Impact of China's Agriculture Policies on Domestic and World Commodity Markets

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Abstract

China's agricultural and trade policies have been shifting despite little change in policy objectives. This paper investigates potential implications of recent agriculture policies applied in China, and quantitatively analyzes their impacts on domestic and international commodity markets. Results from a 42 country partial equilibrium dynamic agricultural simulation model indicate that the effects on international markets are likely to be small with world price impacts of less than one percent. The set of policies partially offset each other in the international market. Results indicate increased returns to farmers and lowering domestic prices to consumers. China's producers increase production slightly because of increased input subsidies. Exports are reduced because of applied export tax and decrease in value added tax rebate. Domestic consumer prices would likely decrease by 2 to 4.5 percent in real terms. The lower prices benefits lower income and rural households, and benefit expanding beef, pork, and poultry production in China.

Key words: China, policy, trade, value added tax, export tax, subsidies, VAT rebates, dynamic partial equilibrium simulation model

Introduction

China's agricultural and trade policies have been shifting in recent years, despite little change in policy objectives. Due to the dynamics of China's policy development and implementation an in depth analysis would shed light and contribute insights about the effects of these policy changes on China's agriculture. The contribution of this research is to investigate potential implications of the recent agricultural policy reforms implemented in late 2007 and 2008, and analyze their quantitative impacts on domestic and international commodity markets.

This study begins with a brief review of the objectives of China's major agricultural and trade policies and major policy instruments implemented by the Chinese Government to achieve the country's policy objectives. The next section analyzes potential implications of the new policy measures, and discusses some observations/results and evidence of the policy implementations. The policies analyzed include recent adoption of export taxes, reduction of export value added tax rebates, and input subsidies. Lastly, the paper incorporates the recent policies into a partial equilibrium agricultural trade model to capture the impacts of these policies on the domestic and international markets and concludes with discussions of simulation results.

Policy Objectives

As in many other countries, China's overall agricultural policy goal is to support economic development. Before rural reforms began in 1979, China had two agricultural policy objectives: producing ample and cheap food for urban residents, and exporting farm products to earn hard currency with which to import advanced technology and equipment for urban industrialization (Tuan 2004). Those specific goals evolved and broadened over the next two and half decades,

before China's accession to the WTO in late 2001. Several publications provide detail discussion and background of the country's agricultural and trade policy reforms (OECD 2004, Tuan 2004, Gale 2005, and OECD 2009); but few published papers, especially in English, have investigated the implications of the most recent policies. The changes over those years can be categorized into seven general areas (Tuan et al, 2004):

- reduced support for urban industrialization;
- reduced emphasis on earning foreign currency via agricultural trade, because exports of manufactured goods have surged;
- increased concern for farmers' incomes;
- greater emphasis on domestic market stability and long-term food security;
- increased focus on the government budget and the debts of state-owned enterprises;
- gradual liberalization of agricultural trade in order to join the WTO; and
- increased concern for protecting the natural environment.

The agricultural policy objectives outlined in China's 11th Five Year Plan (2006-2010) not only aimed at promoting agricultural development and raising farm income, but also included new goals as follows.

- increasing productivity in the agricultural sector;
- increasing farm incomes;
- improving services in rural areas;
- improving farmers' education;
- improving public and private investment in rural areas; and
- deepening overall rural reform.

The 11th Five Year Plan also calls for the establishment of a mechanism for the country's industrial sector to support agriculture, and for cities to support the countryside. In sum, the traditional objectives of attaining food security and self sufficiency and of maintaining stable domestic production, marketing, and commodity price levels to protect farmers' interests still remain. However as mid-November 2008, the Chinese government announced the country's

mid- and long-term food security plans, in which the goal for food self-sufficiency should be maintained at 95 percent in 2020, a slight reduction from the current rate of 98 percent.

Review of agricultural and trade policy measures

Since joining the WTO in December 2001, China has been using a hybrid approach in formulating agricultural and trade policies. It has begun to abandon total direct central planning, state monopolies, and continues to move toward a more market driven economy. China has adopted a more open trade regime that complies with WTO requirements. However, Chinese policymakers have reserved important policy levers used to guide the agricultural economy.

Specifically, as a WTO member China cut agricultural tariffs, one of its main trade policy instruments, to an average level of 15.3%; eliminated most state trading monopolies; reduced non-tariff barriers; agreed to allow foreign companies to operate in China; agreed to set sanitary and safety standards and agreed to make these standards and regulations publicly available. Tariff rate quotas (TRQs) were set to limit imports of certain commodities like rice, wheat, corn, cotton, and sugar, with low in-quota tariffs of 1-5 percent, but established significantly higher over-quota tariffs. The share of TRQs allocated to state trading enterprises (STEs) remains relatively high. In 2007 and 2008, for instance, the fractions of total wheat, sugar, corn, rice, and cotton quotas allocated to STEs were 90, 70, 60, 50, and 33 percent, respectively.

Since WTO accession China has announced and implemented several major agricultural and trade policy measures including the following:

1. China's domestic agricultural policies—tax cuts, farm subsidies, input subsidies, price supports, and financial support for agricultural initiatives—were revamped after WTO accession, in part to counter anticipated effects of imports on Chinese farmers.

   China is among the world's countries with the longest history of taxing agriculture, extending over more than 2,000 years. However, as industrialization has advanced, annual average incomes of farm households in recent years has fallen farther behind those of urban households. In 2004, China's government announced gradual elimination of the agriculture tax paid to the government, and in 2006, all provinces in the country eliminated their centuries-old agricultural tax.

   In the early 2000's, the government gradually withdrew from a direct role in grain procuring, price setting, marketing, and buffer stock-holding, but this trend has been slowed or even reversed; now, the government has established a minimum-price procurement policy which has made the government the significant purchaser of food grains again.

   In 2004, the government began setting minimum procurement prices for rice, then in 2006 the government expanded the minimum price procurement policy to wheat to ensure that farmers would produce more food grains. For instance, the Chinese government raised early-crop, intermediate, and Japonica rice procurement prices from 0.7, 0.72, and 0.75 yuan per jin (one jin equals ½ kilograms) in 2004 to 0.77, 0.79, and 0.82 yuan per jin in 2007. Over the last two years, the government procured more than

80 million tons of wheat from the markets, with minimum procurement prices. More recently, the government extended minimum price procurements to corn and soybean in the Northeast provinces, rapeseed along Yangtze River, and to cotton in the Xinjiang Autonomous Region.

In 2004, China's government began to subsidize grain farmers with monetary subsidies to elevate farmers' incentives for grain cultivation. Major forms of subsidies include direct payments to grain producers, and subsidies for purchase of quality seed, high-yielding crop varieties, better animal breeds, and large machinery and equipment. In 2008, government direct payments increased to more than 40 Yuan per mu (one mu is 1/15 hectare), from an average of about 17 Yuan per mu in the previous year, with payments in some places over 70 Yuan per mu. Total financial support by the Central Government reached 95.1 billion Yuan in 2008, which is a significant increase from just 11.7 billion Yuan in 2004.

Table 1. Total financial support to agriculture (Billion Yuan)

Items	Beg. year	2003	2004	2005	2006	2007	2008
Direct payments	2004	-	11.6	13.2	14.2	15.1	15.1
Input subsidies	2006	-	-	-	12.0	27.6	63.8
Quality seeds	2003	0.4	-	3.9	4.2	6.7	12.1
Machinery subsidies	2004	-	0.1	0.3	0.6	2.0	4.0
Min. price procurement	2004	-	-	-	5.9	-	-
Subsidies for milk cows	2006	-	-	-	0.1	0.1	0.1
Total		**0.4**	**11.7**	**17.4**	**37.0**	**51.5**	**95.1**

2008 figures are estimates

*** Data sources:** Estimated by DRC, State Council, April, 2008.

2 China supplements traditional trade measures—tariffs and quotas—with value-added tax (VAT) waivers and rebates, *ad hoc* tariff cuts, import licenses, and expansion of import quotas, export taxes, and export quotas.

Imports of agricultural products in China are generally subject to a VAT. The rate levied on agricultural products has been at 13 percent, 4 percentage points lower than the general VAT rate on domestically produced products. Agricultural imports are subject to licenses and import prohibitions. Automatic licensing is in place to monitor imports; non-automatic import licenses are used to fulfill China's international obligations and to administer TRQs. Automatic licensing covers some meat products, edible oils, and tobacco products. The agricultural exports subject to state trading are cotton, rice, corn, and tobacco. Exports of agricultural products are entitled to VAT rebates at the time of exporting with rebates varying according to commodity. The VAT on all agricultural goods is normally 13 percent. Export rebate rate for agricultural goods is normally 5 percent. Export rebates for products containing agricultural inputs were increased in 2007 from 5 percent to 11-13 percent, to promote the use of agricultural inputs in domestic production for the export market.

In response to high world agricultural commodities prices, and domestic inflationary concerns, on December 17, 2007, China's Ministry of Finance announced on its website that VAT refunds for grain products (including wheat, milled rice, paddy rice, corn, and soybeans) would be eliminated beginning December 20, 2007, to discourage grain

exports. This policy was aimed at mitigating price inflation for food grains in domestic markets.

In addition to reductions of VAT rebates, China's State Council announced on December 30, 2007 that for 2008, a total of 54 major grain and oilseeds items (including wheat, corn, paddy rice, milled rice, and soybeans) and their processed products would be subject to 5-25 percent taxes if exported (NGOIC weekly Report, January 2008). This policy was put in place to further control exports of all major agricultural commodities that otherwise would go abroad. The export control policy demonstrates how the government was determined to fight creeping inflation of food and edible oils prices within the country. Mid-year reports from China's Customs Administration indicated that wheat and corn exports in the first quarter of 2008 dropped by 46 and 96 percent, respectively, because of the export tariffs and reduced VAT refunds.

3 Government analysts track trade, prices, and other indicators using an "early warning system," with the intent of detecting market disruptions that can be addressed using various policy measures. This monitoring program, operated by the Commerce Ministry, carefully watches to determine whether imported volumes, particularly of soybeans and cotton, are excessively larger than total consumption, and more importantly, whether imports would damage domestic production and demand for domestically-produced output.

4 In China, general policies are formulated at the central level, but provincial and local authorities have considerable latitude when implementing them. Many policies only apply to specific provinces or regions as described above. In some cases, local governments have contributed unknown amounts of subsidies in addition to those of the central government, and in other cases local governments may have illegally retained part of the subsidies from the central government, to make up shortfalls in their budget revenues.

A number of questions arise when addressing China's recent policy adoption. How instrumental are these policies in achieving China's agricultural objectives? Have these policies distorted China's domestic as well as international commodity markets?. A systematic, quantitative analysis can provide a clearer picture of how trade-restricting policies affect markets. Are China's price-stabilization policies effective? This study only addresses a small subset of these questions by specifically analyzing China's adoption of recent policies on trade and subsidies.

Scenario analysis

Based on the previous review of China's recently policies, China's adopted policies target both domestic and international commodity targets in the environment of the high world commodity prices. Our scenarios are formulated to capture the impacts of these policies at three levels: domestic, international, and combined.

Note that agricultural land tax elimination, and procurement prices for wheat and rice already are incorporated into the reference projection. Throughout the projection, prices are high enough that

procurement prices are not binding, both under reference projection and scenarios. The higher prices are based on USDA's annual 10 year agricultural projections, (USDA, 2009).

Scenario1: For policies affecting domestic markets, this scenario is quantitatively designed to capture the impact of input subsidies. The Chinese government increases input subsidies for seeds, fuel, fertilizers and machinery to lower production costs, increase production and consequently increase farmers' revenue. China has increased a number of input subsidies significantly over the past 5 years, often doubling the budget each year, for example input subsidies for improved quality seeds increased from a budget of Yuan100 million in 2002 to a budget of Yuan12.1 billion in 2008. The Chinese government more than doubled the budget numerous years from 2002 to 2008, for numerous types of input subsidies, (OECD, 2009). Based on China's increasing budget allocated to agricultural input subsidies we've developed this scenario. More specifically in our scenario, subsidies for corn in 2009 are raised from Yuan184/mt to Yuan424/mt by 2012, for rice from Yuan189/mt to Yuan434/mt, and for wheat from Yuan181/mt to Yuan422/mt. In the model, these input subsidies exogenously lower production cost from current levels over a three-year period beginning in 2009 and then held constant from 2012-2018.

Scenario 2: In this scenario, we capture the impact of trade policies announced by China's government in December 2007 and applied in 2008 (WTO, 2008). More specifically, the 8 percent export VAT rebate is eliminated and an export tax of 5 percent is imposed on corn, rice, and wheat in 2008. These policies were driven by the environment of high prices in 2008 (Jun, Qiu, Huang, and Rozelle 2008) . The Chinese government reduced the impact of global high

prices on the domestic markets by adopting policies that restricted commodity exports, which increased domestic supplies and maintained domestic prices below international prices. Hence, export taxes and elimination of the VAT rebate were adopted. The VAT rebate and export taxes are modeled as a ad-valorem tax on the China export price. The border price is a function of international prices, transportation costs, and the real exchange rate.

Scenario 3: Finally, in this scenario we combined Scenario 1 and 2 together to capture the total effect of China's domestic and international policies in the 2008 high international commodity prices environment.

Model and Data

This study uses the USDA-ERS Country-Commodity Linked System (CCLS), the USDA-ERS China model, and the USDA-ERS Food and Agricultural Policy Simulator (FAPSIM) model of U.S. agriculture. This is a large-scale dynamic partial equilibrium simulation system consisting of 42 country and regional models. The country models incorporates domestic and trade policies and institutional behavior, such as tariffs, subsidies, and TRQs. Production, consumption, imports, and exports are endogenous and depend on domestic and world prices, which are solved within the modeling system. Macroeconomic assumptions and projections are exogenous based on USDA's 10 year agricultural projections (USDA, 2009). The system reaches simultaneous equilibrium in prices and quantities for 24 world commodity markets for each of the 10 projected years in the analysis to 2018. The 24 commodity markets include detailed coarse grains, food grains, oilseeds, meals, oils, cotton, sugar, and animal products. Primary data sources are USDA's Production, Supply, and Disappearance, (USDA, November 2008), USDA's National

Agricultural Statistical Service, the United Nations Food and Agricultural Organization's FAOStat, Chinese Ministry of Agriculture (MOA).

China Model

The USDA-ERS China model is used for analyzing potential policy changes and analyzes the impacts on international and U.S. agricultural markets and trade. The China model used in this analysis incorporates behavior of state trading enterprises (STE's) and WTO commitments (such as tariff-rate quotas) into import and export equations for the relevant commodities. The model is solved at the national level for these scenario analyses, but production can also be solved for six different regions. World price signals enter the domestic market through import and export equations. China's domestic prices adjust until supply and demand are in equilibrium in all domestic commodity markets.

The grain sectors of the China model have four major components: 1) price and expected revenue equations; 2) production and consumption; 3) feed demand linked to livestock sectors; and 4) trade equations. Production of corn, wheat, and rice is calculated from area harvested yield equations. Area harvested and yields are determined by expected returns for a given crop and substitute crops. Food demand is modeled by rural and urban per capita consumption equations for the individual commodities, which are functions of own consumer price, substitute food prices, and income. Feed demand is a function of derived feed demand, based on quantity of pork and poultry produced in the commercial and specialized livestock sectors. Livestock production and feed rations vary for backyard, specialized, and commercial operations. Import demand is a function of the world price and domestic consumer price, and incorporates TRQs

and State and non-State trading. Export supply is a function of the export price and consumer price. China's producer or farm prices are solved to close the model for equilibrium in supply and demand. China's production, consumption, and domestic prices are affected by the international price through the import demand and export supply functions.

The supply response elasticities for corn, wheat and rice producers with respect to expected revenues are 0.33, 0.332 and 0.251 respectively. Area harvested and consumption adjust as new equilibrium commodity prices are solved for in the model. Food demand is specified with two distinct market segments, urban and rural consumers. Corn, wheat, and rice elasticities with respect to urban prices are -0.18, -0.31, and -0.25; with respect to rural prices are -0.28, -0.17, and -0.21; with respect to urban income are -0.18, -0.312, and -0.25; and with respect to rural income are -0.20, -0.12, and -0.19. Rice and wheat are staple foods, and exhibit declining per capita consumption as incomes increase.

Results

The rice, wheat, and corn trade results from scenario 1 (domestic policies), scenario 2 (trade policies) and scenario 3 (scenario 1 and 2 applied together) are provided in table 2. Table 3 provides price results for scenario 3. As mentioned earlier scenario 1 involves policies affecting domestic markets and quantitatively designed to capture the impact of input subsidies. In scenario 2 we capture the impact of trade policies, export tax and reduced VAT rebate. Scenario 3 is discussed in detail, which given recent high international commodity prices in 2008 is being maintained. Figures 1 through 6 provide changes from reference projections for trade,

production, consumption, ending stocks, and domestic prices. Because of space limitations, we only focus on the discussion of scenario 3.

Production: Under scenario 3, increased input subsidies cause farm revenue to increase, overcoming the negative price effect caused by reducing exports through the export tax and elimination of the VAT rebate. Corn, wheat, and rice farmers increase production by 397,000, 195,000, and 77,000 mt in 2009; and by 670,000, 723,000, and 167,000 mt in 2018, respectively. (See Figures 4-6: increased production ranges from 0.05% to 0.65% for any individual year). The results indicate that increased revenue and profit from input subsidies are sufficient to increase grain production and move resource allocation away from other crops. All other production costs are held constant in real terms throughout the projection period.

Consumption: Under scenario 3, China's corn, wheat and rice consumption respectively increase by 11,000, 77,000, and 147,000 mt in 2008; and by 704,000, 845,000, and 232,000 mt by 2018. The consumption increase ranges from 0.01% to 0.72%. Increased consumption results from slightly lower consumer and farm prices as production increases and exports are reduced. A majority of the population consumes rice and wheat as staple foods.

Prices:

China's grain markets are closed, and domestic prices can be in equilibrium at prices lower or higher than those in international markets. As exhibited in figure 3, changes in domestic prices (expressed in real terms) are relatively large. Prices decrease because of increased production and decreased exports. Wheat price declines the most, by about 4 percent for both farmers and

consumers. Next are rice prices, which decrease by about 2 percent, while corn prices decrease by 1.5 percent. All three policies work to increase domestic supplies and lead to lower prices with little impact on international markets, trade, and prices. The international prices for corn, wheat and rice are mostly unaffected, as shown in table 3. The countries responding most to lower international prices for corn in later years are developing countries such as Indonesia.

Trade: The policies adopted under scenario 3 give offsetting trade effects. Input subsidies increase farmers' profits, leading to increased area planted, increased production, lower prices, decreased imports, and a potential for increased exports and greater competitiveness. But application of an export tax and elimination of the VAT rebate cause a decrease in exports and even lower domestic prices, leading to increased domestic consumption. China's exports of corn, wheat and rice respectively (figure2) decrease by 56,000, 130,000, and 220,000 mt in 2008; and decrease by 13,000, 153,000, and 82,000 mt by 2018. Imports (figure 1) decrease throughout the projection period. In 2008, imports of corn and rice decrease by 2,000 and 7,000 mt respectively, and imports of wheat decrease by less than 1,000 mt. By 2018, imports of corn, wheat, and rice decrease by 23,000, 33,000, and 15,000 mt respectively.

A decrease in imports leads to lower international prices, while a decrease in exports leads to higher international prices; these effects partially offset each other, especially for corn (see figures 1 and 2). The international corn price change is almost zero but initially increases and then slightly decreases. Wheat and rice exhibit a larger decrease in exports than imports, so international prices are slightly higher. The international effects are quite small, with no country exhibiting a change in trade larger than 1 percent.

Summary and Conclusions

The contribution of this research is to investigate potential implications of the recent changes in agricultural policy instruments in China and analyze quantitatively their impacts on domestic and international commodity markets. This study begins with a brief review of the objectives of China's major agricultural and trade policies adopted in recent years and categorize all major policy instruments implemented by the Chinese Government in order to achieve the country's policy objectives. The paper discusses the policy issues facing China today and attempts to quantify their impact. Understanding the impact of China's recently adopted policies is important for both China and US officials, grain traders and farmers. Our scenarios are formulated to capture the impacts of these policies at three levels: domestic, international, and combined.

In our simulation model, we increased China's input subsidies over a 3 year period; coupled with a 5% export tax on corn, wheat, and rice, and elimination of 8% VAT rebate to exporters. The model results indicate that the impact on international markets is quite small with price changes less than 1 percent in China as the two sets of policies offset each other. China's producers increase production slightly, causing imports to decrease, while exports decline because of the export taxes and the loss of VAT rebates. Domestic prices to consumers decrease by 2 to 4.5 percent in real terms. The lower price levels domestically benefit lower-income and rural households, whose diets are largely based on rice and wheat as staple foods.

Future model enhancements should include measures of producer and consumer welfare. In other words, we intend to include measures of producer and consumer surplus measures in order to

capture the total impacts of policies and policy changes in China. In addition, this study does not account for research and development (R&D) activities in China that impact productivity as well as capital investment, with their associated production efficiencies.

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Figure 1 China's Imports

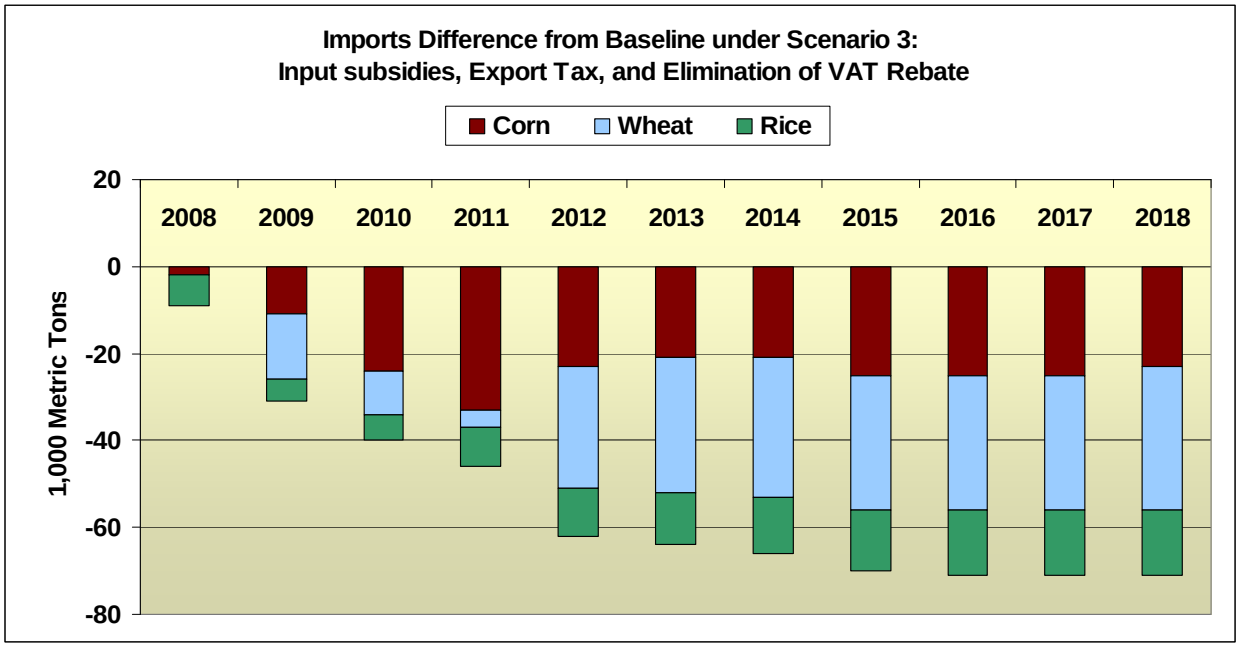

Figure 2 China's Exports

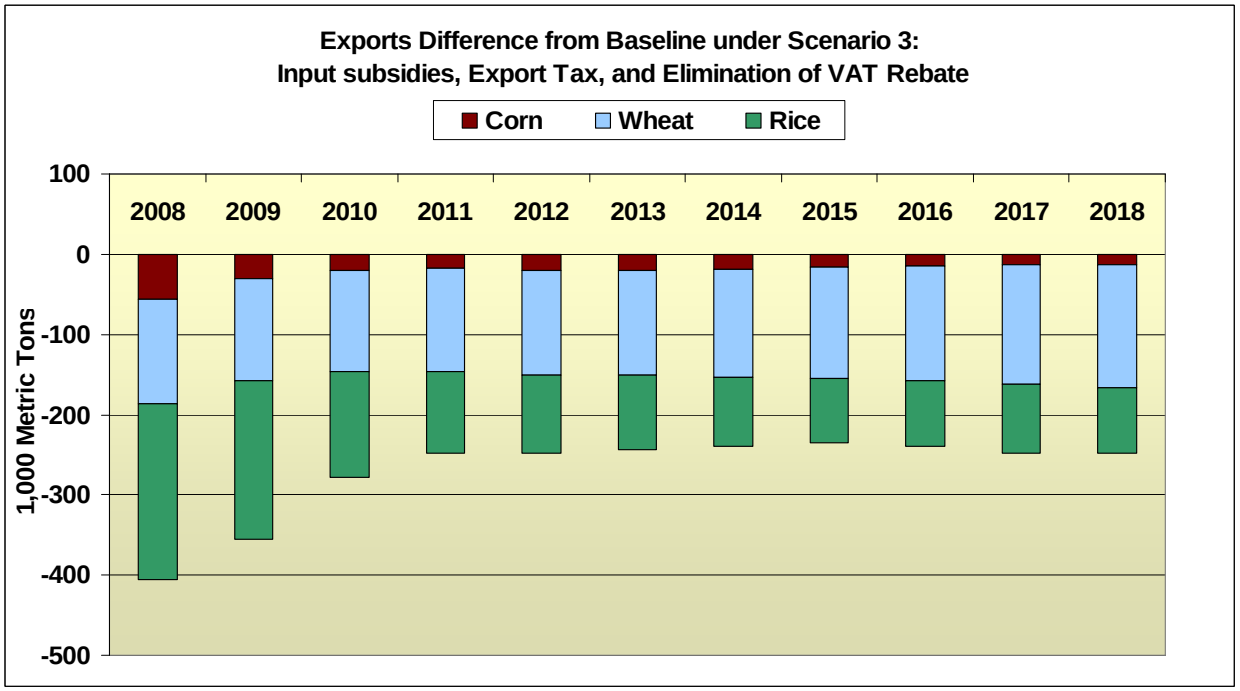

Figure 3 China's Prices

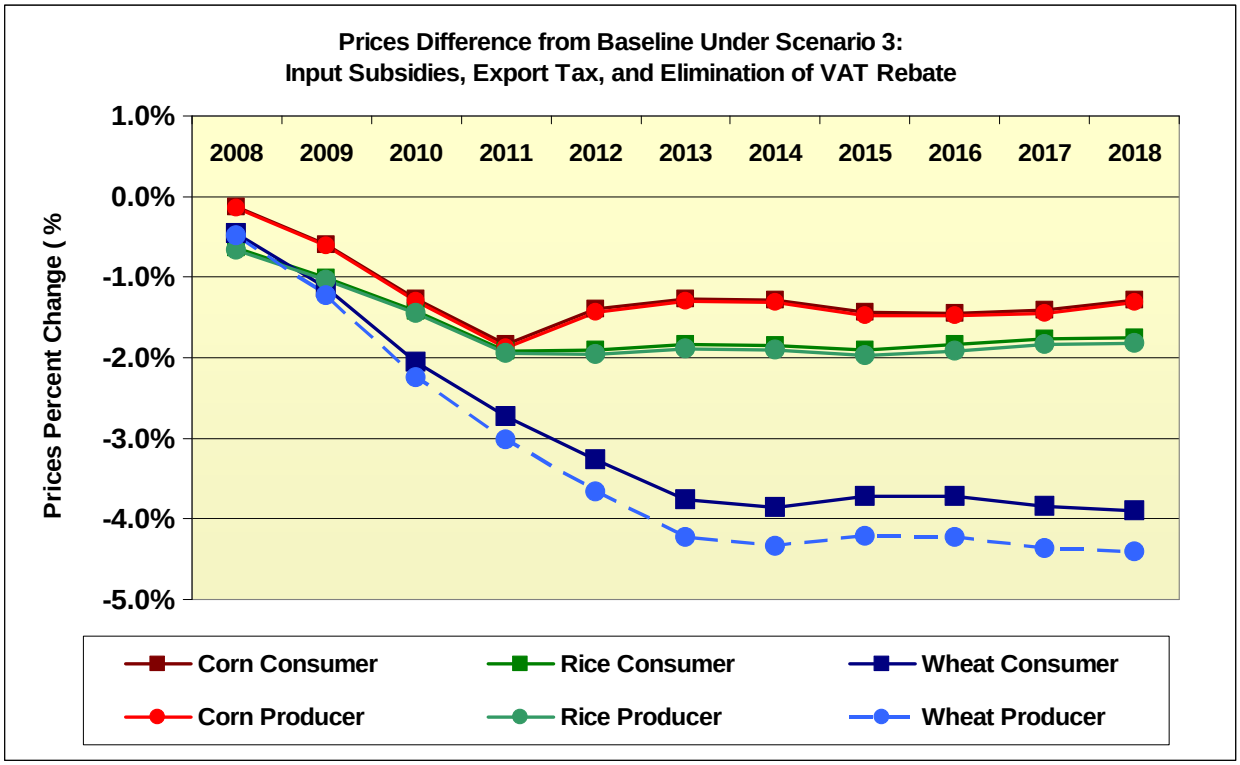

Figure 4 China's Corn

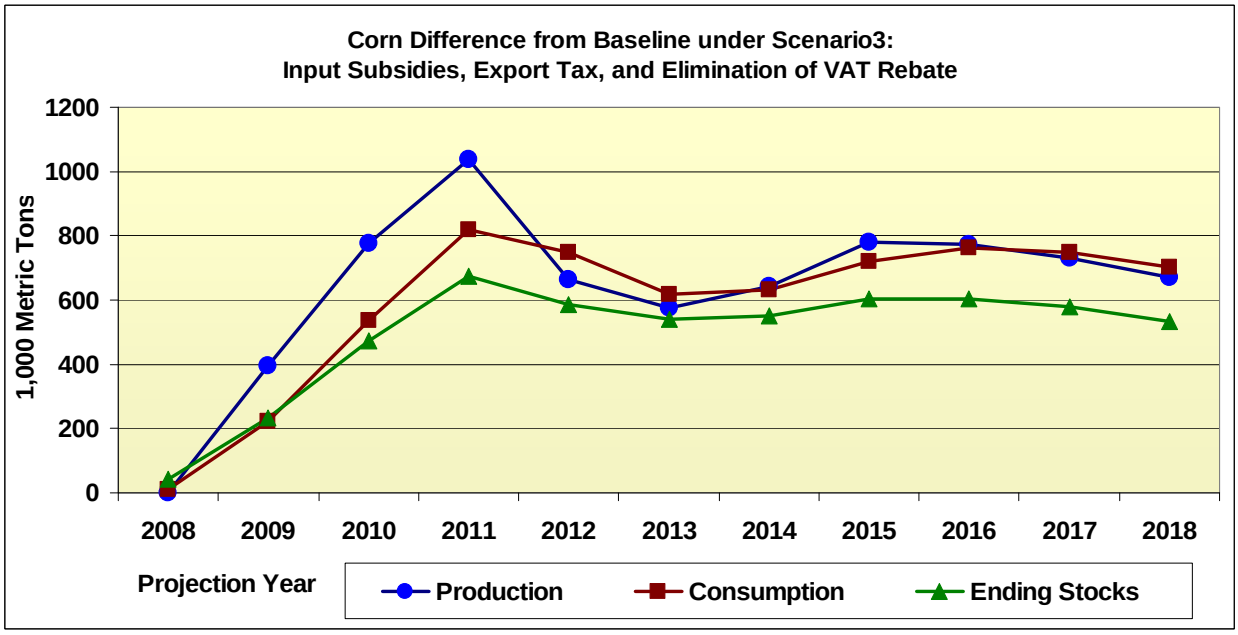

Figure 5 China's Wheat

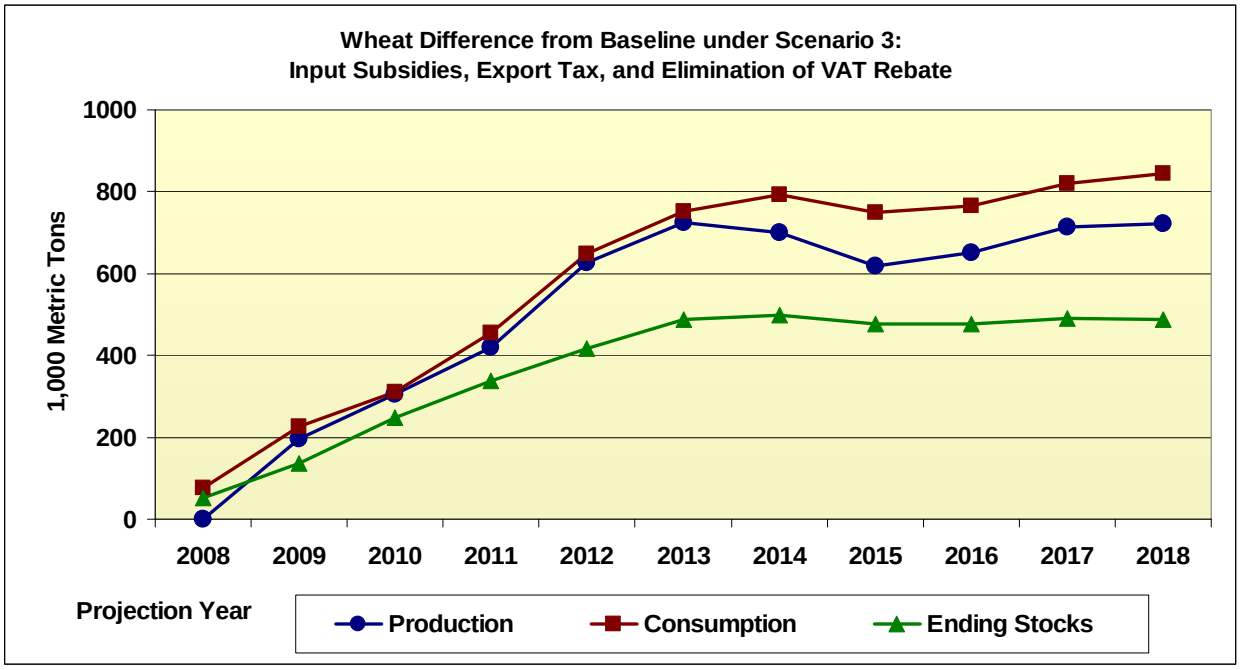

Figure 6 China's Rice

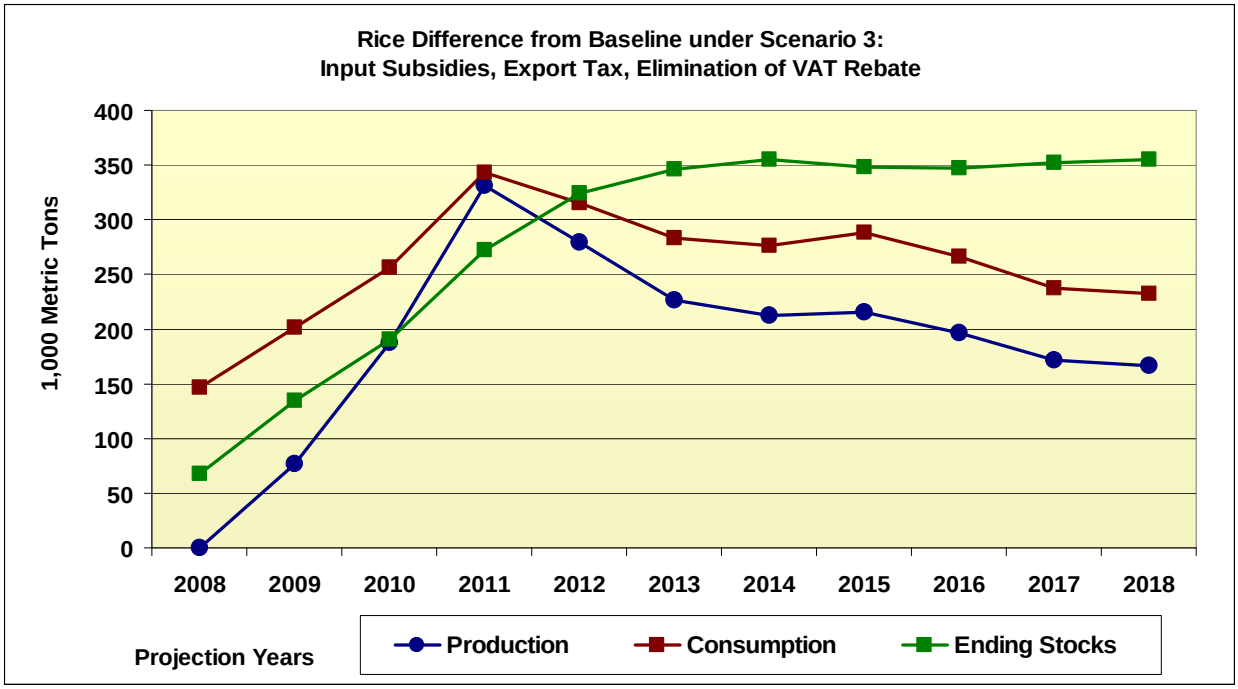

Table 2. Trade Impacts of Input Subsidies, Export Tax and Elimination of VAT Rebate Scenarios 1, 2, and 3 ; levels, differences, and percent differences from reference projections.

Countries and Scenarios	2009	2012	2018
China			
Corn Import Base (1000mt)	254	803	2374
Scenario1: Input Subsidies	-3.15%	-2.74%	-0.93%
Scenario2: Eliminate Rebate, Export Tax	-1.18%	-0.12%	-0.04%
Scenario3: Scenario 1 and 2	-4.33%	-2.86%	-0.97%
Scenario3: Difference from Base (1000mt)	-11	-23	-23
Corn Export Base (1000mt)	322	311	326
Scenario1: Input Subsidies	0.62%	1.93%	0.92%
Scenario2: Eliminate Rebate, Export Tax	-9.94%	-8.04%	-4.60%
Scenario3: Scenario 1 and 2	-9.32%	-6.43%	-3.99%
Scenario3: Difference from Base (1000mt)	-30	-20	-13
Wheat Import Base (1000mt)	104	152	226
Scenario1: Input Subsidies	-8.65%	-16.45%	-12.39%
Scenario2: Eliminate Rebate, Export Tax	-5.77%	-2.63%	-2.21%
Scenario3: Scenario 1 and 2	-14.42%	-18.42%	-14.60%
Scenario3: Difference from Base (1000mt)	-15	-28	-33
Wheat Export Base (1000mt)	2473	2900	3595
Scenario1: Input Subsidies	0.12%	0.45%	0.53%
Scenario2: Eliminate Rebate, Export Tax	-5.30%	-4.90%	-4.78%
Scenario3: Scenario 1 and 2	-5.18%	-4.48%	-4.26%
Scenario3: Difference from Base (1000mt)	-128	-130	-153
Rice Import Base (1000mt)	346	426	650
Scenario1: Input Subsidies	-0.29%	-0.94%	-1.23%
Scenario2: Eliminate Rebate, Export Tax	-1.45%	-1.64%	-1.23%
Scenario3: Scenario 1 and 2	-1.45%	-2.58%	-2.31%
Scenario3: Difference from Base (1000mt)	-5	-11	-15
Rice Export Base (1000mt)	1588	2633	2725
Scenario1: Input Subsidies	0.44%	1.67%	0.99%
Scenario2: Eliminate Rebate, Export Tax	-12.78%	-5.24%	-3.89%
Scenario3: Scenario 1 and 2	-12.41%	-3.72%	-3.01%
Scenario3: Difference from Base (1000mt)	-197	-98	-82

Table 3. Price Impacts of Input Subsidies, Export Tax and Elimination of VAT Rebate Scenarios 3; percent difference from reference projections.

Selected Years	2009	2012	2018
Difference from Baseline			
Prices Corn: Scenario 3			
International	0.02%	-0.05%	-0.03%
Consumer	-0.59%	-1.40%	-1.29%
Producer	-0.61%	-1.43%	-1.31%
Prices Wheat:			
International	0.07%	0.00%	0.0299
Consumer	-1.14%	-3.27%	-3.901
Producer	-1.23%	-3.66%	-4.414
Prices Rice:			
International	0.35%	0.12%	0.08%
Consumer	-1.01%	-1.90%	-1.75%
Producer	-1.04%	-1.96%	-1.83%