

# Role of risk sharing and transaction costs in contract choice: Theory and evidence from groundwater contracts

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Received 6 December 2002; received in revised form 2 June 2005; accepted 15 June 2005

Available online 19 May 2006

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## Abstract

Empirical modeling of contract choice has been problematic because routine large-scale surveys do not contain sufficient information on matched partners and on contractual terms. This paper is based on a primary level survey of groundwater contracts in India. We discuss several different measures for riskiness and transaction costs and use them to test for alternative theories of contract choice. Although the risk sharing explanation has been most popular in the theoretical literature, it is not found to be significant. The data are more consistent with a double-sided incentive model, where the need for giving proper incentives to the buyer and the seller determines contract choice.

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*JEL classification:* O12; Q12; D82

*Keywords:* Contracts; Risk; Transaction costs; Groundwater; Agriculture; India

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## 1. Introduction

With the spread of contracting all over the world, there has been a growing interest in examining the determinants of contract choice. Theoretical research on the subject has analyzed the role of a wide array of factors, such as risk sharing, moral hazard, capital constraints and transaction costs on contract choice (Cheung, 1969; Stiglitz, 1974; Grossman and Hart, 1983; Eswaran and Kotwal, 1985; Laffontaine, 1992; Laffont and Matoussi, 1995). However, it is important to recognize that

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most of the results derived from these models hold only under very specific assumptions regarding the functional forms and the strategy space of the agent (Holmstrom and Milgrom, 1987). Thus, it is widely recognized that careful empirical work is critical in our understanding about the accuracy and generality of the theoretical results.

Empirical research on contract choice has proved to be quite challenging for several reasons. At the core lies the difficulty in finding appropriate empirical measures for theoretical constructs, such as risk attitudes of contracting parties, riskiness of technology, monitoring, enforcement and other transaction costs. Most of the theoretically interesting variables are either not observed or only partially observed. Given this problem, the empirical methodology used most often is to regress contract choice on a range of proxies relating to the characteristics of the contracting parties and crops (alternatively, jobs/technology). The estimated coefficients on these proxies are then used to test hypothesis regarding contract choice. In a recent paper, Akerberg and Botticini (2002) point out that this methodology could lead to misleading results if the potential endogeneity of contracting parties is not given adequate attention. In their study of land tenure contracts in Renaissance Tuscany, they found that the omitted variable bias due to endogenous matching can be quite serious and casts doubt on results from previous empirical papers that have neglected this issue.

Most large-scale surveys contain, at best, very scanty information on matched partners. An additional difficulty in the study of agrarian contracts is that contractual terms tend to be qualitative and often closely enmeshed with social norms. Thus, these are generally missed in routine large-scale surveys, leaving the researcher with an incomplete picture of the contractual structure. On the other hand, surveys that are specifically designed to capture contractual intricacies tend to be limited in their geographical coverage and often cover just 1 year of data. To estimate the contract choice equation, one needs proxies for contractual determinants (such as riskiness of alternative crops or their input intensities) that are exogenous to the contract itself. Such proxies are difficult to construct from the available data.

The present paper uses data from a specially designed primary level survey to examine the determinants of contract choice in groundwater contracts in western India. An important externality associated with this data is that the villages surveyed belong to the same agroclimatic region in western India in which ICRISAT also collected panel data on production conditions.<sup>1</sup> The existence of this supplementary data together with the primary level survey provides us with a unique setting to address the problems generally encountered in doing empirical research on contract choice, as discussed above. We also believe that groundwater contracts provide an interesting avenue to revisit some of the ongoing controversies in contract literature, such as those regarding the role of risk sharing in contract choice, as well as provide new perspectives on the working of agrarian institutions. Existing empirical research on contract choice in agriculture has almost exclusively focused on the case of land tenure. With the spread of irrigated agriculture across the developing world, groundwater transactions between farmers who own wells and their neighbors have become quite widespread, particularly in South Asia. Numerous case studies on water markets from South Asia have pointed to how these markets are changing the structure of the agrarian economy.<sup>2</sup> However, to the best of our knowledge, contract theory has not been systematically applied to understand contract choice in groundwater transactions.

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<sup>1</sup> See footnote 6 for more details on the ICRISAT data.

<sup>2</sup> In particular, these studies have pointed to how social and economic prestige are now more closely related to ownership of a productive well rather than landownership per se. Studies on groundwater markets include Janakarajan (1992), Shah and Ballabh (1997), Dubash (2002), Shah (1993), Kajisa and Sakurai (2003) for India; Meinzen-Dick and Sullins (1994) for Pakistan; Wood and Palmer-Jones (1990) and Fujita and Hossain (1995) for Bangladesh.

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