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External enablement of new venture creation: An exploratory, query-driven assessment of China's high-speed rail expansion☆

Jean Jinghan Chen[a], Chuantao Cui[b], Richard A. Hunt[c], Leona Shao-Zhi Li[a,d,*]

[a] University of Macau, Macau SAR, China
[b] Sichuan University, Chengdu, China
[c] Virginia Polytechnic Institute, Blacksburg, VA, USA
[d] Zhuhai UM Science and Technology Research Institute, Zhuhai, China

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ABSTRACT

This study seeks to build upon empirical and conceptual work examining the characteristics, mechanisms, and roles of exogenous, actor-independent drivers of entrepreneurial actions and outcomes, known as "external enablers" (EE). These aggregate-level changes – ranging from unforeseen, episodic EEs such as natural disasters and pandemics, to evolving, pan-generational EEs such as socio-demographic shifts, climate change, and breakthrough technologies – constitute a burgeoning stream of research concerning the manner and degree to which disequilibrating circumstances facilitate or forestall business venturing. The central focus of our investigation takes up the critical issue of an EE's temporal, spatial, and sectoral scope. Specifically, we seek to extend and enhance the EE framework by offering a more nuanced assessment of how and why the actions and outcomes elicited by EEs vary, often significantly, as a function of an EE's characteristics. To delve into this emerging line of inquiry, we conduct an abductive, query-driven, exploratory investigation of the impact China's high-speed rail expansion has had on new business venturing. Our findings contribute to further refinement of the theoretical EE framework, provide an important road map for future empirical studies, and offer considerable practical and policy implications.

Executive summary

No entrepreneur operates in a vacuum. Evolving contextual circumstances continually change the calculus of resources, capabilities, networks, competitive forces, and innovations. Although much of entrepreneurship research aptly explores the roles of individuals and firms in business venturing, scholars have increasingly sought to incorporate the impact of macro-level environmental changes that lie beyond the direct influence of any given entrepreneur or business. The external enabler (EE) framework (Davidsson, 2015; Davidsson et al., 2018) was developed to capture the influence exerted by exogeneous, macro-environmental changes on entrepreneurial actions and outcomes. These external conditions include both sudden and slow developments – demographic shifts, natural disasters, political developments, large-scale technological shifts, even pandemics – that possess the capacity to influence the rate, extent, and nature of entrepreneurial activity.

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* Corresponding author.
E-mail address: leonali@um.edu.mo (L.S.-Z. Li).

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The central focus of our investigation takes up the critical issue of an enabler's temporal, spatial, and sectoral scope; specifically, how these characteristics activate enabling mechanisms and determine the extent of an EE's influence. Existing research on EEs recognizes that enablers are far from uniform in the impact they exert (Bennett, 2019a, 2020; Davidsson, 2019; Davidsson et al., 2018), yet it remains unclear why identical EEs may exert very little influence in one context and massive influence in another. In concert with Davidsson's (2019) call for exploration aimed at capturing the "existence, characteristics and variance of environmental changes," our study adopts an exploratory, abductive research design and difference-in-differences analytical model, using a granular, data-rich context involving the rollout of China's high-speed rail (HSR) service. Our results reveal that the HSR project elicited significant increases in new business venturing activity; however, most of the favorable effects were highly localized, with a declining impact after the project's first anniversary. Interestingly from an economic development perspective, regions that were already well-off exhibited the greatest increases in entrepreneurial action, meaning that HSR's rising tide did not lift all the boats equivalently.

As the first large-scale application of the EE framework to China, our findings lend material refinement to five key aspects of the literature on EEs: (i.) the level of conceptual and empirical precision used in categorizing EE's temporal, spatial, and sectoral scope characteristics; (ii.) the sources of variance – ranging from non-occurrence, to weak effects, to strong effects – arising across regions, sectors, and agent characteristics; (iii.) the manner in which simultaneous enabling mechanisms should be parsed and assessed; (iv.) the differentiation between and importance of the scope of enablers and the scope of enabler effects; (v.) and, the introduction of the *generic intensity* concept, including consideration of how it relates to agency intensity, opacity, and the influence exerted by an enabling mechanism. Overall, our study contributes to EE's theoretical underpinnings, while offering a novel analytical toolbox for future studies and offering potent implications for practitioners and policy-makers.

1. Introduction

Macro-environmental forces – some instantaneous and short-lived (Dutta, 2017) and others emerging and persisting over the course of generations (Baumol, 1996) – variously facilitate and inhibit entrepreneurial action (Davidsson, 2015; Gnyawali and Fogel, 1994), opening and closing "windows of opportunity" by activating broad contextual conditions (Bennett, 2019a; Welter, 2011) and actor-specific circumstances (Lofstrom et al., 2014; Shane, 2003; Simon et al., 2000) that lead to business venturing. These largely exogenous influencers, dubbed "external enabler" ("EE") by Davidsson (2015) constitute disequilibrating forces, possessing the capacity to activate "system-level" mechanisms that fundamentally recalibrate the rate, extent, and substance of entrepreneurial actions and outcomes (Davidsson et al., 2018; Shane, 2012).

Yet, scholarly attentiveness to environmental forces has, until quite recently, lagged actor-centric conceptions of business venturing (Bennett, 2019a, 2019b; Chalmers et al., 2019; Davidsson, 2015, 2019; Davidsson et al., 2018; Obschonka and Audretsch, 2019; von Briel et al., 2018; Browder et al., 2019; Leten et al., 2016). As Davidsson (2019) notes, the vast majority of hypothesized relationships in entrepreneurship research have tended to attribute causation to agents. He finds that just one in eight hypotheses incorporates environmental forces in any form and only one in two hundred ascribes the direct effects of entrepreneurial action and outcomes to environmental change. Unquestionably, the causal influence exerted by founders and founding teams is central to business venturing, but the relative paucity of studies taking into account the influence of macro-environmental changes understates their role and obviates the need for continuing development of the EE framework.

The central focus of our investigation takes up the critical issue of an EE's temporal, spatial, and sectoral scope. Existing conceptualizations of EEs have embraced the notion that enablers are far from uniform in their respective impacts (Bennett, 2020; Davidsson, 2019; Davidsson et al., 2018), yet it remains unclear why identical EEs might exert little influence in one context and massive influence in another. To this, we ask: How and why do the actions and outcomes elicited by EEs vary, often significantly, as a function of an EE's characteristics? And, what are the implications of this variance for the activation of enabling mechanisms?

In concert with Davidsson's (2019) call for exploration aimed at capturing the "existence, characteristics and variance of environmental changes" pursuant to the EE framework, our study adopts an exploratory, abductive research design and difference-in-differences analytical model by capitalizing on a highly granular, data-rich context, involving high-speed rail (HSR) service in China. Following Audretsch et al. (2015) and Bennett (2019a), the HSR context employs a well-demarcated set of infrastructural investments, but with a more complete set of time-varying and space-varying dimensions. An exploratory study is warranted in early-stage efforts to address less-well-formed domains and emerging concepts such as EE (Edmondson and McManus, 2007; Wennberg and Anderson, 2020), especially given the highly heterogeneous nature of EEs' temporal and spatial contexts (Davidsson et al., 2018). For these reasons, our study approaches the EE domain through pragmatic empirical theorizing (Shepherd and Suddaby, 2017), by posing framing questions that guide our empirical assessment through the lens of the HSR context.

Our study extends and enhances the literature on EEs through a number of contributions that provide strong support for the EE framework and its utility in identifying and explicating the linkages that tie macro-environmental forces to micro-level new business venturing. First, we explicate critical sources of variance arising from contextual factors related to the influence of EEs, thereby adding considerable nuance to the characteristics of "scope" and "onset," as developed by Davidsson et al. (2018). Specifically, we highlight the important distinction between the scope of an EE and the scope of its enabling effects, which can be utilized as a conceptual tool to perform comparative assessments across types and instances of environmental changes.

Second, we develop new insights concerning the emergence and impact of enabling mechanisms. Our study – which is the first to consider the simultaneous activation of multiple, latent situational mechanisms, intermediating EEs and individual agents – reveals that EEs can and do elicit multiple enabling mechanisms, some of which prove to be more impactful than others, depending upon the interaction with agents and contextual characteristics. Specifically, we build upon von Briel et al. (2018) and Bennett (2019a) by parsing the precise effects and relative importance of three different enabling mechanisms: communication cost compression, new

idea generation, and final demand expansion. In this fashion, we develop an analytical process that illuminates why and how an EE actually functions. Furthermore, inspired by our exploratory findings, we propose an additional property of "generic intensity" representing the inherent capacities of the enabling mechanisms to exert influence on business venturing. To conceptually identify and isolate an enabling mechanism's generic intensity, agency intensity, and relative opacity (Davidsson et al., 2018) will enhance the analytical capacity of the EE framework.

Third, as the first large-scale application of the EE framework to China, we are able to assess entrepreneurial impacts in a developing country that is still relatively early in its post-colonial, industrial development, one characterized by a different institutional environment and less infrastructural saturation than existing studies (e.g. Audretsch et al., 2015; Bennett, 2019a) as well as one embodying both market-based and planned-economy governance, activity, and ownership. By exploiting these design features, our study reveals new patterns and relationships that enhance the understanding of EEs and further emphasize the importance of integrating agent and context characteristics into the EE analytical framework. Overall, our study contributes to further refinement of EE's theoretical underpinnings, while providing an analytical toolbox and road map for future studies.

2. Conceptual framework and framing questions

2.1. External enabler framework and new venture emergence

An EE is defined as "a single, distinct, external circumstance that has the potential of playing an essential role in eliciting and/or enabling a variety of entrepreneurial endeavors by several (potential) actors" (Davidsson, 2015: 683). As initially developed by Davidsson (2015), and then elaborated and refined by Davidsson et al. (2018), EEs are conceptualized in terms of their characteristics, mechanisms, and roles. EE characteristics influence actionability and market potential by virtue of their "scope" and "onset." Scope characteristics are comprised of spatial, temporal, sectoral, and socio-demographic dimensions. Onset characteristics are expressed as two inter-related dimensions, timing and foreseeability. EE timing ranges from those characterized by a sudden onset, such as an unexpected political victory, to those that materialize gradually, such as an aging population. EE foreseeability ranges from those that are utterly unpredictable, such as a tornado strike, to those that have a readily predictable onset, such as a large-scale infrastructure project. Depending on the manner and degree to which EE characteristics interact with agent characteristics and context characteristics, an EE may activate one or more enabling mechanisms, which Davidsson et al. (2018:16) describe as relational constructs, "providing a means to connect external elements and the entrepreneurial agent in the spirit of Shane and Venkataraman's (2000) original nexus idea."

The precise manner in which enabling mechanisms fuel new venture emergence continues to develop. von Briel et al. (2018) posited six major EE mechanisms in their conceptual work on digital technologies – compression, conservation, expansion, substitution, combination, and generation. Work by Bennett (2019a) introduces constructive and destructive aspects of a dynamism mechanism. Davidsson et al. (2018) propose a non-exhaustive list of eleven mechanisms, while noting that future research will no doubt identify additional mechanisms and will find value in establishing boundary conditions for those that have already been proposed. Emanating from these lower-order mechanisms, the EE framework posits three major roles – triggering, outcome-enhancing, and shaping – representing the actual influence of EEs at different stages of new venture development. These three roles determine when and how agent-independent forces actually exert influence through a process of engendering or enabling new business ventures (von Briel et al., 2018) by activating lower-order mechanisms towards higher-order business activities across the venturing lifecycle (Davidsson et al., 2018). Overall, the integrative purpose of EE framework is to establish a coherent basis through which entrepreneurial activity is constituted by a balanced nexus of factors related to both agents and environments (e.g. Davidsson et al., 2018). Key to that coherence and the expanding use of the EE framework in scholarly research are efforts to stress test enabler models across diverse contexts to generate more nuanced conceptualizations of how an EE's characteristics, mechanisms, and roles relate to one another and how those relationships often drive divergent impacts on venture formation (Bennett, 2019a, 2020; Davidsson, 2019).

Empirical and conceptual research employing the EE framework has been applied to a diverse range of contexts, including 3-D printing (von Briel et al., 2018), infrastructure projects (Bennett, 2019a), artificial intelligence (Obschonka and Audretsch, 2019), disease and blockchain in the music industry (Chalmers et al., 2019), among many others. Reflecting the novelty of the enabler concept, selected facets of the EE framework remain a work in progress and would benefit from exploratory investigation (Davidsson et al., 2018; Davidsson, 2019). Therefore, rather than hypothesizing relationships that are themselves under development – particularly the interactive nature of characteristics, mechanisms, and roles – we propose a series of investigative questions (e.g. Graesser et al., 1996; Moeen and Agarwal, 2017) through which to frame an abductive inquiry into the enabling impacts of China's HSR rollout.

2.2. Framing questions

Davidsson et al. (2018) introduced the characteristics of scope and onset as an analytical lens through which to evaluate an EE's actionability and market potential, recognizing that an EE's impact can be highly heterogenous. The presence of an EE neither guarantees activation of enabling mechanisms, nor that activated mechanisms will drive the same outcomes. In this sense, scope and onset are critical in connecting EEs to enabling mechanisms and then expressing the influence exerted by EEs as a function of its effect scope and intensity as it is manifested through one of the three EE roles. Davidsson et al. (2018) noted the need for greater nuance across each of these dimensions as the EE framework is further refined and more extensively theorized; an exercise requiring highly

granular, longitudinal data, involving an observation window extending before, during, and after the EE. Rather than hypothesizing these relationships, in a priori fashion, we propose engaging in an abductive exploration of such a data set (i.e. China's HSR rollout), applying the EE framework to the complete landscape of varied scope and onset characteristics in order to illuminate multiple facets of an EE's heterogeneous effects without *ex ante* prediction regarding the directionality and magnitude of those effects.

2.2.1. Exploring temporal scope

Some EEs materialize almost instantly such as natural disasters, pandemics, price shocks, and political confrontations, while others materialize over the course of decades, generations, or even centuries, such as socio-cultural and religious shifts or climate changes (Davidsson et al., 2018). This exploration is imperative to understanding the temporal variance of "Why at this time, but not at that time?" Therefore, in the context of China's HSR, we ask:

Framing Question 1a. When does the enabling influence of EEs begin and end?

Framing Question 1b. Does the same EE exert differing influence at different points in time?

2.2.2. Exploring spatial scope

Similarly, although entrepreneurship scholars have been attentive to spatial-contextual factors (e.g. Sternberg, 2009) there are comparative aspects and complex interactions merit further investigation. The emergence of an EE, the activation of enabling mechanisms, and the intensity of a mechanism's influence on new business venturing are likely to be non-uniform across regions with varying initial conditions. This exploration is imperative to understanding the spatial variance of "Why there, but not here?" as well as the extent to which an EE's influence may be distant or highly proximal to the epicenter of its occurrence. Thus: we ask regarding China's HSR rollout:

Framing Question 2a. Is the activation of enabling mechanisms unique to the spatial context?

Framing Question 2b. Are there spatial spillover effects from EEs?

2.2.3. Identifying, parsing, and assessing enabling mechanisms

The ability to isolate differential activation of enabling mechanisms lies at the heart of conceptualizing the heterogeneous effects of the enabling outcomes. Davidsson et al.'s (2018) framework addresses this concern on multiple fronts by developing relational characteristics of the mechanisms, such as the "opacity" of a given enabler and the "agency-intensity" of the resource and knowledge requirements. Opportunities to extend and enhance the EE framework methodological underpinnings emerge through the exploration of the simultaneity of multiple mechanisms, the non-occurrence of enabling mechanisms in the presence of an EE, and, the need to isolate, model, and assess mechanisms.

Framing Question 3a. Do EEs generate multiple enabling mechanisms?

Framing Question 3b. Can the effects of multiple, simultaneous enabling mechanisms be parsed and reliably assessed?

2.2.4. Exploring agent characteristics

Agent characteristics may also emerge as important determinants of an EE's influence. Within the context of China's transitional, quasi-controlled economy, ownership categories – as well as governance structures and incentive systems – are particularly salient agent characteristics, ones that differ quite markedly from the characteristics exhibited in existing EE research concerning the U.S. (Bennett, 2019a) and Europe (Audretsch et al., 2015). Although these factors are not a facet of an EE, Bennett's findings related to public and private infrastructure investments suggest that they may exert material influence on firm formation. Since many developing countries exhibit a complex array of ownership types, we are prompted to ask:

Framing Question 4. Does an EE exert differing influence across different types of firms?

2.2.5. Assessing role intensity and scope

Ultimately, the impact exerted by an EE is a function of the intensity and scope of its influence. That influence is derived through a melding of environmental forces, manifested as an EE, individual-agentic forces, and the contextual conditions (Davidsson et al., 2018). As noted above, Davidsson et al.'s (2018) framework identifies three roles – triggering, outcome-enhancing, and shaping – that situate an enabling mechanism's effect according to the path-dependent sequence of venture creation stages (i.e. outcome-enhancing cannot occur unless triggering has occurred first). While all three roles are instrumental to determining an EE's overall influence, China's HSR rollout is most conducive to an examination of the triggering role. Thus, our exploratory investigation traces HSR's scope and onset characteristics through the activation of enabling mechanisms to the intensity and scope of its triggering role, and guided by the following questions:

Framing Question 5a. How do EE characteristics affect the intensity of its triggering role?

Framing Question 5b. How do EE characteristics affect the temporal and spatial scope of its triggering role?

In this same vein, heterogeneity may arise in the intensity of an EE's influence between two similar regions, such that the potential

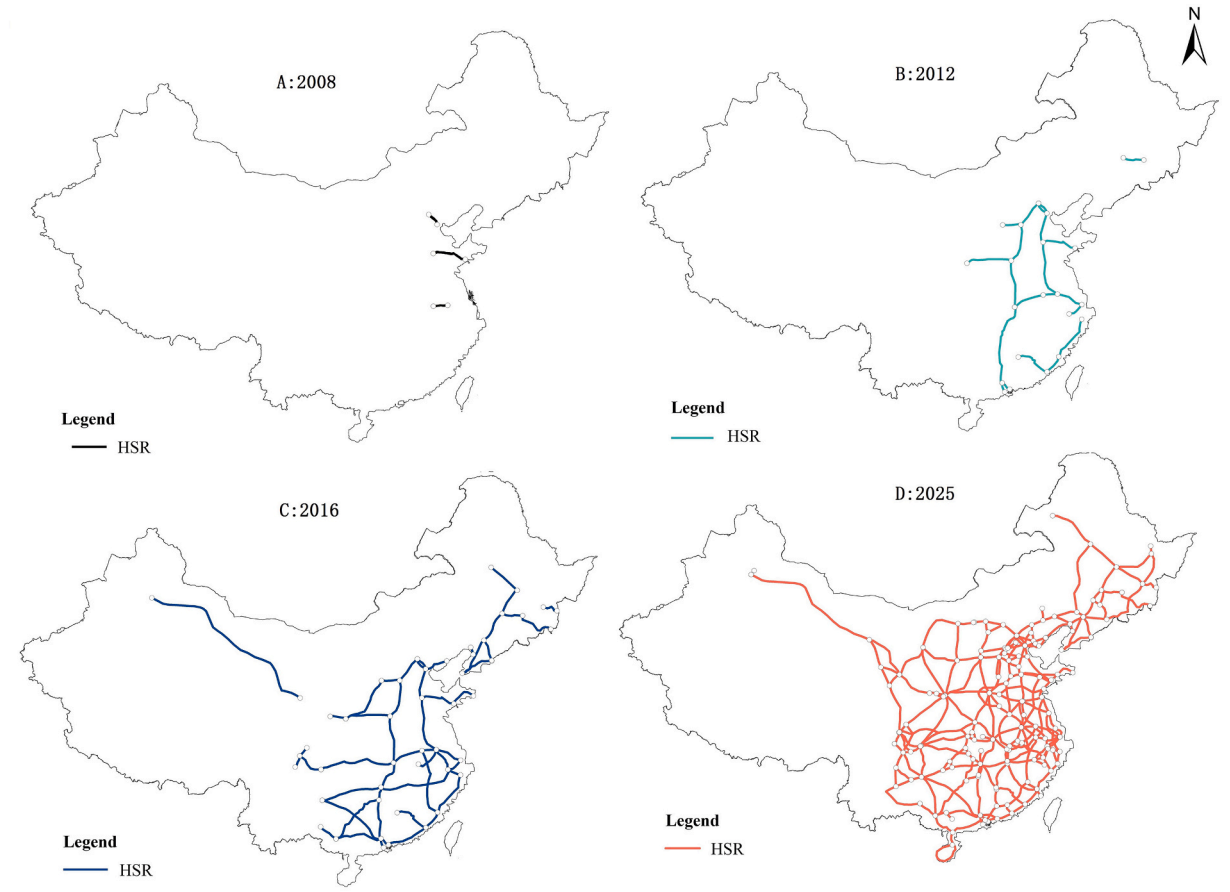

Fig. 1. Development and projection of HSR system in China (2008–2025).
Source: China Railway Yearbook and Medium- and Long-Term Railway Network Planning Report.

scope is identical but the actual scope varies as a function of ability and willingness to operationalize that potential.

Framing Question 5c. Is it possible that the potential scope of the EE and the actual scope of its enabling effects may be different, meaning that they are somehow misaligned? If so, what causes this?

3. Method

3.1. Empirical context: HSR as an external enabler of new business formation

Following Audretsch et al. (2015) and Bennett (2019a), we elected to develop our research design around infrastructural investments. As pointed out by Audretsch et al. (2015: 226), "infrastructure may be one of the most overlooked influences of entrepreneurial activity." For the sake of exhaustive, granular data, we focused on China's expansion of its HSR, which has the added benefit of providing a starkly different context from existing work, and which contains important implications for scholars, practitioners, and policy-makers.

China is the first developing economy to build an extensive HSR network. Fig. 1 contains a city-level HSR road map that covers different years: 2008, 2012, 2016, and 2025 (projected). Fig. 2 plots the annual ridership and number of operating stations between 2007 and 2017. Since its inception, China's HSR network has experienced mercurial growth in both geographic coverage and passenger carriage, covering 29 out of 31 provinces (in mainland) and carrying over 9 billion riders, cumulatively.

HSR expansion in China is ideally suited to our exploratory assessment for the following reasons. First, the context provides a vivid portrait of circumstances thinly considered in existing EE studies. As discussed in Bennett (2019a), physical infrastructure in advanced economies is mature and largely invariant, in some cases bordering on infrastructural saturation, while the impact of HSR in China is cast across socio-economic dynamism idiosyncratic to emerging economies. Given the importance of agentic characteristics in determining the eventual triggering effect of any EE (Davidsson et al., 2018), China's HSR rollout involves an institutional setting with mixed governance and ownership, allowing us to evaluate the varying enablement outcomes of HSR based on firms with different structures and motivations.

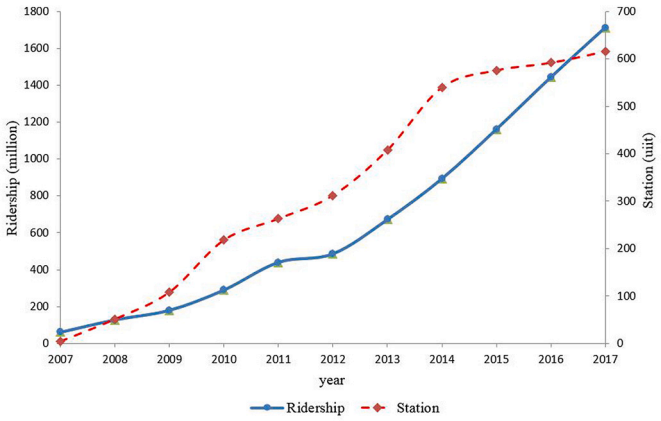

Fig. 2. Number of stations and ridership of HSR system in China (2007–2017).
Source: Extracted from www.gov.cn.

Next, since HSR construction in China is a national project with centralized planning and implementation, the location and timing of HSR operations at the regional level are subject to fewer local vagaries and unobserved characteristics (Ke et al., 2017).[1] The HSR rollout therefore constitutes an EE with conditions and implications that both facilitate causal identification (Anderson et al., 2019) and allow for a rich set of investigations that enrich our understanding on the temporal and spatial scope of EE analyses.

Lastly, fruitful exploration of EE impacts requires deepening scholars' understanding of enabling mechanisms. Towards this end, we leverage the HSR context to build upon the analysis of sectoral scope developed in Davidsson et al. (2018), thereby defining and integrating sectoral effects in a more theoretical fashion. Since HSR rollout is a spatially motivated, sector-neutral endeavor, involving potential benefits for all economic activities in the region, it does not appear to exert predetermined, a priori industry-specific enablement. For this reason, the *ex post* differential triggering effects across a wide assortment of industries with varying characteristics can be informative in unveiling enabling mechanisms (Duranton et al., 2014; Coşar and Demir, 2016). Thus, the HSR context provides fertile exploratory ground for application of the EE framework.

3.2. Data and variables

3.2.1. Dependent variable: measurement for new business formation

Following Delgado et al. (2010) and Glaeser et al. (2015), we consider two of the most commonly-used measures of local entrepreneurial activities: (1) start-up employment share, and (2) start-up firm share. For each county-industry cell,[2] we calculate the start-up employment share (start-up firm share) as the ratio of employment (number of firms) generated by new entries in year t to that of total employment (total number of firms) in year t, using the Annual Survey of Industrial Firms (ASIF) database, collected by China's National Bureau of Statistics. The ASIF database includes all state-owned manufacturing firms and non-state manufacturing enterprises with annual sales above 5 million RMB, between 1998 and 2013, representing over 85% of the industrial gross output and 71% of the industrial employment in China (Brandt et al., 2017). To match the HSR expansion period, we use the relevant information between 2007 and 2013. In our seven-year sample of industrial firms, the average annual start-up employment rate in China is 3.35% and the start-up firm rate is 3.91%.[3]

3.2.2. Focal predictor: HSR

To distinguish the treatment effect of HSR accessibility, we created a regional dummy variable HSR_c which is assigned 1 if there is HSR operation in county c between 2007 and 2013, and 0 otherwise. A timing dummy $Post_{ct}$ is constructed based on the year of HSR opening. We collected the HSR information from China Railway Yearbooks, and cross-checked it with the official HSR ticket website.[4] An announcement timing dummy is similarly constructed using the HSR announcement dates from Wikipedia and government reports. A neighboring HSR dummy, capturing the potential spatial spillover effects, is assigned 1 if there are HSR operations in at

[1] We acknowledge the potential political economy influence of rent-seeking by local government officials (e.g. Krueger, 1974; Tullock, 1967; Zhou, 2020) and therefore develop additional identification strategies in our empirical sections. We thank an anonymous reviewer for raising this important point.

[2] Our units of analysis are at the county and industry level. We collect data for 2438 county-level regions and 29 industries between 2007 and 2013.

[3] We acknowledge the potential limitation of using an above-scale sample. Unfortunately, in the case of China, the comprehensive firm-level data is only available for 2008 (within our sample period) when a nation-wide Economic Census was conducted. Sensitivity test based on the full 2008 Census data is available in the online appendix.

[4] In the baseline reporting, we consider $Post_{ct}$ to be 1 if an HSR station at county c starts running by the end of August in year t. Sensitivity tests based on the June cut-off generate similar results (available in online appendix).

least one of the border-sharing counties, and 0 otherwise.

3.2.3. Industry-level indicators of knowledge intensity, communication intensity, and distance to final demand

We calculated industry-level knowledge intensity through patent registrations. We obtained patent information from the Chinese Patent Data Project, which collects data from China's State Intellectual Property Office. For each 2-digit industry, we calculated the ratio of the total number of patents to firms in each year and took a simple average across the years in the dataset, thus yielding an industry-level patent intensity measure. Next, to obtain industry-level communication intensity, we borrowed insights from the labor economics literature of task production (e.g. Autor, 2013). Lacking China-specific work activity information (Hardy et al., 2018), we adopted the U.S. industry-level communication intensity measure from Oldenski (2012), with the implicit assumption that such widely available technologies are global and time-invariant. Lastly, we calculated the industry-level downstreamness measure using China's input-output table in 2007, following Antras et al. (2012). Along the supply chain, the more upstream an industry, the further its distance from final consumption. To facilitate interpretation, we converted it into a series of "downstreamness" measures, by taking the inverse of industry-level "upstreamness" values. These industry-level indicators were utilized for sectoral scope analyses and evaluation of multiple enabling mechanisms.

3.2.4. Control variables

We included a large set of control variables to account for alternative explanations. First, following the long-standing literature (e.g. Ellison and Glaeser, 1997; Glaeser et al., 2015) that emphasizes the role of Marshallian externalities (i.e. the benefit-producing concentration of production in a locale) in facilitating new firm entries, we included the location quotient of employment as a proxy for the clustering effect (Delgado et al., 2010). This variable reflects the (employment) concentration of an industry within a specific county relative to the concentration of that industry nationwide. We expect a positive effect of the location quotient. Next, we accounted for relevant regional characteristics, including population, gross domestic product (GDP) per capita, foreign direct investment (FDI), industrial structure, fixed capital investment, human capital endowment, market liberalization rate, and degree of Jacobian externality (i.e. externalities generated by firms in different industries). A larger population size, a higher level of economic development, and a higher non-agricultural share of GDP are generally associated with greater market potential and thus, more entrepreneurial opportunities (Audretsch, 2003). Fixed capital investment and inward FDI, through resource sharing and knowledge spillover, are also favorable to new firm entries (Albulescu and Tămăşilă, 2014). Human capital endowment, as measured by number of college students per ten thousand residents, is expected to have a positive effect on local entrepreneurship, as documented in Ghani et al. (2014). Market liberalization rate, constructed as the revenue ratio of private enterprises in a county following Park et al. (2006), is expected to be positively related to new business creation (Chang and Wu, 2014). To control for possible Jacobian externality, we constructed a Herfindahl-Hirschman Index (HHI) to measure the degree of industry diversity within a county. Higher industry diversity, through inter-sectoral knowledge spillover, is expected to be good for regional entrepreneurship (Guo et al., 2016).

Furthermore, we explicitly controlled for simultaneous improvements in other physical infrastructure and transport capacities to single out the effect of HSR. We included regional mobile-phones per capita, internet access per capita, water and electricity supply per capita, passenger and freight volumes through railway and highway, urban road area per capita, as well as the intra-region land supply for transport system. Based on Audretsch et al. (2015), we expect railway and internet infrastructure to have positive effects on new business formation. These regional characteristics would be informative for spatial scope analyses. Lastly, we included county-level fixed effects to address the time-invariant unobserved spatial characteristics, such as culture, rule of law, and natural endowment (Castaño et al., 2015). We used 2-digit industry-level fixed effects to adjust for the sectoral heterogeneity arising from the differences in product technology, market structure, and industrial policy (Fee et al., 2004). Province-year fixed effects were also included to account for macroeconomic conditions and business cycle fluctuations.

In terms of data sources, we collected data on the county-level land use for transport systems from website www.landchina.com, which is managed by China's Ministry of Land and Resources. All other regional controls were either obtained from China City Statistical Yearbooks and China Regional Economic Statistical Yearbooks or calculated based on the ASIF database. Table 1 provides the summary statistics for all variables.

3.3. Empirical specification

To estimate the impact of HSR operations on local new business formation, our study exploits variations across sector, space, and time, using a county-industry panel-data model with a difference-in-differences (DD) specification, as follows:

$$E_{cjt} = \alpha_0 + \alpha_1 HSR_c + \alpha_2 Post_{ct} + \beta_1 HSR_c \times Post_{ct} + \gamma_1 X_{cjt} + \gamma_2 Z_{ct} + \gamma_3 F_{ct} + \mu_c + \mu_j + \mu_{rt} + \varepsilon_{cjt} \quad (1)$$

where E_{cjt} denotes the intensity of entrepreneurial activities at industry j of county c in year t, as measured by start-up employment share or start-up firm share. HSR_c is a dummy variable that equals 1 if a HSR station operates in county c. $Post_{ct}$ is a year dummy that equals 1 after HSR station starts to operate at county c. X_{cjt} measures the location quotient of employment. Relevant regional characteristics were accounted for through Z_{ct}, and F_{ct} contains the set of infrastructure and transport capacities. μ_c, μ_j, and μ_{rt} stands for county-level fixed effects, industry-level fixed effects, and province-year fixed effects, respectively. We adopted robust standard deviations clustered at the county-level (ε_{cjt}). The coefficient of the interaction term, β_1, is the DD estimator of interest (please refer to Section 4 of Parker (2018) for more details on the DD strategy). If the HSR connection increases (decreases) local new business entry, we expect $\widehat{\beta}_1$ to be positive (negative). To further explore the temporal, spatial and sectoral scope of the EE effects, we adopt a similar

Table 1
Summary statistics.

Variables	Mean	S.D.	Min.	Max.
Start-up employment share (%)	3.35	14.24	0	18.01
Start-up firm share (%)	3.91	14.46	0	25.00
HSR (dummy)	0.10	0.31	0	1.00
Location quotient	3.15	19.22	0	34.59
Knowledge intensity	8.34	2.28	1.09	11.65
Communication intensity	0.57	0.11	0.33	0.69
Downstreamness	0.44	0.08	0.34	0.61
Regional level controls				
Population (ten thousand)	418.59	250.18	47.29	1432.31
GDP per capita (thousand RMB)	24.08	24.06	0.82	467.75
Non-agriculture share in GDP	0.79	0.23	0.11	1.00
FDI (million USD)	588.15	1309.90	0.01	13,599.85
Investment in fixed capital (billion RMB)	89.73	108.12	3.61	1351.99
College student intensity (among ten thousand residents)	173.04	205.69	13.19	1021.06
Market liberalization (output ratio of private enterprises)	0.92	0.04	0.33	0.99
Herfindahl-Hirschman index	0.27	0.21	0.07	0.76
Infrastructure related indicators				
Mobile-phones per capita	0.79	0.82	0.15	3.51
Internet access per capita	0.11	0.15	0.02	0.71
Industrial water supply per capita (ton)	42.57	84.28	2.03	385.13
Industrial electricity supply per capita (kilowatt hour)	1684.81	3651.14	47.08	19,826.15
Transport infrastructure related indicators				
Land supply for transport system (hectare)	402.91	3473.64	0	101,234.00
Passenger through railway (million person-time)	6.23	14.14	0.01	281.69
Passenger through highway (million person-time)	97.52	171.18	2.82	2865.57
Freight through railway (million ton)	13.70	25.59	0	264.02
Freight through highway (million ton)	88.28	167.72	3.76	5542.03
Urban road area per capita (squared meter)	10.77	11.98	1.27	32.52

Note: Population, GDP per capita, non-agricultural share in GDP, market liberalization, Herfindahl-Hirschman index and land supply for transport system are county-level variables. Other regional controls are prefecture-level variables.

DD strategy with augmented interactions, which includes, respectively, the various pre-HSR and post-HSR year dummies, an announcement year indicator, a neighboring spillover indicator, a set of regional characteristics capturing initial conditions, and three industry-level intensity measures as our proxy for mechanism evaluation. The full specifications of these estimations can be found in the online appendix.

4. Results

4.1. HSR enabling effect: baseline estimates

Table 2 contains the results of our baseline estimation. After controlling for a large set of regional co-variates, infrastructure conditions, and various fixed effects, we find that the opening of an HSR station in a county increases local new business formation by 0.85% in terms of employment share ($\beta = 0.85$, std. err. = 0.22, $p < 0.001$, 95% CI = [0.43,1.28][5]), and 0.92% in terms of firm share ($\beta = 0.92$, std. err. = 0.25, $p < 0.001$, 95% CI = [0.45,1.39]).[6] The average county-industry level entrepreneurial intensity in our sample is 3.35% based on start-up employment share and 3.91% based on start-up firm share. The identified HSR effect is therefore economically sizable, representing a close to 25% increase in new business formation for the average county-industry.

Coefficients for the control variables are consistent with existing literature. First, we confirm the importance of Marshallian externality with a positive and significant coefficient on the location quotient of employment (Delgado et al., 2010; Guo et al., 2016). This indicates that geographic concentration of an industry's activity, through better availability of key inputs and customers, is beneficial to new business entry within a county. Second, similar to findings in Zheng and Zhao (2017) and Lu and Tao (2010) based on the Chinese context, regions with a higher population, FDI, physical capital investment, skill endowment, and market

[5] Consistent with the reporting procedures advocated by Anderson et al. (2019), we include the exact *p*-values and 95% confidence intervals for the key estimates.

[6] Since the HSR stations are introduced across multiple periods, the estimated coefficients are weighted averages of each locale's average treatment effects, and thus the results can be subject to the negative weights problem as discussed in recent studies by Callaway and Sant'Anna (2019) and de Chaisemartin and D'Haultfoeuille (2019). However, in our sample, the occurrence of negative weight is very low, with the total sum of all negative weights equaling −0.0017. Utilizing the package from de Chaisemartin et al. (2019) we directly estimated the Fuzzy DD coefficient. When using the start-up employment share as dependent variable, the Fuzzy DD estimate is 0.83%, which is very close to our baseline result of 0.85%. The full table is available in the online appendix.

Table 2
Impact of HSR on local new business formation: baseline estimates.

Variables	Start-up employment Share			Start-up firm share		
	(1)	(2)	(3)	(4)	(5)	(6)
HSR effect	1.166***	0.903***	0.854***	1.258***	0.986***	0.922***
	(0.279)	(0.221)	(0.217)	(0.313)	(0.248)	(0.243)
Location quotient	0.125***	0.104***	0.103***	0.087***	0.064***	0.064***
	(0.011)	(0.010)	(0.010)	(0.009)	(0.007)	(0.007)
Regional level characteristics						
Ln (population)		2.596**	2.445**		2.574**	2.360*
		(1.184)	(1.155)		(1.275)	(1.237)
Ln (GDP per capita)		1.221	1.151		0.846	0.728
		(1.119)	(1.099)		(1.204)	(1.179)
Non agricultural share in GDP		−0.016	0.007		0.002	0.030
		(0.050)	(0.050)		(0.054)	(0.054)
Ln (FDI)		0.168**	0.161**		0.261***	0.254***
		(0.070)	(0.069)		(0.073)	(0.072)
Ln (investment in fixed capital)		0.571*	0.691**		0.801**	0.937***
		(0.340)	(0.338)		(0.361)	(0.358)
Ln (college student among ten thousand residents)		0.180**	0.215***		0.226***	0.264***
		(0.077)	(0.078)		(0.083)	(0.085)
Output ratio of private enterprises		0.425***	0.425***		0.452***	0.452***
		(0.007)	(0.007)		(0.007)	(0.007)
Herfindahl-Hirschman index		−1.058	−1.105		−1.391*	−1.446**
		(0.710)	(0.708)		(0.734)	(0.731)
Infrastructure related indicators						
Ln (mobile-phones per capita)			1.046			1.040
			(0.810)			(0.862)
Ln (internet access per capita)			4.263***			4.985***
			(1.217)			(1.383)
Ln (industrial water supply per capita)			−0.257			−0.322
			(0.217)			(0.235)
Ln (industrial electricity supply per capita)			0.149***			0.172***
			(0.056)			(0.061)
Transport infrastructure related indicators						
Ln (land supply for transportation)			0.058**			0.061**
			(0.025)			(0.028)
Ln (passenger through railway)			0.086			0.136**
			(0.060)			(0.063)
Ln (passenger through highway)			0.423**			0.555***
			(0.174)			(0.194)
Ln (freight through railway)			0.001			−0.006
			(0.049)			(0.052)
Ln (freight through highway)			0.047			0.017
			(0.188)			(0.215)
Ln (urban road area per capita)			0.213			0.246
			(0.208)			(0.223)
County FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
Province*year FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	227,544	227,544	227,544	227,667	227,667	227,667

Note: Dependent variable is start-up employment share at Column (1)–(3), and start-up firm share at Column (4)–(6). Variable *HSR effect* is the estimated coefficient for the interaction term $HSR_c \times Post_{ct}$ in Eq. (1). The estimates for HSR_c and $Post_{ct}$ are not separately identifiable and omitted in the reporting as HSR_c is captured by the county FE and $Post_{ct}$ shares the same variation with the interaction term. Standard errors, reported in parentheses, are heteroskedasticity robust and clustered at the county level.

*** $p < 0.01$.

** $p < 0.05$.

* $p < 0.1$.

liberalization rate observe stronger patterns of new venture creation. The role of Jacobian externality, measured by industry diversity within a county, is statistically significant in the start-up firm share regression, but not start-up employment share. The negative estimated coefficient of HHI suggests a positive impact of Jacobian externality on entrepreneurship, which emphasizes the role of inter-industry knowledge spillover in the creation of new entrepreneurial opportunities. Next, in terms of physical infrastructure, we echo the findings in Audretsch et al. (2015) that internet access plays a positive and significant role in facilitating connectivity and boosting new business opportunities. Industrial electricity supply is also a positive predictor. Bennett (2019a) identified a pro-business role of regional utility infrastructure, but in his work, only private contemporaneous investment is statistically significant

while our measure reflects a stock concept encompassing the consequences of both public and private investments. Lastly, regarding transportation infrastructure, we report positive effects of transport-related land use and passenger flows via highways. Our finding is generally consistent with prior studies and partially corroborates the argument in Audretsch et al. (2015) that the mobility of people is more important in promoting entrepreneurial activities than is the transport of goods. The documented intensity of the HSR triggering effect is also economically larger than those of the traditional types of inter-regional transportation infrastructure.

4.2. Temporal scope of the enabling effects

Two under-evaluated dimensions of EE's temporal scope are apparent from our exploration. First, we examine whether the announcement of HSR planning is sufficient to trigger forward-looking entry decisions. The DD estimation results are reported at Column (1)–(2) of Panel A in Table 3. Announcement on HSR projects, usually 3–4 years prior to the actual operation, casts no statistically significant impact on local new business formation ($\beta = -0.40$, std. err. = 0.41, $p = 0.32$, 95% CI = [−1.19,0.39]). Fig. 3 further compares the regional entrepreneurial activities three years before and after HSR announcement between counties with and without HSR construction.[7] The results indicate that there are no anticipatory effects of HSR. Instead, most of HSR's triggering role as an EE is *ex post* and operational.

Column (3)–(4) of Panel A at Table 3 reports the DD estimation results with pre- and post-year interactions. Again, we can see that HSR connectivity exerts a positive and statistically significant impact on local new business entries only after the commencement of service. Fig. 4 further verifies that counties with and without HSR stations exhibit no statistically significant difference in new business entry rates pre-HSR operation. Including the pre- and post-time trends, we find that the temporally proximal effects of HSR operation are strongest. Notably, these effects are not transient, evidenced by the significant positive impact on new business formation in the subsequent two years, albeit at a declining rate. Fig. 5 plots the marginal HSR effect from two years prior to two years after the HSR opening based on start-up employment share.

4.3. Spatial scope of the enabling effects

We first examine the possibility of HSR enablement spillovers. Column (1) of Panel B at Table 3 shows that new HSR operations in a neighboring county does not foster new business formation in adjacent areas ($\beta = 0.26$, std. err. = 0.16, $p = 0.16$, 95% CI = [−0.08,0.59]). Thus, the enabling effect is local and spatially concentrated.[8] Next, given the same set of external shocks and enabling mechanisms, regions with distinct initial conditions may experience differential enabling effects. Column (2)–(6) contains the interaction of HSR with income level, human capital intensity, location quotient, HHI, and market liberalization rate. Column (7) provides an estimation including all interaction terms while Column (8) reports the corresponding standardized beta coefficients. The p-value for the joint test of significance is reported in the final row of the Panel. Several facets of this analysis are noteworthy. First, counties with higher human capital intensity benefit more from HSR accessibility. Highly-skilled agents tend to be more adept in adjusting to external changes and in identifying new opportunities. Second, regions enjoying both Marshallian and Jacobian externalities are observed to have stronger HSR-enabling effects. The magnitude of the location quotient interaction is comparatively sizable. This indicates that HSR operations are complementary to the clustering forces that produce regional cost advantages through the sharing of inputs and customers. The reinforcing role of Jacobian externalities is relatively smaller, but still statistically significant. However, the level of economic development in general, as measured by GDP per capita, and the institutional variable of marketization, are not statistically significant moderators. Lastly, it is interesting to assess the effects of HSR's interaction with alternative regional transportation infrastructure, as reported in Panel C of Table 3. The marginal HSR effect on new business formation is not sensitive to coexisting inter-regional transportation volume through highways and railways, but there exists strong complementary between HSR and intra-region transportation infrastructure. The triple interactions with region-level land supply for transportation and urban road area per capita are both positive and statistically significant. Counties with good internal transportation infrastructure can reap more benefit from the inter-regional accessibility facilitated by HSR.

4.4. Sectoral scope and the creation of mechanism pathways

Table 4 presents the estimation results augmented by interactions with industry-level indicators of knowledge intensity, communication intensity, and distance to final demand. We use start-up employment share as the dependent variable. In Column (4), measures of industry intensities are expressed as natural logarithms while Column (5) shows the standardized beta coefficients. The coefficients for all interactive terms are positive and jointly significant. And the three interactive coefficients are significantly different from one another in the pairwise tests for equality of coefficients. Therefore, the HSR-driven entrepreneurial activity is stronger among: (1) knowledge-intensive industries, (2) communication-intensive industries, and (3) downstream industries closer to final

[7] Since the county-level announcement and opening of HSR varies across different years, our selection of the corresponding control group (for both Figs. 3 and 4) is based on the propensity score matching results. We normalize all cases temporally by setting the announcement year (commencement year) as A (T) and take average across all observations by the treated and control groups for the seven-year windows to compose the common trend figures (details available in the online appendix).

[8] We also examined the possible spillover effect from other counties within a prefecture. Here, too, no statistically significant results were found (details available in the online appendix).

Table 3
Impact of HSR on local new business formation: temporal and spatial scope.

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Panel A. Temporal scope: announcement and dynamic effects								
HSR effect	0.609**	0.735**						
	(0.299)	(0.336)						
HSR announcement effect	−0.403	−0.307						
	(0.405)	(0.455)						
HSR × $Post_{T-2}$			0.215	0.224				
			(0.166)	(0.202)				
HSR × $Post_{T-1}$			0.122	0.066				
			(0.151)	(0.194)				
HSR × $Post_{T}$			1.053***	1.328***				
			(0.286)	(0.341)				
HSR × $Post_{T+1}$			0.691***	0.604**				
			(0.226)	(0.267)				
HSR × $Post_{T+2}$			0.529***	0.375**				
			(0.185)	(0.104)				
Panel B. Spatial scope: spillover effect and the role of initial conditions								
HSR effect	0.715***	0.775***	0.556***	0.622**	0.573***	0.440***	0.317***	0.148 ***
	(0.224)	(0.201)	(0.211)	(0.310)	(0.140)	(0.123)	(0.085)	(0.044)
HSR neighboring effect	0.257							
	(0.159)							
HSR*GDP per capita		0.118					0.127	0.073
		(0.254)					(0.272)	(0.127)
HSR*Human capital			0.864**				1.782***	0.153***
			(0.378)				(0.474)	(0.042)
HSR*Location quoient				0.495***			0.424***	0.086***
				(0.156)			(0.144)	(0.029)
HSR*Herfindahl-Hirschman index					−1.127***		−1.197***	−0.038***
					(0.312)		(0.297)	(0.009)
HSR*Marketization						−0.017	−0.025	−0.006
						(0.040)	(0.041)	(0.011)
(Joint Test) p-value		0.6330	0.0215	0.0015	0.0003	0.6733	0.0000	0.0000
Panel C. Spatial scope: the role of other transport infrastructure								
HSR effect	0.628**	0.722***	0.692**	0.750***	0.752***	0.739***	0.603**	0.144***
	(0.284)	(0.280)	(0.300)	(0.286)	(0.217)	(0.234)	(0.257)	(0.046)
HSR*Passenger through railway(in log)	0.067						0.199	0.092
	(0.054)						(0.204)	(0.074)
HSR*Passenger through highway(in log)		0.008					0.008	0.026
		(0.008)					(0.008)	(0.021)
HSR*Freight through railway(in log)			0.049				0.093	0.002
			(0.057)				(0.205)	(0.061)
HSR*Freight through highway(in log)				0.021			−0.588	−0.029
				(0.040)			(0.442)	(0.116)
HSR*Land supply for transportation(in log)					0.053***		0.043***	0.019***
					(0.019)		(0.013)	(0.003)
HSR*Urban road area per capita(in log)						0.035**	0.037**	0.021**
						(0.013)	(0.014)	(0.008)
(Joint Test) p-value	0.2017	0.3293	0.3832	0.5899	0.0047	0.0011	0.0014	0.0014
All Other Controls and Interactions	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Province*year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
County FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Note: For Panel (A), dependent variable is start-up employment share at Column (1) and (3), and start-up firm share at Column (2) and (4). For Panel (B) and Panel (C), dependent variable is start-up employment share. Coefficients at Column (8) are beta standardized coefficients. Variable *HSR effect* is the estimated coefficient for the interaction term $HSR_c \times Post_{ct}$ in Eq. (1) and others are coefficients for the triple interaction terms $HSR_c \times Post_{ct} \times Z_{ct}$ or $HSR_c \times Post_{ct} \times F_{ct}$ (please refer to the online appendix for the full augmented specifications). The double interactions and other controls are not reported for sake of brevity. *P*-values for the joint-test of significance for the marginal effects of interaction terms are reported at the last row of each panel. Standard errors, reported in parentheses, are heteroskedasticity robust and clustered at the county level. ***p < 0.01, **p < 0.05, *p < 0.1.

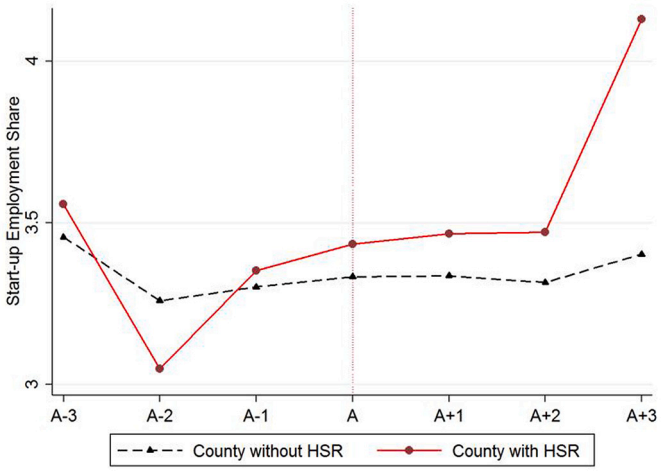

Fig. 3. Entrepreneurial activities before and after HSR announcement.

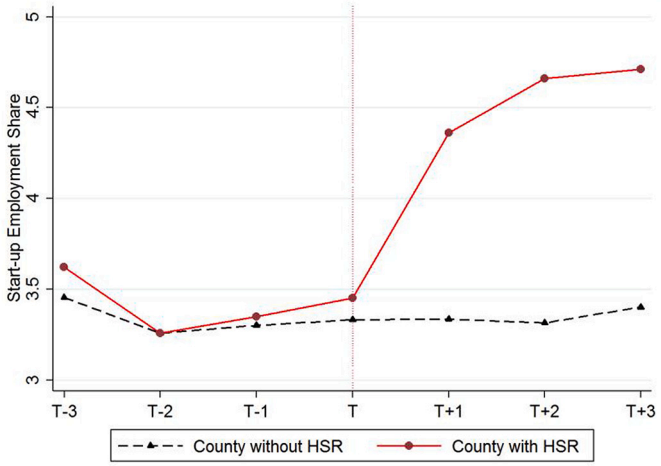

Fig. 4. Entrepreneurial activities before and after HSR opening.

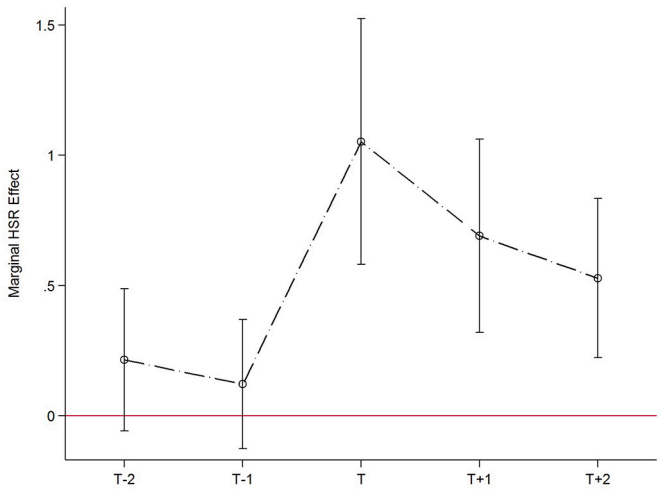

Fig. 5. Estimated marginal HSR effect before and after HSR opening.

Table 4
Sectoral scope: a mechanism pathway.

	(1)	(2)	(3)	(4)	(5)
HSR effect	0.557***	0.645***	0.586***	0.467***	0.129***
	(0.198)	(0.151)	(0.153)	(0.173)	(0.059)
HSR*Knowledge Intensity	0.069**			0.065**	0.055**
	(0.034)			(0.032)	(0.028)
HSR*Communication Intensity		0.835***		0.837***	0.089***
		(0.074)		(0.074)	(0.021)
HSR*Downstreamness			0.583*	0.589*	0.066*
			(0.329)	(0.328)	(0.036)
(Joint Test) p-values	0.0001	0.0000	0.0010	0.0000	0.0000
All other controls and interactions	Yes	Yes	Yes	Yes	Yes
County-, Industry- and Province*Year-FE	Yes	Yes	Yes	Yes	Yes
Observations	227,544	227,544	227,544	227,544	227,544

Note: Dependent variable is start-up employment share. Coefficients at Column (5) are beta standardized coefficients. *HSR effect* denotes the estimated coefficient for the interaction term $HSR_c \times Post_{ct}$ in Eq. (1) and others are coefficients for the triple interaction terms $HSR_c \times Post_{ct} \times \Omega_j$ (please refer to the online appendix for the full augmented specifications). The double interactions and other controls are not reported for sake of brevity. *P*-values for the joint-test of significance for the marginal effects of interaction terms are reported. Standard errors, reported in parentheses, are heteroskedasticity robust and clustered at the county level. ***p < 0.01, **p < 0.05, *p < 0.1.

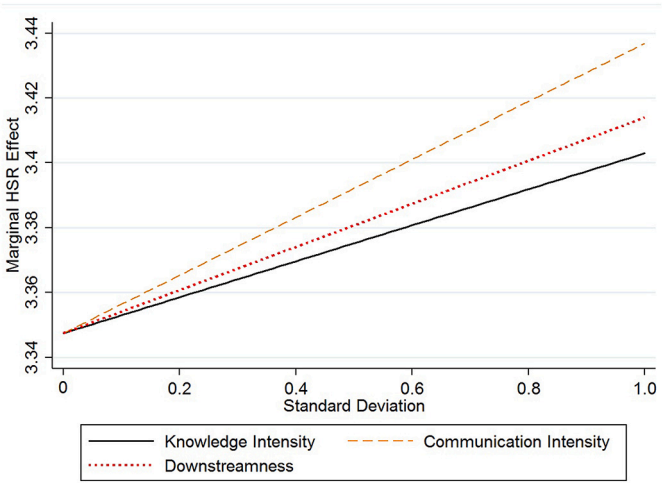

Fig. 6. Estimated marginal HSR effect based on industry characteristics.

demand.[9]

After including the three interaction terms, the stand-alone HSR dummy remains significantly positive, but becomes weaker in absolute magnitude. It declines from 0.854 from the baseline estimation at Table 2 (Column 3) to the current value of 0.467 (Column 4). Thus, we conclude that the combined variation of these three industry characteristics accounts for close to half (45.3%) of the documented HSR effect on new firm entry within our sample.

Fig. 6 depicts the marginal HSR effect by industry characteristics, based on the standardized beta coefficients. In terms of relative magnitude, communication cost compression matters the most. By shrinking the commuting time and facilitating face-to-face interaction, HSR operations lead to a significant decline in searching and communication cost. The improvement in communication between nodes drives time compression (Davidsson et al., 2018), especially for the types of business that rely heavily on searching and sourcing. This finding also corroborates other recent studies that identify a strong effect of HSR in facilitating communication and transactions, such as Bernard et al. (2019) and Charnoz et al. (2018). The demand expansion mechanism is also sizable, which is consistent with studies in which researchers report a substantial influx of tourists, migrants, and new employment following an HSR opening (e.g. Lin, 2017; Guirao et al., 2018), thereby generating new market opportunities for consumer goods. Lastly, variation of knowledge intensity is the least important factor, but is still significantly positive. As HSR accessibility shrinks the bilateral travel time, the de facto knowledge stocks and information flows in the HSR-connected regions will increase. This creates a regional context

[9] We calculate the pairwise correlations among these three industry-level intensities, which range from 0.30 to 0.34, with only one pair to be statistically significant at 10%. Therefore, although there is some degree of overlap among these indicators, they are in general reflecting diverse industry/product-level characteristics.

Table 5
Impact of HSR on local new business formation: agent-type moderation by ownership.

Variables	Start-up employment share			Start-up firm share		
	(1)	(2)	(3)	(4)	(5)	(6)
	Private	Foreign	SOE	Private	Foreign	SOE
HSR effect	0.947***	0.482***	0.234***	1.039***	0.578***	0.267***
	(0.285)	(0.160)	(0.072)	(0.337)	(0.168)	(0.079)
Location quotient	0.101***	0.017***	0.006***	0.065***	0.024***	0.006***
	(0.011)	(0.003)	(0.002)	(0.010)	(0.003)	(0.002)
All other controls and interactions	Yes	Yes	Yes	Yes	Yes	Yes
County-, Industry- and Province*Year-FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	227,544	227,544	227,544	227,544	227,544	227,544

Note: Dependent variable is start-up employment share at Column (1)–(3), and start-up firm share at Column (4)–(6). Variable *HSR effect* is the estimated coefficient for the interaction term $HSR_c \times Post_{ct}$ in Eq. (1). Standard errors, reported in parentheses, are heteroskedasticity robust and clustered at the county level. ***p < 0.01, **p < 0.05, *p < 0.1.

with greater knowledge intensity, which enhances the probability of one identifying an opportunity, consistent with the knowledge spillover theory of entrepreneurship (e.g. Audretsch and Lehmann, 2005; Audretsch and Keilbach, 2007; Acs et al., 2013).

4.5. Agent-type moderation of the enabling effects

Although not a central focus of the EE framework, individual agency in entrepreneurial pursuits is fully acknowledged by Davidsson et al. (2018). China, with its mixed ownership structure, offers us a pertinent context to evaluate this aspect. Table 5 reports the heterogeneous enabling effects of HSR on firm entry across ownership type. On average, the HSR impact on private firm birth is significantly larger than that on foreign firms and SOEs. Based on the start-up employment share, the presence of HSR station increases regional private firm entry by 0.95% ($\beta = 0.95$, std. err. = 0.29, $p = 0.001$, 95% CI = [0.38,1.52]), foreign firm entry by 0.48% ($\beta = 0.48$, std. err. = 0.16, $p < 0.001$, 95% CI = [0.16,0.79]), and state-owned enterprises by 0.23% ($\beta = 0.23$, std. err. = 0.07, p = 0.001, 95% CI = [0.09,0.38]). This result is aligned with the different motivations, objectives, and operating environments across Chinese companies with different ownership structure (e.g., Chang and Wu, 2014; Pan et al., 2014). In particular, corporate decisions involving SOEs are usually constrained by political agenda and non-economic considerations (Hsieh and Song, 2015). In comparison, private business entry best reflects the pioneering and innovative spirits of entrepreneurship, through which private agents react swiftly to recognize and exploit the emerging opportunities resulting from HSR operation. The marginal HSR effect for foreign firms falls in between, reflecting both their flexibility and adaptiveness as well as the constraints they may face in the regulated Chinese market (Niu et al., 2012).

4.6. Addressing endogeneity

Empirical studies of regional settings are often confronted with potential endogeneity problems. In the HSR context, our estimation may be biased by endogenous route placements; that is, the non-random allocation of HSR stations (Lin, 2017). To mitigate this concern, we developed two identification strategies to establish a reliable causal relationship between HSR and new business formation.

Table 6
Identification tests: inconsequential units approach and falsification test.

Variables	Start-up employment share		Start-up firm share	
	(1)	(2)	(3)	(4)
	County only	Falsification	County only	Falsification
HSR effect	1.192***	−0.435	1.210***	−0.429
	(0.288)	(0.321)	(0.320)	(0.349)
Location quotient	0.156***	0.138***	0.101***	0.116***
	(0.020)	(0.029)	(0.013)	(0.029)
All other controls and interactions	Yes	Yes	Yes	Yes
County-, Industry- and Province*Year FE	Yes	No	Yes	No
Observations	153,503	9148	153,503	9148

Note: Dependent variable is start-up employment share at Column (1)–(2), and start-up firm share at Column (3)–(4). Variable *HSR effect* is the estimated coefficient for the interaction term $HSR_c \times Post_{ct}$ in Eq. (1). Standard errors, reported in parentheses, are heteroskedasticity robust and clustered at the county level. ***p < 0.01, **p < 0.05, *p < 0.1.

First, following Faber (2014) and Redding and Turner (2015), we adopted the inconsequential units approach by limiting our analysis to the less-developed counties in our sample. Specifically, we excluded districts under prefecture-level cities in the estimation. Although counties and districts share similar administrative status in China, counties are generally more rural, less-populated, and less-developed. Based on the 2010 Population Census in China, the HSR-connected counties are 29% smaller in terms of their average urban population size and 32% lower in average GDP per capita when compared to the HSR-connected districts. Similar to Chandra and Thompson (2000), we assume that these counties are less likely to be incorporated as HSR stops due to their own economic properties or political power. Results for the county-only sample (based on Eq. 1) are reported at Column (1) and (3) in Table 6, using start-up employment share and start-up firm share as dependent variable, respectively. The estimated coefficient for the HSR effect is 1.2% in both measures and statistically significant. Therefore, we argue that our key findings are unlikely to be driven by the endogenous selection of well-developed regions (as HSR stops) and their unobserved characteristics.

Secondarily, we performed a falsification test similar to the strategies developed in Acemoglu and Johnson (2007) and Nunn and Wantchekon (2011), making use of the varying HSR launch dates. In our sample, 36% of HSR stations commenced operations in the month of December, including stops at five different rail lines spanning nine province-years (please refer to the online appendix for details). In the baseline estimation, these HSR connections are not counted in the respective years ($Post_{ct}=0$) as they only opened after mid-December. As a placebo test, we re-estimated the specification using these nine province-years only, though we allowed $Post_{ct}=1$ for the HSR-connected counties. If the baseline relationship is caused by coinciding policy changes rather than HSR operations, we would find that $\widehat{\beta}_1$ in this subsample is spuriously significant. Alternatively, if HSR is the exclusive driver of new business formation, then we would find no effect in these locations since the HSR stations only operated for a limited number of days at the end of the respective years. Column (2) and (4) present the falsification test result using these nine province-years subsample. Reassuringly, the impact of HSR is statistically insignificant in both entrepreneurial measures. This alleviates the concern that unobserved, coinciding changes (in anticipation of HSR) may have contributed to new business formation. In sum, these tests lend support to our causal interpretation that HSR connection promotes local entrepreneurial activities.[10]

Finally, to further evaluate the validity of our findings, a battery of sensitivity and robustness tests were performed, including: (1) adopting alternative measurements of new business formation; (2) conducting aggregate-level estimation based on prefecture city and Porterian industry clusters; and, (3) verifying the treatment effect based on propensity score matching method. These results can be found in the online appendix.

5. Discussion

5.1. Contributions to the EE framework

We commenced our exploratory investigation with the aim of discerning how and why the actions and outcomes elicited by EEs vary, often significantly, as a function of an EE's characteristics. Further, we sought to discover what implications, if any, this variance might hold for the activation of enabling mechanisms. In the most expansive sense, our study provides strong conceptual and empirical support for the EE framework and its demonstrated utility in identifying and explicating the linkages that tie macro-environmental forces to micro-level new business venturing. Our findings lend material refinement to five key aspects of the literature on EEs: (i.) the level of precision used in categorizing EE's temporal, spatial, and sectoral scope characteristics; (ii.) the sources of variance – ranging from non-occurrence, to weak effects, to strong effects – arising across regions, sectors, and agent characteristics; (iii.) the manner in which simultaneous enabling mechanisms should be parsed and assessed; (iv.) the differentiation between and importance of the scope of enablers and the scope of enabler effects; (v.) and, the introduction of the generic intensity concept, including consideration of how it relates to agency intensity, opacity and the influence exerted by an enabling mechanism. We have sought to capture these contributions as well as other key findings from our study in Fig. 7, below.

5.1.1. A more nuanced treatment of the scope concept in the EE framework

Davidsson et al. (2018) acknowledged in their development of the EE framework that significant variations were likely to arise through the influence exerted by EEs as a consequence of scope and onset characteristics. As we discovered in our exploratory investigation, it is critical to parse scope characteristics. The ability to identify, distinguish, and assess static versus dynamic characteristics is essential to understanding how EEs actually function locale-to-locale, time-to-time, and sector-to-sector. For example, pursuant to framing question 1a and 1b, we found no evidence of anticipatory behaviors, or “announcement effects,” despite the fact that once HSR stations commenced operations, the local increases in firm formation were swift and significant. We also performed the first investigation of time-dependent intensity and the duration of enabling effects. While the temporal scope of HSR as an EE persists for several years, the enabling effects it triggers are far from constant. As our findings suggest, the enabling effects of HSR are strongest in the period immediately after the emergence of an EE, the intensity of which declines in subsequent periods, at an extinction rate that varies significantly across the sample.

Similarly, regarding the spatial scope queries we raised through framing question 2a and 2b, we demonstrate the critical importance of parsing the effects to illuminate the sources and extent of variance in an EE's influence. In our study, adjacent county spillovers are not a significant driver of business venturing. We find that the enabling effects of HSR are exceedingly local, indicating

[10] Other empirical specifications and ownership-specific analysis are also subject to these two identification tests, and details are available in the online appendix.

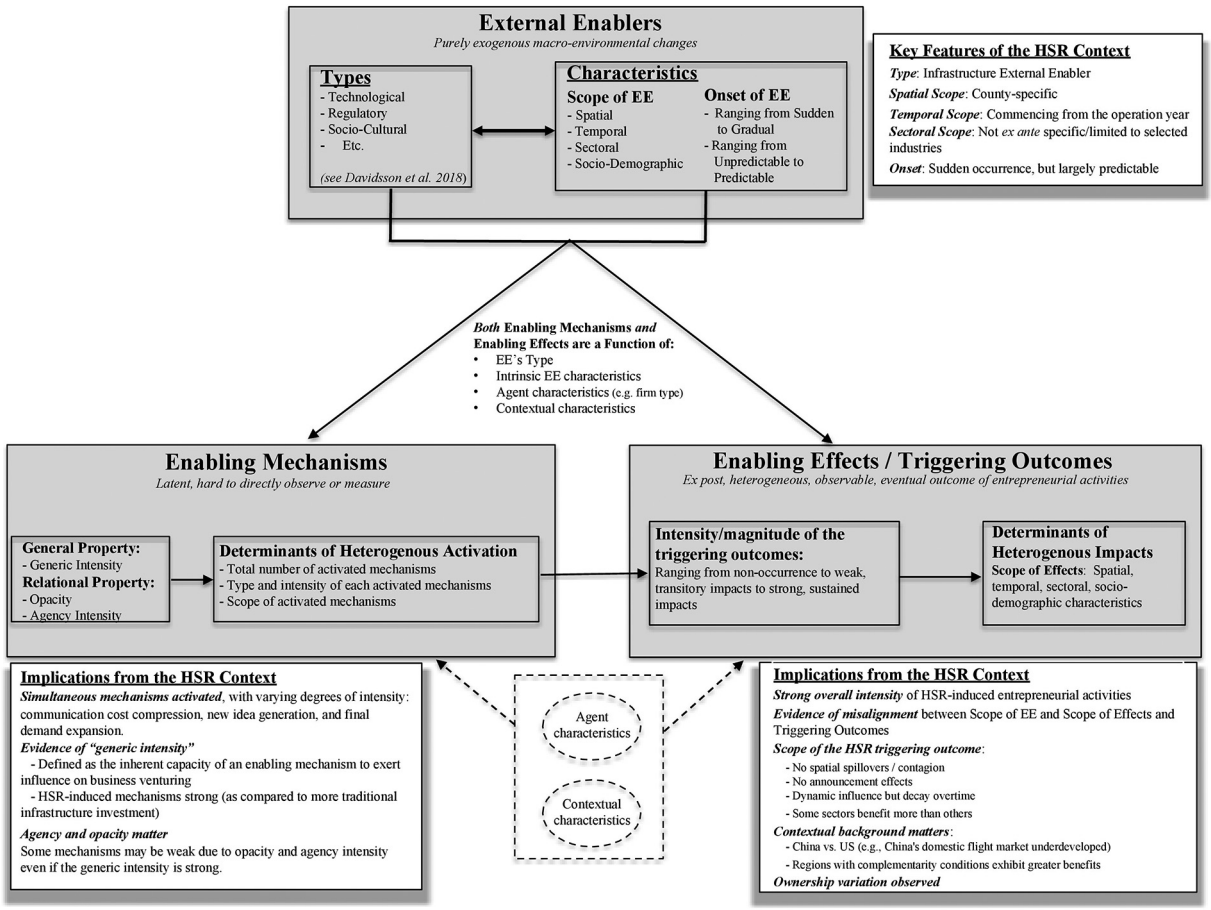

Fig. 7. Generalization of exploratory findings from the HSR context.

a high degree of spatial concentration. As physical distance from the locational epicenter of the EE increases, the intensity of the EE's influence declines precipitously. However, our interactive DD design demonstrated that spatial impacts related to differential regional endowments are highly significant. These nuanced facets of spatial influence suggest that scope elements in the EE framework are best conceptualized as a continuum of potential and actual impacts rather than a dichotomous rendering of impact versus no impact.

In Davidsson et al. (2018)'s original framework, the spatial and temporal scope of an EE overlaps with the scope of its enabling effects; while our exploratory study raises the possibility of potential misalignment between the two layers. Framing questions 5a, 5b, and 5c were posed with the explicit intent of pursuing this line of inquiry. The substance of our findings is displayed in Fig. 7. Our reconfiguration offers two benefits. First, our treatment of scope lends additional nuance to the largely dichotomous approach in Davidsson et al. (2018). By parsing the spatial and temporal characteristics of EEs, our approach demonstrates the added value of specifying the intensity of enablement effects across time, space, and industry sectors. Second, we establish a basis upon which to develop a system of scales and indicators for scope characteristics, which in turn enriches the capacity of the EE framework to facilitate useful comparisons between and across similar and distinct EEs. To this end, our techniques in analyzing a scope's spread and the differences between the spatiotemporal scope of an EE's enabling effects versus the scope of an EE's characteristics, can be utilized as a conceptual tool. For example, consider two EEs with identical spatial scope situated in similar contextual backgrounds. In such a case, the EE with larger spread in spatial scope (i.e. the gap between the EE's radiating range in terms of its enabling effects and the original spatial scope of that EE) may help alleviate regional inequality in terms of entrepreneurial entry, thereby generating preferable options for policy-makers under certain circumstances.

Another interesting finding from our scope-related analysis that is informative for future EE research, especially that involving transportation infrastructure, relates to the intensity of triggering effects that are reinforced through intra-region transport facilities (i.e., road quality of the county) but unrelated to other, competing inter-regional transport supplies (i.e., railways and highways connecting different counties). This observation motivates a conceptual categorization of different EEs into substitutive or complementary groupings. In our study, we discovered that two EEs can be combined to produce favorable, synergistic circumstances when their spatial scopes are complementary to each other. Alternatively, different EEs may exert complementary mechanisms that are jointly beneficial to entrepreneurial activities.

5.1.2. Activation of enabling mechanisms and the property of generic intensity

As demonstrated throughout the course of our exploratory investigation, the relative impact of HSR on new business venturing is materially dependent upon the activation of enabling mechanisms, the precise scope and scale of which stems from a host of initial conditions, spatiotemporal factors, and agent characteristics. Our study is the first to consider the simultaneous activation of multiple, latent situational mechanisms intermediating EEs and individual agents. Using HSR expansion in China as a natural experiment, we also go further than the theoretical elaboration in von Briel et al. (2018) to offer an empirical evaluation of the proposed channels, thereby yielding scholarly and practical insights that are generalizable to other settings.

Specifically, our study provides conceptual and empirical insights regarding three different latent enabling mechanisms that were activated by HSR: communication cost compression, new idea generation, and final demand expansion. These map to the categories of compression, generation, and demand expansion as proposed in Davidsson et al. (2018). Framing questions 3a and 3b explicitly sought to instigate more penetrating exploration of how multiple, simultaneous mechanisms can be identified and – through the use of novel analytical tools – parsed, in order to assess the relative impact of each. Among the three mechanisms identified in this study, communication cost compression was found to be the most significant driver of new business venturing, followed by final demand expansion and new idea generation. In each case, industry-level characteristics provide informative guidance regarding the presence and relative importance of each latent mechanism. Based on the relational qualities of mechanisms discussed in Davidsson et al. (2018), we conjecture that quantitatively weak new idea generation may partially reflect the agency-intensity of this mechanism, which requires significant amounts of specialized knowledge, prior investment and risk-bearing willingness for agents to realize the enabling effect. Conversely, communication cost compression and final demand expansion are comparatively easy to identify (e.g., low opacity) and do not pose a high barrier for agentic action (e.g., low agency-intensity).

Although not directly comparable, the intensity of HSR's triggering role in our study is statistically and economically stronger than that of traditional railways and highways. It is highly likely that for all these types of transportation infrastructure EEs are exerting similar enabling mechanisms of compression, generation, and expansion, but with varying degrees of strength and effectiveness (e.g., traditional railway connections increase the sales demand for a typical venture by 10 units while HSR operations brings in final demand expansion of 20 units). Davidsson et al. (2018) takes note of this “inherent capacity” of an EE to enable a specific mechanism but focused principally on the relational qualities of mechanisms related to agent awareness and capabilities. Inspired by the findings from our empirical investigation, we extend and enhance the conceptualization of inherent capacity in Davidsson et al. (2018) to incorporate environmental forces by introducing the concept of “generic intensity,” which we have situated in Fig. 7 in the domain of enabling mechanisms.

Generic intensity represents the inherent capacity of the enabling mechanism to exert influence on business venturing that is accentuated or diminished by the relative “opacity” of the enabling mechanism – representing the degree to which the enabling mechanism's potential can be fathomed by would-be entrepreneurs – and the “agency intensity” of the enabling mechanism, representing the idiosyncratic ardor of capitalizing on an enabling mechanism's potential. While the “generic intensity” of an enabling mechanism, by definition, exerts uniform influence (e.g. idea generation, or the legitimacy garnered through official business registration, or the mitigation of information asymmetries), that influence may decay or strengthen as it moves across time and space, as a function of opacity, agency intensity, and the EE's scope characteristics. In the EE framework, this occurs as a consequence of the extent to which an activated enabling mechanism has greater or lesser intensity and scope in affecting the roles played by an EE. Our configuration of the EE framework in Fig. 7 captures this important dynamic by recasting EE scope as a key determinant of both the type and magnitude of enabling effects, which our study confirmed through our investigation of effects related to the triggering role of HSR.

As the foregoing suggests, it is conceptually important to identify and separate the generic intensity of an enabling mechanism from its opacity and agency-intensity dimensions. Failure to identify and isolate generic intensity conceptually makes it difficult, if not impossible, to draw meaningful conclusions from the analysis of an enabler's effects because radically different relationships can yield indistinguishably similar outcomes. Adding the property of generic intensity is particularly useful for analysis seeking to compare EEs and evaluate across EEs. For example, an enabling mechanism that is weak in overall intensity may have very low generic intensity; or, an enabling mechanism may have very high generic intensity, but the overall intensity is heavily offset by high opacity and onerous agency-intensity. Under such circumstances, near-term, both enabling mechanisms may lead to similarly low triggering effects. However, in the latter case, agents may gradually accumulate the necessary knowledge to benefit from the enabling mechanisms. As entrepreneurs address and eventually surmount the impediments posed by opacity and agency-intensity, they are increasingly able to capitalize upon the high generic intensity and, through this, the EE may exert increasing enablement effects in the years to come.

5.1.3. Methods and context

In addition to these conceptual contributions, our research analytics add to the methodological advances of Bennett (2019a) and von Briel et al. (2018) by developing and testing a road map for future research designs through the novel application of DD and other econometric tools to robust analyses of temporal, spatial and sectoral comparisons. As we had hoped through our pursuit of methodological gains through framing questions 3a and 3b, our query-driven investigation also expands the empirical acuity of the EE framework by highlighting important dimensions that are idiosyncratic to the China context. Building on the insights of recent studies drawn from U.S. and European data, the China HSR rollout represents a context that is still highly proximal to post-colonial, industrial development. China's distinctiveness is highly material. For example, in the studies conducted by Bennett (2019a) and Audretsch et al. (2015), rural and suburban access to infrastructure is much further along the historical timeline than is HSR expansion in contemporary China. Indeed, we find that in a context exhibiting significantly less infrastructural saturation, public

infrastructure investments have the capacity to yield favorable returns. Furthermore, contrasts are particularly marked in developing countries, or entities in markets with less mature formal institutions (Okpara, 2011), and our exploratory approach led us to another source of beneficial granularity concerning firms with different ownership types. Consistent with the investigative aims of framing question 4, it became apparent in our exploration that the ownership distinction is indispensable to conducting an EE analysis of China as ownership type constituted a significant source of variance in business venturing, with SOEs generating far less entrepreneurial activity – a circumstance that is likely to be replicated in developing countries. For this reason, Fig. 7 amends the EE framework by incorporating the ownership dimension. Overall, examining EEs through the lens of China's transitional, quasi-controlled economy, our findings substantiate Davidsson et al. (2018) and Bennett (2019a, 2019b) regarding the importance of context and agency in determining the quantity and substance of entrepreneurial activity. As new studies emerge based on diverse backgrounds, theory-building within the EE framework may consider categorizing the types/impacts of context in an abstracted manner, which will facilitate a more systematic application of the EE framework.

The findings drawn from our exploratory investigation of China's HSR rollout and generalized in Fig. 7 are intended to offer insights into specific ways that scholars may improve the accuracy of the analysis and the explanatory comprehensiveness of the EE framework. The efficacy of these refinements to the EE framework is borne out in our findings by the important function of key interaction terms in predicting the impact of scope and intensity on triggering effects. As such, Fig. 7 suggests an underlying dynamism to the EE framework driven by the ongoing, evolving impacts of scope as agents decode and effectuate novel outcomes from environmental forces.

5.2. Practitioner implications

Entrepreneurship studies have long emphasized the environmental scanning activities of firm founders and corporate entrepreneurs, through which agents try to identify potential opportunities and threats from complex situations replete with mixed environmental signals. Armed with judgment-based insights regarding uncertain landscapes (Foss and Klein, 2012), individuals attempt to comprehend and contextualize macro-environmental characteristics, roles, and mechanisms (Shane and Venkataraman, 2000; Venkataraman, 1997; Welter, 2011). The HSR example demonstrates how infrastructure upgrades, and technological progress in general, can produce new business opportunities and alter the landscape of existing competition (Chalmers et al., 2019; Leten et al., 2016; Obschonka and Audretsch, 2019; von Briel et al., 2018). Given the positive linkage between environmental information processing and firm performance (Dollinger, 1984; Daft et al., 1988), the enhanced understanding of contextual change, as well as the corresponding mechanisms triggered, offer important insights on strategic decision-making. For example, potential businesses that rely heavily upon communication tasks and serve primarily for final consumption may consider entry and fast expansion in regions anticipating infrastructural improvements. In particular, forward-looking entrepreneurs may benefit by capitalizing on the absence of announcement effects and spillovers to adjacent locales. Doing so may heighten short-term risks, but lower the overall costs of market-entry for proactive entrepreneurs who can garner first-mover status and occupy attractive locations before competition materializes. Alert individuals may also find ways to exploit the patterns of regional comparative advantage, which may be disrupted or further reinforced by infrastructural investments (Bennett, 2019a).

5.3. Policy implications

Valuable policy insights can be harvested from our results. First, by quantifying the enabling mechanisms of HSR, our study highlights the generic elements conducive to new business creation. Beyond the adoption of an HSR network per se, an effective government, with the hope of creating a favorable environment for business entry, can implement policies and promote an institutional context that lowers transaction costs, facilitates knowledge exchange, and heightens consumer demand (Bennett, 2019b, 2020; North, 2006). Furthermore, we show that the effect of any specific external enabler is conditional upon initial conditions and the broader business environment and entrepreneurial spirit of the region. Had the HSR system been introduced in a period of state-dominant economy in China, we would not have found the documented positive effects. Hence, for developing countries eager for economic dynamism, we have illuminated important factors that are pertinent to unleashing the full entrepreneurial potential of an economy and the full value of massively scaled infrastructure investments. In this regard, our work complements extant studies that explore the macroeconomic outcomes of infrastructure investment (e.g. Faber, 2014; Donaldson and Hornbeck, 2016). The mechanisms we highlight can assist in optimizing the planning and implementation of transit systems. For example, when deciding the specific routes and locations, policymakers can evaluate the initial conditions of each region to see where complementary institutions might amplify the effects of a project's enabling mechanisms to reap maximal returns.

5.4. Limitations and opportunities

As with all studies, design decisions attendant to this investigation required us to strike a balance between promising avenues to explore and technical limitations of our data set and analytical model. These limitations shed light on opportunities for future research. To begin with, data availability constrained our examination to the impact of HSR accessibility on entrepreneurship using above-scale industrial and manufacturing firms in China. Also, we had to stop our empirical analysis in 2013 owing to data constraints; however, the HSR network in China has continued to expand. As more data becomes available, it will be interesting to expand the focus to include service-sector business formation using updated data and to evaluate its impact on the informal entrepreneurial activities. Future studies can apply advanced techniques such as synthetic control methods (e.g. Abadie et al., 2010) to

look even further spatially and temporally to track the treatment effect in a time-series perspective and to evaluate the network effects of critical mass.

By design, this study explores the triggering effect of HSR as an EE, since our central preoccupation involved exploring the EE framework's efficacy as a reliable basis to describe the intermediating role between macro-environmental forces and micro-level entrepreneurial action. This decision, by necessity, meant that the outcome-enhancing role and shaping role (Davidsson et al., 2018) of EEs were not considered. However, follow-on studies can and should examine how EEs may affect the operational performance and survivability of new ventures, as well as the potential disruption to existing business. As Bennett (2019a:20) noted, "Infrastructure investments change the physical environment in a way that provides a window of opportunity for entrepreneurs to enter the market while at the same time closing the window on some existing opportunities." Future studies should also investigate the degree to which the windows of opportunity include announcement effects, the absence of which in our study is compelling, but is unlikely to fully generalize to all EE contexts. Given the potent implications of anticipatory venturing activity for matters of competitive positioning, policy-making, and planning, the specific conditions under which announcement effects do or do not occur warrants further study.

While our exploratory study constitutes an expansive effort to quantify the influence of simultaneous enabling mechanisms, the well-parsed, reliably supported forces spotlighted in our study only explain half of the focal effects, meaning that there is more work to do. Joining Davidsson et al. (2018), we encourage further investigation into alternative mechanisms, which will substantially enhance our knowledge in this area. Our approach to handling multiple mechanisms – likely the norm in complex system environments – opens the door to fresh hypothesizing about varied EE impacts and contexts. Such work potentially includes a focus on the minimization of transaction costs encountered by start-ups (e.g. Coase, 1937; Zacharakis, 1997) as a function of the enabling mechanisms we, and others (e.g. Davidsson et al., 2018) have identified. There is also an opportunity to hypothesize about the role of tacit knowledge and emergence of dynamic capabilities (Teece and Pisano, 2003) that may prove to be beneficial in an environment characterized by the sequential or simultaneous activation of multiple enabling mechanisms.

CRediT author statement

Author involvement in the development of this manuscript is as follows:
Jean Jinghan Chen: Conceptualization, Resources, Writing - Review & Editing.
Chuantao Cui: Software, Resources, Formal Analysis.
Richard A. Hunt: Methodology, Formal Analysis, Writing - Original Draft, Writing - Review & Editing.
Leona Shao-Zhi Li: Conceptualization, Methodology, Formal Analysis, Writing - Original Draft, Writing - Review & Editing.

Author's declaration

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Appendix A. Supplementary data

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References

Abadie, A., Diamond, A., Hainmueller, J., 2010. Synthetic control methods for comparative case studies: estimating the effect of California's tobacco control program. J. Am. Stat. Assoc. 105 (490), 493–505.
Acemoglu, D., Johnson, S., 2007. Disease and development: the effect of life expectancy on economic growth. J. Polit. Econ. 115 (6), 925–985.
Acs, Z.J., Audretsch, D.B., Lehmann, E.E., 2013. The knowledge spillover theory of entrepreneurship. Small Bus. Econ. 41 (4), 757–774.
Albulescu, C.T., Tămăşilă, M., 2014. The impact of FDI on entrepreneurship in the European countries. Procedia Soc. Behav. Sci. 124, 219–228.
Anderson, B.S., Wennberg, K., McMullen, J.S., 2019. Editorial: enhancing quantitative theory-testing entrepreneurship research. J. Bus. Ventur. 34 (5), 1–11.
Antras, P., Chor, D., Fally, T., Hillberry, R., May 2012. Measuring the upstreamness of production and trade flows. Am. Econ. Rev. 102 (3), 412–416.
Audretsch, D.B., 2003. Entrepreneurship: A Survey of the Literature. Working Papers, Official Publications of the European Communities Luxembourg.
Audretsch, D.B., Keilbach, M., 2007. The theory of knowledge spillover entrepreneurship. J. Manag. Stud. 44 (7), 1242–1254.
Audretsch, D.B., Lehmann, E.E., 2005. Does the knowledge spillover theory of entrepreneurship hold for regions? Res. Policy 34 (8), 1191–1202.
Audretsch, D.B., Heger, D., Veith, T., 2015. Infrastructure and entrepreneurship. Small Bus. Econ. 44 (2), 219–230.
Autor, D.H., 2013. The task approach to labor markets: an overview. Journal for Labour Market Research 46 (3), 185–199.
Baumol, W.J., 1996. Entrepreneurship: productive, unproductive, and destructive. J. Bus. Ventur. 11 (1), 3–22.
Bennett, D.L., 2019a. Infrastructure investments and entrepreneurial dynamism in the US. J. Bus. Ventur. 34 (5), 1–28.
Bennett, D.L., 2019b. Local economic freedom and creative destruction in America. Small Business Economics. URL. https://doi.org/10.1007/s11187-019-00222-0.
Bennett, D.L., 2020. Local institutional heterogeneity and firm dynamism: decomposing the metropolitan economic freedom index. Small Business Economics. https://doi.org/10.1007/s11187-020-00322-2. (URL).
Bernard, A.B., Moxnes, A., Saito, Y.U., 2019. Production networks, geography, and firm performance. J. Polit. Econ. 127 (2), 639–688.
Brandt, L., Van Biesebroeck, J., Wang, L., Zhang, Y., 2017. WTO accession and performance of Chinese manufacturing firms. Am. Econ. Rev. 107 (9), 2784–2820.
Browder, R.E., Aldrich, H.E., Bradley, S.W., 2019. The emergence of the maker movement: implications for entrepreneurship research. J. Bus. Ventur. 34 (3), 459–476.
Callaway, B., Sant'Anna, P.H., 2019. Difference-in-differences with multiple time periods. Available at SSRN 3148250.
Castaño, M.-S., Méndez, M.-T., Galindo, M.-Á., 2015. The effect of social, cultural, and economic factors on entrepreneurship. J. Bus. Res. 68 (7), 1496–1500.
Chalmers, D., Matthews, R., Hyslop, A., 2019. Blockchain as an external enabler of new venture ideas: digital entrepreneurs and the disintermediation of the global music industry. J. Bus. Res. https://doi.org/10.1016/j.jbusres.2019.09.002.

Chandra, A., Thompson, E., 2000. Does public infrastructure affect economic activity?: evidence from the rural interstate highway system. Reg. Sci. Urban Econ. 30 (4), 457–490.
Chang, S.-J., Wu, B., 2014. Institutional barriers and industry dynamics. Strateg. Manag. J. 35 (8), 1103–1123.
Charnoz, P., Lelarge, C., Trevien, C., 2018. Communication costs and the internal organisation of multi-plant businesses: evidence from the impact of the french high-speed rail. Econ. J. 128 (610), 949–994.
Coase, R.H., 1937. The nature of the firm. Economica 4 (16), 386–405.
Coşar, A.K., Demir, B., 2016. Domestic road infrastructure and international trade: evidence from Turkey. J. Dev. Econ. 118, 232–244.
Daft, R.L., Sormunen, J., Parks, D., 1988. Chief executive scanning, environmental characteristics, and company performance: an empirical study. Strateg. Manag. J. 9 (2), 123–139.
Davidsson, P., 2015. Entrepreneurial opportunities and the entrepreneurship nexus: a re-conceptualization. J. Bus. Ventur. 30 (5), 674–695.
Davidsson, P., 2019. Guidepost: look out! See change? Sea change ahead!. Academy of Management Discoveries. https://doi.org/10.5465/amd.2019.0141.
Davidsson, P., Recker, J., von Briel, F., 2018. External enablement of new venture creation: a framework. Acad. Manag. Perspect. https://doi.org/10.5465/amp.2017.0163.
de Chaisemartin, C., D'Haultfoeuille, X., 2019. Two-way fixed effects estimators with heterogeneous treatment effects. Tech. rep.. National Bureau of Economic Research NBER Working Paper No. 25904.
de Chaisemartin, C., D'Haultfœuille, X., Guyonvarch, Y., 2019. Fuzzy differences-in-differences with Stata. Stata J. 19 (2), 435–458.
Delgado, M., Porter, M.E., Stern, S., 2010. Clusters and entrepreneurship. J. Econ. Geogr. 10 (4), 495–518.
Dollinger, M.J., 1984. Environmental boundary spanning and information processing effects on organizational performance. Acad. Manag. J. 27 (2), 351–368.
Donaldson, D., Hornbeck, R., 2016. Railroads and American economic growth: a "market access" approach. Q. J. Econ. 131 (2), 799–858.
Duranton, G., Morrow, P.M., Turner, M.A., 2014. Roads and trade: evidence from the US. Review of Economic Studies 81 (2), 681–724.
Dutta, S., 2017. Creating in the crucibles of nature's fury: associational diversity and local social entrepreneurship after natural disasters in California, 1991–2010. Adm. Sci. Q. 62 (3), 443–483.
Edmondson, A.C., McManus, S.E., 2007. Methodological fit in management field research. Acad. Manag. Rev. 32 (4), 1246–1264.
Ellison, G., Glaeser, E.L., 1997. Geographic concentration in us manufacturing industries: a dartboard approach. J. Polit. Econ. 105 (5), 889–927.
Faber, B., 2014. Trade integration, market size, and industrialization: evidence from China's national trunk highway system. Review of Economic Studies 81 (3), 1046–1070.
Fee, P.R., Mialon, H.M., Williams, M.A., 2004. What is a barrier to entry? Am. Econ. Rev. 94 (2), 461–465.
Foss, N.J., Klein, P.G., 2012. Organizing Entrepreneurial Judgment: A New Approach to the Firm. Cambridge University Press.
Ghani, E., Kerr, W.R., O'connell, S., 2014. Spatial determinants of entrepreneurship in India. Reg. Stud. 48 (6), 1071–1089.
Glaeser, E.L., Kerr, S.P., Kerr, W.R., 2015. Entrepreneurship and urban growth: an empirical assessment with historical mines. Rev. Econ. Stat. 97 (2), 498–520.
Gnyawali, D.R., Fogel, D.S., 1994. Environments for entrepreneurship development: key dimensions and research implications. Entrepreneurship Theory and Practice 18 (4), 43–62.
Graesser, A.C., Baggett, W., Williams, K., 1996. Question-driven explanatory reasoning. Appl. Cogn. Psychol. 10 (7), 17–31.
Guirao, B., Campa, J.L., Casado-Sanz, N., 2018. Labour mobility between cities and metropolitan integration: the role of high speed rail commuting in Spain. Cities 78, 140–154.
Guo, Q., He, C., Li, D., 2016. Entrepreneurship in China: the role of localisation and urbanisation economies. Urban Stud. 53 (12), 2584–2606.
Hardy, W., Lewandowski, P., Park, A., Yang, D., 2018. In: Institute for structural research working paper (Ed.), The Global Distribution of the Routine and Non-routine Work.
Hsieh, C., Song, Z., 2015. Grasp the large, let go of the small: the transformation of the state sector in China. Brook. Pap. Econ. Act. 295–346.
Ke, X., Chen, H., Hong, Y., Hsiao, C., 2017. Do China's high-speed-rail projects promote local economy?–New evidence from a panel data approach. China Econ. Rev. 44, 203–226.
Krueger, A.O., 1974. The political economy of the rent-seeking society. Am. Econ. Rev. 64 (3), 291–303.
Leten, B., Belderbos, R., Looy, B.V., 2016. Entry and technological performance in new technology domains: technological opportunities, technology competition and technological relatedness. J. Manag. Stud. 53 (8), 1257–1291.
Lin, Y., 2017. Travel costs and urban specialization patterns: evidence from China's high speed railway system. J. Urban Econ. 98, 98–123.
Lofstrom, M., Bates, T., Parker, S.C., 2014. Why are some people more likely to become small-businesses owners than others: entrepreneurship entry and industry-specific barriers. J. Bus. Ventur. 29 (2), 232–251.
Lu, J., Tao, Z., 2010. Determinants of entrepreneurial activities in China. J. Bus. Ventur. 25 (3), 261–273.
Moeen, M., Agarwal, R., 2017. Incubation of an industry: heterogeneous knowledge bases and modes of value capture. Strateg. Manag. J. 38 (3), 566–587.
Niu, Y., Dong, L.C., Chen, R., 2012. Market entry barriers in China. J. Bus. Res. 65 (1), 68–76.
North, D.C., 2006. Understanding the Process of Economic Change. Academic foundation.
Nunn, N., Wantchekon, L., 2011. The slave trade and the origins of mistrust in Africa. Am. Econ. Rev. 101 (7), 3221–3252.
Obschonka, M., Audretsch, D.B., 2019. Artificial intelligence and big data in entrepreneurship: a new era has begun. Small Business Economics. https://doi.org/10.1007/s11187-019-00202-4. (URL).
Okpara, J.O., 2011. Corporate governance in a developing economy: barriers, issues, and implications for firms. Corporate Governance: The international journal of business in society 11 (2), 184–199.
Oldenski, L., 2012. Export versus FDI and the communication of complex information. J. Int. Econ. 87 (2), 312–322.
Pan, Y., Teng, L., Supapol, A.B., Lu, X., Huang, D., Wang, Z., 2014. Firms' FDI ownership: the influence of government ownership and legislative connections. J. Int. Bus. Stud. 45 (8), 1029–1043.
Park, S.H., Li, S., David, K.T., 2006. Market liberalization and firm performance during China's economic transition. J. Int. Bus. Stud. 37 (1), 127–147.
Parker, S.C., 2018. The Economics of Entrepreneurship. Cambridge University Press.
Redding, S.J., Turner, M.A., 2015. Chapter 20 - transportation costs and the spatial organization of economic activity. In: Duranton, G., Henderson, J.V., Strange, W.C. (Eds.), Handbook of Regional and Urban Economics. Vol. 5 of Handbook of Regional and Urban Economics. Elsevier, pp. 1339–1398.
Shane, S., 2003. A General Theory of Entrepreneurship: The Individual-Opportunity Nexus. Edward Elgar Publishing.
Shane, S., 2012. Reflections on the 2010 AMR decade award: delivering on the promise of entrepreneurship as a field of research. Acad. Manag. Rev. 37 (1), 10–20.
Shane, S., Venkataraman, S., 2000. The promise of entrepreneurship as a field of research. Acad. Manag. Rev. 25 (1), 217–226.
Shepherd, D.A., Suddaby, R., 2017. Theory building: a review and integration. J. Manag. 43 (1), 59–86.
Simon, M., Houghton, S.M., Aquino, K., 2000. Cognitive biases, risk perception, and venture formation: how individuals decide to start companies. J. Bus. Ventur. 15 (2), 113–134.
Sternberg, E.M., 2009. Healing Spaces. Harvard University Press.
Teece, D., Pisano, G., 2003. The dynamic capabilities of firms. In: Handbook on Knowledge Management. Springer, pp. 195–213.
Tullock, G., 1967. The welfare costs of tariffs, monopolies, and theft. Econ. Inq. 5 (3), 224–232.
Venkataraman, S., 1997. The distinctive domain of entrepreneurship research. In: Seminal Ideas for the Next Twenty-Five Years of Advances. Emerald Publishing Limited, pp. 5–20.
von Briel, F., Davidsson, P., Recker, J., 2018. Digital technologies as external enablers of new venture creation in the IT hardware sector. Entrepreneurship Theory and Practice 47–69.
Welter, F., 2011. Contextualizing entrepreneurship – conceptual challenges and ways forward. Entrepreneurship Theory and Practice 35 (1), 165–184.
Wennberg, K., Anderson, B.S., 2020. Enhancing the exploration and communication of quantitative entrepreneurship research. J. Bus. Ventur. 35 (3), 105938.
Zacharakis, A.L., 1997. Entrepreneurial entry into foreign markets: a transaction cost perspective. Entrepreneurship Theory and Practice 21 (3), 23–40.
Zheng, L., Zhao, Z., 2017. What drives spatial clusters of entrepreneurship in China? Evidence from economic census data. China Econ. Rev. 46, 229–248.
Zhou, Y., 2020. Horizontal "checks and balances" in the socialist regime: the party chief and mayor template. J. Inst. Econ. 16 (1), 65–82.