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Yu, Wusheng; Frandsen, Søren E.

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China’s WTO Commitments in Agriculture: Does the Impact Depend on OECD Agricultural Policies?*

Wusheng Yu
and
Søren E. Frandsen
Danish Research Institute of Food Economics
E-mail wusheng@foi.dk and soren@foi.dk

Abstract

This study provides a preliminary assessment of the potential effects of implementing China’s WTO agricultural commitments. Particular attention is given to the integration of the actual commitments and to the explicit modeling of the newly introduced Tariff Rate Quotas for major crops into the global model and database that underlie this study. The results show that China’s import of agricultural commodities will increase (in particular the imports of grains), and that in general there will be a slight contraction of output and a modest expansion of export in agriculture. The impact on the Chinese welfare is limited as the positive efficiency gains are partially negated by a terms of trade loss. Although the results found seem to generate an unfavorable picture for the Chinese agricultural sectors in the short run, this is by no means as alarming as feared by some observers.

To explore the perspectives of Chinese agriculture in the continued multilateral agricultural negotiations, we further conduct a few counterfactual scenarios. The simulations clearly illustrate that many of the negative effects on China caused by the implementation of the WTO deal can be limited if the more protectionist rich countries take action to reform their agriculture policies. The scenarios on reforming domestic supports and market access in three rich economies show that, although they produce differential impacts, both of them affect the results non-negligibly. Therefore, continued agriculture liberalization requires paralleled efforts in both these two areas in the OECD countries.

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Introduction

China’s accession to the World Trade Organization has led to speculations and studies on its potential effects on China and the World economy. Among these discussions, the commitments in agriculture have been debated more intensively both within China and around the world. This is partly due to the size of China’s population—the question of “who is going to feed China”, and partly due to the fact that agriculture in China remains relatively inefficient and is largely based on very small scaled and labor intensive farms—the question of whether or not Chinese agriculture can survive such a drastic policy change. Further, the fact that a very large part of the Chinese population is either full time or part time employed in the rural areas makes this a very sensitive issue as it may affect the lives of millions of rural residents. Finally, the continued declining of China’s agriculture sectors, relatively to its booming industry and service sectors, only attaches more importance to this issue.

To what extent will the implementation of China’s commitments affect the Chinese agriculture production and trade? Does it affect China’s self-sufficient policy in a negative way? Is this a significant offer to the rest of world? What is the impact on the world market? Will China become a major importer of agricultural commodities? These are the questions that have been studied and debated intensively by numerous studies. Another set of questions goes beyond the immediate impact of China’s accession and considers the possible consequences of further agriculture trade negotiations after China’s entry. What will the world’s response to China’s joining the WTO be? If China’s offer is significant, will the rest of the world follow suit and continue reforming their protective agricultural policy in the next round of WTO negotiations? Part of answer lies in reforming the protectionist agricultural policies in the rich OECD economies as the world agricultural market is by and large dominated by these countries. The recent U.S. farm bill certainly is not a step in the right direction to support further multilateral trade liberalization. The remaining substantial barriers in market access, export subsidies and domestic support in the OECD countries will likely be debated further in the Doha Round. Will the removal of their protectionism measures in the OECD economies help China in coping with the possible negative impact in agriculture? Quantitative assessments along this line are relatively few. But these questions are again at the center of the ongoing agriculture negotiations, not just for China, but also for all the developing countries alike.

In this study, we try to provide some insights in addressing these two sets of questions, using a global general equilibrium model that contains sufficient details in agri-
cultural sectors and that allows examining the interactions of China and OECD countries’ policies. Our efforts are partly motivated by the recent release of the actual commitments by the Chinese government. We believe that using the actual offer will give a more accurate assessment, compared to earlier studies based on counterfactual experiments. We have also made considerable efforts in conducting a more realistic starting point where the implementation of the WTO offer will take place. These efforts are also embodied in constructing the scenarios for examining the interactions between key OECD economies and China. A review of the literature below will provide some justifications and motivations for conducting this study.

**Literature Review**

In the existing literature, there are some agreements that China’s agriculture as a whole will suffer in the short run as cheaper foreign goods gain greater access to the Chinese market, while the impact on the world market will be moderate.

Studies on full trade liberalizations (covering all the sectors) by China are abundant. Some recent examples are Lejour, Zhai and Li, Fan and Zheng. Most of these studies consider agriculture as a whole and none of them take into account the actual commitments made in the accession agreement. Thus, neither do they provide the sectoral results, nor do they give the realistic impact from the actual commitments. Some examples of the studies focused on agriculture are Fuller *et al.*, Huang *et al.* (1998) and Diao *et al.*. Fuller *et al.* assesses the sectoral impact of China’s WTO entry using a partial equilibrium model and shows that domestic food price in China decreases while per capita consumption goes up, reflecting rising import and limited export expansion. According to their study, there is no sharp decrease in food self-sufficiency for China and the impact on world market prices are positive but moderate. Huang *et al.* also uses a partial equilibrium model to evaluate the impact of full trade liberalization by China and their results show that China will be a net importer of grain but a major exporter of pork and poultry meats. China’s ability to expand export of meat products is criticized by Schmidhuber on the ground of unfavorable sanitary conditions. Diao *et al.* constructs a regional CGE model and shows that China’s agriculture sector will suffer if only agriculture trade is liberalized.
There are two problems associated with the above studies. The first is the failure to include the actual WTO commitment. In fact, except for the Fuller et al. study\(^1\), none of the above studies are based on the actual commitments made by China. The second problem relates to their simplistic treatments of more complex policy measures and the questionable initial protection levels for China (upon which the cuts are based) applied in those studies. One example is the Tariff Rate Quota (TRQs) regime that China will implement for corn, rice, wheat and cotton, etc. These TRQ regimes are often not represented and modeled in the previous studies. According to the data from the WTO and FAO (see Table 1), the quotas for wheat and rice are set at very high levels, relatively to the actual imports, while the quota for corn is almost binding, relative to the actual imports in recent years. Implementing these TRQs may cause very different results among these crops, due to the initial quantities of imports. The problem of the level of the bilateral tariff rates is also severe. For example, the bilateral tariff rates for wheat are in the range of 70 percent to over 100 percent in the Global Trade Analysis Project database (GTAP for short, see Dimaranan and McDougall), while these are only 14 percent in Fuller et al. According to the WTO document on China’s accession (see WTO), the bound tariff rate for wheat in 2000 is 74 percent\(^2\).

Clearly the assessment of the impact of implementing the WTO commitments can be improved and be more precise, if a more accurate representation of the current Chinese agricultural protection measures and the WTO commitment is applied. With the release of the complete WTO agreement, now it is at least possible to analyze the po-

\(^1\) Actually, even this study only considered some of the bilateral agreements with China, not the final commitments declared by the Chinese government and the WTO.

\(^2\) The differences regarding China’s tariff rates in the initial period of implementing the WTO agreements can be partly attributed to the unavailability of the official release of the WTO agreements. However, China actually started to reform their policies before the WTO accession. As a result, some of the ending bound tariff rates specified in the agreement have been achieved already. This also leads to the different starting tariff rates in different studies. As the objective of this paper is to quantify the effects of implement this agreement, which is defined upon the bound tariff rates, we choose to apply the difference between the beginning and ending bound rates in our experiments. By doing so, we argue that we give a complete assessment of implementing the WTO agreement, including not just what is likely to happen in the coming years, but also the effects of the concessions that have already been made and that fall into the concession schedules in the WTO agreement. Therefore, while our results illustrate the likely impact of the agreements, they are not predictions on what will happen in the actual scheduled implementation period. In fact, we expect the actual impact in the next few years to be smaller than what we present here.
tential impact of the actual commitments\textsuperscript{3}. In this study, we try to formulate our analysis more concretely by applying the actual WTO commitments.

The typical approach followed by many of the quantitative studies on China’s WTO entry assumes no policy changes for the rest of the world when China liberalizes its policy. While this is the right way to gauge the impact on China itself and the world, it is nonetheless not sufficient to measure the impact of China’s WTO entry, relative to the possible effects of continued multilateral trade negotiations in agriculture. Furthermore, this approach ignores any possible feedback of the multilateral agricultural liberalization on implementing China’s WTO commitment. For example, an illustration by Frandsen \textit{et al.} shows that even a partial removal of EU’s domestic support has a significant impact on world output and world market prices and decisively changes the “environment” of the world agriculture market. The Producer Support Estimates (PSE Tables, see OECD) quantifies these distortionary measures in OECD countries. Realizing these limitations, we try to push the impact assessment one step further, by conducting several counter-factual liberalization scenarios in which major OECD countries also liberalize their import barriers and domestic support measures. The impact on the world market and China from these scenarios is compared with a base case (without policy changes) to show the relative impact brought about by China’s WTO entry. It also illustrates the perspective of China’s agriculture sectors in the post-entry era when agriculture negotiations continue. This is the second motivation of this study.

To summarize, in this study we analyze the impact of implementing China’s WTO commitment on China’s agriculture sectors and on the world market. We also explore how these effects can be changed if major OECD economies, namely the USA, the EU and Japan, remove their protections in agriculture. The analysis is expected to show that the impact of these economies’ agricultural policy reforms on the world market is far greater than that caused by implementing the commitments made by China; and that the elimination of these distortions caused by them will provide a fairer “environment” for China to implement its WTO commitments. Thus, to continue multilateral agricultural trade liberalization and to promote economic development for developing countries, there is much to do in reforming both developing and developed countries’ agricultural policies.

\textsuperscript{3} Again, we remind the reader of the differences between the impact of the actual commitments and the predictions on what will be happening in the next few years, due to the fact that some of the commitments have already been implemented. Detailed explanations are offered in Footnote 2.
Methodology, Data and Policy Scenarios

To achieve our objectives, we conduct various policy scenarios to simulate the impact of implementing China’s agricultural commitment as well as the impact of the policy changes in three major OECD countries (the USA, the EU and Japan). First we construct a base case to project the world economy from 1997 to 2005. This base case provides a benchmark against which these policy scenarios are analyzed. The CGE model of the Global Trade Analysis Project (see Hertel) and database (Dimaranan and McDougall) are employed. To incorporate the important TRQ regimes, the original GTAP model is modified according to Elbehri and Pearson’s work on TRQ modeling. Also, additional data are employed and incorporated into the GTAP database, which includes the macroeconomic projections used to update the GTAP database from 1997 to 2000 and 2005, China’s WTO commitments, trade volume data from the FAO for the TRQ commodities, etc.

The section begins with a description of China’s WTO commitments followed by a brief introduction of the commodities and regions covered in this study. Then we present the construction of the base case and the alternative scenarios analyzed in this paper.

China’s WTO commitments in agriculture

The WTO database on China’s WTO commitments (see WTO) specifies both initial and final bound rates, and the implementation period of tariff reductions. These are defined at HS 8-digit levels. Agriculture and industry TRQs are also contained in the database—for agriculture TRQ commodities (wheat, corn, rice, soybean, sugar, wool and cotton), information on the initial and final quotas, the implementation period, the staging of the quantity and the share between State Trading Enterprises (STE) and private traders, is included. We aggregate these tariff rates from the 8-digit level to
the GTAP sectoral classifications. Where trade quantities are available, we also include the TRQ regimes for the TRQ products. These are summarized in Table 1.

**Table 1. China’s WTO commitments: bound tariff rates and TRQs**

<table>
<thead>
<tr>
<th></th>
<th>pdr</th>
<th>wht</th>
<th>gro</th>
<th>v_f</th>
<th>osd</th>
<th>c_b</th>
<th>pfb</th>
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<td>74</td>
<td>74</td>
<td>74</td>
<td>17.6</td>
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<td>10</td>
<td>11.3</td>
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<td>42</td>
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<td>T_1</td>
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<td>65</td>
<td>13.8</td>
<td>8</td>
<td>10</td>
<td>8.9</td>
<td>8.9</td>
<td>4.5</td>
<td>11.4</td>
<td>15.8</td>
<td>17.2</td>
<td>10.8</td>
<td>12.2</td>
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<td>38.4</td>
<td>16.7</td>
<td>25.6</td>
<td>11.2</td>
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<tr>
<td>T_{in}</td>
<td>1</td>
<td>1*</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>4.96</td>
<td>3.32</td>
<td>1.68</td>
<td>9</td>
<td>1</td>
<td>20**</td>
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<tr>
<td>Q_1</td>
<td>9.64</td>
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<tr>
<td>Q_t</td>
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<td>5.16</td>
<td>0.66</td>
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</tr>
</tbody>
</table>

Source: WTO documents and FAO statistics.

Note: T_0, T_1, T_{in}, Q_0, and Q_1 refer to, respectively, out-of-quota ad valorem tariff rate in 2000 and 2004, in-quota tariff rate, beginning quota, and ending quota. Q_t is the annual average actual imports during the period 1997 to 2000. This is taken from FAO’s database. Quotas are in million metric tons.

*: for some lines under corn, this is 9%.
**: in-quota tariff rates for sugar will be reduced to 15% by 2004.

For non-TRQ crops, the tariff rates will mostly fall to around 10 percent for crops. For example, tariff rates for plant-based fibers and vegetable oils will go down from 11.3 and 20.5 to 8.9 and 10.8 percent, respectively. For animal products, the final bound rates will be somewhat higher but the cuts are also significant, e.g. from 21.7 to 15.8 for beef and lambs. For TRQ commodities, although out-of-quota tariff rates will remain substantial, quotas are nonetheless set to very high level. The out-of-quota tariff rate for wheat will decrease from 74 to 65 percent. However, the in-quota tariff rate is only 1 percent. Furthermore, quotas are expanding at a considerable rate, e.g. quota for wheat is set to expand by over 20 percent at the end of the implementation period. Moreover, compared to the total imports in 2000 (from FAO), quotas for wheat and rice are much higher than imports in 2000, suggesting possibly low quota-

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4 Our aggregation starts with the tariff lines at 8-digit level. Due to the lack of trade data at 8-digit level, we apply the simple average of the tariff data in many of the cases. However, we have tried to discern the most important tariff lines within an aggregated group according to our best knowledge of the trade situation. This exercise of judgment implies that for many of the key crops, the aggregated tariff rates reflect those for the most important lines. The aggregation involves two steps—in the first step, we aggregate the tariff lines into GTAP aggregation, while in the second step we aggregate GTAP tariff lines into the 25 aggregated commodities in this study. In the second step, however, we conduct weighted average using the trade data from GTAP. Please note that the adjustment to the Chinese tariff rates in the GTAP database occurs in the aggregated GTAP database used in this study. This way, we avoid the computing burden in changing the original database.
fill rates at the end of the implementation and virtually free access to the Chinese market. Failure to model these TRQ regimes (especially for wheat, corn and rice) will lead to erroneous results since the gaps between the in-quota rates and the out-of-quota rates are huge.

Overall, the concession made by China is impressive, as many of the agriculture sectors will have considerably lower bound tariff rates. The TRQ systems also provide some market access opportunities for China’s trading partners. If indeed they serve only as an interim step towards total tariffication, it would lead to more market access in the future. This seems to indicate China’s determination in integrating its agriculture into the world trading system. It is no doubt a very positive first step towards the next phase of agriculture liberalization.

**Sector and regional aggregations**

Since this study is focused on China, including the impact of major OECD countries policy on China, we use a smaller regional aggregation of the GTAP database, which consists of 7 regions, namely China, Australia and New Zealand, Canada, USA, EU, the rest of East Asia and South East Asia, and the rest of the world. The sectoral aggregation consists of 20 agriculture and food products, as well as 5 aggregated other sectors (natural resources, manufacturing, textiles, services and forestry and fishes). To facilitate reading the results, descriptions of these sectors are included in Appendix Table 1.

**Policy Scenarios**

The implementation of China’s WTO commitment will be completed by 2005. To evaluate the impact of these commitments, we first conduct a base case that reflects our projection on the world economy in 2005. This base case incorporates the World Bank’s projection on real GDP, population, and skilled and unskilled labor growth and productivity changes during the period of 2000 to 2005. No policy changes are conducted in this benchmark. Since we use the GTAP version 5 data base, which has 1997 as its base year, the first step towards such a base case is to update the 1997 data base to 2000, by targeting the real GDP growth while taking into account of population growth, changes in skilled and unskilled labor force and productivity changes in that period. The second step is to update relevant policy instruments, namely the tariff rates for China in 2000 and the latest domestic support data as published in the OECD PSE tables. The latter is important as its correct representation plays a key role in our
counterfactual scenarios. The final step in building the base case calls for a projection procedure toward the world economy in 2005, using macroeconomic projections. These three steps are summarized in Box 1.

**Box 1. Experiment Scenarios**

*Base case: projection from 2000 to 2005 with no policy changes.*

**Step 1.** Project the GTAP 5 database from its base year of 1997 to 2000, targeting real GDP growth and taking into account of population growth, changes in skilled and unskilled labor forces, and productivity changes;

**Step 2.** Adjust the database from Step 1. This includes incorporating China’s initial bound tariff in 2000; building the TRQ structure into the model and database, using WTO data and FAO statistics; and updating the domestic support data to 2000, drawn from the OECD PSE tables version 2000, for major OECD countries (EU, USA and Japan);

**Step 3.** Project from 2000 (the database from Step 2) to 2005, targeting the World Bank’s projections on real GDP and taking into account of population growth, changes in skilled and unskilled labor forces, and productivity changes.

*Policy scenarios against the base case:*

**Scenario 1.** China implements its WTO commitment in agriculture, including tariff cuts and the expansion of quotas for TRQ commodities

**Scenario 2.** Scenario 1 plus EU, USA and Japan removing their tariff, export subsidy, and domestic support (output subsidy and payments on the use of land and capital in agriculture).

*Decomposition Scenarios:

**Scenario 3.** Scenario 1 plus tariff removal in EU, USA and Japan.

**Scenario 4.** Scenario 1 plus the removal of export subsidy and domestic support (output subsidy and subsidy on the use of land and capital in agriculture) in USA, EU and Japan.

The base case provides a platform against which various policy scenarios can be compared. The first of these scenarios is the implementation of China’s WTO commitment in agriculture, while all the other policies as reflected in the base case data (in 2005) are maintained and unchanged. This scenario is largely similar to the previous studies on China’s WTO accession. However, using the real commitment data, together with the important TRQ regimes for rice, wheat and corn, etc., our experiments give a more accurate and realistic assessment.

Scenario 2 analyzes the impact of both the implementation of China’s WTO commitments and the hypothetical changes in the policy in three main OECD countries (USA, EU and Japan)—namely, a complete removal of border protection, export subsidies and domestic support (output subsidies and payments based on land and capital employed in agriculture). Combined with Scenario 1, this alternative scenario is used.
to illustrate how the impact of implementing China’s WTO deal changes when the “environment” is different. It also serves the purpose of showing the perspective of further multilateral agriculture negotiation after China’s entry. A third and fourth scenarios complete the exercises by considering the differential effects of liberalizing OECD countries’ domestic support and border protections on implementing China’s WTO commitments.

Scenario 1: Implementing China’s WTO commitments in agriculture

_Agriculture trade and production_

Implementing its WTO commitment causes importing prices in China to decline for most of the agricultural and food products (see Table 2), most notably for wheat (-41.5 percent), rice (-28.7), sugar (-20.6), corn (-9.8), and milk (-12.7), and also substantial for beef and lamb (-4.8) and plant based fiber (-9.1). The decreases in import price for vegetable and fruits, and other crops are moderate (under 5 percent). These declines in prices cause increases in imports at different rates for different commodities. For example, wheat and rice imports increase by over 150 and 80 percent, respectively, while milk imports go up by 21 percent and corn imports go up by nearly 17 percent. The only exceptions are the small declines in imports of oilseeds and other animal products, which can be explained by the very small tariff cuts for these two commodities (from 8.5 to 8 percent and from 12.3 to 11.4 percent, respectively).

Given the tariff cuts on non-TRQ commodities (Table 1), it is easy to understand the changes in imports of these commodities, while the changes in imports of the TRQ commodities are less obvious and need some explanations. For example, wheat price decreases by over 40 percent, while the out-of-quota tariff rate cut is only from 74 to 65 percent. One might suspect that this is because the quota is not exceeded so that the cut of out-of-quota tariff does not matter. This is well founded as one can see from Table 1 that the actual average import-quota ratio in recent years is very low for wheat and rice but very high for corn, suggesting that the quota for wheat and rice may not be binding while that for corn may be reached after implementing the WTO commitments. Our calculation indeed supports this. The quota fill rates are about 60 percent for wheat and 15 percent for rice (implying effective tariff rates at 1 percent),
while the corn quota becomes binding and the effective tariff rate is about 51 percent.\\n
\textbf{Table 2. Changes in imports/export quantities and prices under alternative scenarios, percent from base case}\\n
<table>
<thead>
<tr>
<th></th>
<th>Total imports into China</th>
<th>Market price of composite imports in China</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Scenario 1</td>
<td>Scenario 2</td>
</tr>
<tr>
<td>wht</td>
<td>152.2</td>
<td>130.6</td>
</tr>
<tr>
<td>gro</td>
<td>11.8</td>
<td>11.8</td>
</tr>
<tr>
<td>v_f</td>
<td>5</td>
<td>7.5</td>
</tr>
<tr>
<td>osd</td>
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<td>-11.3</td>
</tr>
<tr>
<td>pf</td>
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<td>13</td>
</tr>
<tr>
<td>ocr</td>
<td>1.5</td>
<td>1.3</td>
</tr>
<tr>
<td>oap</td>
<td>-0.4</td>
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</tr>
<tr>
<td>cmt</td>
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<td>7.4</td>
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<tr>
<td>omt</td>
<td>3.2</td>
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</tr>
<tr>
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<td>12.7</td>
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<tr>
<td>mil</td>
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<td>10</td>
</tr>
<tr>
<td>pcr</td>
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<td>80.5</td>
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<tr>
<td>sgr</td>
<td>21.2</td>
<td>21</td>
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</table>

<table>
<thead>
<tr>
<th></th>
<th>Total exports from China</th>
<th>China’s export price index</th>
</tr>
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<tr>
<td></td>
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<td>Scenario 2</td>
</tr>
<tr>
<td>wht</td>
<td>22.9</td>
<td>236</td>
</tr>
<tr>
<td>gro</td>
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<td>v_f</td>
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<td>osd</td>
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<td>cmt</td>
<td>1.7</td>
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<td>sgr</td>
<td>3.7</td>
<td>37.2</td>
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</tbody>
</table>

Source: Simulation results.
Note: The description of the sectors can be found in Appendix Table 1

On the export side, our results (lower half of Table 2) show positive increases in export of all the agricultural sectors. This is due to lower domestic and exporting prices, which are pushed down by cheaper imported goods. Wheat exports increase by over

\footnote{Note that the 17 percent increase in corn imports is smaller than the percentage changes of the quota from 2000 to 2005. This is because this percentage change is based on the base case, which projects higher corn imports than in 2000.}
22 percent, which is mostly due to the depressed domestic wheat price in China. Other notable increases are exports of other animal products (5.5 percent), pig and poultry meats (3 percent), and oil seeds (3.7 percent). However, the changes are smaller than predicted by Huang et al. (1998).

What does this imply for domestic agriculture production in China? Table 3 reports percentage changes in China's agricultural output. Not surprisingly, due to drastically increased imports, wheat is the most affected commodity as its output contracts by more than 12 percent. Similarly, output for vegetable oil and sugar declines by 5.2 and 7.8 percent, respectively. Contrary to the above cases, rice output is not affected much as the decline in rice output is just under 1 percent, despite over 80 percent increase in rice imports. This can be explained by the fact that only a small portion of rice is traded. The decline in corn output is also minor, which is less than 1 percent. Apparently the protection provided by the TRQ regime works in favor of Chinese farmers. Apart from the TRQ commodities, noteworthy output change can be found in milk, whose output decreases by over 5 percent. The other changes come from vegetable and fruits, pig and poultry meats, and other animal products, all of which experience smaller positive changes in output.

Table 3. Changes in agriculture output in China under alternative scenarios, percent from base case

| Scenario 1 | -12.5 | -0.3 | 0.1 | -0.7 | -2 | -0.1 | 0.3 | -1.1 | 0.2 | -4.3 | -5.2 | -0.5 | -7.8 |
| Scenario 2 | -9.4 | 1.8 | 0.4 | 2.6 | 3.2 | 0.9 | 0.5 | 5.8 | 1.6 | -4.4 | 5.9 | 0 | 0.1 |
| Scenario 3 | -10.9 | 0.6 | 0.6 | -0.6 | 4.9 | 0.8 | 0.5 | 6.1 | 1.3 | -4.4 | 6 | 0 | -0.9 |
| Scenario 4 | -11.3 | 0.8 | -0.1 | 2.5 | -3.4 | -0.1 | 0.3 | -1.5 | 0.5 | -4.4 | -5.5 | -0.6 | -7.2 |

Source: Simulation results.

Self-sufficiency in agriculture

Does China’s entry into the WTO harm China’s self-sufficiency agriculture policy? This is the concern expressed by some people. Although our results show an adverse impact on most of the agriculture sectors in terms of increased imports and slightly contracted output, they by no means indicate a substantial overall danger to the viability of Chinese agriculture sectors, except for some selected commodities, notably wheat. A comparison of self-sufficiency rates under alternative scenarios are compiled in Table 4. Compared to the base case, we find that the self-sufficiency rate declines notably only for wheat and that it decrease slightly for vegetable oil and milk.
In contrast, in several other cases (e.g. other crops and oils seeds), this rate even improves slightly.

<table>
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<tr>
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<th>whit</th>
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<th>osd</th>
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<td>0.997</td>
<td>0.81</td>
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<td>0.885</td>
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<td>Scenario 1</td>
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<td>1.052</td>
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<td>0.996</td>
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<td>Scenario 2</td>
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<td>0.894</td>
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<td>0.849</td>
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<td>0.833</td>
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Source: GTAP database and Simulation results.

**Welfare effects and the impact on the world market**

Agriculture tariff reduction and the introduction of the TRQ regime result in allocation efficiency gains. This is a result of the removal of the excess burden associated with the tariffs. On the other hand, cheaper imported goods dampen the domestic market price and thus lower the exporting prices. Together with slightly higher world market price for imports (due to increased import demand by China), this tends to create negative terms of trade effects, thereby negating some of the gains from more efficient use of resources. Overall, the welfare impact on China from implementing its WTO commitments in agriculture is very limited.

The impact on the world agricultural market appears to be limited, too. We consider the impact on world import and export price indexes, world trade quantity and total world output, as shown in Table 5. The only notable changes are on wheat. The world import/export price index for wheat increases by just over 0.3 percent, while this index for other agriculture commodities increases by even smaller percentages. Total world trade increases by more than 4 percent for wheat, more than 3 percent for rice, and about 1 percent for vegetable oils. For most other commodities, growth in world trade appears to be very small. The aggregated world output effects are negligible except for wheat (a decline of 0.6 percent), indicating that there is no basis for worrying about "who is going to feed for China". The major beneficiaries of China’s expanded import demand are Australia, New Zealand and the USA, as the output of wheat, corn, vegetable oil and rice in these countries expands (Table 6).

In general, China’s implementation of its WTO commitments in agriculture will benefit the rest of the world as China’s imports for a number of commodities expand,
which boosts the domestic production in a number of regions. As a result of improved terms of trade and more efficient resource allocation, all the regions included in this study will enjoy moderate welfare gains (not shown here).

Table 5. Impact on world market under Scenario 1, percent change from base case

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<td>0.047</td>
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<td>0.052</td>
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<td>P_\text{wx}</td>
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<td>0.062</td>
<td>0.044</td>
<td>0.124</td>
<td>0.123</td>
<td>0.05</td>
<td>0.021</td>
<td>0.056</td>
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<td>0.03</td>
<td>0.026</td>
<td>0.073</td>
<td>0.017</td>
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<tr>
<td>Q_\text{wm}</td>
<td>4.029</td>
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<td>0.123</td>
<td>-0.332</td>
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<td>0.087</td>
<td>0.074</td>
<td>0.127</td>
<td>1.376</td>
<td>0.158</td>
<td>3.407</td>
<td>0.482</td>
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<tr>
<td>Q_\text{wo}</td>
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<td>-0.011</td>
<td>0.023</td>
<td>-0.041</td>
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<td>-0.006</td>
<td>0.091</td>
<td>-0.013</td>
<td>0.002</td>
<td>-0.057</td>
<td>-0.007</td>
<td>-0.023</td>
<td>-0.012</td>
</tr>
</tbody>
</table>

Source: Simulation results.
Note: P_\text{wm}, P_\text{wx}, Q_\text{wm}, Q_\text{wo} denote, respectively, percentage changes in world import price, world export price, world import quantity and world output quantity.

Table 6. Changes in agricultural output in selected regions under Scenario 1, percent from base case

<table>
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<tr>
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<td>China</td>
<td>-12.53</td>
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<td>0.1</td>
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<td>-0.1</td>
<td>0.31</td>
<td>-1.15</td>
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<td>-4.3</td>
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<td>-7.76</td>
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<td>AUS*</td>
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<td>1.99</td>
<td>-0.15</td>
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<td>-0.3</td>
<td>0</td>
<td>-0.05</td>
<td>0.01</td>
<td>-0.01</td>
<td>0.05</td>
<td>0.34</td>
</tr>
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<td>USA</td>
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<td>-0.01</td>
<td>-0.01</td>
<td>-0.05</td>
<td>0.83</td>
<td>-0.09</td>
<td>0.02</td>
<td>0.01</td>
<td>0.03</td>
<td>0.46</td>
<td>0.01</td>
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<tr>
<td>Canada</td>
<td>9.23</td>
<td>0.15</td>
<td>-0.47</td>
<td>-0.86</td>
<td>2.2</td>
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<td>-0.67</td>
<td>-0.25</td>
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<td>0.11</td>
<td>-0.07</td>
<td>-0.8</td>
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<td>EU</td>
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<td>0.06</td>
<td>0.02</td>
<td>0.15</td>
<td>0.1</td>
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<td>0</td>
<td>0.01</td>
<td>0</td>
<td>0.13</td>
<td>0.04</td>
<td>0.08</td>
<td>0.04</td>
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</tbody>
</table>

Source: Simulation results.
*: Australia and New Zealand

Scenario 2: Impact of reforming policies in OECD countries

In the second scenario, we conduct an experiment to illustrate how the impact of China’s WTO commitments in agriculture can be changed when border protection as well as output subsidies and payments based on land and capital in three OECD countries are removed. Removing these three regions’ market access restrictions will improve market opportunities for Chinese products. Recall that China’s export in the first scenario only shows very modest increases. The removal of output subsidies and land and capital based payments in the OECD regions is also expected to generate significant impact on the world agricultural markets. While the removal of output subsidies will reduce excess output and raise world market price, elimination of the
payments to land and capital (which influence production decision and are considered "coupled") will in general increase the marginal cost of production (paid by farmers) and reduce the competitiveness. At the same time it will cause a reallocation of capital and land among agriculture sectors. All of these point to a lower agriculture production in these regions and higher world market prices. Thus, we expect to see improved export opportunity for China and possibly less imports into China.

We first look at changes in China’s agriculture trade. As shown in the seventh column of Table 2, the decreases in market prices of imports are less than in the first scenario for most of the agricultural commodities. In other cases, market prices for imports even increase. For example, market price for wheat, corn and rice imports decrease by about 36, 7 and 26 percent, respectively, in comparison to about 41, 10 and 29 percent in the first scenario. For oil seeds, market price for imports even increases by 11 percent. Taking out the impact of the reduced tariff rates, these higher market prices (compared to scenario 1) are the results of higher world market prices and a somewhat lower Chinese imports. This is certainly the case for wheat, oil seeds, milk, rice and sugar (as shown in the third column of Table 2). Despite higher market prices for imports, however, we do observe more imports for several other commodities (compared to scenario 1), e.g. vegetable and fruits, plant-based fiber, and many of the meat products. This is partly due to the activities on the export side, where higher world market prices boost China’s agriculture export (see lower half of Table 2). With limited output expansion, more imports are needed to meet domestic demand. Take vegetable and fruits as an example: the world market price faced by China increases by over 2 percent, while export from China increases by 40 percent. However, its output only expands by 0.4 percent (Table 3), which makes imports more desirable (7.5 percent increase), despite the moderate decrease of 1 percent in the market price of imports of the commodity.

The expansion of agriculture output in China is most visible for milk, other crops, and oil seeds (Table 3). The production of meats and other animal products also increases notably, which is in sharp contrast to the declines as shown in scenario 1. Output in wheat, rice and sugar will decrease, but to much smaller degrees (at 9.4 percent, 0.2 and 1 percent, respectively). The output expansion in many agricultural sectors and the much smaller contraction in the other agricultural sectors lead to improved self-sufficiency rates for these agriculture commodities (Table 4), in comparison to those from Scenario 1, where policy changes are only conducted for China.
In summary, this hypothetical experiment shows that indeed if the implementation of China’s WTO commitment in agriculture was operated in a world of greater market access opportunities and fewer domestic supports in the three key OECD countries, the problems faced by China’s agriculture sectors during the process of implementing its agricultural commitments would be far less challenging.

Scenarios 3 and 4: Market access reform vs. domestic support reforms

We now turn to the discussion of our last two scenarios, which compare the impact of liberalization of OECD market access (Scenario 3) and domestic supports (scenario 4) on China’s WTO implementation. As the combined forces of these two factors drive the results in Scenario 2, Scenarios 3 and 4 provide an opportunity to decompose the effects from these two forces.

Impact of OECD Market access reform

Market access reform reduces the border barriers to allow Chinese exports greater access to the three biggest economies in the world and leads to higher prices for exports from China. As can be seen in the lower half of Table 2, export prices for most commodities from China go up, which sharply contrasts what happens under scenario 1. Furthermore, from the small differentials between the export price indexes under scenarios 2 and 3, we can see that a large portion of the increases in export prices, as observed under Scenario 2, can be attributed to the market access reform in the three OECD economies, while the domestic support reform only plays a minor role in this regard. For example, the export price index for wheat rises by 2.4 percent under scenario 2, of which 2.1 percent points are from scenario 3. Changes of total exports from China depend not only on the export prices but also the domestic supply responses in China and the initial tariff structure in the three OECD economies. As such, the changes in exports of some commodities are close to those under scenario 2, while for other commodities these changes are far below the corresponding changes under scenario 2. Take oil seeds as an example. When removing all their tariffs in oil seeds, the USA and the EU, who have relative low initial tariff rates will be able to get the access to the Japanese market, which has high initial tariff rate. This leaves

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6 In both Scenarios 3 and 4, China’s WTO commitments are implemented. Therefore, the combined effects of these two scenarios count the implementation of China's WTO commitment twice. One can verify this point by the numbers shown in Table 3, where the sum of the percentage changes for each commodity in scenarios 3 and 4 minus the corresponding change in scenario 1 will be roughly equal to the percentage change in scenario 2.
fewer market opportunities for China and consequently, the Chinese export and output increase only marginally, compared to scenario 1. For commodities such as vegetable and fruits, rice, and sugar, changes of Chinese exports are not far behind that in scenario 2, as the tariff cuts in the OECD economies are all significant and of comparable magnitude.

On the import side, we can see from the upper half of Table 2 that market prices for imports into China decrease, but to a less degree as compared to Scenario 1. This is because world market prices are generally being pushed up by increased import demand in the three OECD economies. However, the changes (decreases) in imports in this scenario exceed the changes in Scenario 1 for all the agricultural commodities. This seemingly contradicts the smaller decrease in market prices for imports. Again, this is because the greater access to OECD market pushes up China’s exporting and domestic prices and thus imports become more desirable—even when domestic output in China goes up. In fact, most of the output expansion as seen in Scenario 2 can be attributed to the improved market access in this scenario—the changes in output (listed in Table 3) clearly display this point. For some commodities, output results from this scenario even exceed those in Scenario 2, as the reform of domestic support in Scenario 2 negates some of the expansion effects (as reported in scenario 3). An example is plant-based fiber—its output in China increases by 4.9 percent, which is greater than the 3.2 percent increase in Scenario 2, while in Scenario 4, it decreases by 3.4 percent. Apparently, these two types of policy changes affect China’s agriculture in different ways. We now turn to the discussion of the reforms of OECD domestic support.

**Impact of OECD domestic support reform**

Compared to the market access liberalization scenario (scenario 3), the elimination of domestic support, especially the reduction of payments to land and capital, leads to a resource re-allocation among agriculture sectors in the three regions (especially the USA and the EU), and results in differential output effects. Depending on the relative size and nature of the existing distortionary domestic support measures associated with each individual commodity, the removal of such measures in the OECD leads to factors moving away from the production of relatively more protected sectors and into that of relatively less protected sectors. This leads to increased output in some sectors and decreased output in other sectors. Furthermore, as some of the factors—especially land, which has no alternative uses outside of agriculture—cannot totally move out of agriculture and that the protective border measures are maintained in this scenario,
output in the three OECD economies will experience limited contraction, in comparing to Scenario 3. This means uneven export opportunities for China in different sectors. An example is the movement of land from wheat production to plant-based fibers and other crops in the USA. As land based payments to wheat have a much higher ratio in its total production value than in the latter (see the OECD PSE tables), a complete removal of the payments in these sectors causes increased use of land in plant-based fiber and other crops. Maintaining the border protections in this scenario causes output for other crops and plant-based fiber to even increase in the USA. As a consequence, China’s domestic output of plant-based fiber is pushed down by 3.4 percent.

Our results show that OECD domestic support reform will boost Chinese exports of corn, oil seeds, animal and meat products, and vegetable oils. On the other hand, this reform has limited effects for the other commodities, where market access reform is more effective. On the import side, as the OECD domestic support reform generates much smaller price effect than the implementation of China’s WTO commitment, we observe similar import quantity effects to scenario 1. However, we also observe differential deviations from the results in scenario 1, due to the differential changes in world demand and supply situation that is partly influenced by OECD’s domestic support reform.

In summary, both the improved market access and the reduction in the domestic support in the three OECD economies change the potential effects of implementing China’s WTO commitments—the former affects the results in providing more market access opportunities and leads to universally more exports of all agricultural goods from China and greater domestic output, thereby negating much of the negative impact that is brought about by implementing the commitment alone, while the latter changes the resource allocation among agriculture sectors in the three OECD countries and generates differential output effects and to a less degree price effects. These also place a non-negligible impact on China, especially the positive output and export perspectives in the sectors of corn, oil seeds and sugar.

**Conclusions and discussions**

In this study, we provide a quantitative assessment on the potential effects of implementing China’s WTO commitment on agriculture on China and the world market. Efforts have been devoted to constructing data and scenarios to reflect the actual commitments made by China and to explicitly modeling the newly introduced TRQ
regimes for major crops in China. Our results of implementing the commitments against the base case (with no WTO commitments) illustrate that China’s agriculture sectors may suffer a minor overall losses in terms of a lower level of agricultural production, a limited export outlook, and increased imports, particularly for grain. This is due to China’s unilateral liberalization of part of its distortionary agricultural trade policy (as agreed in the WTO deal). The overall welfare consequence is non-significant as the positive efficiency gains are partially offset by a terms of trade loss in agriculture. On the other hand, most other regions outside China gain from improved terms of trade. Although our results seem to indicate a less favorable situation for many agricultural commodities in China, this is by no means as alarming as feared by some of the observers.

The remaining counterfactual scenarios explore the perspectives of Chinese agriculture in the continued multilateral agricultural negotiations. This is illustrated by removing market access barriers and domestic support measures in three key OECD economies. Our results confirm the general hypothesis that many of the expected negative effects in China brought about by the implementation of the Chinese WTO commitments will be alleviated or even reversed if the rich countries take action to liberalize their agriculture policies. The last two scenarios compare the effects of liberalizing the domestic supports and market access barriers in the EU, Japan and the US and the simulations show that although they produce differential impacts, both of them affect the results non-negligibly. Therefore, continued agriculture liberalization requires paralleled efforts in these two areas.

Although we have put considerable efforts in compiling data on the initial state of the Chinese agricultural protection and the WTO commitments, as well as on the recent estimates of OECD domestic support, we acknowledge that continued efforts towards a more accurate representation of all these measures are needed. This indeed reflects in the divergent views expressed in the various existing studies since very likely they are based on data sets of different qualities. It remains an area of improvement for any continuation of this study too.

Another important issue is that like most of the GTAP applications and many other CGE studies, neoclassical theory is applied in our study. The supply side responses in China may be influenced by various market imperfections, such as the lack of fully functioning markets, the difficulties of the urban sector to create jobs to accommodate rural labors from agricultural sectors. Huang et al. (2000) have touched upon some of these points and argued that some of these factors may act as a shield for the Chinese
farmers in the short run. As such, the results presented here can only be viewed as indicative since we do not offer any insights on the potential effects of all these factors.

Lastly, we need to bear in mind that this study focuses on detailed analysis of agriculture sectors. It does not take into account of the many concessions and commitments made by China in manufacturing and service sectors. Liberalizations in these areas will no doubt benefit the Chinese economy and the world, as reported by many other studies contributed on the overall impact of China’s WTO accession. Also, as a comparative static study, many of the dynamic effects are not captured in this study. If taking all these factors into consideration and expanding the scope to non-agriculture commitments, the overall picture will be much more positive.
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<td>Sugar cane, sugar beet</td>
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References


Dimaranan, B.V. and R.A. McDougall (2002). Global Trade, Assistance, and Production: The GTAP 5 Data Base. Center for Global Trade Analysis, Purdue University.


FAO statistics. See http://www.fao.org


WTO documents on China’s accession. See http://www.wto.org

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