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“Forced technology transfer” policies: Workings in China and strategic implications

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ABSTRACT

This paper evaluates the ability of “forced technology transfer” (FTT) policies – i.e., policies meant to increase foreign-domestic technology transfer that simultaneously weaken appropriability of foreign innovations – to contribute to technology transfer. We focus on transfer of frontier technology in China’s newly designated “strategic emerging industries” (SEIs). Drawing on a survey of foreign firms, extensive interviews with foreign firms, and case studies of Chinese firms, we identify three categories of FTT policies in SEIs: “lose the market”, “no choice”, and “violate the law” policies. Our thematic analysis finds that FTT policies likely exert the most leverage over (i.e., force) frontier technology transfer when accompanied by seven conditions: (1) strong state support for industrial growth, (2) oligopoly competition, (3) other policies closely complementing FTT policies, (4) high technological uncertainty, (5) policy mode of operation offering basic appropriability and tailored to industrial structure, (6) reform avoidance by the state, and (7) stringent policy compliance mechanisms. We develop a Strategy & Risk Matrix to forecast the overall leverage of individual FTT policies. We conclude that Chinese FTT policies may enable domestic acquisition of frontier foreign technology if all seven conditions determining policy leverage are fully exploited by the state. However, if this is not the case, the policies have weaker leverage and may even discourage technology transfer.

1. Introduction

Many Chinese firms lack core technological capabilities, which restrains their ability to indigenously innovate and catch up with fore-runners (Fu and Gong, 2011; Xiao et al., 2013). These challenges can be addressed by acquiring and absorbing valuable foreign technology, and simultaneously upgrading internal firm capabilities (Fu et al., 2011; Fu and Gong, 2011). Like other interventionist states in the past (e.g., Japan), the Chinese government tries to help domestic firms acquire foreign technology despite reluctance from foreign firms to transfer their technology (Grimes and Sun, 2014; Hout and Ghemawat, 2010). This raises the question of how the state might best be able to provide strategic help to latecomer firms in acquiring valuable foreign technology. This paper explores this question by analyzing the ability of “forced technology transfer” (FTT) policies to spur transfer of frontier technology in China’s “strategic emerging industries” (SEIs). *FTT policies can be defined as government policies meant to increase foreign-domestic technology transfer that simultaneously weaken appropriability of foreign*

innovations. Our research targets policymakers considering adopting or revising FTT policies, as well as companies seeking to manage risks associated with FTT policies.

Our study focuses on SEIs because their development is central to the Chinese government’s ongoing indigenous innovation and larger economic catch-up strategy (State Council, 2010; Prud'homme 2016a, b). In 2010, China’s central-level government designated seven SEIs: (i) energy conservation and environmental protection, (ii) new generation information technology (IT), (iii) biotechnology, (iv) high-end equipment manufacturing, (v) new energy, (vi) new materials, and (vii) new energy vehicles. In the same year, the target was set for SEIs to account for 8% of China’s GDP by 2015 and 15% by 2020 (State Council, 2010). Additionally, we focus on transfer of “frontier” technology because of its importance, relative to more mature/less cutting-edge technologies, to competitiveness in SEIs (Wen, 2013). Frontier technology is the most advanced technology emerging from research and development (R&D), which is generally not at the point of mass commercial adoption (Acemoglu et al., 2006).

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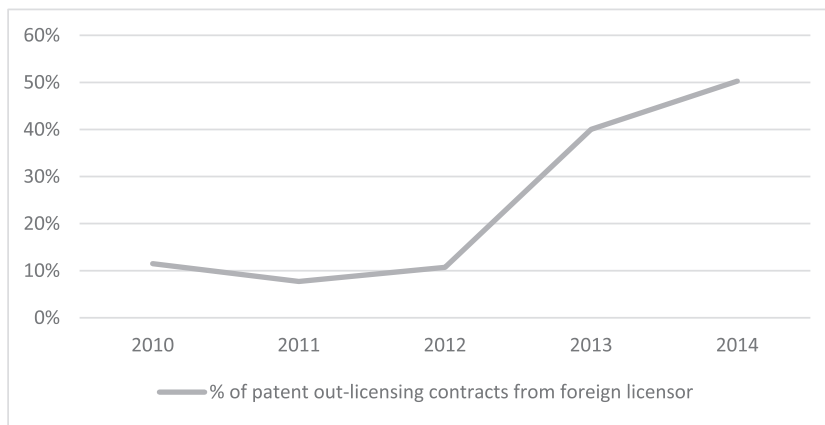


Fig. 1. Percentage of foreign patent out-licensing to China-based entities in SEI-related industries (2010–2014).

Footnote: Based on technology fields in Schmoch (2008) determined to be the closest fit with China's SEIs (specifically, fields 1, 2, 3, 4, 11, 15, 17, 20, 21, 24, 27, and 29).

Source: Based on CNIPR Patent Information Database, technology classification from Schmoch (2008) and State Council (2010).

The Chinese state has instituted a multifaceted strategy to encourage foreign-Sino transfer of frontier technology in SEIs and other industries. One component of this strategy is to strengthen China's appropriability environment. This is exhibited, for instance, by the last revision to China's Patent Law (Hu and Jefferson, 2009). The term "appropriability" broadly refers to the ability of a firm to capture the profits generated by its knowledge as it chooses (Teece, 1986). Appropriability "weakened" by the state refers to restrictions imposed by government policies on a firm's ability to exploit its technology as it chooses (Gao et al., 2007).

There are different types of what can be considered "FTT" policies. The literature most often focuses on one branch of closely related policies, namely intellectual property (IP) laws and IP enforcement (e.g., Hall, 2014). However, the literature typically does not refer to these by the name "forced technology transfer policies". Other literature discusses trade performance requirements (e.g., Blomstrom et al., 2000; Kokko and Blomstrom, 1995; UN, 2003), which, depending on the details of the requirements therein, can be considered FTT policies. Scholarly studies into what can be considered China's FTT policies largely focus on technology for market access requirements, other foreign investment catalogue restrictions, or local content requirements (e.g., Pearson, 1991; Bruun and Bennett, 2002; Thun, 2006; Hout and Ghemawat, 2010; Feng, 2011; Xia and Zhao, 2012; Grimes and Sun, 2014; Holmes et al., 2015). However, as explained throughout the remainder of this paper, China also employs other types of FTT policies.¹

The concept of what we label as policy "leverage" is integral to understanding the ability of FTT policies to contribute to technology transfer. The Chinese state institutes FTT policies in an attempt to shift the bargaining power in commercial transactions from foreign to Chinese firms (Holmes et al., 2015). The leverage exerted by FTT policies is represented by the extent to which they are actually successful in shifting bargaining power in technology transfer arrangements. In other words, "leverage" is the ability of the state to pressure (what some would call "force") technology transfer. As discussed throughout this paper, an FTT policy's leverage is not only owed to its internal design but also to its strategic deployment in the right conditions.

As is evident throughout this paper, with the exception of one type of FTT policies ("no choice" policies), foreign firms are allowed some flexibility to decide whether or not they want to comply with China's FTT policies. Therefore, even though non-compliance with FTT policies

is always met with consequences, using the word "forced" is arguably somewhat of a misnomer. To be consistent with well-established lingo, we still retain the term "forced" technology transfer policies but only for policies that meet our corresponding definition provided at the outset of this paper (i.e., government policies meant to increase foreign-domestic technology transfer that simultaneously weaken appropriability of foreign innovation). To be sure, not all Chinese FTT policies we explored necessarily violate World Trade Organization (WTO) obligations, although some very well might.²

The possibility that FTT policies may not have leverage over frontier technology transfer, or might even discourage technology transfer if not smartly designed, represents potentially high stakes risk-taking by policymakers. There is already some evidence that China's FTT policies in SEIs might not be having their desired effect (Prud'homme, 2012; USCBC, 2013). At the same time, Fig. 1 shows that the percentage of total patent out-licensing contracts (one important type of technology transfer) from domestic and foreign licensors to China-based entities in industries broadly related to SEIs has significantly increased. Then again, the general trends in Fig. 1 tell us little about FTT policies. A more granular analysis is needed to explore the contribution of FTT policies to foreign-Sino technology transfer in SEIs.

There are at least three gaps in the literature regarding the workings of FTT policies. First, despite interesting scholarship regarding some types of FTT policies, there is little if any academic literature comprehensively investigating the workings of the many different types of FTT policies currently being used by China. Second, there appears to be no literature that thoroughly disentangles how different types of FTT policies dynamically interact with numerous other relevant factors in the economy to actually force (i.e., exert significant leverage over) foreign-domestic technology transfer. And third, we know little about the ability of FTT policies to spur transfer of frontier technology in particular, let alone frontier technology in China's SEIs specifically.

This paper seeks to bridge these gaps in the literature by investigating how different FTT policies in China impact foreign-domestic technology transfer. Specifically, we seek to answer the following questions:

- (1) What factors contribute to the ability of China's FTT policies in SEIs to enable frontier technology transfer from foreign firms to Chinese firms?
- (2) What implications do these findings have for catch-up strategy

¹ At the time of research for this paper, US government reports looked at some, though not all, of these policies (see BEA, 1999; CECC, 2010; Linton et al., 2010). Also, after the research for this paper was completed, the US Chamber of Commerce published a useful paper on controversial IP and technology policies in China (see https://www.uschamber.com/sites/default/files/final_made_in_china_2025_report_full.pdf). And while this paper was under review at TFSC in 2018, the US Trade Representative's Office published a substantial report on controversial Chinese technology and IP policies (see <https://ustr.gov/sites/default/files/files/Press/Reports/2018%20Special%20301.pdf>).

² For some of the most relevant WTO "plus" provisions in this regard, see Article 7(3) of China's Protocol of Accession to the WTO and Paragraph 203 of the Working Party Report on China's WTO Accession. Several provisions of the Trade-related Aspects of Intellectual Property (TRIPs) Agreement may also be relevant. Note that some FTT policies may also contain provisions actually meant to strengthen appropriability of foreign innovations; however, all policies fitting the definition of FTT policies outlined in this paper will at least have some provisions that weaken appropriability of foreign innovations.

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