



# Uncertainty, opportunistic behavior, and governance in construction projects: The efficacy of contracts

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## Abstract

Uncertainty makes exchanges subject to substantial opportunistic behavior that is generally believed to be curbed by the contract. However, how the contract governs the relationship between uncertainty and opportunistic behavior has not been elaborated. This paper examines the effects of uncertainty on the supplier's opportunistic behavior and the moderating effects of contractual complexity. This research classifies uncertainty into environmental uncertainty and behavioral uncertainty and distinguishes contractual complexity from a functional perspective, with elements including control, coordination and adaptation. Using data from 220 owners and general contractors in the Chinese construction industry, this research reveals that a positive relationship exists between uncertainty and opportunistic behavior. Contractual control and adaptation have effects on weakening the relationship between environmental uncertainty and opportunistic behavior, while contractual coordination can mitigate the opportunistic behavior induced by behavioral uncertainty. These findings offer new insights into uncertainty management and a nuanced understanding of contractual governance in projects.

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## 1. Introduction

Transaction cost economics (TCE) posits that transaction characteristics determine the appropriate type of governance structure for the transaction (Williamson, 1985). As one type of transaction characteristics, uncertainty has been recognized as the major source of complication in projects (Wang et al., 2017a). Uncertainty creates the need for adaptation in situations fraught with incomplete and asymmetric information (Zhou and Poppo, 2010), which leads to exchanges that are subject to substantial opportunistic behavior (Williamson, 1985). Opportunistic behavior is defined as behaviors by a supplier that are motivated to pursue its self-interest with deceit to achieve gains at the expense of the buyer (Das and Rahman, 2010; Lu et al., 2016). As a formal inter-organizational governance mechanism,

the contract has been regarded as an effective way to mitigate opportunistic behaviors (Malhotra and Lumineau, 2011). Therefore, it is of relevance to examine how to devise the most appropriate governance structure (i.e., contract) to deal with transaction hazards (i.e., opportunistic behavior) which are induced by transaction characteristics (i.e., uncertainty).

Over the years, two main contract research streams have formed. The first examines the potential determinants or antecedents, such as asset specificity, uncertainty and task interdependence, which can be used to explain and predict the design features of the contract (e.g. Anderson and Dekker, 2005; Li et al., 2012; Turner and Simister, 2001). However, there exists inconsistent evidence on how uncertainty affects contract governance structures. Some scholars argue that higher levels of uncertainty lead to complex contracts (e.g., Cruz and Marques, 2013; Leiblein, 2003). In contrast, Saussier (2000) holds the view that external uncertainty has a negative influence on contractual complexity. The second research stream studies the effects of

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different contract structures, examining how project performance is improved or cooperative behavior is facilitated (e.g. Poppo and Zhou, 2013; Wang et al., 2017b). However, consistent conclusions on how contract framing affects opportunistic behavior have not been drawn. Some scholars argue that a more complete contract is generally believed to attenuate opportunistic behavior (Lu et al., 2016; Luo, 2002), whereas others argue that contractual governance has no significant effect on opportunistic behavior (Lu et al., 2015a) or may even lead to an erosion of positive attitudes and consequently more opportunistic behavior (Kadefors, 2004).

The two main research streams both have deficiency since they do not consider transaction characteristics and transaction outcomes simultaneously. To be more specific, the first stream is ultimately silent on the performance or their implications for contractual design. Meanwhile, what causes the contract to become complex has not been thoroughly elucidated in the second stream. In order to fill this gap, a distinctive model should be established, which can link the transaction characteristics to the performance of a governance structure. In the context of this research, the highlight of the model manifests in the different moderating impacts of contractual complexity on framing the relationship between uncertainty and opportunistic behavior.

The above inconsistent conclusions derive mainly from a failure to divide contract into dimensions. Since individual dimensions of contract focuses on different aspects of the contractual framework (Luo, 2002), contract theory came up with a functional perspective that considers the contract provisions as serving three functions, namely, contractual control, which safeguards investments and controls opportunistic behavior, contractual coordination, which aligns expectations and clarifies task specifications, and contractual adaptation, which copes with future contingencies (Mellewigt et al., 2012; Schepker et al., 2014). These three functions serve to mitigate inter-organizational hazards caused by different transaction characteristics. Apart from disaggregating contract, how to characterize the design features of contract is critical for contract research. Williamson (1985) argues that crafting and negotiating complex contracts will incorporate large ex-ante transaction costs. Thus the degree of detail of a contract is a variable to be determined concerning the economizing of transaction costs (Williamson, 1985; Mellewigt et al., 2012). In this research, contractual complexity is used to reflect the degree of explicitness and elaborateness of details specified for governing the relationship between transacting parties (Mellewigt et al., 2012; Srivastava and Teo, 2012).

The goals of this study are to bring new explanations for previous controversy and provide empirical evidence on the linkage between uncertainty and supplier's opportunistic behavior, and then to demonstrate the different roles played by the complexity of each contractual function. This paper aims to fill the aforementioned research gaps and address the following research questions:

- 1) What effects do the two types of uncertainty have on suppliers' opportunistic behavior?
- 2) How does the complexity of each contractual function moderate the above effects?

To further understand the interplay among uncertainty, opportunistic behavior, and contract governance, we use a sample of construction projects carried out by Chinese firms. We focus our analysis on construction projects because they are usually executed in a dynamic environment (Guo et al., 2016) and information asymmetry exists between owner and contractor (Xiang et al., 2015). Meanwhile, due to the characteristics of long duration and high cost, construction contracts are comprehensive, and the success of construction project relies heavily on effective contractual governance. These considerations make construction projects a good context in which to study this topic, and they may not always be apparent in other types of project.

## 2. Theoretical background

### 2.1. Environmental and behavioral uncertainty in projects

The concept of uncertainty has long been important in many project management studies. Koopmans (1957) distinguishes between two types of uncertainty that are primary uncertainty, which reflects a lack of knowledge about states of nature, such as the uncertainty regarding natural events, and secondary uncertainty, which reflects a lack of knowledge about the actions of other project participants. Williamson (1985) considers that the secondary uncertainty referred by Koopmans is a rather innocent type, and without strategic nondisclosure of information. Later, some scholars used environmental uncertainty to describe the rate and unpredictability of environmental changes surrounding projects over time and behavioral uncertainty to reflect the difficulty in anticipating and understanding the actions of an exchange partner (e.g., Fink and Harms, 2012; Krishnan et al., 2006; Zhou and Poppo, 2010). Moreover, others used external uncertainty and internal uncertainty to disaggregate uncertainty (Luo, 2006; Zhao et al., 2004). According to their definitions, primary uncertainty, environmental uncertainty and external uncertainty are synonymous and result from exogenous sources outside the scope of the project, such as unpredictability in markets. Moreover, secondary uncertainty, behavioral uncertainty and internal uncertainty are also synonymous. They reflect a situation when one party cannot effectively assess or measure the performance of the other (Zhou and Poppo, 2010). Although this categorization was not developed specifically to construction projects, it provides a useful framework to analyze uncertainty issues in the construction field. Construction works are exposed to adverse weather conditions and unforeseen ground conditions that are beyond the control of contracting parties (Pang et al., 2015). Meanwhile, unlike many other industries, construction is a complex blend of disparate needs, skills and techniques that makes it difficult to assess the performance. Therefore, both dimensions of uncertainty are considerable in construction projects.

Aligning with most project management research, this study adopts environmental and behavioral uncertainty to distinguish between the two types of uncertainty. Environmental uncertainty refers to the degree of instability and unpredictable changes in circumstances surrounding a project (Abdi and Aulakh, 2017).

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