



Grain subsidy, liquidity constraints and food security—Impact of the grain subsidy program on the grain-sown areas in China



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ABSTRACT

This study examined the effects of China's grain subsidy program, the largest food self-sufficiency project of all developing countries, on grain-sown areas within the context of liquidity constraints. A large household-level panel was used to evaluate how the subsidy program affected the cultivation schedule of farm households through the relaxation of households' liquidity constraints over a given period. Results suggest that, in general, the grain subsidy program improved farm households' grain planting areas in liquidity-constrained households. This finding provides a more comprehensive understanding of the effects of China's grain subsidy than previous studies have.

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1. Introduction

Increases in China's grain output and sown areas have been accompanied by substantial government subsidies. Since the launch of the grain subsidy program in 2004, China has provided major subsidies in terms of per unit of cultivated area and total budget allocations [Huang et al. \(2011b\)](#). The amount of grain subsidies given to farmers in 2004 was 14.5 billion yuan¹ (Ministry of Finance, China, 2005), which rapidly increased to 166.8 billion yuan ([Chen, 2013](#)) in 2012. With the expansion of the subsidy budget from 2004 to 2012, the sown areas and outputs of grain crops (rice, wheat and corn) increased by 19% and 32% (National Bureau of Statistics of China, 2013), respectively.

Even though a substantial amount of public resources has been dedicated to the grain subsidy program, the program's impacts on grain production remain unclear. On one hand, several previous studies have indicated that the recent increase in grain output is hardly related to grain subsidies ([Gale et al., 2005](#); [Heerink et al., 2006](#); [Huang et al., 2009, 2011b,a](#)). [Gale et al. \(2005\)](#) posited that grain subsidies should have little impact on grain production because the subsidies are not large enough and not tied to production decisions. Using micro-survey data, [Huang et al. \(2011b\)](#)

indicated that the subsidy program has not encouraged grain production in terms of grain-sown areas and fertilizer uses.

On the other hand, [Meng \(2012\)](#) found that grain subsidies have kept farmers from engaging in migratory work, thereby increasing labor inputs in grain production. Furthermore, [Yu and Jensen \(2010, 2014\)](#) showed that implementing the grain subsidy program has increased grain production and improved farm income in cases in which grain subsidy disbursement has been coupled with grain production. [Yu and Jensen \(2010\)](#) found that the combination of grain subsidies and the elimination of agricultural taxes has increased grain area and yield. [Xu et al. \(2012\)](#) confirmed that the repeal of China's agricultural taxes, which is similar to introducing subsidies, has helped raise farm income by increasing grain production by using more inputs, such as labor and planting areas. All these studies implicitly assume that all rural markets in China operate perfectly.

The objective of this study was to examine the effect of China's grain subsidy program on grain planting areas of various farm households with different liquidity conditions. Previous studies have rarely considered the impacts of relaxing liquidity constraints for farm households receiving subsidies. A number of studies have shown that farm households in China usually face incomplete credit markets ([Feder et al., 1990](#); [Rozelle et al., 1999](#); [Simtowe and Zeller, 2006](#); [Uchida et al., 2009](#); [Dong et al., 2010](#)). Thus, liquidity constraints cause households to have underemployed and ill-allocated productive assets that could have been utilized under unconstrained conditions ([Sadoulet et al., 2001](#)). It is expected that the money paid by the grain subsidy program can

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¹ 1 US dollar = 6.2 yuan.

Table 1
Composition of grain subsidy 2004–2012.

	2004	2005	2006	2007	2008	2009	2010	2011	2012
Direct subsidy (billion yuan)	11.6	13.2	14.2	15.1	15.1	15.1	15.1	15.1	15.1
Comprehensive input subsidy (billion yuan)	0	0	12	27.6	71.6	79.5	83.5	89.3	107.8
High-quality seed subsidy (billion yuan)	2.8	3.8	4.0	6.7	12.1	19.9	20.4	22	22.4
Machinery subsidy (billion yuan)	0.07	0.3	0.6	2.0	4.0	13.0	15.5	17.5	21.5
Total (billion yuan)	14.5	17.3	30.8	51.4	102.8	127.5	134.5	143.9	166.8

Data sources: Ministry of Finance, China.

provide farmers with liquidity, allowing them to adjust their production by investing more in productive assets for grain crops. More importantly, farm households with various levels of liquidity constraints may be affected differently by the grain subsidy. Within this context, we therefore provide a new insight into the impact of grain subsidies on crop production.

We relied on the ratio of agricultural costs to household income as an indicator for liquidity constraints. A household with a higher ratio is more likely to face liquidity restrictions than one with a low ratio. We then divided the total sample into two subsamples according to the ratio to investigate the heterogeneous effects of grain subsidies on crop planting areas among farm households. One of the advantages of our method is that it takes the farm size of farm households into consideration: a household with a large farming area usually has relatively more liquid assets and is assumed to have no liquidity constraints. However, this assumption is not necessarily accurate because a large farm size suggests higher liquidity demand for agricultural production. Therefore, small farm households as well as large farm households may face liquidity constraints.

Using a unique survey dataset, the present study revealed that the grain subsidy program generally stimulated grain production in sown areas over the observation period. However, the subsidies did not help households in the liquidity-constrained group to improve their living expenditures and expand non-grain-sown areas. As expected, the grain subsidy was less likely to encourage liquidity-unconstrained households to allocate more planting areas for grain production.

The rest of this paper is organized as follows: Section 2 describes the grain subsidy program in China; Section 3 introduces the data used for the estimations; and Sections 4–6 present the empirical estimation, the empirical results, and the conclusion, respectively.

2. Grain subsidy program in China

The grain subsidy program was originally designed for farmers who wanted to plant grain crops, including rice, wheat, and corn.² The program consisted of four elements: direct subsidy, comprehensive input subsidy, high-quality seed subsidy, and agricultural machinery subsidy. The latter three types of subsidies were supposed to be related to grain production. Based on the initial arrangements, the direct subsidy was expected to improve grain producers' income. The comprehensive input subsidy would offset high production costs, such as fuel and fertilizer price increases. The high-quality seed subsidy and agricultural machinery subsidy were designed to encourage grain producers to adopt better varieties of seeds and to promote production efficiency, respectively.

Table 1 illustrates the composition of the steadily increasing amount of grain subsidies from 2004 to 2012. Although not introduced until 2006, the comprehensive input subsidy grew rapidly and surpassed all other subsidies after 2007. The high-quality seed

subsidy and machinery subsidy started at different magnitudes but together grew to 22 billion yuan. As a subsidy program for stimulating grain production, the total budget for China's grain subsidy program is much greater than that of other countries such as Honduras, Mexico, Malawi and Nicaragua (Handa and Davis, 2006; Dorward and Chirwa, 2011). Based on funds per area, the subsidy that an average Chinese farm household could have received in 2012 was 95 yuan/mu, equivalent to 92 US dollars per acre. This finding indicates a greater subsidy level in China in 2012 than what a typical US farmer received.³

The disbursement modes of the four subsidies are different. Currently, all of the subsidies, except for the machinery subsidy, are wired to farmers' bank accounts.⁴ However, most farm households are unable to differentiate the value of each of the three wired subsidies because banks do not provide this information. On the other hand, the machinery subsidy is only targeted to the buyers of medium- or large-size machines, where approximately 30–50% of the price-value subsidy is deducted from the price. Therefore, those households that apply for the machinery subsidy usually know how much they are receiving. However, the fact that most rural households have small farming areas dictates that only a few farmers, either with large cultivation scales or specialized agricultural machinery services, will apply for the machinery subsidy. In addition, the voluntary feature of the machinery subsidy differentiates it from the other subsidies, which will become a major challenge for impact analysis. Hereafter, the three wired subsidies are the focus of this study, and as such, "grain subsidy" excludes the machinery subsidy. The grain subsidies are accessible to farmers through a three-step implementation process. First, the State Council determines an annual subsidy budget according to regional differences in grain production. Second, provincial departments of finance divide the total available budget from the central government budget according to the grain production of all of the counties. Finally, local financial bureaus distribute the subsidies to farmers in accordance with specific criteria. In 2007, the Ministry of Finance stated that the criteria could be any of the following standards: (i) the amount of contracted land that a household was allocated during the late 1990s; (ii) the actual grain-sown areas; and (iii) the taxable grain production target for a normal year (although the agricultural tax has been abolished since 2003).

In practice, the wired grain subsidies, including the direct subsidy, comprehensive input subsidy and high-quality seed subsidy, are not distributed according to production choices. To date, most surveys have shown that China's grain subsidy program is not based on the current year's grain inputs or outputs of farmers but rather is related to historical grain production or contracted land areas (Tian and Meng, 2010; Huang et al., 2011b,a), with contracted land area being the most commonly used measure. There

³ The average household's land size in China is $\frac{1}{315}$ of that of the farmers in the US (Huang et al., 2011b); hence, per household subsidy is still low in China.

⁴ With the rapid development of information technology, everyone, from the Ministry of Finance to individual households, has a special bank account. Thus, the grain subsidy can be easily distributed to farmers according to schedule, which is usually around the time that farmers are making planting decisions.

² Four provinces and municipalities in Northeast China also have a high-quality seed subsidy for soybeans.

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