



Ownership domination in standardization: Evidence from Chinese industrial firms

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ABSTRACT

This paper empirically analyzes how ownership affects firms' participation in formulating Chinese national standards and trade standards using a large dataset of Chinese industrial firms. Overall examinations show that foreign enterprises are less likely to participate in drafting standards than domestic firms, whereas state-owned enterprises do not have significant advantages over domestic firms of other ownerships in formulating standards. Further extending the study to consider industrial heterogeneity, we find that ownership domination of domestic firms over foreign firms is more serious in formulating trade and voluntary high-tech standards, but is not significant in the case of national and compulsory high-tech standards. This implies that China's standards system seems to be more market-oriented and more communicative with foreign players in its essential areas.

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1. Introduction

While China has gained rapid economic growth, it is still a latecomer in technology development. However, ever since the beginning of 2000s, China has been making continuous efforts to promote indigenous innovation capacity and facilitate technology leapfrog to achieve technological independence. Enhancing national R&D intensity, strengthening the intellectual property right regime and developing its own technical standards are recognized as critical elements of Chinese technology policies (Suttmeier & Yao, 2004).

Utilizing its growing technological capabilities and market power, China has been actively developing its own technical standards, especially in the field of Information and Communications Technology (ICT). This effort has attracted considerable attention from researchers. Massive research and discussions have been dedicated to the nature and motivations of China's strategy in standardization. Some scholars attribute the government's standards strategy to “techno-nationalism”, which describes the attempt of advancing national interests through indigenous innovation (Naughton & Segal, 2003). However, there are also arguments that China's standards policy is far beyond the scope of techno-nationalism, and that it is a combination of distinct or even contradictory approaches (Lee, Chan & Oh, 2009; Kim, Lee, Kwak & Seo, 2014; Kwak, Lee & Fomin, 2011; Nakayama, 2012; Shen, Graham, Stewart & Williams, 2013; Suttmeier & Yao, 2004; Williams, Graham, Jakobs & Lyytinen, 2011; Zhou, 2006). Case studies focusing on Information and Communications Technology (ICT) industries have also revealed the pattern of government intervention in Chinese standardization (Kwak et al., 2011; Kshetri, Palvia & Dai, 2011; Xia, 2011; Gao, 2014; Gao, Yu & Lyytinen, 2014; Gao & Liu, 2012; Yan, 2007; Van De Kaa, Greeven, & van Puijenbroek, 2013; Su & Fomin, 2010; Zhan & Tan, 2010).

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Along with the arguments about the complexity of Chinese standards strategy, research also presents conflicting evidence on the involvements of firms of different ownerships. Many scholars observe that Chinese standards policy favors domestic firms over foreign firms in technological competition and standardization (Kshetri et al., 2011; Suttmeier & Yao, 2004; Weeks & Chen, 2003). Besides, in case studies concerning China's efforts to promote its own ICT standards, some scholars also notice significant involvements and dominations of state-owned enterprises (SOEs) (Gao, 2014; Gao & Lyytinen, 2000; Zhou, 2006). However, opposite observations exist too. For example, it is demonstrated that China provides national support to various types of firms (including POEs) for technological advancements, rather than only to SOEs, and that there are also considerable foreign involvements in Chinese technology areas (Kim et al., 2014; Kwak et al., 2011; Zhou, 2006).

Recognizing that the involvements of firms with different ownerships reflect the balance and coordination among contradictory forces on the path of Chinese standardization, this paper intends to explore the feature of Chinese standards strategy by empirically examining the pattern that how firms of different ownerships are involved in Chinese standardization. Current qualitative studies have reached some inspiring conclusions from case study and narrative induction, yet empirical research based on firm-level data is still rare. To the best of our knowledge, only one paper analyzes factors driving firms to participate in standardization. That is, Blind (2006) employs manufacturing firm data in German and finds that company size has a significant and positive effect on the probability of participating in standardization. Although there are some other firm-level studies relating to standards and standardization, these research mainly focus on how standardization affects firm behavior and performance such as export (Chen, Otsuki & Wilson, 2006; Fontagné, Orefice, Piermartini & Rocha, 2013; Reyes, 2011), R&D (Swann & Lambert, 2010) and productivity (AFNOR, 2009), the motivation of voluntary adoption of standard (Christmann & Taylor, 2001; Rysman, Simcoe & Wang, 2015), and the coordination in standards committees (Simcoe, 2012). Few studies have addressed the issue of ownership and firm's participation in standardization.

This paper extends research on this issue by employing econometric analysis based on a large sample of Chinese industrial firms. The analysis here takes into account both the overall involvements of firms in standardization and firms' participations in drafting standards of different levels (national standards and trade standards) and attributes (compulsory standards and voluntary standards). All results confirm the existence of ownership domination in the sense that domestic firms are significantly more likely to draft Chinese standards than foreign firms, but reject the hypothesis that SOEs have significant advantages over other domestic firms in formulating standards. The analysis is further extended to consider industrial heterogeneities. This extension demonstrates that foreign companies face more severe situations of ownership domination in high-tech industries when formulating trade standards and voluntary standards, but reveals no significant ownership domination in the case of national and compulsory high-tech standards. These results imply that China's standards system seems to be more market-oriented and more communicative with foreign players in its essential areas.

The remainder of this paper is organized as follows. The next section briefly introduces backgrounds and hypotheses; Section 3 presents the sample, the definition of variables and descriptive statistics; Section 4 displays results of our empirical analysis and robustness checks; Section 5 concludes.

2. Backgrounds and hypotheses

2.1. Chinese standards strategy and research hypotheses

Over the past 30 years, China has gained rapid growth in both its economy and technological capacity. Since the beginning of 2000s, China has been dedicated to promoting its own technical standards, especially in the field of ICT. Cases of China's standards campaigns, such as the Wireless Authentication Privacy Infrastructure (WAPI), the Time Division-Synchronous Code Division Multiple Access (TD-SCDMA) and the Audio Video coding Standard (AVS), have attracted worldwide attentions and raised questions about the motivations behind and the nature of Chinese standards policy.

One of the most important motivations behind Chinese standards strategy is to move away from technology imports to indigenous innovation and technological independence. Since the open-up, China has specialized in low-end assembly operations in manufacturing sectors. Most Chinese firms, especially those private-owned ones, rely on low labor costs, technology imports and imitations to establish their competitive advantage, with core IPPs held by foreign companies. The weak control of upper-stream technology gradually becomes a huge threat to Chinese producer's profit. The case of DVD is prevalently used to illustrate this point. While market competition drove the unit price down to \$60 or even lower, foreign companies such as Phillips, Sony and LG demanded patent fees amount to \$15–22 per unit, leaving Chinese producers only a slim profit margin (Zhou, 2006). Being aware of the technological threatens and the fact that those challenges would intensify after accessing WTO, Chinese government started to adjust its technical policy to promote its own technical standards.

Besides the motivation of achieving technological independence, there are also some other motivations and even contradictory approaches in Chinese standards strategy. This leads to divergences in how to summarize the main feature of the standards strategy. Some scholars tie Chinese technology policies to techno-nationalism, which means the government attempts to enhance national interests through supporting domestic technological activities. The source of the techno-nationalism is mainly ascribed to the commercial interests of technological autonomy and escaping from the "patent trap" of substantial royalty burdens, as mentioned above (Breznitz & Murphree, 2013; Chen, Fan & Lu, 2002; Ernst, 2009, 2011; Gao, 2014; Suttmeier & Yao, 2004; Xia, 2011; Zhan & Tan, 2010; Zhou, 2006). In addition to technological independence, the perception that the nation's growing innovation capacity and market size can influence the adoption of standards

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