



Do incentives still matter for the reform of irrigation management in the Yellow River Basin in China?



Jinxia Wang^{a,*}, Jikun Huang^a, Lijuan Zhang^a, Qiuqiong Huang^b

^a Center for Chinese Agricultural Policy, Institute of Geographical Sciences and Natural Resources Research, Chinese Academy of Sciences, Jia, No. 11, Datun Rd, Anwai, Beijing 100101, China

^b Department of Agricultural Economics and Agribusiness, University of Arkansas, Fayetteville, AR 72701, United States

ARTICLE INFO

Article history:

Received 28 January 2014

Received in revised form 22 May 2014

Accepted 24 May 2014

Available online 2 June 2014

This manuscript was handled by Geoff Syme, Editor-in-Chief, with the assistance of V. Ratna Reddy, Associate Editor

Keywords:

Irrigation management reform

Incentive mechanism

Water use

Crop yields

Yellow River Basin in China

SUMMARY

Under the pressure of increasing water shortages and the need to sustain the development of irrigated agriculture, since the middle of the 1990s, officials in the YRB have begun to push for the institutional reform of irrigation management. Based on a panel data set collected in 2001 and 2005 in the Yellow River Basin, the overall goal of this paper is to examine how the irrigation management reform has proceeded since the early 2000s and what the impacts are of the incentive mechanisms on water use and crop yields. The results show that after the early 2000s, irrigation management reform has accelerated. Different from contracting management, more Water User Associations (WUAs) chose not to establish incentive mechanisms. The econometric model results indicate that using incentive mechanisms to promote water savings is effective under the arrangement of contracting management and not effective under WUAs. However, if incentives are provided to the contracting managers, the wheat yield declines significantly. Our results imply that at the later stage of the reform, the cost of reducing water use by providing incentives to managers includes negative impacts on some crop yields. Therefore, how to design win-win supporting policies to ensure the healthy development of the irrigation management reform should be highly addressed by policy makers.

© 2014 Elsevier B.V. All rights reserved.

1. Introduction

Water is very scarce and is becoming more limited in the Yellow River Basin (YRB). The basin runoff, at 54 billion cubic meters per year on average, accounted for only 2 percent of the total national runoff in the past decade (Ministry of Water Resources, 2011). Since 1950s, precipitation in the YRB has been declining with obvious consequences for the available water supplies (Wang et al., 2013; Liu et al., 2008b). At the same period, the share of agricultural water use has decreased from over 97 percent to less than 70 percent, while the share of industry and domestic water use increased from less than 3 percent to over 30 percent (YRCC, 2012; Wang et al., 2011). Despite facing sharp competition, water use efficiency in the agricultural sector is very low, at only approximately 30–40 percent (Chang and Xiao, 2006; Deng et al., 2006).

Under the pressure of increasing water shortages and the need to sustain the development of irrigated agriculture, since the middle of the 1990s, officials in the YRB have begun to push for the

institutional reform of irrigation management. The major purpose of irrigation management reform is to increase the agricultural water use efficiency and also to promote the continuing growth of agricultural production. To push the reform, local government has not only made detailed reform plans but has also issued relevant regulations and technical guidance (Wang et al., 2005). As a result, from the middle of the 1990s to 2001, the traditional collective irrigation management at the community level was replaced by Water Users Associations (WUAs) and contracting arrangements in many locations in the YRB (Wang et al., 2005; Zhou et al., 2009). In some regions, the reformed institutions (WUAs or contracting) have even become the dominant form of management.

However, not all irrigation management reforms in the YRB have been implemented successfully. Based on one large field survey in 2001, Wang et al. (2005, 2006) found that in most villages in the YRB, reform was only nominally implemented, and there are few apparent differences when comparing the reform institutions (WUAs or contracting) to the traditional collective management forms. These authors argued that only those institutions that provided incentives to the irrigation managers were successful in achieving large water savings and reduced the water use per hectare by 40 percent. In addition, the incentive mechanism had a

* Corresponding author. Tel.: +86 10 64889841; fax: +86 10 64856533.

E-mail address: jxwang.ccap@igsnr.ac.cn (J. Wang).

small or no effect on the crop yields. The incentives has been defined as offering the irrigation managers the rights to the earnings equal to the value of the water saved by irrigation management reform. In China, under collective management, managing water is only one of regular responsibilities for village committee. Village committee earn wages for all their responsibilities and they cannot claim any extra income from water saving. Therefore, the incentives only can be set up in WUAs or contracting management, not for traditional collective management. Other researchers also noted the institutional arrangement problems that arose when reforming the irrigation management in the YRB (Zhou et al., 2009).

In fact, not only in the YRB but also in other regions in China or in other countries, the record of irrigation management reform is also mixed. Under the guidance of the “Five Principles” promoted by World Bank, the irrigation management reforms in Hubei and Hunan Provinces in China have been generally considered to be success cases (Liu et al., 2008a,b; Wang et al., 2010). The “Five Principles” include adequate and reliable water supply, legal status and participation, WUAs organized within hydraulic boundaries, water deliveries that can be measured volumetrically, and the equitable collection of water charges from members by the WUA (Wang et al., 2010). However, visits to the field in rural China can easily uncover cases in which local irrigation management changes were implemented and failed (Ding et al., 2006). Mukherji et al. (2009) undertook a systematic review of 108 cases of irrigation management reform in large scale publicly owned irrigation systems in Asia and found that less than 40% of the documented cases were successful. The mixed performance of irrigation management reform has also been summarized by some other scholars, such as Mishra et al. (2011) and Yakubov (2012).

Facing with the mix record of irrigation management reform, evaluating the reform and identifying the factors influencing the successful implementation of the reform has attracted attention of many scholars. As expected, through establishing WUAs to transfer full or partial management responsibilities from the government to irrigators (or improve the collective action of farmers), the reform can obviously improve the performance of irrigation system (such as increasing irrigation efficiency, adequacy and equity of water delivery, cost recovery, agricultural productivity and farmer income) (Özerol, 2013; Bassi and Kumar, 2011; Vermillion and Sagardoy, 1999). However, most reforms have not realized the designed purpose due to many reasons. These reasons include such as lack of capacity building for farmers, lack of appropriate legal backup, unreliable water supply, lack of fund to meet the operation and maintenance cost, discrepancy among irrigators and nominally turning responsibilities and power to irrigators (Özerol, 2013; Bassi and Kumar, 2011; Mukherji et al., 2009; Parthasarathy, 2004; Meinzen-Dick et al., 2002).

Although many reasons have been identified for the failure of the reform, seldom literature has noticed the possible reason due to poor incentive mechanism facing by WUA managers. By a formal definition, WUAs are voluntary, non-governmental, nonprofit entities, established and managed by a group of irrigators located along one or several watercourse canals (Wuaconsult, 2008; Vermillion and Sagardoy, 1999). However, due to top-down fashion, in most cases, the “WUA becomes a place in the strongly hierarchical structure that still is controlled by the government” (Zavgorodnyaya, 2006; Veldwisch et al., 2012). Importantly, considering the non-profit nature, establishing incentive mechanisms within WUAs has been much ignored. As Wang et al. (2005, 2006) pointed out that most irrigation reforms in the YRB are nominal due to lack of incentive mechanism. After evaluating the reform performance, Vandersypen et al. (2009) proposes to implement a mix of incentives and measures to resolve the conflict between farmers and the central management to their mutual benefit. In addition to

these studies, seldom literature have examined or noticed the importance of incentives on the success of irrigation management reform. Internationally, most literatures focus on establishing incentives (such as using water price or water rights policy) for irrigators (instead of irrigation managers) to improve water use efficiency (Poddar et al., 2011; William and Liu, 2005 Dinar and Mody, 2004).

Therefore, while there is a rich literature on the evaluation of irrigation management reform either inside or outside of the YRB, there are also research gaps that have limited our deep understanding of the reform. First, most research is either based on case studies or only qualitatively describes the possible experience and lessons of the irrigation management reform, particularly, seldom studies have examined the importance of incentives facing by irrigation managers (Ding et al., 2006; Zhao and Qiao, 2009; Mukherji et al., 2009; Liu and Li, 2011; Poddar et al., 2011). Second, although some researchers conducted the quantitative analysis based on large field surveys (such as Wang et al., 2005, 2006; Liu et al., 2008a,b), their studies were based on one period of data and could not reflect the performance changes from the reform over time. For example, based on field survey data collected in 2001 in the YRB, the early stage of the reform, Wang et al. (2006) applied an econometric model and assessed the performance of irrigation management reform in the YRB. However, after 2001, the reform has continued and spread widely to more villages in the YRB, but little information is available on how this reform has been implemented and what its impacts are on water use and crop productivity.

To gain a further understanding of the evolution of irrigation management reform and to contribute to more effective policy strategies in the YRB and other regions either inside or outside of China, it is urgent to answer the following important questions. After the early 2000s, how did the irrigation management reform continue to proceed? Has the reform seriously considered the incentive for irrigation managers? Have the effects of reform on water use and crop yields differed from those achieved in the early stage of reform? Does the effectiveness of the incentive mechanisms differ under different institutional arrangements? Understanding these issues is important because they have significant policy implications for designing more effective policy measures to improve the efficiency of water use and crop productivity.

The overall goal of this paper is to answer the questions mentioned above. To pursue this goal, we define the following three specific objectives. First, we trace the evolution of institutional reform and the incentives provided to managers in irrigation management in the YRB. Second, we identify the impacts of irrigation management reform on water use, focusing on the role of incentive mechanisms under various management patterns. Third, we analyze the impacts of the reform on crop yields.

The rest of this paper is arranged as follows. The second section discusses the sampling approach and the information collected. The third section provides the description on the reform of irrigation management and incentive mechanisms in two periods. Applying descriptive statistical analysis and econometric models, the fourth section is to assess the impacts of incentives of irrigation management on crop water use. In the fifth section, based on descriptive statistical analysis and established econometric model, the impacts of incentives on crop yield and the potential benefit-cost of the reform also has been discussed. The final section contains conclusions and policy implications.

2. Methods of data collection

The data for this study come from the two round surveys that we conducted in four irrigation districts (IDs) in Ningxia and Henan provinces in 2001 and 2005. In 2001, to represent as much diversity as possible in our data, we chose provinces located in the

Download English Version:

<https://daneshyari.com/en/article/6412992>

Download Persian Version:

<https://daneshyari.com/article/6412992>

[Daneshyari.com](https://daneshyari.com)