

## Research Paper

# Mind the missing links in China's urbanizing landscape: The phenomenon of broken intercity trunk roads and its underpinnings



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## ABSTRACT

The success of intercity transport planning is not guaranteed, with broken intercity trunk roads (BITRs) as a major case in point. This paper reports a first exploratory analysis of BITRs in China. Our analysis identifies geographical patterns of broken intercity highways and conjectures the relationship between BITRs and their socioeconomic, political, and geographical underpinnings. More specifically, by comparing national highway plans in 2013 and completed highways in 2015, we identified 76 city dyads that are associated with BITRs. A subsequent logistic regression analysis suggests that fragmented landscape, large gaps in total GDP, and provincial boundaries will increase the likelihood of BITRs between city dyads. Our empirical framework can be extended to assess other inter-jurisdictional infrastructure projects such as power grids, railways, and pipelines, where planned but unfinished links are common. The paper concludes with city-regional and transport planning policy implications.

## 1. Introduction

Recent literature has highlighted city-regions as the new urban form in globalization (Harrison and Hoyler, 2014). This (re)surgence of interest in city-regions is particularly relevant for intercity transport planning, as investment, institutions and policies at the city-regional scale are being restructured to facilitate spatial development and accommodate the mobility needs of millions in emerging city-regions (Yang, Lin, & Xie, 2015). Many intercity transport projects have been proposed or implemented, ranging from proposed high-speed-rail corridors within ‘megaregions’ in the US, to the 42-kilometer long Hong Kong-Zhuhai-Macau bridge in China’s Pearl River Delta, and to multi-modal transport networks planned for many cross-border regions in Europe (Castanho et al., 2017; Hou and Li, 2011; Ross, 2011). The importance of intercity transport planning for city-regional development also echoes the observation that cities increasingly compete over connectivity (Khanna, 2016). While inter-city transport planning and development have been examined within the context of the US (Jonas, Goetz, & Bhattacharjee, 2014), Europe (Peters, 2003), and other Asian countries (Miharja and Woltjer, 2010), relatively less is known about intercity transport planning and related infrastructure construction in China, which has a distinct institutional and administrative set-up as compared to other developed countries. Intercity transport planning, nevertheless, often face similar issues such as overlapping jurisdiction, conflicting authority, and unbalanced distribution of costs and benefits

across countries (Martens, Golub, & Robinson, 2012; Taylor and Schweitzer, 2005). Still, as “emerging Chinese cities provide a laboratory to observe planetary urbanization” (Wu, 2016), a closer look into intercity transport planning therein may on the one hand contribute to a nuanced understanding and policy lessons that have international appeals, especially for transition and emerging economies, and on the other hand may enable a more profound reflection of the normative or desired contents and forms of intercity transport planning across countries.

The success of intercity transport planning, however, is not guaranteed, with broken intercity trunk roads (BITRs) as a major case in point. BITRs (*duan tou lu*) generally refer to intercity highways and expressways that are (1) planned but unfinished; (2) usually disconnected near city boundaries; and (3) short in distance, but once connected, would greatly improve inter-jurisdictional transport connections (Fig. 1; Ye and Zhao, 2015; Zhao, Wang, & Mu, 2010). BITRs have become a persistent and pervasive phenomenon across Chinese cities. There are at least 6000 kilometers of BITRs in the National Trunk Highway System alone (Ministry of Transport, 2009), with broken segments present in provincial and municipal highways. Aiming to tackle this issue, the central government has recently issued mandates and planned to invest large sums. The Ministry of Transport recently pledges more than CNY¥ 450 billion to finish broken roads at both inter- and intra-city scales (Xinhuanet, 2015). Similarly, local governments have strived to finish BITR projects through various initiatives

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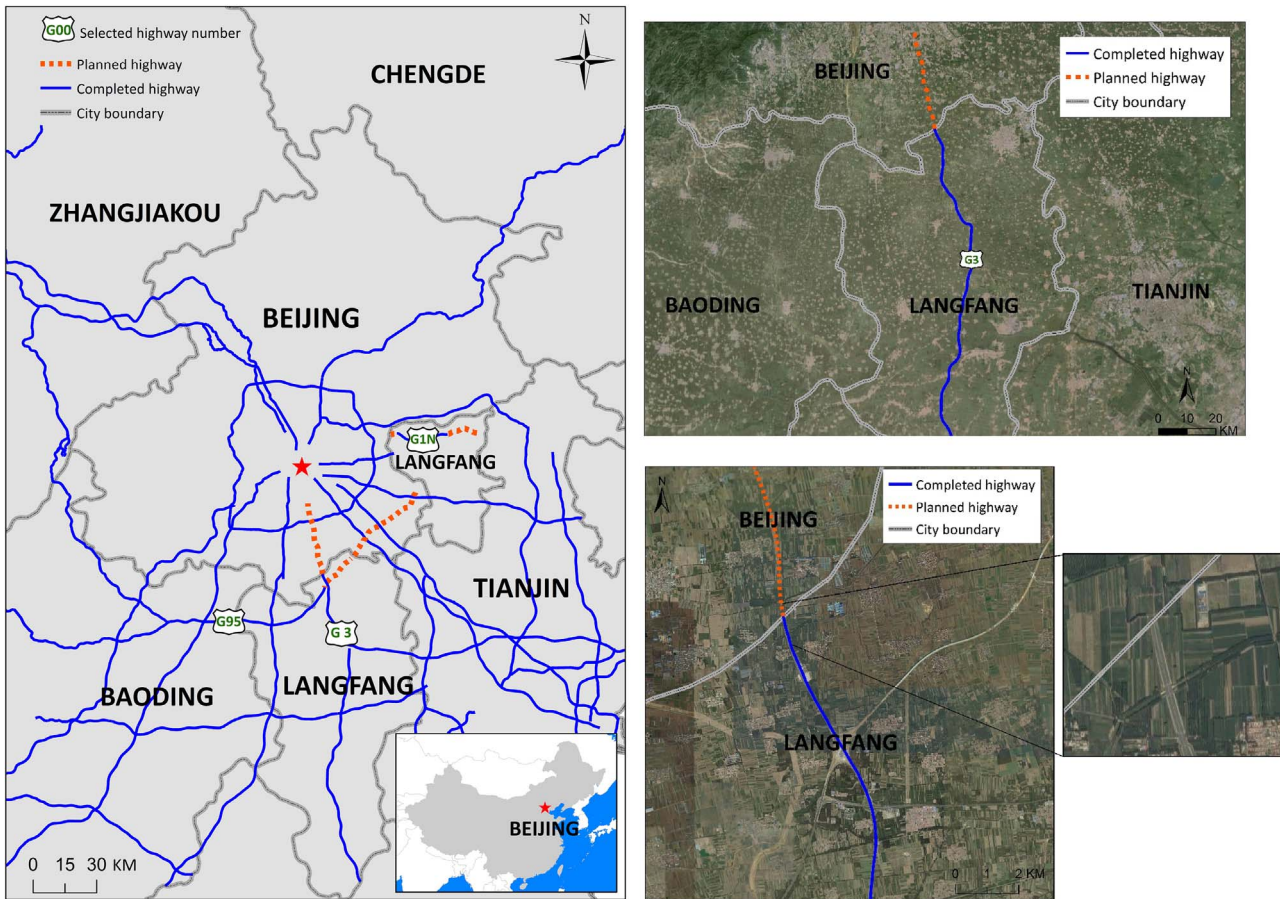


Fig. 1. Examples of BITRs. Left: Selected BITRs near Beijing; Upper right: a broken link on ‘G3’ highway between Beijing and Langfang; Lower right: Remote sensing images in 2015 suggest that the construction of ‘G3’ highway on the Langfang side has been completed.

(Yang et al., 2015). Nonetheless, broken links are not unique to China, as similar phenomena can be found in other contexts, such as planned but unfinished interstate highway in the US (Shatz, Kitchens, Rosenbloom, & Wachs, 2011) and ‘missing links’ in key transport corridors in Europe (European Commission, 2014).

In spite of the prevalence and the clear-cut inefficiency of BITRs, little research has critically examined the distribution, causes and consequences of their presence. Literature on city-regional governance has revealed important socioeconomic, political, and geographical factors underlying (un)successful intercity cooperation (Li and Wu, 2013; Luo and Shen, 2009), but to date there have been few attempts to develop a large-scale systematic empirical evaluation of the identified dynamics. Studies of transport geography and planning have charted the recent infrastructure development and its impacts on intercity connectivity and urban economics (Faber, 2014; Wang, Ding, & Yang, 2011), but missed unfulfilled potentials and distributive effects of BITRs. The limited academic attention devoted to BITRs is patchy and often relies on anecdotal evidence. Missing links and gaps are the hallmark of BITRs, but also evident in the literature on this topic.

Notwithstanding a fruitful line of research in understanding Chinese urbanization in general and city-regional planning and governance in particular, BITRs have been less well-researched. Without such an analysis, we may face a vicious cycle of incomplete understanding and misinformed interventions, endangering the entire effort to tackle BITRs issues. With the aim of filling some of these voids, this study presents a first exploratory of BITRs in China at the national scale. This paper will build upon the insights from several lines of academic inquiry and address the following important questions: What are the geographical patterns of BITRs? Would BITRs more likely to take place in a certain set of social, economic, political, and geographical

contexts? What are the underlying processes that give rise to the observed BITRs patterns? More specifically, our analysis will identify geographical patterns of broken links on national highways and empirically examine the identified relationship between BITRs and a range of underlying dynamics, such as economic development, terrain, and regional coordination.

## 2. Literature review

### 2.1. BITRs in China

Although BITRs have received much policy and media attention, there are no clearly defined criteria for identifying BITRs. In other words, BITRs remain largely a ‘one knows it when one sees it’-type phenomenon. Both the government and media have produced various intuitive, yet incomplete definitions (Yang et al., 2015; Ye and Zhao, 2015; Zhao et al., 2010). Synthesizing these perspectives, we propose a working definition of BITRs as intercity highways that are (1) planned for a while (2–3 years), often partially built, but unfinished; (2) usually disconnected near city boundaries; and (3) short in distance (usually no longer than 100 km), but once connected, would greatly improve inter-jurisdictional transport connections. For BITRs, the construction of roads within individual cities/jurisdictions is often completed, while the cross-boundary segments are unfinished and thus require planning and governance at the city-regional scale (see Fig. 1 for a BITR case between Beijing and Langfang). The concept of ‘broken roads’ has been applied at both intercity (e.g., BITRs) and intra-city scales (e.g., planned but unfinished local streets). We will focus on the former, as intra-city broken roads entail a different set of underlying dynamics. We note that in the literature and practice the term ‘highway’ has been used to refer

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