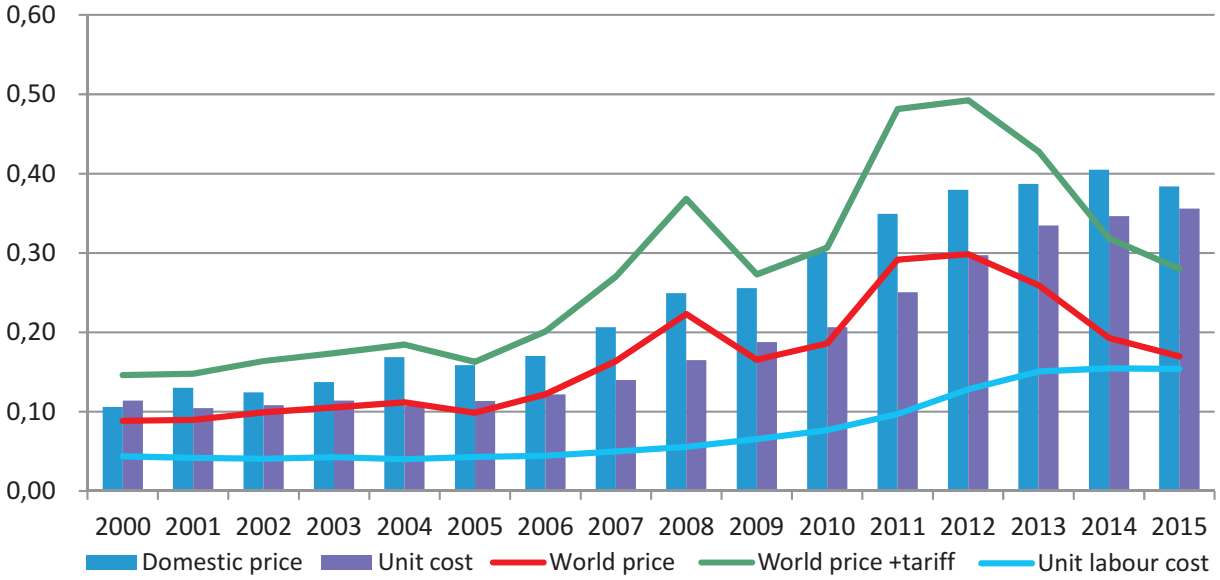
Whether or not China's maize imports in the near future will rise depends on how and at what price the existing maize stock is drawn down. Fast stock release and the end of the maize procurement and stockpiling policy may lead to much lower domestic market prices, which could even possibly reduce maize imports in the short run. On the other hand, the possibility that exports may become another channel to reduce maize stock does not seem to

10 www.ce.cn/cysc/sp/info/201605/25/t20160525_11990312.shtml, accessed 12 November 2016

be realistic as this would likely imply very large effective export subsidies, which would not only be very costly to China but also run against the commitments to end export subsidies reached in the WTO Nairobi Declaration (ICTSD 2016a). In fact, in the case of China, no entitlement to export subsidies exists according to its WTO commitments. Other possibilities for limiting maize imports to aid the process of reducing existing maize stock include attempts to limit the imports of substitute products such as sorghum, barley and DDGS; however, in the absence of effective trade policy instruments such as tariffs higher than those allowed under China's WTO commitment or tariff rate quotas, this is not likely to be possible except for the use of temporary trade remedies such as anti-dumping duties and countervailing duties.[11]

In summary, China's huge maize stock, increasing maize planting area and domestic production at costs far higher than world market price have led to the recent reversal of the temporary procurement and stockpiling policy that had been in place for the better part of the past decade. In the short run, direct government subsidies to producers will be used to facilitate the difficult adjustments that need to take place as maize production and stockholding are reduced. Therefore, it is reasonable to expect that only after these difficult adjustments have been completed can China start a "lighter" approach towards its intervention in the maize sector, featuring lower government spending and lower levels of production, and possibly a smaller domestic-world market price gap.

Figure 10: Maize: domestic prices consistently higher than world market prices (US$/kg)



Source: see note to Figure 6.

11 China's Ministry of Commerce (MOFCOM) launched anti-dumping and anti-subsidy investigations on DDGS imports originated from the US on 12 January 2016. On 12 January 2017 MOFCOM announced its ruling to impose anti-dumping duties between 42.2 percent to 53.7 percent and countervailing duties between 11.2 percent and 12 percent on these imports for the next five years (see MOFCOM 2017a and 2017b).

5. CONCLUSIONS

This paper first provides a review of China's agricultural production and trade patterns in the new millennium, focusing on rice, wheat, maize and soybean, as well as cotton. The first four products are considered food grains in China and have been subject to intensive government interventions using both domestic and trade policy instruments for the purposes of realising food security and self-sufficiency targets, while cotton has also been considered a strategic product for China's downstream industries and because of its importance in the Xinjiang autonomous region. This review reveals that for rice, wheat and maize, despite continuous output growth, both imports and government stockholding have been on the rise. For cotton, production has also been characterised by a general rising trend in recent years but imports have also been higher, resulting in government stock exceeding annual domestic consumption. So at a first glance, rising production for all these four commodities is associated with rising pressure in imports and huge amounts of public stockholding. Ironically, China's soybean sector, which has been subject to mass imports from the world market due to rising domestic demand and minimum import protection, has not suffered from the same symptoms, as its production level has been on a stable slight decline in the past decade while imports continue to rise. Relying on the world market to meet its soybean demand also reduces the need to hold a large reserve stock. Overall, regardless of the sectoral differences in production and trade, it is clear that China has transformed itself into a major importer of all five commodities, although self-sufficiency ratios differ widely between food grains (rice, wheat and maize) and soybean and cotton.

This paper then points to the widening gaps between domestic and world market prices as a direct explanation of the recent development of China's agricultural production and trade patterns. For rice and wheat, it appears that these gaps have been widening since the 2008 world food price spikes. For maize and soybean, Chinese domestic prices have been consistently higher since 2000 and recent gaps have also been increasing. For cotton, Chinese domestic prices have also been higher for most years, and fluctuations on the world market have resulted in only a few years with higher world market price (such as in 2011 when the world market price reached historically high levels). In summary, the almost uninterrupted rising trends of domestic prices in China for all five commodities—a symptom of rising labour and other costs in China—directly explain their declining competitiveness on the world market.

To further understand how China has so far managed to maintain steady output growth in rice, wheat and maize and considerable production in cotton and soybean in spite of rising domestic costs and prices, this paper then discusses how the development of the major elements of China's agricultural policy is connected to the observed market outcomes, particularly in relation to recent rising market price support and increasing domestic direct payments. Following this general discussion, detailed assessments of recent agricultural policy reforms and discussions of future policy options for each of the five commodities are carried out.

For rice and wheat, maintaining or effectively reducing minimum prices in the face of rising production costs appears to be the main policy instrument recently used by China to alleviate the build-up of stocks. Such actions would also help China to curb the rising market price support for these two products, which has recently led to complaints from the US alleging China was breaking its WTO agricultural domestic support commitments. Additionally, if the new strategy of "using domestic and international resources and utilizing domestic and international markets" covers these two products, then a more open attitude to their imports may also be expected, which may result in full utilisation of the rice and wheat import quotas. It is also possible that China may temporarily withdraw marginally productive land from active production through new land management plans. Lastly, recent

consolidation of various direct payments into the single agricultural support payment seems to further decouple these payments from actual production and input use decisions. The delinking of these payments from various inputs could be a signal that the government intends to limit future increases in these payments due to rising input prices.

In the case of cotton and soybean, the most notable change is the implementation of the target price system. This change is more significant for cotton than for soybean, as the "*triple-high*" symptom is most evident for the former product. By applying a target price that is set at a lower level than previous intervention prices and by repealing stockpiling, it is apparent that the target price system for cotton implies smaller government spending on supporting production, in addition to realising fiscal savings from reducing the sizable cotton stock. Nevertheless, the target price system as a market price-based intervention instrument will still leave the Chinese government exposed to uncertain compensation spending arising from price fluctuations. In particular, as illustrated by a model-based numerical illustration, relative decreases in world market prices would lead to rising compensation spending under the target price system; to avoid such an outcome, trade policy coordination may be needed in the form of a rising sliding scale tariff rate or a tightening of the supplementary quota. On the reverse side, rising world market prices, while being helpful for controlling compensation spending, can be similarly troublesome due to the need to control the impact on the downstream industry (i.e. the textile and apparel industry). In that case, policy makers would need to pursue reductions of the sliding scale cotton tariff or effective expansion of cotton. Adjustment of the target price itself could be another option, although this would require prior announcement for purposes of maintaining the credibility of the system itself.

The pilot target price system for soybean, on the other hand, is likely to be subject to fewer uncertainties regarding government budgetary considerations and market outcomes. The reason is that domestic production of soybean is relatively small compared to its domestic consumption and tariff barriers are almost non-existent. Therefore, it is expected that the target price system will not generate drastically different market outcomes for soybean (unless the target price is set at an overly ambitious high level).

Among the four major grains, maize is perhaps the one that is currently undergoing the largest policy adjustment, as the temporary procurement and stockpiling policy gives way to "market procurement" and direct producer subsidies. While the exact details of the new system have yet to emerge, it is clear that dealing with the huge stock (estimated to be as high as 250 million tons) and ever-increasing planting area is the top priority. In the short run, such adjustment would not necessarily lead to larger imports into China, whereas spending on producer subsidies is likely to be substantial to moderate the shocks to producers and the domestic market. In the longer run, reduced outputs and planting areas are expected. After these domestic adjustments and as maize stock returns to lower and stable levels, it is possible that China may start to import more.

To sum up, facing the difficult situation of the "*triple-high*" phenomenon in the rice, wheat, maize and cotton sectors, China has undertaken major changes in its farm policy in the last couple of years, including major changes to the various problematic market price interventions backed by stockpiling policy, particularly for maize and cotton. Moving away from these costly instruments is a very positive development towards reducing swelling government stocks which drain fiscal resources and towards moderating expansion of high-cost domestic production. Regardless of whether these changes would lead to an immediate rise in imports, it is expected that they would lead to decreasing market price support which would improve China's position in relation to its WTO agricultural domestic support commitments. On the other hand, whether China is truly fully embracing its recently declared strategy contained in the 2016 Policy Document no.1 to "rely on both domestic and international

markets and resources" to realise grain security still remains to be seen. This is because decoupling still remains incomplete between price formation and income transfer roles of the new policy instruments (such as the target price system for cotton and soybean, the reduced floor prices for rice and wheat, as well as the new producer subsidies to maize producers).

The consolidated direct domestic subsidies can be another major positive step in China's farm policy reform, if these direct subsidies under the new name of "agricultural support payment" are further decoupled from producers' production and input use decisions. In fact, if such payments are totally delinked from considerations of input price changes, are given on a per unit of land basis and become uniform across Chinese regions and across different commodities, then the new consolidated payment may be considered a truly decoupled income transfer payment to farmers. In that case, it will have minimal production and trade distortion effects, thereby helping improve resource allocations among China's agricultural subsectors, increasing the income transferring efficiency of these subsidies and enabling the government to control budgetary costs. Additionally, decoupled payments will also enable China to fulfil its WTO agricultural domestic support commitments.

In the longer run, with labour costs in China's agricultural sector expected to rise continually due to rural–urban migration and changing rural demographics, Chinese agriculture is expected to undergo a further decline in comparative advantage. This is particularly the case for land-intensive products such as grains (see e.g. Anderson and Strutt 2014 for a projection of China's increasing agricultural imports), suggesting a sustained fundamental conflict between the pursuit of high self-sufficiency ratios in grains and other important agricultural commodities and the constraints on government assistance to agriculture imposed by China's fiscal resources and by its commitments at the WTO. Direct government interventions using market price tools and stockpiling have proven to be costly and inefficient in recent years, as well as contributing to allegations from China's trading partners that the country is exceeding its WTO support ceilings. Moreover, the pursuit of high food grain self-sufficiency with intensive use of chemical inputs and land and water resources has also taken a toll on the environment and the natural resource base, thereby threatening China's sustainability in the agriculture sector. In view of these long-run considerations, recent policy reforms should only be considered as interim steps to alleviate the immediate concerns. Longer-term solution would require further farm policy reforms, such as converting current market price support into true income transfers, and also more openness to trade, particularly for products where China's comparative advantages have been eroded.

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APPENDIX

Table A. China's production, net imports, end stock and stock/use ratios: five major commodities (million ton and percent)

	Production	Net import	End stock	Stock/use ratio (%)	Production	Net import	End stock	Stock/use ratio (%)
	Rice				Wheat			
2000	131.5	-1.6	93.0	69%	99.6	-0.4	91.9	83%
2005	126.4	-0.6	36.8	29%	97.4	-0.3	34.5	34%
2006	127.2	-0.9	35.9	28%	108.5	-2.4	38.6	38%
2007	130.2	-0.7	37.8	30%	109.3	-2.8	39.1	37%
2008	134.3	-0.4	38.5	29%	112.5	-0.2	45.8	43%
2009	136.6	-0.3	40.5	30%	115.1	0.5	54.4	51%
2010	137.0	0.1	42.6	32%	115.2	0.0	59.1	53%
2011	140.7	2.6	45.0	32%	117.4	2.0	55.9	46%
2012	143.0	3.1	49.8	35%	121.0	2.0	54.0	43%
2013	142.5	4.1	53.1	37%	121.9	5.9	65.3	56%
2014	144.6	4.9	57.4	40%	126.2	1.1	76.1	65%
2015	145.8	4.7	63.2	44%	130.2	2.7	97.0	87%
	Maize				Soybean			
2000	106.0	-7.2	102.4	85%	15.4	13.0	4.9	18%
2005	139.4	-3.7	35.3	26%	16.4	28.0	4.6	10%
2006	151.6	-5.3	36.6	25%	15.1	28.3	1.8	4%
2007	152.3	-0.5	38.4	26%	12.7	37.4	2.5	5%
2008	165.9	-0.1	51.2	33%	15.5	40.7	7.5	15%
2009	164.0	1.1	51.3	31%	15.0	50.2	13.2	22%
2010	177.2	0.9	49.4	27%	15.1	52.1	14.5	22%
2011	192.8	5.1	59.3	32%	14.5	59.0	15.9	22%
2012	205.6	2.6	67.6	34%	13.1	59.6	12.4	16%
2013	218.5	3.3	81.3	39%	12.0	70.1	13.9	17%
2014	215.6	5.5	100.5	50%	12.2	78.2	17.0	20%
2015	224.6	3.1	110.7	51%	11.6	82.4	16.0	17%
	Cotton							
2000	4.4	0.0	4.3	87%				
2005	6.2	4.2	4.9	52%				
2006	7.7	2.3	4.5	43%				
2007	8.1	2.5	4.5	42%				
2008	8.0	1.5	4.7	50%				
2009	7.0	2.4	3.1	28%				
2010	6.6	2.6	2.3	23%				
2011	7.4	5.3	6.8	82%				
2012	7.6	4.4	11.0	140%				
2013	7.1	3.1	13.7	182%				
2014	6.5	1.8	14.6	197%				
2015	4.8	0.9	12.7	166%				

Source: USDA PSD online, accessed August 2016.

Table B. Simulated effects of changes in world market price and China's cotton policy on the cotton markets

Percentage changes (unless otherwise noted)	World cotton price drops by 40 percent	World cotton price drops by 40 percent and sliding scale tariff increases by 20 percent	World cotton price drops by 40 percent and cotton target price decreases by 20 percent	World cotton price increases by 40 percent
Domestic price of imported cotton	-37.5	-25.0	-37.5	37.5
Domestic market price of cotton	-35.9	-25.1	-4.6	4.7
Cotton subsidies	55.9	33.4	0.0	-1.7
Changes in spending on cotton subsidies (million US$)	6,270.9	4,393.6	-0.3	-374.5
Quantities of cotton imports	6.8	1.4	69.7	-30.0
Quantities of cotton outputs	0.4	0.6	-33.3	22.0

Source: simulation results reported by Yu (2016).

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