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journal homepage: www.elsevier.com/locate/gfsUnderstanding recent challenges and new food policy in China[☆]Jikun Huang^{a,b,*}, Guolei Yang^{b,c}^a China Center for Agricultural Policy, School of Advanced Agricultural Sciences, Peking University, 100871 Beijing, China^b Center for Chinese Agricultural Policy, Institute of Geographical Sciences and Natural Resources Research, Chinese Academy of Sciences, 100101 Beijing, China^c University of Chinese Academy of Sciences, 100049 Beijing, China

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ABSTRACT

Despite of remarkable achievements in the past, China is also facing several major challenges, in particular on ensuring sustainable growth of agriculture, improving food security, increasing farmers' income. The paper reviews China's agricultural and food policy with specific focus on recent challenges, initial policy responses and their consequences, and re-adjusting in policies. The results show that the policy responses to the challenges of sustainable agriculture are strong and encouraging. Adjusting the national food security target in response to sustainable agriculture and major efforts to improve food security are significant. To increase farmer's income, China has shifted its policy regime from taxing to subsidizing and protecting agriculture in the past decade. However, the results of these efforts are mixture. Price interventions increased farmers' income, they also resulted in several serious problems. Good news is that some new efforts to solve these problems may bring China's market reform back to the right track though they still needs to be evaluated. The paper concludes that the previous experiences on agricultural development through institutional reform, technology change, market reform, and investment in agriculture should still be the keys for successfully ensuring food security and sustainable agriculture for China in the future.

1. Introduction

China's agriculture has changed dramatically since the late 1970s. Agriculture grew at an average rate of 4.6% annually in more than three decades (NBSC, 2015). Although per capita water availability is only 1/4 of the global average and arable land accounts for only 8% of the world total, China provided about 95% of total food for about 20% of the world's population in 2015. The growth has been accompanied with significant structural change in production and food consumption. Growth in agriculture and off-farm employment raised farmers' income and massively reduced rural poverty. China was the first developing country to meet the Millennium Development Goals on reducing poverty population by half ahead of the 2015 deadline.

While the past accomplishments are impressive, China has reached a stage of agricultural development when the previous challenges have intensified and new challenges have emerged. Increased food production has been at the expense of environment and sustainable development (Zhang et al., 2013; Lu et al., 2015). Furthermore, recent rising wages have significantly increased the cost of food production and lowered agricultural competitiveness in the global market, which

further raises food security concern in China (Huang, 2013; Han, 2015). In addition, despite steady growth of farmers' income, their average income is still low, and the rural-urban income gap remains high. How to ensure national food security, higher growth of farmers' income, and sustainable agricultural development are central goals of China's recent agricultural and food policy.

Recognizing the challenges, the Chinese government has taken a series of strong policy measures. The most notable ones are the political commitments to *San Nong* issues (three rural issues: agriculture, rural areas, and farmers). For example, in the past 13 years (2004–2016), the Number One Document, the first and most important national policy document each year released by the Central Committee of the Communist Party of China, has exclusively focused on these three issues. In the literature, while several papers discuss some major policy changes in the recent decade, such as eliminating agricultural tax (Tao and Qin, 2007; Liu et al., 2012), increasing agricultural subsidies (Huang et al., 2011, 2013; Yi et al., 2015), enhancing agricultural research and development expenditure (Huang and Rozelle, 2014; Babu et al., 2016), and raising agricultural price and income support for farmers (OECD, 2013), none of them systematically

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examines the evolution of recent policies and motivations for policy changes.

Understanding the evolution of recent policy changes is interesting not only for China's own development in the coming years, but also for the rest of world. Regarding China, there are both experiences and lessons to be learned from the past and recent policy changes. With the sheer size of its population, any change in China is likely to have profound impact on the international food trade and global food system.

The overall goals of this paper are to review China's agricultural and food policy with specific focus on recent challenges, policy responses and their consequences, and provide policy implications for the way forward. The rest of the paper is organized as follows. Section 2 describes China's agricultural development and past experience. Section 3 presents the major challenges in terms of farmers' income, food security, and sustainable agricultural development that have addressed great attentions by Chinese leaders. Section 4 discusses the recent government policy responses and outcomes. The last section concludes this paper with several policy implications.

2. China's food security and agriculture: past success and experience

2.1. Food security

For more than 20 years, while there were several pessimistic predictions about China's food security and its impact on global agricultural markets, they have failed to materialize. First, there were concerns in the early 1990s that China might struggle to feed itself and massive food imports would eventually starve the world (Brown, 1995). Second, when China entered the WTO in 2001, there were concerns that China's agriculture sector might face enormous challenges and be flooded with cheap food imports. However, the reality was quite different. Food security was largely ensured, and total food exports exceeded imports by the mid-2000s (NBSC, 2015). Rice, wheat and many other commodities are nearly self-sufficient (Fig. 1). Large net import (import-export) occurs only in oilseeds, mainly soybean. Household food security has also improved significantly. For example, the prevalence of undernourishment among the population fell from 24% in 1992 to less than 10% in 2015 in China (FAO, 2015). Despite of the micronutrient problem remains a challenge in the less developed regions (Luo et al., 2014), overall micronutrient has been significantly improved (MOH, 2012).

2.2. Agricultural growth and structural change

Achieving high level of food security in China is mainly due to its rapid agricultural growth. Compared to the pre-reform period of 1970–78, when agricultural gross domestic product (GDP) rose by 2.7% annually, the growth rate more than tripled to 7.1% during the initial

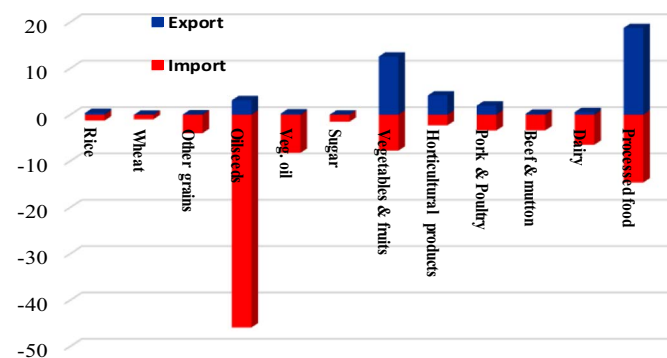


Fig. 1. China's food import and export in 2014 (billion US\$). Numbers are calculated based on UNCOMTRADE database.

reform period of 1979–1984 (Table 1). Although during the later reform period (1985–2014), the annual growth rate reduced to approximately 4%, this growth is still extraordinarily high over such a sustained period.

The growth in crop production has occurred in all commodities. Between 1978 and 2014, grain production increased by 1.9%, nearly double the population growth (1.0%, Table 1). Moreover, the average annual growth rate for cotton, edible oils, and fruits reached 3.2%, 8.8%, and 12.6%, respectively, in 1978–2014. Livestock (6.6%) and aquaculture products (8%) have been growing even faster than the output growth in the crop sector over the same period (Table 1).

Accompanied with agricultural growth is significant production structural change and improvement of food consumption patterns in China. Within the agriculture sector, the area share of cash crops (or non-grain crops) increased from 20% in 1978 to 32% in 2014. Over the same period, the share of animal products (livestock and fishery) in total agricultural output raised from 17–38% (NBSC, 2015).

2.3. Major policies and experience before the mid-2000s

Many factors have simultaneously contributed to China's agricultural growth in the past, of which, rural institutional innovation, technology change, market reform, and investment in agriculture are the four major driving factors (Huang et al., 2011).

2.3.1. Institutional reforms

Rural economic reforms were initiated in 1978 through implementation of the household responsibility system (HRS) that contracted cultivated land to individual households in each village for 15 years based on the number of people and/or labor in the household (equity). As the HRS is an institutional innovation to incentive problems inherent in the previous collective production system under People's communes, it significantly raised agricultural productivity in the early reform period. For example, previous studies show that the HRS accounted for about 40–50% of the total rise in agricultural output during 1978–1984 (Lin, 1992; Huang and Rozelle, 1996; Fan, 1997). Both McMillan et al. (1989) and Jin et al. (2002) also show that HRS contributed significantly to total factor productivity (TFP) growth in major commodities. The significant rise of agricultural production with the equitable distribution of land is a major reason for massive reduction of rural poverty in the early reform period. After the mid-1980s, to facilitate agricultural investment, China's land reforms have focused on stabilizing land tenure (or ensuring the land contract rights). The land contract was also extended to additional 30 years starting in the late 1990s.

2.3.2. Technology changes

Given its large population but with limit of land resource, China's agricultural growth has to largely depend on technological changes. China has developed its strong agricultural science & technology (S & T) innovation system. Huang et al. (2012) estimate that China had at least 68,000 research staff working in the public agricultural R & D system by the late 2000s. China has also developed the largest public agricultural extension system in the world with approximately 700,000 staff members in recent years (Huang and Rozelle, 2015). Previous studies show that technology change has been a primary source of agricultural productivity growth. Hybrid rice was developed by China's scientists in the late 1970s. Technological innovations in wheat, maize, cash crops, and animal products have also been significant. Empirical studies show that the average annual growth rates of TFP in the grain sector increased from 1.5% in 1985 to 2.4% in 1995–2004; annual growth rates of TFP in cash crops and livestock also exceeded 3.5% over the same period (Jin et al., 2010). They also show that nearly all growth in TFP were from technological changes in the 1990s and early 2000s. Since the mid-1990s, China has also relied on innovation from plant biotechnology. For example, Bt cotton has benefited millions of

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