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Impact of Contract Farming on Income: Linking Small Farmers, Packers, and Supermarkets in China

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Summary. — This study compares contract and non-contract growers of apples and green onions in Shandong Province, China in order to explore the constraints on participation and the impact of contract farming on income. We find little evidence that firms prefer to work with larger farms, though all farms in the area are quite small. Using a Heckman selection–correction model, we find that contract farming raises income even after controlling for observable and unobservable household characteristics. These results suggest that contract farming can help raise small-farm income, though questions remain regarding the number of farmers that can be brought into such schemes.

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Key words — China, contract farming, horticulture, farmers, supermarkets, processors, exports

1. INTRODUCTION

The role of contract farming in developing countries has been a topic of interest and some controversy at least since the 1970s (Glover, 1984; Minot, 1986; Morrissey, 1974). Critics of contract farming argue that large agribusiness firms use contracts to take advantage of cheap labor and transfer production risk to farmers. Another concern is that smallholders will be marginalized because companies will prefer to work with medium- and large-scale growers, thus exacerbating rural inequality (Little & Watts, 1994; Singh, 2002). Others are less pessimistic, seeing contract farming as a means to incorporate small farmers into growing markets for processed goods and export commodities. Because the contracts often involve the provision of seed, fertilizer, and technical assistance on credit and a guaranteed price at harvest, this form of vertical coordination simultaneously solves a number of constraints on small-farm productivity, including risk and access to inputs, credit, and information. In this view, contract farming is an institutional solution to the problems of market failure in the markets for credit, insurance, and information (Grosh, 1994; Key & Runsten, 1999).

Contract farming usually involves a large-scale buyer, such as an exporter or a food processor that needs to ensure a steady supply of raw materials meeting certain quality standards. As such, contracting is rare for basic staple foods but relatively common for industrial crops (e.g., sugarcane, tobacco, and tea), poultry, dairy, and horticulture, particularly when produced for high-income consumers who are willing to pay a premium for quality and food safety (Jaffee & Morton, 1994; Minot, 1986).

There are few estimates of the prevalence of contract farming and no estimates of trends over time, but changes in global

agricultural markets provide some hints. First, rapid income growth, particularly in Asia, is shifting consumption away from staple grains and toward high-value commodities such as meat, fish, dairy, and horticulture and toward processed foods (Minot & Roy, 2006). Second, income growth, urbanization, and foreign investment are driving a consolidation in retail food outlets, the supermarket revolution (Reardon, Timmer, Barrett, & Berdegue, 2003). Third, lower trade barriers and improved communication technology are expanding trade linkages, connecting small farmers in developing countries with high-income consumers in developing country cities and in industrialized countries. The growth in high-value agriculture, supermarkets, processing, and export-oriented agriculture suggest that the importance of contract farming is probably growing.

This study provides an empirical analysis of the impact of contract farming of apples and green onions on household income in Shandong Province, China. The issue is relevant to food policy decisions because if contract farming has a pro-poor impact, then policies and programs to support contract farming (such as cost-sharing in the provision of extension services) could be justified on equity grounds. If not, the policymakers would be better allocating resources to other agricultural development strategies. This study also has implications for the debate over whether small farmers will be able to adapt to globalization, which increases the need for various forms of vertical coordination, including contract farming. In China, the average farm size is less than 0.5 ha, which is much smaller than in other Asian developing countries such as India

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(1.5 ha), Thailand (3.4 ha), and South Korea (1.5 ha) (Fan & Chan-Kang, 2005).

More specifically, this paper addresses three related questions. First, to what degree do less educated and small-scale farmers participate in contract farming schemes? Second, does contract farming raise the income of participating farmers? Third, if contract farming raises income, how does it do so, through lower input prices, higher yields, better crop prices, or some other mechanism?

In Section 2, we review previous research that evaluates the distributional effect of contract farming schemes. Section 3 describes the farm survey data and the econometric methods used in this study. Section 4 provides the results in three parts: a description of the contract farming schemes, a comparison of contract and non-contract farmers, and an econometric analysis of contract participation and income. Section 5 provides some concluding comments and policy implications.

2. BACKGROUND

(a) *Previous studies of contract farming in developing countries*

In an early review of contract farming schemes, Minot (1986) finds that most of them improved the income of participants, although rigorous evaluations were rare and the failure rate of contract farming schemes is high. Little and Watts (1994) compile a set of seven case studies of contract farming in sub-Saharan Africa, focusing on conflicts between farmers and the contracting firms, the imbalance of power between the two parties, intra-household tensions over the allocation of new revenues, and the increasing rural inequality as contract farmers grow wealthy enough to hire farm laborers. Nonetheless, Little (1994, p. 221) concludes that “incomes from contract farming increased for a moderate (30–40%) to a high (50–60%) proportion of participants.” In a review of the experience of contract farming in Africa in the early 1990s, Porter and Phillips-Howard (1997) conclude that farmers were generally better off as a result of their participation in contract farming, in spite of a number of social problems that arose in the communities. Singh (2002) identifies a series of problems associated with contract vegetable production in Punjab state in India: imbalanced power between farmers and companies, violation of the terms of the agreements, social differentiation, and environmental unsustainability. Nonetheless, his surveys reveal that most contract farmers have seen incomes rise and are satisfied with the contract arrangement.

A number of studies examine the proportion of contract farmers that are smallholders. Guo, Jolly, and Zhu (2005) analyze the determinants of contract farming participation with farm-level survey data from China. They find that small farmers are less likely to participate in contract farming than larger farmers. In contrast, Runsten and Key (1996) find that multinational tomato processors in Mexico first contracted with large growers but then involved also the small growers because side-selling was a problem with their larger growers. Similarly, a horticultural exporter in Thailand started producing its own horticultural products on company land and later shifted to smallholder contract production (World Bank, 2006). Minot and Ngigi (2004) describe the evolution of several contract farming schemes in Kenya, including one (Del Monte pineapple) that gave up on contract production and others than have shifted from large-scale to small-scale production. In Senegal, green bean exporters switched from small-scale contract production to large-scale production (Maertens, 2006). These findings confirm that the comparative advantage of smallhold-

ers is not a static concept, but it can change as farmers and buyers experiment and learn from their experience. It also implies that there is no intrinsic advantage of large farmers, so that public policy may be able to play a role in supporting the participation of small farmers in these supply chains.

Other studies examine the effect of contract farming on gross margins, crop income, or total income. For example, BIRTHAL, JOSHI, and GULATI (2005) found that the gross margins for contract dairy farmers in India were almost double those of independent dairy farmers, largely because contract growers had lower production and marketing costs.

Some studies take into account the fact that contract farmers are generally not a random sample of the population; they may differ from the population in ways that also affect income. They may differ in *observable* characteristics, such as farm size or education, and/or in *unobservable* characteristics, such as industriousness or intelligence. In either case, the difference in income between contract farmers and other farmers will reflect both the effect of contracting *per se* and the effect of those characteristics. Standard regression analysis can control for the effect of observable characteristics, but to eliminate the bias associated with unobservable characteristics, it is necessary to use a Heckman selection-correction model or an instrumental variables model.

Warning and Key (2002) study contract farming in peanuts in Senegal. NOVASEN, a private company, contracted 32,000 growers and produced approximately 40,000 tons of peanuts annually. Using a two-step Heckman procedure, they find that the increase in gross agricultural revenues associated with contracting is statistically significant and large, equal to about 55% of the average revenue of non-contract farmers. Simmons, Winters, and Patrick (2005) examine contract growers of poultry, maize seed, and rice seed in Indonesia. Using a Heckman selection model, they find that poultry contracts and maize seed contracts resulted in improved returns to capital, while no significant impact was found in the case of rice seed. Contract seed growers were generally larger than the independent growers, but contract poultry growers tended to be smaller than independent poultry growers. They conclude that the contracts increase income and welfare, reducing absolute poverty.

(b) *Apple and green onion markets in Shandong Province*

This study examines contract and non-contract production of apples and green onions in Shandong Province, one of the most commercially-oriented agricultural regions in China. Fruit and vegetable production in China has increased dramatically over the past 25 years. Since 1980, the area planted with fruits and vegetables has increased at 7% per year. Vegetable production in China has increased from 2% of the planted area in 1980 to 11% in 2005, while the area planted with fruit trees has increased from 1% of the total to 6% over the same period (NBS, 2006). Fruit and vegetable exports started later, but have grown more rapidly, rising from US\$ 1.2 billion in 1985 to US\$ 6.4 billion. This represents an average growth rate of 9% per year (FAO, 2006).

China produces more than 20 million tons of apples per year, making it the largest producer in the world. Production has increased almost five-fold since 1990. Apple exports have expanded from US\$ 20 million in 1992 to US\$ 274 million in 2004, turning China from a net importer to a major exporter (FAO, 2006). The main markets for Chinese apples are Russia and Southeast Asia. In Southeast Asia, Chinese apples are displacing imports from the United States and New Zealand. Because just 4% of production is exported, the potential for expansion is large, but Chinese apple exports face a num-

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