Trade policy responses to food price rises and implications for existing domestic support measures: the case of China in 2008

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Abstract

Existing literature on the 2007/8 food price crisis focuses on the causes and poverty and hunger consequences of the crisis and seems to be less concerned with the interactions of different policy measures applied by governments. As such, the relative effectiveness, interactions and costs of these policy actions are often not satisfactorily explored. This paper provides a first preliminary quantitative assessment on the individual and joint effects of China's short term trade policy actions and existing domestic support measures on domestic market prices, outputs, trade flows and farm income, using a global CGE model characterized with detailed and up-to-date policy information for China in the year of 2008.

A series of interesting results emerge from our simulations. First, China's agricultural outputs for many products are estimated to be boosted by up to 1.8 percentage by all the policy interventions combined, indicating that the extra domestic support in 2008 (relative to the pre-crisis level) is able to compensate for the lowered outputs due to the short term trade policy measures. The most stringent export restriction placed on wheat, however, reduces agricultural incentive so much that the observed domestic support measure is not able to compensate the lost domestic production. Second, while both the short term trade policy measures and existing domestic measures are able to reduce domestic market price, roughly two-thirds of the price reductions are due to the increased spending on the domestic measures. Third, the domestic market price reduction effects of the observed policy measures are shown to be large and significant, relative to the observed agriculture and food price indexes in China in 2008. Lastly, while China seems to be quite successful in tackling the food price inflation issue using a combination of policy measures, the fiscal and efficiency costs are not negligible, especially if one considers the extra government spending on the input subsidies necessitated by the insulating trade and border policy measures.

1. Introduction

During the 2007/8 world food price crisis, the Chinese government instituted a series of very active policy interventions at the border to stabilize domestic prices for food, especially for grains and soybeans. These policy interventions include eliminations of export tax rebates, impositions of export taxes and temporary reductions of import tariffs for grains and soybeans (OECD, 2009a; Jones and Kwiecinski, 2010). All these border measures should have helped reduce export supply, boost domestic supply, and ultimately shield the Chinese domestic market from the instabilities in the world market and stabilize domestic market prices. Clearly, the foremost policy objective during that time was to maintain affordable food prices for domestic consumers, especially the poorer segment of consumers. At least in the crisis period, these policy actions had seemingly achieved the target of stabilizing domestic prices (Yang et al. 2008).

While higher food prices pose a threat to the livelihood of poor consumers, if they are allowed to be fully transmitted to the domestic market, they can nevertheless create incentives for producers to produce and supply more to the market. By serving/limiting the transmission of price signals to the domestic market, the incentives for producers/suppliers to produce/supply more are then greatly diminished. Clearly, a first best response would be for producers to respond to the price signals and increase their supply and for the national governments to address potential poverty and hunger issues with targeted safety net mechanisms.[1] Therefore, the efficiency costs arising from reduced supply responses should not be ignored in evaluating the effectiveness of the border policy measures applied by many national governments around the world, including that of China.

In the Chinese case, the efficiency costs associated with reduced supply responses are further compounded by the fact that there are existing domestic policy measures aiming at increasing producer incentives. These include direct payments to grain production and subsidies to fertilizer and other inputs.[2] Lower domestic market prices (as compared to the prevailing world market prices) clearly undermine objective of existing domestic policy measures in increasing farm income and boosting agricultural production. In fact, in conjunction with the border measures, in 2008 the Chinese government strengthened existing domestic policy measures by increasing direct payments to grain farmers, increasing subsidies to adopting improved seeds, increasing minimum procurement prices for wheat and rice, and perhaps most importantly, significantly raising spending on subsidizing purchased inputs (mainly fertilizer), on subsidizing the production and distribution of fertilizers (see Table 1 and 2 for details of these measures; for a more complete introduction on China's domestic support measures, see OECD 2009a and 2009b). In addition, export taxes on fertilizers were also introduced in 2008. All these measures

[1] World Bank (2008) categories typical policy responses to high food prices and discusses the first best instruments in each of these categories.

[2] See Yu and Jensen (2010) for a first quantitative evaluation on how these subsidies improved producer incentive and increased farm income; and OECD (2009) for more updated information on the magnitude and implementation of these and other related subsidies

should have the effects of reducing producers' costs and/or increasing outputs, thereby offsetting the negative effects of the short-term border measures on producers.

The above discussion suggests that the Chinese government's short-term price stabilizing border measures seemingly triggered higher spending on maintaining producer incentives through existing domestic support measures. It clearly illustrates the dilemma and complexities facing policy makers in balancing the interests of poor consumers, producers, and input providers when high prices are present and when incentives sustained by existing domestic measures need to be maintained (see Abbott, 2009, for a more comprehensive discussion).

What is not clear and what has not been quantitatively explored in the current literature, however, is the extent to which the short-term border measures negate/offset the effects of existing domestic measures, including quantitative estimates on the extra domestic assistance needed for maintaining the levels of domestic agricultural production. In the recent literature on the 2007/8 food price crisis, focuses have generally been on the causes of the crisis and how government policy mitigates the negative effects on the domestic market and/or exasperate the instability on the world market. The complex interactions between the short-term measures and existing domestic support measures seem to be less explored. In the Chinese case, to our best knowledge, the only study that touches upon these interactions is a partial equilibrium analysis provided by Hansen et al. (2009) showing that China's export taxes and domestic subsidies provide offsetting effects. Yet, that study is limited in its coverage in the various policy instruments applied by China and the interactions between the border and existing domestic measures are not formally explored. For this reason, a more comprehensive study – such as the current paper – focusing squarely on the interactions of the two types of policy measures is warranted.

The discussion following the 2007/8 food price crisis seems to have elicited a convergence of views on the frequency and persistency of higher food prices. Indeed, in China, another round of high commodity prices (including high food prices, which contribute to the most recent rise of the CPI) seems to be in full force again. Analyzing recent experience will no doubt provide useful inputs into the debate on how China should best respond to this complicated challenge. Thus, the relevance and timeliness of the issue constitute the second motivation of the paper.

Based on information on China's major policy measures both at the border and domestically in combating the food price crisis for the year 2008, this paper aims at examining how these policy measures individually and jointly affect domestic market prices and producer prices, domestic supply, farm income, and trade flows into and from China. To consistently capture the inter-linkages across the different policy measures and different sectors, as well as the interrelations between the domestic and world markets, a global computable general equilibrium modeling framework incorporated with the policy details for China is adopted for the current analysis.

The rest of the paper is organized as follows. Section 2 provides an overview of the policy measures adopted by China and their expected domestic market effects. Section 3 introduces the

modeling framework and the scenarios to be simulated and analyzed. Section 4 contains the main results. The last section concludes with the main findings and their implications.

2. Policy measures applied by China in 2008

According to the OECD (2009a), China applied both macroeconomic policy (such as the appreciation of the yuan against the dollar) and policy measures directly targeting the agricultural and food sector. In the latter case, a host of contingent border policy measures were used, including removing VAT rebate and imposing export tax and licenses on certain grain products, restrictions on ethanol exports and productions, restrictions on exports of fertilizers, temporary removal of tariffs on food imports, etc. While these measures might have the desirable effect of securing short run domestic supply and reducing foreign demands, they nevertheless created disincentives for the needed expansion of agricultural production. For example, reductions of import barriers help lower domestic prices by increasing supply to the domestic market; this in turn reduces the demand for domestically produced products, thereby reducing producer's prices. Increasing export taxes has much the same effects: it makes Chinese products more expensive on the world market, thereby shifting supply to the domestic market and dampening the domestic market prices, and reducing producer's prices. Reducing export VAT rebate rates is similar to a reduction in export subsidies.[3] Therefore, it has the same domestic market effect as increasing in export taxes.

At the same time, the Chinese government also strengthened existing domestic policy measures to boost domestic grain production. Specific measures include higher support for purchasing farm machineries, increased subsidies for farm inputs such as fuels, fertilizers and seeds, increased direct payments to grain producers, and new pilot insurance schemes for crop and livestock producers. In addition, the minimum purchase prices for wheat and rice were also increased. Clearly, strengthening existing policy measures should have created further incentives for expanding agriculture production. For example, output subsidies in the form of minimum procurement prices for wheat and rice help increase producer's prices by creating a gap between domestic market prices and the corresponding producer's prices. Direct payments to grain farmers increase the return to land and increase grain supply; subsidies to purchased inputs, seeds and machineries reduce producers' costs and boost outputs. In addition, export taxes on inputs such as fertilizers push down domestic market prices for farm inputs by reducing foreign demand, which in turn reduces producers' costs of production and increases agricultural production. This generates the opposite effect to export taxes on agricultural outputs.

When domestic market prices for grains are pushed down by the border measures, producers' prices will be necessarily dropping for any given set of domestic support measures. This will create disincentive for agricultural production. Although in the short run, agricultural production

[3] Chao et al. (2006) discusses the export tax rebate policy in China.

decisions such as planting areas cannot be altered, farmers and other stockholders still have the option to reduce their supply to the market when the prices are too low. In addition, farmers can also observe the prevailing market price signals for making decisions on variable inputs such as labor hours, fertilizers and pesticides, which ultimately influences agricultural outputs. Therefore, more agricultural domestic support would be needed to maintain the same producer prices for achieving the same level of production.

Tables 1 and 2 list some of the most important trade/border and domestic support policy measures adopted by China in 2008. For the border measures, export restriction policies are the predominant ones (Table 1) and these restrictions are mostly on grains, soybeans and fertilizers. Although the export restricted on grains and soybeans did not seem to result in large fiscal implications (either in terms of increased tax revenue or reduced subsidy spending), their trade-restrictiveness may not be as negligible. In addition, domestic market interventions in the form of increased minimum procurement prices for rice and wheat are also noted. For the latter case (Table 2), domestic support measures in 2008 and the preceding years are also listed to illustrate the increased spending pattern on these measures. Most notable among these measures are the increased subsidies on inputs: RMB 12.1 billion on seeds, 63.8 billion on purchased subsidies, and nearly 90 billion on fertilizer production.[4]

3. Methodology and scenarios

3.1 Model and database

We adopt and modify the well-known computable general equilibrium model GTAP (Hertel, 1997) with agricultural sector policy details for modeling and analyzing the 2008 border policy and agricultural domestic support policy in China. Following Yu and Jensen (2010), we have made significant changes to the standard GTAP modeling structure to accommodate the observed domestic support and border policy measures of China and characteristics of the Chinese agricultural economy.

The effects and the interactions of the border policy measures and existing domestic policy measures are examined through a series of counterfactual simulations with the modified GTAP model. We base these simulation exercises on the GTAP database version 8 pre-release, which has 2007 as its base year and covers 112 countries/groups of countries and 57 sectors.[5] For the purposes of this study, we aggregate the original database to a manageable size of 12 regions (including China, its main trading partners, and several aggregated regions covering the rest of the world) and 40 sectors (including all 19 agriculture and food sectors originally listed in the disaggregated GTAP database). Keeping the other regions and non-agricultural sectors improves

[4] A more complete account of China's agricultural domestic support can be found in the PSE tables compiled by the OECD (2009b).
[5] Documentation for the GTAP 8 database is not yet available. For details of the most recent earlier version of that database, see Badri and and Walmsley (2008).

the performance of the model. In analyzing the results, we focus on China and its agricultural sectors.

Since the GTAP version 8 pre-release reflects the macroeconomic situation in 2007, it does not reflect agricultural trade and production values for China in 2008. Both the short term agricultural trade policy measures and domestic policy measures for 2008 are also missing in the prerelease database. Part of the data effort underpinning this study is to gather this information and systematically calibrate them to the database to form a realistic agriculture baseline for China in the year 2008. This carefully calibrated base case for the year 2008 reflects everything that we know about 2008 in terms of China's agricultural domestic support policy, agricultural trade policy, agricultural production and trade patterns for China, and agricultural price levels in China.

Counterfactual policy scenarios aiming at estimating the individual and joint effects of the shot-term border policy measures and the existing domestic subsidy programs will then be simulated against the 2008 base case.

3.2 Calibration of the 2008 base case

Regarding the agricultural trade and domestic policy measures, this requires firstly mapping the domestic policy instruments to the relevant variables in the model and secondly calibrate the observed fiscal spending on the domestic support measures into the accompanying database.

Some of the more important domestic support measures are discussed below:

a. Output subsidy captures the difference between the producer price and the market price of an agricultural product. This instrument is used to model China's minimum procurement prices for rice and grain in 2008. The reported spending of RMB3.15 billion for rice and 2.53 billion for wheat are calibrated to the 2008 base case.

b. Intermediate input subsidy captures the difference between farmers' (users') purchasing price and the corresponding market price of a specific intermediate input. The main input subsidies in agriculture used by China are the so-called "comprehensive subsidies on agriculture inputs" (namely, fertilizers, pesticides, and other purchased farm inputs; RMB 63.8 billion in 2008; see Table 2) and subsidies on "improved quality seeds". Subsidies on purchased inputs in recent years have been mainly given to grain production and as such are associated with input use in grains only, whereas seeds subsidies are attached to the use of grains seeds, rapeseed seeds and cotton seeds in the respective sectors. In addition to the input subsidies, producers of fertilizers in China also receive subsidies to compensate the lower market prices at which they sell to fertilizer users. These are captured in the model and database as the differences between producers' prices and the market prices of fertilizers. Unlike the comprehensive input subsidies, these fertilizer subsidies apply to all crops.

c. Land (or capital)-based agricultural subsidy measures the difference between farmers' (users') rental price and the corresponding market rental price of land (or capital). Several different payments/programs fall into this category. Direct subsidies to grain production are generally considered to be attached to arable land for grain production and are modeled as land subsidies, whereas subsidies for purchasing agricultural machineries are treated as subsidies to capital.

d. The relevant border protection measures, mainly export protection measures, are modeled as price wedges between relevant domestic and world market prices. More specifically, export tax occurs when the domestic market price falls below the corresponding FOB export price. On the other hand, export VAT tax rebate is treated as an export subsidy, implying the domestic price exceeds the FOB export price when the rebate rate is positive. Therefore, eliminating export tax rebate has the same qualitative effect as increasing export tax. These export restriction measures mainly concern grains, soybean, and fertilizer.

It needs to be noted that the standard GTAP model typically treats the above policy instruments as *ad valorem* tax wedges. To make sure that the budget outlays associated with the various instruments discussed above are correctly represented in the modified GTAP database, we choose to target the budget outlays while allowing the tax wedges to adjust in the calibration processes. Budgetary implications associate with these measures are also reported in Tables 1 and 2.

3.3 Alternative scenarios

Against the 2008 baseline we conduct a series of counterfactual scenarios to exam how the absence of individual policy actions at the border or within the border would have resulted in different outcomes (particularly in terms of domestic market prices, agricultural production and trade patterns, and farm income) as compared to the baseline situation. That way, we will arrive at a more detailed and direct decomposition of the individual and joint effects of the various policy actions taken.

More specifically, the following alternative scenarios are simulated:

S1. The absence of export measures for grains and soybeans, and import tariff reduction for soybeans. In this scenario, we remove the export taxes and restore the export tax rebates for grains and soybeans (see Table 1), and restore the import tariffs for soybeans (i.e. a 2% increase). All other policies including domestic policy measures remain unchanged at the 2008 base case levels.

S2. The absence of export tax on fertilizers. In this scenario, we remove the export tax on fertilizers which is estimated to be around 95% on average for the 2008 base case. All other policies remain unchanged at the 2008 base case levels.

S3. Removing the implicit output subsidies due to the increased minimum procurement prices for rice and wheat. This results in a reduction of output subsidies in the order of RMB 5.7 billion for these two products. All other policies remain unchanged at the 2008 base case levels.

S4. Lowering domestic support measures to the pre-food crisis levels. In this scenario, we reduce the major domestic support measures to the observed levels in 2006. This implies a slightly smaller direct payments to grain farmers but far more significant reductions to all the input based subsidies (see Table 2), including a reduction of nearly RMB 8 billion in seeds subsidies, nearly 52 billion in comprehensive input subsidies, and 28.6 billion in subsidies to fertilizer production. All other policies remain unchanged at the 2008 base case levels.

S5. The pre-food price crisis policy scenario where all the short-term contingent border measures are removed and all domestic support measures are restored to the pre-crisis levels of 2006 (as in scenario S4). The result from this scenario summarizes the joint effects of all the individual policy actions assumed in Scenarios S1-S5.

4. Results

This section reports the individual and joint effects of the short-term trade policy responses and the existing domestic support measures on domestic outputs, domestic market prices, international trade for key agricultural products, and farm income. Since the scenarios are conducted by removing the various policy measures from the 2008 base case, they reflect the effects of removing these measures rather than the marginal effects of imposing these measures. In order to facilitate the discussion on the effects of imposing these measures, we further process the results so that they can be treated as the effects of imposing these policy measures. Tables 3-5 report respectively the output, market price, and export quantity effects of the concerned policy measures reported in scenarios S1-S5.

S1. Effects of imposing export tax and eliminating export VAT rebates on grains and soybeans

Impositions of export taxes and the elimination of export VAT rebates (which is similar to removals of export subsidies) forces domestic market prices to be lower than the corresponding FOB export prices, thereby increasing export prices, reducing exports, lowering domestic market price and dampening domestic outputs. Indeed, these measures significantly reduce exports of rice (processed), wheat, other grains, and oil seeds (soybeans) by 50%, 89%, 29%, and 44%, respectively.

These changes in agricultural exports influence their domestic outputs. In particular, the estimated reduction of domestic outputs of wheat is the biggest at over 10%. This dramatic decrease in wheat production results in a significant second round effect in reallocations of resources into other crops to the extent that the joint effects of all these export measures for rice and a few other products turn out to be positive. Nevertheless, outputs of oil seeds and other grains (maize) remain in the negative direction.

On the other hand, domestic market prices are lowered by these export measures, ranging from reductions of over 5% for wheat, to 3.5% for oil seeds (soybeans), and 1.8% for rice (processed). These lowered prices represent nearly 2% reduction of farm income, with the lowered wheat price and outputs contributing to more than half of the income reduction. So, clearly, while the export measures result in lower domestic market prices which benefit consumers, it also places a cost on producers and in particular, farm income drops as a result of lower agricultural outputs and lower domestic market prices. These are indications of production efficiency costs of the export measures.

S2. Effects of imposing export tax on fertilizers

In contrast to export measures on agricultural products, export tax on agricultural inputs such as fertilizers has a different intention and leads to different effects: it reduces domestic costs of these inputs and therefore contributing to lower domestic market prices of agricultural outputs. The exact effects depend on the intensity of these inputs in producing individual products. Simulation results show that outputs of paddy rice, wheat, cotton and other crops rise marginally, while outputs of a few other products diminishes marginally. These modest changes in outputs can be justified by reductions in domestic market prices for essentially all agricultural products. Agricultural exports increases marginally as a result. On balance, the lower input cost effect is offset by the lower domestic market prices, leading to a slightly lower farm income (by 0.2 percent).

In summary, the objective of restricting fertilizer exports for keeping input costs low for producers does not seem to be realized as it does not lead to an overall increase in domestic outputs.

S3. Effects of increasing minimum procurement prices for wheat and rice

According to Jones and Kwiecinski (2010), the fiscal spending on the increases in the minimum procurement prices for wheat and rice is about RMB 5.7 billion. This spending is shown to boost outputs of wheat and rice by 0.5% and 0.2%, respectively. Although domestic market prices for the two products drop by 1.2% (wheat) and 0.7% (rice), producer prices are nearly unchanged due to the minimum procurement prices.[6] As such, farm income is actually slightly higher (0.14 percent). Therefore, this domestic market price measure seems to slightly offset the negative effects on agricultural production and farm income caused by the export measures discussed in scenario S1.

[6] Note that not all wheat and rice are purchased by the government so the average producer prices reported do not necessarily move in the same direction as the procurement prices. Our simulations show that they increase by around 0.2 percent, far less than the increase in the actual procurement prices.

S4. Effects of increasing domestic subsidies to agricultural inputs and fertilizer production

This scenario focuses on the increased spending on the comprehensive input subsidy program and improved seed program for grains, the production subsidies on fertilizers used for all crops. All these subsidies contribute to lowering agricultural production costs and higher outputs, and lower domestic market prices. In particular, grain outputs increase noticeably: 1.1% for paddy rice, 3.5% for wheat, and 2.8% for other grains (maize). Domestic market prices drop even more: 4.1% for paddy rice, 10.3% for wheat, and 7.5% for other grains (maize). Due to lower domestic market prices, even with the presence of export taxes, in this case China would be able to increase its exports to the world market most notably wheat, and then rice and other grains. Farm income is estimated to increase by 1 percent due to these increased spending, which more than compensates half of the income losses resulted from the short term export measures.

Among the three types of domestic support measure considered[7], the comprehensive input subsidies on fertilizers, pesticides, and other chemicals and fuels seem to generate the largest output and price effects. More than one half of the estimated farm income gain is also due to these subsidies. This is quite understandable as the change in spending on this program between 2006 and 2008 is the largest, valued at nearly RMB 52 billion.

In contrast to the short-term export measures examined in scenario S1, increases in domestic subsidies assumed in this scenario generate opposite and positive output effects for both grains and oil seeds (soybeans). However, in the cases of wheat and other grains (soybeans), the incentives provided through the increased domestic subsidies are not enough to totally offset the negative output effects caused by the short term export measures. On the other hand, both types of measures help to reduce domestic market prices, thereby mitigating the burdens caused by high food prices on consumers. It should be noted that the individual efficiency costs of both types of measures need to be considered and that the short term border measures do necessitate rising spending on existing domestic policy measures.

S5. Joint effects of short term trade policy measures and increasing domestic subsidies

When all the short term trade policy measures and domestic support policy measures examined in S1-S4 are considered jointly, the combined effects of all these policy measures are obtained. Results from scenario S5 summarize these combined effects and are reported as the last column in Tables 4-6, while results reported for the previous scenarios in these tables can be seen as an indicative decomposition of the results for S5.

On aggregate, the combined forces of all the policy measures have the joint effects of boosting outputs for many agricultural products up to 1.8 percent, indicating mainly that extra spending on existing domestic support measures are able to compensate for the negative output effect due to

[7] The direct payments to grain production only increased by less than just less than RMB 1 billion between 2006 and 2008. They are therefore not considered in this scenario due to space limitations.

the short term border measures. However, for several key products, the extra domestic support proves to be unable to reverse the negative output effects, in particular for wheat (due to the 20% export tax and elimination of a 13% export VAT rebate), and oil seeds (soybeans). To fully compensate the domestic production losses, a higher domestic support would be needed.

Since both sets of policies generally reducing domestic market prices, the price stabilizing effects are mutually strengthening between the two types of policies. On aggregate, domestic market prices for grain are lowered by between 6.6 to 14.2 percent (as compared to the situation where these policy measures are absent); and 1 to 3 percent for other agricultural products. According to China's statistical yearbook (NBSC, 2009), the actual retailing price index and producers' price index for grains for 2008 are respectively 7 and 7.1 percent.[8] Relative to these official price indexes, our estimated domestic market price effects due to the policy measures are quite large. Between the two types of policy measures, our estimates suggest that the domestic policy measures actually contribute about twice as much to the reductions of domestic market prices for grains, as compared to the short term border measures.

Lastly, although the world market price effects of these policy measures are not the focus of the current paper, China's policy actions do affect the world market through reduced exports and increased imports in the case of oil seeds (soybeans). Reduced exports are most pronounced in relative terms for wheat, rice, and oil seeds, and other grains (maize). However, other than soybean, China has not been a large exporter/importer for grains. So the extent to which China's action contributes to the food price crisis cannot be exaggerated, as pointed out by Abbott (2009) and certainly corroborated by results from the current study.

5. Conclusions

Few studies in the existing literature investigate the complex interactions among the domestic and trade policy measures governments adopted to combat the 2007/8 global food price crisis. This paper provides a first preliminary quantitative assessment on the individual and joint effects of China's short term trade policy actions and existing domestic support measures on domestic market prices, outputs, trade flows and farm income. The analysis is based on a global CGE model characterized with detailed and up-to-date policy information for China in the year of 2008. A base case scenario characterizing the agricultural trade and production situation and the associated policy environment for China is established for that year. A series of counterfactual scenarios are simulated against the base case.

A series of interesting results emerge from these quantitative exercises. First, in many cases agricultural outputs are estimated to be boosted by up to 1.8 percentage due to all the policy interventions, with the extra domestic support in 2008 (relative to the pre-crisis level in 2006) being able to compensate for the lowered outputs due to the short term border measures. The

[8] The OECD reports an 18.7% increase in consumer food price increase for 2007/8, according to Jones and Kwiecinski (2010).

most stringent export restriction placed on wheat, however, reduces agricultural incentive so much that the observed domestic support measure is not able to compensate. Second, while both the short term trade policy measures and existing domestic measures are able to reduce domestic market prices, roughly two-thirds of the price reductions are due to the increased spending on the domestic measures. Third, the estimated domestic market price reduction effect is large and significant relative to the observed food price inflation in China in 2008. Lastly, while China seems to be quite successful in tackling the food price inflation issue using a combination of policy measures, the costs are not negligible, especially if one considers the extra government spending on the input subsidies.

Table 1. Short run trade policy measures adopted in 2008 in China

Instrument	Description	Commodities	GTAP sector	Fiscal implications (RMB mil)	Fiscal implications (USD mil)	2008 base case	Counterfactual scenarios
Import tariff	3% to 1%	Soybeans	osd[1]	2274.0	327.3	1%	3%
Export VAT rebat	13% to 0%	Grains	pcr, wht, gra	-607.6[2]	-87.5	0	13% export subsidy
Export VAT rebat	13% to 0%	Soybeans	osd	-317.1[2]	-45.6	0	13% export subsidy
Export VAT rebat	13%-17% to 0%	Vegetable oils	vol	-467.0	-67.2	0	14.1% export subsidy[3]
Export tax	5%	Soybeans	osd	-116.2	-16.7	5% export tax	0%
Export tax	5%	maize, rice, sorghum, millet	pdr, pcr, gra	-212.5	-30.6	5% export tax	0%
Export tax	20%	Wheat	wht	-35.4	-5.1	20% export tax	0%
Export tax	20-150%	Fertilizers	crp	14781.4	2127.4	95% export tax[4]	0%
Min procurement price	9%-10%	Rice	pdr	3150.0	453.4	453.4mn output subsidies	0%
Minimum procurement price	4%-7%	Wheat	wht	2520.0	362.7	363.7 mn output subsidies	0%

Note: this table is based on Appendix table A.4 on pp 66-67 of Jones and Kwiecinski (2010), own calculations based on data from UN COMTRADE database, and the GTAP concordance between GTAP sectors and the HS system (www.gtao.org).

1. UN COMTRADE database shows that most OSD imports into China in 2008 were soybeans and a significant portion of its OSD exports was also soybeans.
2. Jones and Kwiecinski (2010) report the fiscal savings from reducing the tax rebate for grains and soybeans in 2008 are 916 million RMB. Our calculations based on data from UN COMTRADE database suggest a total saving of RMB 924.7 million.
3. The average rebate rate is calculated by using trade data from UN COMTRADE.
4. The 95% percent tariff is obtained by taking the weighted average over the 12 month period: 20% Feb-Mar; 100% Apr-Aug; 150% for the rest of 2008. See page 67 in Jones and Kwiecinski (2010).

Table 2. Major agricultural domestic subsidies in China: 2004-2008 (billion RMB)

	Direct subsidies to grains (rice, wheat, maize)	**Improved quality seeds (wheat, rice, maize, soybean since 2006; rapeseeds and cotton added since 2007)**	**Comprehensive subsidy on agricultural inputs (mainly grains)**	**subsidy for the purchase of agricultural machinery**	**subsidies on fertilizer production and distribution (all crops)**
2004	11.6	2.85	0	0.48	12.889
2005	13.2	3.87	0	1.4	41.494
2006	14.2	4.15	12	1.7	60.943
2007	15.1	6.66	27.6	2 (central gov't only)	**89.508**
2008	**15.1** (US$2,173.3mil)	**12.1** (US$1,741.5 mil)	**63.8** (US$9,182.5mil)	**4 (central govt only)** (US$808.4mil)	**89.508*** (US$12,882.6mil)

Source: OECD (2009) and various documents from the websites of Ministry of Finance, China. The exchange rate for converting the value from RMB yuan to US dollar is 6.948 RMB per US dollar, according to IMF.

*Subsidies to fertilizer producers in 2008 are not available and in this paper we use the 2007 figure.

Table 3. Simulated changes in agricultural outputs for selected products (percent)

	S1. border barriers							S2. export tax on fertilizer	S3. minimum procurement prices	S4. domestic subsidies				S5. ALL
	sum	Import tariff	Export tax and elimination of export VAT rebate							sum	Fertilizer prod subsidy	Input subsidy	seed subsidy	
		oil seeds	rice	other grains	wheat	oil seeds	Veg. oil		rice and wheat		all crops	grains	mainly grains	
paddy rice	0.17	0.01	**-0.47**	0.06	0.40	0.11	0.05	0.01	0.17	**1.14**	0.15	0.98	0.00	**1.35**
wheat	**-10.31**	0.01	0.08	0.12	**-10.74**	0.21	0.11	0.00	0.45	**3.52**	0.50	2.94	0.04	**-2.10**
other grains (maize)	**-1.07**	0.02	0.05	**-1.83**	0.54	0.16	0.01	-0.06	-0.03	**2.82**	0.39	2.17	0.23	**1.58**
vege & fruits	0.47	0.01	0.03	0.05	0.29	0.09	0.00	-0.04	-0.02	0.15	0.19	-0.04	0.00	**0.42**
oil seeds	**-2.18**	-0.15	0.11	0.17	1.09	**-2.45**	-0.92	-0.07	-0.08	0.19	0.41	-0.21	-0.01	**-2.68**
sugar cane/beets	1.13	0.02	0.07	0.10	0.65	0.17	0.10	-0.03	-0.05	0.15	0.32	-0.15	-0.01	**0.89**
cotton	0.98	0.05	0.05	0.08	0.57	0.12	0.09	0.30	-0.01	0.78	0.86	-0.08	0.00	**1.79**
other crops	2.95	0.01	0.18	0.26	1.75	0.48	0.22	0.19	-0.17	-0.52	0.21	-0.69	-0.03	**1.61**
vegetable oil	0.23	0.07	0.06	0.11	0.62	0.69	**-1.31**	-0.15	-0.04	0.35	0.31	0.04	0.00	**0.09**
rice	**0.48**	0.01	0.03	0.04	0.32	0.05	0.03	-0.04	0.05	**0.54**	0.10	0.44	0.00	**0.90**

Source: Simulation results.

*: for scenarios with multiple policy measures, "sum" refers to the total effects of imposing all concerned instruments, while subsequent columns provide a decomposition of the individual effects of individual policy measures.

Table 4.Simulated changes in domestic market prices for selected agricultural products (percent)

	S1. Border barriers							S2. Export tax on fertilizer	S3. minimum procurement prices	S4. domestic subsidies				S5. ALL
	sum	Import tariff	Export tax and elimination of export VAT rebate							sum	Fertilizer prod subsidy	Input subsidy	seed subsidy	
		oil seeds	rice	other grains	wheat	oil seeds	Veg. oil		rice and wheat		all crops	grains	mainly grains	
paddy rice	-2.38	0.00	-0.35	-0.20	-1.31	-0.34	-0.21	-0.19	-0.70	-4.14	-0.43	-3.76	0.02	-6.62
wheat	-5.25	0.00	-0.09	-0.14	-4.70	-0.23	-0.14	-0.18	-1.23	-10.27	-1.54	-8.93	-0.07	-14.19
other grains (maize)	-2.60	0.00	-0.12	-0.90	-1.14	-0.29	-0.21	-0.21	0.11	-7.54	-0.96	-6.32	-0.44	-9.41
vege & fruits	-1.22	0.01	-0.08	-0.11	-0.70	-0.17	-0.18	-0.22	0.08	0.08	-0.45	0.51	0.02	-0.93
oil seeds	-3.50	-0.08	-0.11	-0.16	-1.08	-1.51	-0.66	-0.23	0.11	0.22	-0.35	0.56	0.02	-2.88
sugar cane/beets	-2.09	0.01	-0.13	-0.19	-1.26	-0.33	-0.20	-0.21	0.12	0.07	-0.56	0.61	0.03	-1.49
cotton	-0.97	0.01	-0.06	-0.09	-0.58	-0.16	-0.09	-0.10	0.06	-1.11	-1.73	0.63	0.01	-1.85
other crops	-0.97	0.00	-0.06	-0.09	-0.58	-0.13	-0.13	-0.12	0.06	0.22	-0.06	0.27	0.01	-0.54
vegetable oil	-1.85	-0.07	-0.07	-0.11	-0.65	-0.66	-0.31	-0.19	0.06	-0.13	-0.26	0.13	0.00	-1.79
rice	-1.79	-0.15	-0.24	-0.14	-0.90	-0.23	-0.15	-0.16	-0.48	-2.85	-0.29	-2.58	0.01	-4.76

Source: Simulation results.

*: for scenarios with multiple policy measures, "sum" refers to the total effects of imposing all concerned instruments, while subsequent columns provide a decomposition of the individual effects of individual policy measures.

Table 5.Simulated changes in export quantities for selected agricultural products (percent)

	S1. Border barriers							S2. export tax on fertilizer	S3. minimum procurement prices	S4. domestic subsidies				S5. ALL
	Sum*	Import tariff	Export tax and elimination of export VAT rebate							Sum*	Fertilizer prod subsidy	Input subsidy	seed subsidy	
		oil seeds	rice	other grains	wheat	oil seeds	Veg. oil		rice and wheat		all crops	grains	mainly grains	
paddy rice	22.20	-0.01	3.21	1.46	10.61	2.66	1.47	1.46	5.26	36.69	2.62	32.28	-0.11	71.17
wheat	-88.96	0.03	3.27	4.46	-89.20	8.71	4.78	1.55	10.80	146.43	8.83	103.92	0.36	-78.00
other grains (maize)	-28.94	-0.01	0.36	-31.51	3.57	0.87	0.61	0.52	-0.27	20.25	2.01	16.21	0.93	-16.03
vege & fruits	4.22	-0.03	0.27	0.34	2.40	0.59	0.54	0.69	-0.27	-0.40	1.35	-1.64	-0.05	3.06
oil seeds	-43.78	0.51	0.66	0.96	7.49	-47.79	4.76	1.03	-0.48	-1.17	1.47	-2.46	-0.11	-45.38
sugar cane/beets	5.62	-0.01	0.35	0.47	3.31	0.85	0.48	0.57	-0.31	-0.32	1.34	-1.55	-0.06	3.89
cotton	5.09	-0.03	0.30	0.44	2.95	0.83	0.44	0.48	-0.31	5.17	8.70	-2.93	-0.07	9.29
other crops	6.75	-0.02	0.40	0.55	3.81	0.95	0.78	0.85	-0.37	-1.58	0.23	-1.74	-0.08	3.59
vegetable oil	-47.61	0.63	0.58	0.97	6.22	7.74	-51.47	1.19	-0.33	0.57	1.44	-0.82	-0.02	-47.86
rice	-50.34	1.02	-53.03	0.97	7.40	1.67	1.02	0.83	2.21	13.93	1.17	12.52	-0.05	-43.26

Source: Simulation results.

*: for scenarios with multiple policy measures, "sum" refers to the total effects of imposing all concerned instruments, while subsequent columns provide a decomposition of the individual effects of individual policy measures.

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