

Modelling domestic and international impacts of China's grain policy reform scenarios since 2014: a comparison of two modelling approaches

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Abstract

China has conducted major changes to its main grain policy instruments concerning rice, wheat, soybean and maize since 2014 to combat challenges such as apparent oversupply of these products at higher-than-world market prices, rapidly accumulations of government stock, and mounting pressure to increase imports. These reforms include overhauls of stockpiling policies for soybean and maize, stabilization and reductions of minimum support prices for wheat and rice, and consolidations of various domestic support programs. Such policy changes have been thoroughly characterized in the OECD's PSE estimates. This paper reports recent modeling efforts in understanding these policies changes by extending the OECD's PEM partial equilibrium model to cover China. This extension offers a first direct application of the new PSE estimates on China's recent policy changes in the PEM framework. Domestic and international market impacts as well as welfare effects of such reforms are evaluated through a series of simulations of the PEM model. To reveal the strengthes and weaknesses of the PEM approach, similar experiments are also conducted using the GTAP model framework. A comparison of the results of the two modeling approaches also offers a more balanced picture on the impacts of these reforms.

Introduction and background

China's agricultural sector is currently in an uncomfortable position: while ample supplies of grains and other strategically important agricultural commodities – partially aided by large government support and produced at higher-than-world market prices – have been secured, the same government policy has also led to large public stocks as China is facing increasing pressure to import more of the same products. This development has necessitated major recent policy changes to rice, wheat, soybean, other oilseeds, maize, and cotton individually, as well as a re-design of the broader policy agenda under the so-called “supply-side structural reforms in agriculture” which also contains measures on land management and resource and environmental protections, as well as emphasis on improving the quality and safety attributes of domestic agricultural products.

These major shifts in policy measures have happened in a relatively short period of time, having started around 2014. The main policy reforms on market price support instruments include: the replacement of the temporary purchase and stockpiling policy for soybean and cotton by the so-called “target price” system; the abolishment of the similar policy for maize by “market purchase and producer support” system around 2016; and the stabilization and reductions of the minimum purchase prices for rice and wheat. Accompanying these changes on market price support, China also consolidated three important direct payments to agriculture into a single “agricultural support and protection payment” that is primarily tied to land areas. While the former changes signalling a move from direct market price support to (potentially less distorting) direct payments based on outputs and planting areas for specific commodities, the latter policy change seemingly suggests a change from direct payments tied to various inputs and land to decoupled payments paid to land used by all/multiple crops.

Purposes

To understand the domestic and international market implications of these policy changes and to evaluate their desirabilities in terms of government costs and welfare effects, the OECD's Policy Evaluation Model (PEM) has recently been extended to include China. As a multi-sector and multi-country partial equilibrium model, the PEM model is directly built upon the OECD's PSE tables and can be deployed with relative ease to evaluate the re-instrumentation among policy instruments categorized according to the PSE classifications. The first purpose of this paper is therefore to build a series of policy scenarios to mimic the actual policy development from 2014 and onwards, as discussed above, and to evaluate the market and welfare effects of such policy changes.

As with the case of any other PE models, since the PEM model is inherently limited in its ability to model complete factor market linkages and input-output linkages to non-agricultural sectors, it is possible that the market and welfare effects from the PEM simulations can be incomplete. However, such limitations must be evaluated against the agilities of the PEM model in modelling quite complicated policy re-instrumentations. To assess such trade-offs, in this study we implement similar policy changes in a more general modelling framework, namely the CGE framework of the GTAP model. The relative ease/difficulties of the two modelling approaches will then be compared, and similarities/differences between simulations results from the two models will also be evaluated. An assessment regarding the relative performance and usability of the PEM extension on China can then developed. This constitutes the second purpose of this study.

Design of the scenarios and implementations

Based on the recent policy development in China since 2014, a series of policy scenarios are constructed and simulated based on the PEM and GTAP models, including:

- a. Actual reductions of market price support for soybean and maize and equivalent increase in direct payments based on outputs of the two products;
- b. Actual reductions of market price support for soybean and maize and (hypothetical) equivalent increase in direct payments based on planting areas of the two products;
- c. (Hypothetical) reductions on market price support to rice and wheat and equivalent increase in direct payments based on planting areas of the two products;
- d. (Hypothetical) reductions on market price support to all four commodities (soybean, maize, rice and wheat) and equivalent increase in direct payments based on planting areas of all four products;

Implementation of the four scenarios in the PEM model will be conducted against the same base case of 2014, using the model's implementations of the PSE instruments directly. In the case of GTAP, calibrations of the PEM instruments will be carried out for China, before such scenarios can be constructed and simulated.

Expected findings

Results from the two model runs will reveal the similarities/differences in the size and directions of market effects (such as production, consumption, trade, factor and input demand, etc.) and welfare effects (e.g. producer surplus, consumer surplus, terms of trade effects, government and taxpayer costs, and total welfare). In the case of welfare effects, to facilitate meaningful comparisons of these effects in partial and general equilibrium, a scheme for comparing individual components of total welfare changes will be developed. These similarities and differences, in conjunctions with the ease/difficulties in implementing the policy scenarios in the two models, will then be the basis for assessing the relative performance of the two modelling approaches and explore the complementarities of the two modelling approaches.