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# Price behavior in China's wheat futures market

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## Abstract

Wheat futures prices have been playing an active role in China's agricultural price system since the contract's debut at the China Zhengzhou Commodity Exchange (CZCE). This paper analyzes CZCE wheat futures prices from 2000 to 2002 quantitatively. Results show the prices have unit root and time-varying variances. Alternative ARCH, GARCH, and ARMA models are fitted to the data resulting in the selection of AR(1), ARCH(2), and GARCH(1,1) models. Comparisons of these three models indicate that ARCH/GARCH describes the prices better than ARMA model, and GARCH further improves upon ARCH. Out-of-sample prediction performance also confirms this result.

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*Keywords:* Futures price; China; GARCH; Wheat; Prediction

## 1. Introduction

Wheat production, consumption and trade account for a major share of China's food system. In 2002, wheat production and consumption reached 93.87 and 108.74 million tons, respectively, about 27.0% and 28.9% of all grain<sup>1</sup> production and consumption. Wheat exports and imports are 1.51 and 1.09 million tons, respectively, about 12.6% and 32.9% of all grains exports and imports. Wheat price volatility also plays a very influential role in overall grain price volatility. The prosperity of wheat futures in world's major commodity futures markets has provided an effective channel for market participants to hedge price risks and insure profits (Yang & Leatham, 1999). If the futures market is efficient, price will move in a way to reflect its real equilibrium level in the spot market.

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<sup>1</sup> All grain includes wheat, rice, corn, barley, sorghum, rye, oats, millet, and other coarse grains.

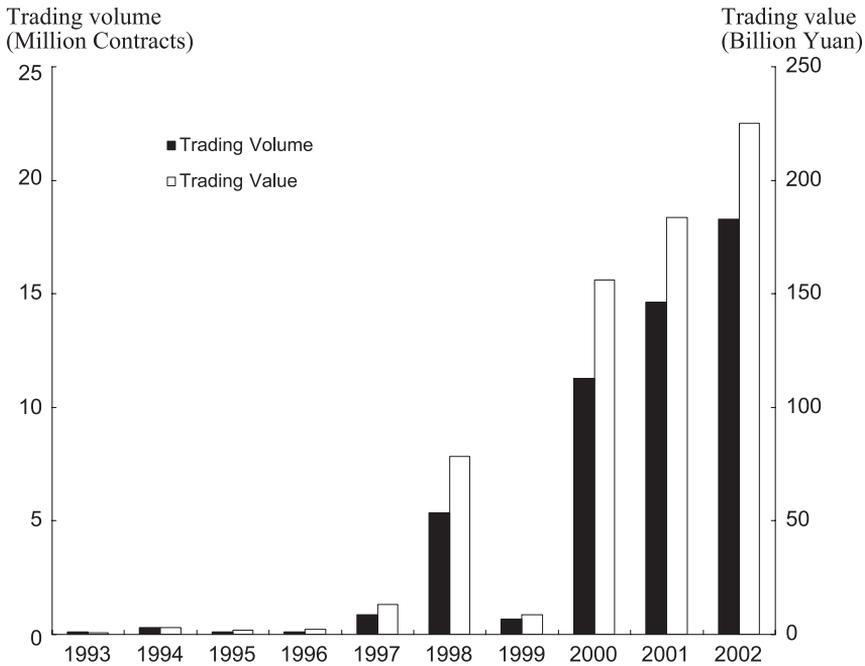


Fig. 1. Annual wheat futures trading in CZCE 1993–2002. Data source: CZCE 2002 Annals <http://www.czce.com.cn/home/annals.asp>.

Efficient futures prices help the formation of a rational market expectation of price in both the short run and the long run.

Agricultural commodity futures markets emerged in China in the early 1990s, when China was stepping into a higher phase of its market-oriented economic reform. One of the motives to establish futures markets was to provide a price indicator and stabilizer to reduce the volatility in agricultural spot markets in China. In this paper, we investigate the price behavior in China's wheat futures market in an attempt to provide a tractable model for prediction.

China's first exchange market, the China Zhengzhou Commodity Exchange (CZCE) was founded in 1990. Wheat futures trading started in May 1993. CZCE is the only exchange trading wheat futures contracts in the country today. In 1999, CZCE accounted for 50% in total trading value and 49% in total trading volume of all commodity exchanges in China. Since then, the trading of wheat futures has experienced a stable growth except for 1999.<sup>2</sup> In 2002, the total trading value amounted to 225.25 billion Yuan<sup>3</sup> and total trading volume was 18.27 million contracts (Fig. 1).

<sup>2</sup> The low trading in 1999 was mostly affected by the regulatory change in CZCE, which was designed to discourage the mung bean trading then. As a result, mung bean trading declined sharply and disappeared in the following years.

<sup>3</sup> \$1 equals about 8.3 Yuan.

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