Papers in Evolutionary Economic Geography

15.22

Does Creative Destruction Work for Chinese Regions? An Empirical Study on the Articulation between Firm Exit and Entry

Yi Zhou, Canfei He & Shengjun Zhu

Utrecht University
Urban & Regional research centre Utrecht

Does Creative Destruction Work for Chinese Regions? An Empirical Study on the Articulation between Firm Exit and Entry

Yi Zhou, Canfei He*, Shengjun Zhu

College of Urban and Environmental Sciences, Peking University, Beijing , 100871
*Corresponding Author E-mail: hecanfei@urban.pku.edu.cn

This work was supported by the Natural Science Foundation of China under Grant No. 41271130; National Science Foundation for Distinguished Young Scholars of China under Grant NO. 41425001.

Does Creative Destruction Work for Chinese Regions? An Empirical Study on the Articulation between Firm Exit and Entry

Abstract: Creative destruction is a key driving force behind industrial development. The continuing process of creative destruction provides an impetus to regional industrial renewal. Our analytical framework that emphasizes the ways in which firm exit creates a stimulus for firm entry, resulting in incremental innovation and productivity increase is complementary to the process of technological change and industrial renewal articulated by Schumpeter who pays attention to how new entrants bring in radical innovation and new products, making incumbents' products and technologies obsolete and force them to exit or catch up. Using firm-level data of China's industries during 1998-2008, this paper seeks to argue that the articulation between firm exit and entry has been constantly shaped by an assemblage of various factors, including firm characteristics, industrial linkages, regional institutions and geographical proximity.

Keywords: Creative destruction, Firm Exit, Firm Entry, Industrial Dynamics, China

1. Introduction

Industrial renewal and restructuring takes place through a dual process where on the one hand long periods of incremental innovation and technological changes gradually transform industrial structure, and on the other hand radical technological paradigm shifts reshape economic landscape in a more fundamental way. Such a dual process has resulted in the rise and fall of regional economies and the restructuring of industrial areas, and we now have several examples of where such process has forced the restructuring of regional economies in Europe, North America and Japan (Schamp 2005; Hassink 2007), the Asian newly industrialized economies since the mid-1990s (grunsven and Smakman 2005), and emerging economies such as mainland China since the 2000s (Wei, Lu, and Chen 2009). Disturbances and shocks that emerge at the global, national, regional and local level in the form of institutional transformation, policy changes, fluctuation of currency exchange rates, and technological shifts have a remarkable impact over industrial development and may result in decline, atrophy, or even shut-down of an entire industry in certain geographical areas(Martin and Sunley 2015). Resilience of regional economies in face of disturbances and shocks has

been valued as a key feature a region should possess in order to achieve sustainable development (Martin and Sunley 2015). One type of regional resilience is related to creative destruction (Schumpeter 1939; Schumpeter 1942), referring not only to the capability of local entrepreneurs to develop new product or processes that can replace the traditional ones and render the latter obsolete in the short term (Schumpeter 1942), but also to the capability of a certain geographical region to generate and attract new entrants to offset the destruction caused by firm exit and industrial decline. This process of firm exit and entry is dynamic and complex, underlining the broader industrial evolution and economic development.

Many studies on creative destruction in developed economies tend to focus on the ways in which firm entry and exit as well as industrial restructuring has unfolded in capitalist market economy and on the key role of market economy in facilitating the process of creative destruction (Dunne, Roberts, and Samuelson 1989; Hahn 2000; Audretsch and Fritsch 2002; Aghion et al. 2004; Knott and Posen 2005; Pe'er and Vertinsky 2008; Brixy 2014), whereas little attention has been directed towards the potential effect that non-market factors (e.g., institutional contexts) could have over the process of industrial evolution, and even less attention to questions like what kind of geographical regions is able to attract more new entrants and therefore is more likely to maintain its competitiveness. China's manufacturing industry provides a rich context. On the one hand, since the initiation of China's Reform and Opening-Up Policies, China has undergone dramatic economic growth and has experienced three fundamental transformations: (1) from a planned to an increasingly market-based economy; (2) from a state-owned, collective economy to one with growing level of private ownership; and (3) from a partially closed economy to one oriented towards export markets (Wei 2001; He, Wei, and Xie 2008). On the other hand, decentralization in China has created opportunities for local authorities to take different routes, resulting in a geographically uneven economic and institutional landscape. Even though Brandt et al. (2012) work has pointed out the existence of creative destruction in China's so-called 'socialist market economy', few has been done to understand the determinants of firm exit and entry and their interaction, the role of regional institution in the process of creative destruction, and the subsequent industrial restructuring in such a transitional economy.

This research seeks to fill this gap. We contribute to the understanding of the role of firm exit in regional industrial renewal process and to the debate over whether firm exit is good (Knott and Posen 2005), by suggesting that firm exit may attract new entrants that are likely to become more productive through a redeployment of resources released by firm exit. This research echoes with Pe'er & Vertinsky (2008) findings based on firm exit and entry in

Canada, but pays more attention to the ways in which the above mentioned process is constantly shaped by an assemblage of various factors, including firm characteristics, industrial linkages, regional institutions and geographical proximity. Our findings also highlight the bright side of firm exit and particularly its positive role in promoting regional productivity, and therefore show that certain industrial policies that are designed to prevent inefficient firms from dying could be counterproductive in practice. The next section provides a literature review and proposes an analytical framework to understand firm exit and entry in transitional economy like China. In section three, we introduce data sources and describe the patterns of firm dynamics in China. After interpreting the model and variables in section four, section five reports and analyzes the statistical results. The last section concludes the paper by summarizing the main findings and discussing policy implications.

2. Articulation between firm entry and exit

Entrepreneurial activity is increasingly regarded as playing a primary role in shaping the regional economy and industrial renewal (Audretsch and Thurik 2001; Dejardin 2009; Fritsch and Mueller 2004), a process which is characterized by creative destruction that introduces superior products and technologies and renders old ones obsolete (Schumpeter 1942). While Schumpeter has focused on radical technological shifts and on how new entrants bring in new products and more advanced technologies, making existing technology regime and products of incumbents obsolete and forcing them to exit or catch up, Pe'er and Vertinsky (2008) have examined industrial renewal and restructuring through a different perspective that emphasizes a local creative destruction process through which technologies change incrementally. Unlike Schumpeter who examines the impact of the introduction of radical innovation and entry of new firms over exit of incumbents, Pe'er and Vertinsky (2008) show that firm exit actually creates a stimulus for entry of new firms, resulting in incremental innovation and productivity increase. In other words, both studies agree that firm exit and entry interact with one another, but disagree on the direction of causality (Figure 1).

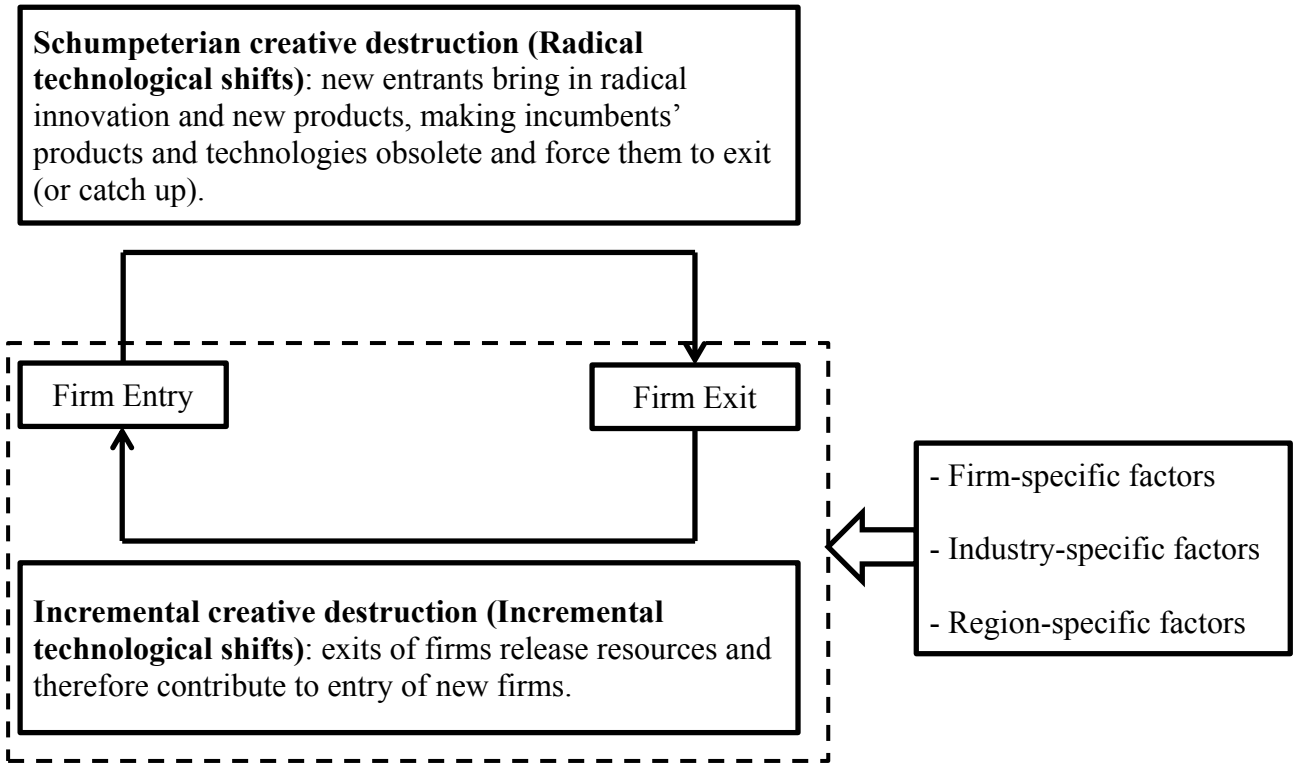


Figure 1 Two perspectives on the articulation of firm entry and exit

Exit of incumbent firms contributes to entry of new firms in many ways (Bates 2005; Deng 2009; Pe'er and Vertinsky 2008; Pe'er, Vertinsky, and King 2008). First, the potential entrants can learn from the exit of incumbents in terms of why they fail to maintain their competitiveness (Cannon and Edmondson 2005; Joseph Amankwah‐Amoah 2011; Madsen and Desai 2010). Second, new entrants are also able to recruit skilled and experienced employees released in the process of firm exit (Delacroix and Carroll 1983; Knott and Posen 2005). Third, tangible and intangible assets released in firm exit can be absorbed by new entrants particularly from the same and related industries, lowering the entry barrier and costs for new entrants (Clark and Wrigley 1997; Kessides 1991). Finally, firm exit also releases market for new entrants (Clark and Wrigley 1997; Kessides 1991; Knott and Posen 2005). This research builds on these studies, but moves beyond and pays more attention to the ways in which the articulation between firm exit and firm entry has been constantly shaped by an assemblage of various factors—firm-specific, industry-specific and region-specific (Figure 1).

Firm-specific factors

Firm exit or failure is often related to its age and size (Dunne, Roberts, and Samuelson 1989).

Resources released by exiting firms are often determined by firm characteristics. For instance, the exit of young firms endowed with very limited amount of tangible and intangible assets releases less resources for firm entry than that of old, mature ones (Bates 2005; Harris and Hassaszadeh 2002). Exit of large firms that own a large number of workers and plenty of tangible and intangible assets may also release more resources and create more opportunities for entry (Haltiwanger, Jarmin, and Miranda 2012). Small firms tend to employ more temporary, part-time and precarious workers, pay lower wages, and conduct more labor-intensive production (Brock and Evans 1989; Mayo and Murray 1991). In addition, they rely heavily on bank loans (Beck and Demirguc-Kunt 2006), which could dry up more quickly than large firms particularly during economic downturns (Fazzari, Hubbard, and Petersen 1987). Nevertheless, employees working in small firms may have a better chance to familiarize with a broader spectrum of operations (Storey 1982), and therefore small firms can also be seen as incubators, the exit of which may release some well-rounded workers (Cross 1981).

Industry-specific factors

Marshallian and Jacobian externalities are defined as the benefits arising from knowledge spillover and technology transfer within the same industry and across a variety of different industries, respectively. However, it is increasingly acknowledged that knowledge spillover does not exist across any industries; terms like cognitive proximity and technological relatedness have been used to explore the effectiveness of knowledge spillover and industrial evolution (Balland, Boschma, and Frenken 2014; Frenken, Van Oort, and Verburg 2007; Hassink 2005; Neffke, Henning, and Boschma 2011). There is a growing body of literature that suggests knowledge spillover occurs through sharing overlapping knowledge bases between related sectors rather than within a broad range of random sectors(Asheim, Boschma, and Cooke 2011; Frenken, Van Oort, and Verburg 2007). Industries that were technologically related to the preexisting productive structure in a region have a higher probability of entering that region than do industries that are technologically unrelated to the region's preexisting industries (Neffke, Henning, and Boschma 2011). Technological relatedness plays an crucial role in industrial clustering (Boschma and Wenting 2007; Delgado, Porter, and Stern 2010), employment growth (Bishop and Gripaios 2010; Hartog, Boschma, and Sotarauta 2012), spinoff dynamics (Heebels and Boschma 2011), productivity growth (Quatraro 2010), and regional growth (Boschma and Iammarino 2009; Boschma, Minondo, and Navarro 2012;

Frenken, Van Oort, and Verburg 2007). In our case, the interaction between firm exit and firm entry is therefore expected to be shaped by industry-specific factors and technological relatedness. Our hypothesis is firm exit in one industry may be more attractive for entrants from the same or related industries that are more capable to utilize the released resources.

Region-specific factors

Research based on case studies in developed capitalist economies tends to emphasize the role of market economy that allows resources to flow relatively freely(Essletzbichler and Rigby 2005), but pay less attention to the impact of non-market factors (e.g., institution) over regional industrial evolution and to regional variation in terms of institutional and economic contexts. Regions can differ from each other drastically in terms of institutional contexts, particularly in developing and emerging economies like China where decentralization has empowered local authorities to participate directly in the development process as planners, developers and policy-makers, resulting in a geographically uneven institutional and economic landscape (Zhao and Zhang 1999). This process of decentralization may affect firm exit and entry in many ways. On the one hand, less developed regions in China are more likely to protect local economy, resulting in a high entry barrier. On the other hand, developed and rich regions particularly in China's coastal areas are more active and capable in upgrading their industrial structure. Consequently, high level of firm exit in one industry in developed regions may indicate local authorities' decision to abandon this industry as a whole and upgrade to more advanced industries. In this sense, firm exit does not necessarily lead to firm entry in the same industry.

Marketization allows better labor mobility, and smoother knowledge spillover through industrial linkages, and boost entrepreneurship (He and Pan 2010), enabling new entrants to easily absorb resources released by firm exit. However, in a transitional economy, due to decentralization, marketization has been implemented to different extents in different regions, generating different institutional contexts that facilitate or hinder the process of creative destruction to different extents and shape the articulation between firm exit and entry in different ways (Han and Pannell 1999). Specifically, in more liberalized regions, market economy not only facilitates the mobility of released resources, but also allows participants to quickly capture useful market information, such as information on firm exit and local authorities' attitude towards specific industry.

Decentralization and regional variation in terms of institutional contexts also result in high geographical and political barriers between different regions (Fan 2005; Wei 2001; Zhao

and Zhang 1999). Even though the mobility of factors and resources has increased as marketization and globalization proceeded in China (Fan 2005; Fang and Dewen 2003; Luke 2005), it is still difficult for some resources (e.g., skilled workers and machinery) to become mobile enough to easily cross jurisdiction barriers derived from decentralization. The effect of firm exit over firm entry may thus be geographically bounded and exhibit a distance decay pattern.

3. Data source and industry dynamics

3.1. Data source

One database on firm-specific economic and financial variables is used: China's Annual Survey of Industrial Firms (ASIF) (1998-2008). The ASIF is administered by the National Bureau of Statistics of China and covers all Chinese industrial state-owned enterprises and non-state-owned enterprises with annual sales of five million RMB or more. The database provides firm-level data on firm structure and operation, including firm identification, location, capital structure, total profits, total shipments, exported shipments, intermediary inputs, asset value, inventory, employment, sales value, type of investment, output, value added, R&D expenses, education and training of staff, and wages, social insurance, and benefits paid.

Because this dataset suffers some problems, such as missing data on indicators, vague definition of variables and measurement errors, we have adopted a systematic method, developed by (Brandt, Van Biesebroeck, and Zhang 2012), to clean this dataset and delete some incomplete items[1]. If firm *i* is reported in the ASIF in year *t* but not in year *t*-1, this is considered as a firm entry in year *t*. Likewise, if firm *i* is reported in the ASIF in year *t*-1 but not in year *t*, it is assumed that firm *i* exits in year *t*. Since ASIF dataset only includes non-state-owned enterprises with annual sales of five million RMB or more besides state-owned enterprises, firm exit is likely to be slightly overestimated due to the fact that: non-state-owned enterprise that passes the threshold (annual sales of five million RMB or more) in year *t* but fails to do so in year *t*+1 will be treated as an exiting firm. Nonetheless, this flaw only slightly affects research results; ASIF has been widely used to study firm exit and entry (Brandt, Van Biesebroeck, and Zhang 2012). Given this issue, firm exit in our research is more like firm failure—a firm that is able to meet the threshold in year *t* fails to do so in year

[1] Please see (Brandt, Van Biesebroeck, and Zhang 2012) for further details.

t+1. Firm failure and firm exit have been also used interchangeably by Caves (1998) to describe firm discontinuance.

3.2. Temporal and spatial changes of China's industrial dynamics

Table 1 presents the temporal change of firm entry and exit in China. Firm entry rate is calculated as the ratio of the number of new firms to the number of all firms in a specific year, and firm exit rate is the share of the number of exiting firms. Year 2004 is China's economic census year, and 2004 database includes many firms that have been omitted in non-census-years. Two 4-digit sectors are missing in 2008. As a result, statistics in 2004 and 2008 can be erratic and will be carefully treated. The number of firms increases from 134,063 in 1998 to 375,883 in 2008. The average entry and exit rate are 21.3% and 13.3%, respectively, throughout this time period. Firm exit rate decreases continuously from 14.98% in 1998 to 11.49% in 2007. Entry rate however fluctuates, ranging from 13.33% to 43.31% during this time period.

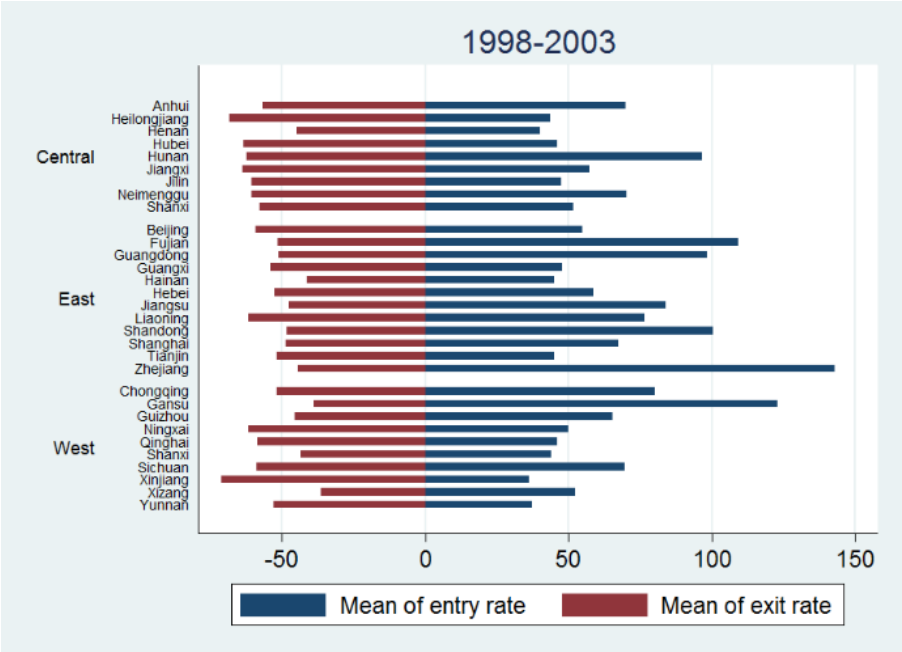
We also compare exit rates of different types of firms (Table 1). Exit rate of young firms is lower than that of old firms, suggesting a negative relationship between firm age and firm exit. Young firms may be more energetic and prepared to adopt new technologies and products. Exit rate of small and medium sized firms is higher than that of large firms, which is consistent with other studies and indicates that small and medium sized firms are more dynamic(Faggio and Konings 2003). Large firms are more capable to tackle with challenges, and therefore face lower turnover rate. Finally, firm ownership also has an impact over firm exit. While exit rate of foreign-owned firms is low and quite stable, that of state-owned and private firms is decreasing and increasing respectively. Foreign-owned firms are often subsidiaries of trans-national corporations, and resources imported from parent firms may make these subsidiaries in China become more resilient. The decrease of exit rate of state-owned firm is due to the reform of state-owned firms in the 1990s in China (Walder, Luo, and Wang 2013). As marketization proceeded and entry barrier for private firms was lowered, private sector boomed, resulting in an increasing level of competition and exit rate in private sector.

Table 1 Firm entry and exit in China (1998-2008)

Year	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
All firms	134063	131507	128677	141899	153860	170305	245139	240877	268868	303876	375883
Firms entry		17532	17368	36213	29459	35154	106169	32879	47616	55408	106922
Firm exit	20088	20198	22991	17498	18709	31335	37141	19625	20400	34915	
Entry rate (%)		13.33	13.50	25.52	19.15	20.64	43.31	13.65	17.71	18.23	28.45

Failure rate (%)	14.98	15.36	17.87	12.33	12.16	18.40	15.15	8.15	7.59	11.49
By Age (Exit rate, %)										
Above 4 year	11.14	12.38	15.06	9.55	9.35	13.54	9.37	5.39	5.56	8.35
1-3 year	2.62	1.99	1.72	1.83	1.90	3.38	4.17	1.92	1.27	2.09
By Firm Size (Exit rate, %)										
Small (<50 employees)	6.10	4.81	4.63	4.42	4.48	5.98	6.80	3.13	3.14	3.99
Medium (50-200 employees)	6.16	7.22	8.10	5.78	5.66	9.00	6.49	3.94	3.51	5.59
Large(>200 employees)	2.73	3.32	5.14	2.13	2.02	3.43	1.87	1.08	0.94	1.91
By Ownership (Exit rate, %)										
State owned	4.21	4.10	4.80	2.74	2.51	2.43	2.10	0.64	0.92	0.46
Private	1.83	2.76	3.65	3.34	3.89	7.34	6.93	3.78	3.40	5.91
Foreign-owned	1.69	1.35	1.37	1.23	1.13	1.67	1.77	1.11	1.00	1.50

Figure 2 shows the geography of firm entry and exit in China in two periods: 1998-2003 and 2003-2008. During the first time period, firm entry rate is at a similar level as firm exit rate, except in a number of coastal provinces, such as Zhejiang, Fujian and Shandong where entry rate is as high as 100% from 1998-2003. However, firm entry rate surpasses exit rate in the second time period, not only in the wealthy coastal regions (e.g., Liaoning, Jiangsu, Shandong), but also in central China (e.g., Anhui and Jiangxi) and West China (e.g., Sichuan and Chongqing). In some of the above notified provinces, entry rate reaches 200% during 2003-2008.



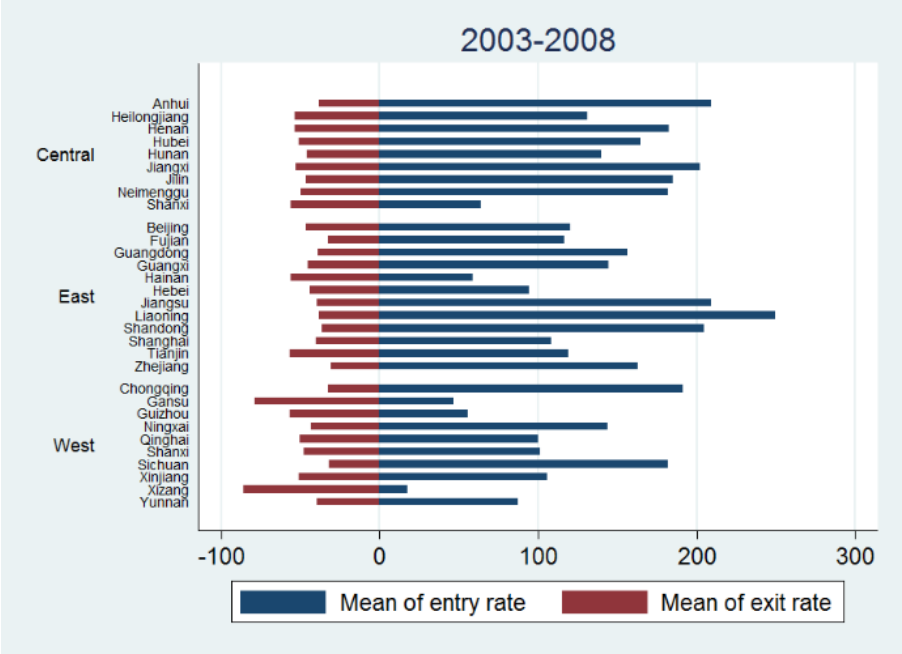


Figure 2 Firm exit and entry in China at provincial level in 1998-2003 and 2003-2008

To better understand the geographical and temporal change of China's industrial dynamics, we follow Audretsch and Fritsch's (2002) work and differentiate four types of growth regimes: entrepreneurial regime, revolving door regime, routinized regime, and downsizing regime. A region is defined as: (1) an 'entrepreneurial regime' region if in this region firm entry rate exceeds the median value but the exit rate is below the median value; (2) a 'revolving door regime' region if in this region firm entry rate and exit rate both exceed the median value; (3) a 'routinized regime' region if in this region firm entry rate and exit rate are both below the median value; (4) a 'downsizing regime' region if in this region firm entry rate is below the median value but exit rate exceeds the median value (Figure 3).

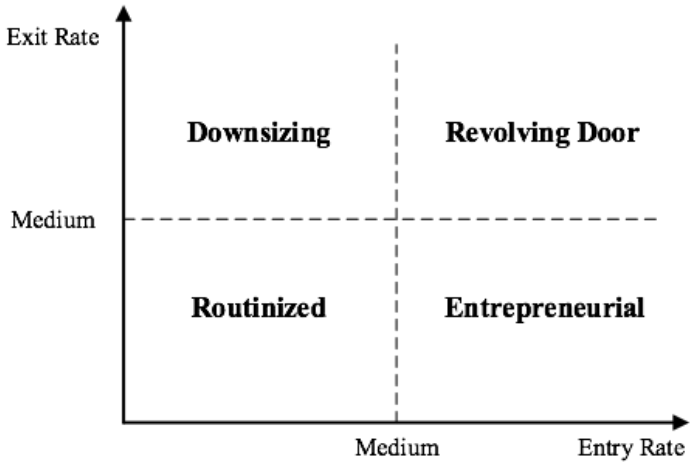


Figure 3 Four types of growth regimes based on firm entry and exit rate

Figure 4 classifies China's prefecture level cities into four types of growth regimes in two time periods. There is a clear belt of entrepreneurial regime regions during 1998-2008, spanning from Shandong peninsula to Yangtze River Delta. In addition, this belt becomes even wider and longer in 2003-2008 as more coastal areas become entrepreneurial regime regions. Entrepreneurial regime regions are also located in Pearl River Delta and some of China's big inland cities along Yangtze River. Most of the revolving door regime regions are located in Northeastern, Inner Mongolia and part of central and south China, where the reform of state-owned enterprises has fundamentally restructured local industrial structures in the 1990s and early 2000s. Routinized regime regions are concentrated in central and southwest China where industrial structures are relatively stable. Figure 4 also shows the industrial decline in west and northwest China where the majority of downsized regime regions concentrates.

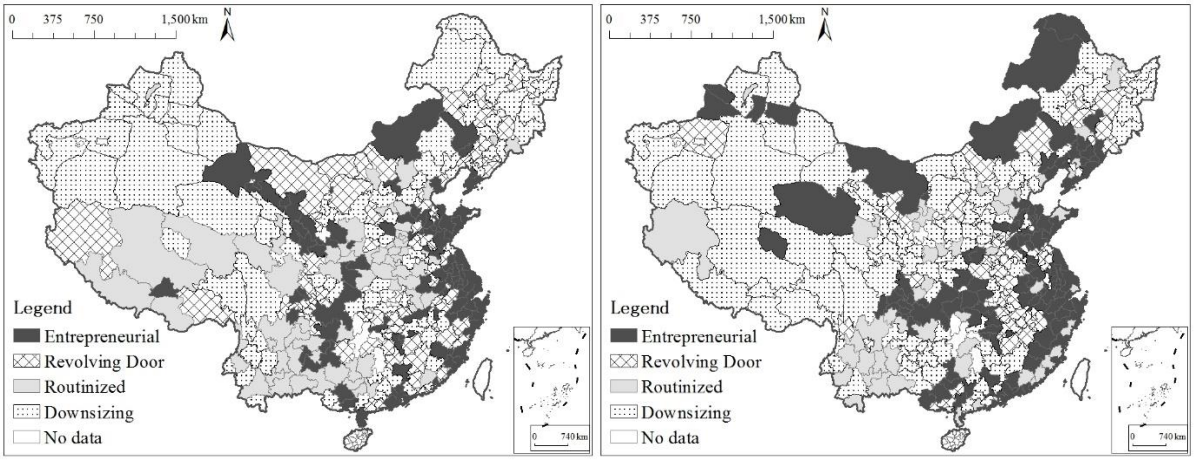


Figure 4 Growth regimes in China at prefecture level in 1998-2003 and 2003-2008.

We use Brandt, Van Biesebroeck, and Zhang's (2012) approach to calculate total factor productivity (TFP) of exiting and entering firms (Figure 5a and 5b). First, exiting firms tend to be less productive than new entrants, suggesting that productivity is improved after new entrants redeploy resources released by exiting firms. This also resonates with conclusions made by Brandt, Van Biesebroeck, and Zhang (2012) and Loecker, Jan, and Konings (2004). Second, TFP of exiting and entering firms in East China is declining during 1999-2007 while that in central and west China fluctuates in the same time period. Third, East China has the highest TFP in both exiting and entering firms.

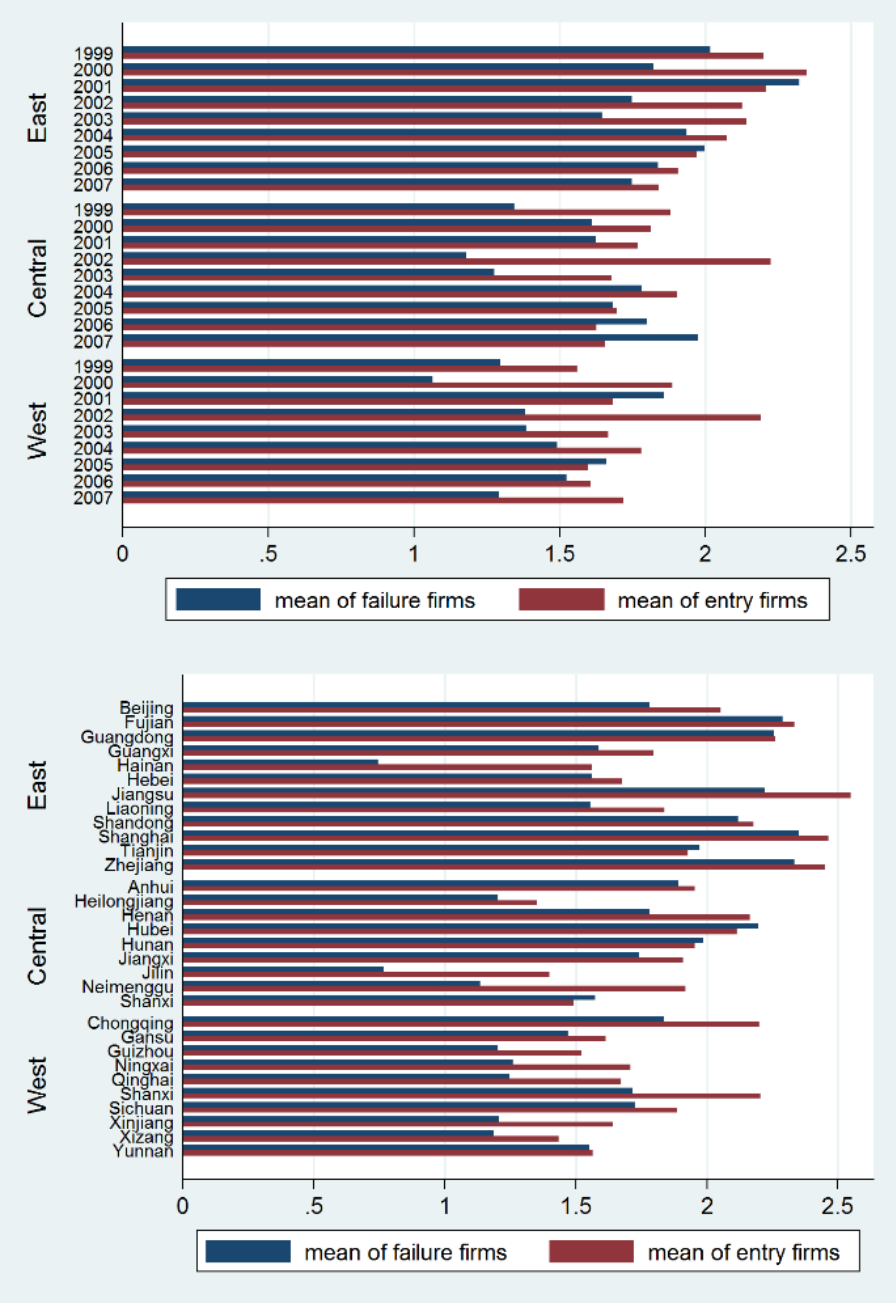


Figure 5 (a) TFP of exiting and entering firms in central, east and west China during 1999-2007 (left); (b) TFP of exiting and entering firms during 1999-2007 at provincial level (right)

4. Model specification and variables

The above statistical analysis indicates how firm entry and exit vary across space and time. This part will conduct a more systematic analysis to investigate the ways in which the articulation between firm entry and firm exit has been shaped by firm-specific, industry-specific and region-specific factors in China's manufacturing industries. The dependent variable ($Entry_{i,j,t}$) is the number of employees of new entrants in a prefecture-level city i in

year t and industrial sector j. A new entrant decides to locate in cities that guarantee the highest expected profits. The expected profits are not directly observable, but the new firms established in each city each year can be observed. In these circumstances, data are censored and the appropriate statistical model for estimating the firm entry in a city is the Tobit estimated by the maximum likelihood method (Tobin 1958). The Tobit model is defined as follows:

$$Entry_{i,j,t} = \beta_0 + Exit_{i,t-1} + f_1(FS_{i,t-1}, IS_{i,j,t-1}, RS_{i,t-1}) + f_3[(FS_{i,j,t-1}, IS_{i,j,t-1}) \times RS_{i,t-1}] + X_{i,t-1} + w_j + v_i + u_t + \varepsilon_{ij} \quad \text{(1)}$$

Where i, j, and t denote city, industry, and year, respectively. $Exit_{i,t-1}$, measured as the number of employees of exiting firms in city i in year $t-1$ and in all industrial sectors, is included to test the impact of firm exit in all industrial sectors over firm entry in industry j.

Firm-specific factors ($FS_{i,t-1}$) capture the characteristics of exiting firms in all industrial sectors, such as firm age and size. Following (Pe'er and Vertinsky 2008), we consider an exiting firm as an old firm if its age is more than four years. Otherwise, it will be treated as a young exiting firm. $Exit_{i,t-1}$ is therefore decomposed into $Exit\_old_{i,t-1}$ and $Exit\_young_{i,t-1}$, measured as the number of employees of old and young exiting firms in city i in year $t-1$ and in all industrial sectors, respectively, in order to investigate the different impacts of exit of old and young firms over firm entry. A considerable number of firm exits take place within the first three years after firm formation. Resources released by old and young exiting firms are often different from one another (Pe'er and Vertinsky 2008; Yang and He 2014). In addition, the exits of large, medium and small sized firms are likely to release different resources, tangible and intangible assets as well. We define $Exit\_large_{i,t-1}$, $Exit\_medium_{i,t-1}$, $Exit\_small_{i,t-1}$, as the number of employees of large (more than 200 employees), medium (50-200 employees), and small (0-50 employees) exiting firms in city i in year $t-1$ and in all industrial sectors, respectively.

$IS_{i,j,t-1}$ refers to the industry-specific factors that affect firm entry. Tangible and intangible assets released by firm exit may be absorbed more easily by new entrants in the same and technologically related industries, than by those in unrelated industries. Accordingly, we define $Exit\_focal_{i,j,t-1}$, $Exit\_focal_{i,j,t-2}$ and $Exit\_focal_{i,j,t-3}$ as the number of employees of exiting firms in city i in industrial sector j and in year $t-1$, $t-2$ and $t-3$, respectively, to explore the effects of firm exit over firm entry in the same industry. Furthermore, we adopt the co-

occurrence approach developed by Hidalgo et al., (2007) to calculate technological relatedness between industries, measured as the minimum pairwise conditional probability of two industrial sectors located in the same region. Specifically, technological relatedness between industry *j* and *k* is as calculated as:

$$Relatedness_{ij} = min\left[P\left(RCA_k|RCA_j\right) + P\left(RCA_j\middle|RCA_k\right)\right]$$

$$\text{Where, RCA} = \begin{cases} 1, LQ \geq 0.5 \\ 0, LQ < 0.5 \end{cases} \quad \text{..... (2)}$$

Where LQ is the employment location quotient of industry *j* (or *k*) at the city level. We define revealed comparative advantage (RCA) as 0, if LQ is less than 0.5. Otherwise, RCA is 1. Based on this, firm exit in related industries ($Exit\_related_{i,j,t-1}$) is defined as the firm-exit weighted technological relatedness of industry *j* and *k* in city *i* and year *t-1*:

$$Exit\_related_{i,j,t-1} = \sum_k Relatedness_{j,k} * Exit_{i,k,t-1} \quad \text{..... (3)}$$

$RS_{i,t-1}$ is the region-specific factors. This captures the impact of regional institutional contexts over the articulation between firm exit and entry, and pays special attention to the role of marketization and fiscal decentralization in the context of China. State-owned enterprises (SOEs) are often considered as less productive and efficient than private enterprises in communist and post-communist economies (Ahrend and Martins 2003), and a big proportion of SOEs reflects a low level of marketization. As a result, we use the proportion of non-SOEs' output in the total in city *i* and year *t-1* ($Market_{i,t-1}$) as a proxy of marketization. In addition, the ratio of fiscal revenue to fiscal expenditure in city *i* and year *t-1* ($Dec_{i,t-1}$) captures the economic capability of local administration under China's decentralization system.

$X_{i,t-1}$ represents control variables. First, agglomeration externalities have been extensively seen as a key factor affecting firm entry (Fotopoulos 2014). Studies on localization economies argue that knowledge is predominantly industry-specific and therefore local specialization will foster economic growth and firm entry (Henderson 1994; Marshall 1920).

In this paper, localization economies ($Local_{i,j,t-1}$) is measured as the density of total employments of industry *j* in city *i* and year *t-1*. The other hypothesis, proposed by (Jacobs 1969), claims that regional diversity in economic activity will result in agglomeration externalities as knowledge developed by one industry can also be fruitfully applied in other

industries, therefore increase the attractiveness of region to new entrants. Likewise, urbanization economies ($Urban_{i,t-1}$) is calculated as the density of total employment in city *i* and year *t-1*. Second, it is argued that diverse regional industrial structure is likely to attract more new entrants (Fotopoulos 2014; Gudgin 1978). This paper uses Theil index ($Theil_{i,t-1}$) to measure regional industrial diversity[2]. We also include the comparative advantage of industry *j* in city *i* and year *t-1*, measured by the location quotient ($LQ_{i,j,t-1}$). Finally, w_j indicates the industry-specific effect, v_i indicates the region-specific effect, and u_t indicates the time-specific effect.

5. Empirical results

5.1. Empirical results on firm-specific factors

In the estimation equations, lagged terms of independent and control variables have been adopted, given the fact that it takes time for new entrants to be attracted by resources released by firm exit. The geographical unit of analysis is China's prefectural level city (excluding Taiwan, Hong Kong and Macau). Correlation analysis indicates that correlations of most independent variables are moderate or low, suggesting no serious problem of multi-collinearity. Variables of exits of different types of firms (in terms of age and size) are correlated with each other; we therefore put them into different models. Table 2 reports estimation results focusing on firm-specific factors. In Model (1)-(6), independent variables, including Exit, Exit_old, Exit_young, Exit_large, Exit_medium and Exit_small, are calculated based on all 4-digit industrial sectors. For example, Exit_old is measured as the number of employees of old exiting firms in city *i* in year *t-1* and in all industrial sectors. In Model (7) and (8), these independent variables are calculated based on the focal industry. For example, Exit_old is measured as the number of employees of old exiting firms in city *i* in year *t-1* and in industry *j*.

[2] Please see Theil (1972) for the calculation of Theil Index.

Table 2 Regression Results on Firm-Specific Factors (1999-2008)

	All 4-digit sectors						The focal 4-digit sector	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Exit	0.005***						0.002***	0.002***
Exit_old		0.009***					0.625***	
Exit_young			-0.005***				0.517***	
Exit_large				0.011***				0.507***
Exit_medium					0.002***			1.373***
Exit_small						-0.018***		0.428***
Market	436.9***	426.4***	402.4***	428.2***	406.4***	396.4***	435.3***	418.5***
Dec	831.9***	766.4***	915.8***	772.7***	921.4***	929.6***	788.6***	800.2***
Urban	-0.683***	-0.859***	-0.389***	-0.957***	-0.414***	-0.428***	-0.310***	-0.159***
Local	0.350***	0.351***	0.349***	0.350***	0.350***	0.349***	0.260***	0.233***
LQ	0.015***	0.015***	0.015***	0.015***	0.015***	0.015***	0.012***	0.0115***
Theil	0.283***	0.106	1.178***	0.452***	0.866***	1.368***	0.262***	0.123*
Industry	included	included	included	included	included	included	included	included
Province	included	included	included	included	included	included	included	included
Year	included	included	included	included	included	included	included	included
_cons	-744.2***	-822.7***	-510.6***	-728.4***	-546.7***	-414.3***	-733.1***	-735.1***
sigma _cons	1373.3***	1370.4***	1376.1***	1369.8***	1376.3***	1375.9***	1286.2***	1274.0***
N	262102	262102	262102	262102	262102	262102	262102	262102
pseudo R^2	0.035	0.035	0.034	0.035	0.034	0.034	0.042	0.043
log lik.	-993949	-993578	-994340	-993491	-994363	-994297	-986255	-985142.4
chi-squared	71703.0	72445.4	70920.4	72618.6	70875.2	71007.7	87090.6	89315.9

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.0$

Model (1) shows that firm exit in all industrial sectors has a significant and positive impact on firm entry, indicating that firm exit creates opportunities for new entrants. Model (2), (3) and (7) suggest that exits of young and old firms in the focal industry and all industrial sectors have different effects over firm entry. Exit of old firms is likely to release more resources, for example more skilled labor, and thereafter attract more new entrants (Model (2) and (7)). This is consistent with Pe'er and Vertinsky's (2008) findings. Exit of young firms in the focal industry also has a positive and significant effect on firm entry, but its coefficient is smaller than that of old firms (See model (7)), indicating a slightly weaker effect. However, exit of young firms in all industrial sectors exhibits a negative and significant effect over firm entry (Model (3)). This inconsistency can be reconciled by the following explanation. A high level of exit of young firms within all industrial sectors may indicate an unfriendly environment for new entrants and therefore give region a bad reputation that frightens new entrants away.

Likewise, high level of exit of small firms within all industrial sectors may be due to the unsupportive local economic environment, which tends to frightens new entrants away (Model (6)). In contrast, exit of large, medium and small firms in the focal industry all contribute to attracting new entrants. Exit of large firms releases plenty of tangible and

intangible assets (Government of Canada 2013). However, employees working in small firms may have a better chance to familiarize with a broader spectrum of operations, and therefore small firms can also be seen as incubators, the exit of which may release some well-rounded workers (Loecker, Jan, and Konings 2004). Model (8) shows that the coefficients of Exit_small and Exit_large are both smaller than that of Exit_medium, suggesting an inverted U shaped relationship between firm size and the effect of firm exit over firm entry, probably due to the fact that medium firms are able to release both a considerable amount of resources and some well-rounded workers.

In almost all models, control variables show a relationship with firm entry that is consistent with theoretical predictions. Regions with high localization economies are more attractive for new entrants. The sign of LQ's coefficient suggests that new firms in an industrial sector are willing to enter regions which have comparative advantage in this specific industrial sector. The positive coefficient of Theil index indicates that cities with a diversity of industries are more capable to attract new entrants, this is consistent with Fotopoulos's (2014) and Renski's (2014) conclusion. However, urbanization economies have a negative and significant effect over firm entry probably because high level of urbanization economies leads to intensive local competition and high costs derived from congestion effects. The institutional context in China characterized by a dual process of marketization and decentralization also plays a critical role in regional industrial evolution. Statistical results show that high level of marketization not only generates better labor mobility, and smoother knowledge spillover through industrial linkages, but also boosts entrepreneurship, enabling new entrants to easily absorb resources released by firm exit. Finally, regions with better fiscal performance and higher level of fiscal revenue tend to have more new entrants, as such regions are capable to provide better infrastructure, more skilled and educated labor force, and more advanced supporting facilities and services.

5.2. Empirical results on industry- and region-specific factors

To test our hypothesis that firm exit in one industry may be more attractive for entrants from the same or related industries as they are more capable to utilize the released resources, we develop a series of models (see Table 3). The estimated parameters of the control variables are mostly unaltered. In Model (1)-(3), we include one-, two- and three-year lagged terms of firm exit in the focal industry to investigate the time effect of creative destruction. All three have a significant and positive impact over firm entry, indicating that it takes time for resources released by firm exit to be fully absorbed by new entrants. In addition, the one-year

lagged term (Exit_focal) of course has the strongest effect. Resources released in one industry also attract new entrants in related industries (see Model (4)), however, to a lesser extent, as the parameter of Exit_related is much smaller than that of Exit_focal. This echoes with recent evolutionary economic geography literature on the role of technological relatedness in regional diversification (Boschma, Minondo, and Navarro 2013; Frenken, Van Oort, and Verburg 2007; Neffke, Henning, and Boschma 2011; Neffke and Henning 2008).

Table 3 Regression Results on Industry-Specific and Region-Specific Factors (1999-2008)

	(1)	(2)	(3)	(4)	(5)	(6)
Exit_focal	0.607***				0.440***	
$Exit\_focal_{t-2}$		0.446***				
$Exit\_focal_{t-3}$			0.476***			
Exit_related				0.013***		0.035***
Exit_focal*Market					0.320***	
Exit_focal*Dec					-0.030**	
Exit_related*Market						-0.014***
Exit_related*Dec						-0.013***
Market	419.0***	386.7***	368.4***	403.4***	382.1***	464.8***
Dec	836.2***	828.8***	825.9***	836.4***	840.1***	855.2***
Urban	-0.147***	-0.259***	-0.248***	-0.599***	-0.120***	-0.548***
Local	0.253***	0.297***	0.292***	0.349***	0.239***	0.349***
LQ	0.012***	0.013***	0.015***	0.015***	0.012***	0.015***
Theil	0.574***	0.798***	0.858***	0.645***	0.507***	0.723***
Industry	included	included	included	included	included	included
Province	included	included	included	included	included	included
Year	included	included	included	included	included	included
_cons	-625.6***	-554.2***	-557.4***	-695.5***	-598.0***	-833.3***
sigma _cons	1283.7***	1352.1***	1406.7***	1374.4***	1281.1***	1374.4***
N	262102	211881	167110	262102	262102	262102
pseudo R^2	0.042	0.038	0.036	0.035	0.043	0.035
log lik.	-986102	-834935	-689886	-994037	-985900	-993986
chi-squared	87396.4	65743.9	51962.5	71526.7	87799.8	71628.2

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

In Model (5) and (6), we add four interaction terms between Exit_focal, Exit_related, Market and Dec. First, the interactions terms, Exit_focal*Dec and Exit_related*Dec, both present significant and negative signs, while Dec exhibits positive and significant signs. This inconsistency could be reconciled by the following explanation. On the one hand, regions with better fiscal performance are capable to provide better infrastructure, more skilled and educated labor force, and more advanced supporting facilities and services, and therefore can attract more new entrants. On the other hand, in a transitional economy, developed and rich regions particularly in China's coastal areas are more active and capable in upgrading their industrial structure. As a result, in regions with better fiscal performance and high level of

firm exit in the focal industry or related industries may indicate local authorities' decision to abandon this industry or this type of industries as a whole and upgrade to more advanced industries. For example, high level of firm exit in pollution-intensive industries in China's developed coastal regions reflects an exodus of these industries and the intention of local governments in coastal regions to upgrade to cleaner and greener industries. Accordingly, local governments become less supportive for pollution-intensive industries; financial aid is likely to be directed more towards green industries. In this case, firm exit does not necessarily lead to firm entry, even though a large amount of resources may be released by firm exit.

Second, likewise, even though Market presents a positive and significant sign in Model (5) and (6), the interaction term between Exit_related and Market exhibits a negative and significant sign. In addition, in Table A-2 in Appendix[3], the interaction term between Exit_focal and Market also has negative and significant effect over firm entry. High level of marketization not only allows better labor mobility and more efficient knowledge spillover, but also boosts entrepreneurship and therefore attracts more new entrants. However, regions with high level of marketization and high level of firm exit in one industry or related industries may suggest this industry or this type of industries are not able to survive in highly competitive markets due to factors (e.g., high land price and labor costs) that have industry-wide effects and therefore affect firms' location decision. For example, high level of firm exit in labor-intensive industries in coastal regions reflects firms in these industries are not able to maintain their competitiveness and survive in highly competitive coastal regions where labor costs, land price and costs of other factor inputs have all increased drastically lately. Labor-intensive firms' profit margins have been squeezed to an extent that they have to either upgrade or relocate their labor-intensive production to low-cost locations. Consequently, in this sense, resources released by firm exit do not necessarily attract new entrants.

5.3. Geographical proximity in creative destruction

Finally, to test if the effect of firm exit over firm entry is geographically bounded, we include firm exit in the focal industry but in other cities within the same province, Exit_focal_province (Table 4). Model (1) shows that even though new entrants in one city benefit from resources released by exiting firms in the same industry in other cities within the

[3] In Table A-1 to A-3, we exclude 2004 and 2008 dataset and run the same models that we have in Table 2-4, in order to test the robustness of our estimation results. The reason that 2004 and 2008 dataset is excluded has been clarified in Section 3.

same province, this effect is much weaker than that of firm exit in the same city over firm entry. In a word, it is not easy for resources to cross political borders and therefore the effect of firm exit over firm entry exhibits a distance decay pattern.

Table 4 Regression Results on Geography Proximity (1999-2008)

	(1)	(2)	(3)
Exit_focal	0.596***		
Exit_focal_province	0.032***	0.0447***	-0.068***
Exit_focal_ province*RMarket			0.045***
Exit_focal_ province *RDec			0.077***
RMarket		214.1***	162.4***
RDec		586.8***	517.2***
Market	426.4***		
Dec	851.1***		
Urban	-0.843*	-0.287***	-0.287***
Local	0.243***	0.333***	0.318***
LQ	0.0117***	0.0150***	0.0151***
Theil	0.588***	1.182***	1.142***
Industry	included	included	included
Province	included	included	included
Year	included	included	included
_cons	-824.0***	-751.5***	-691.3***
sigma _cons	1178.9***	1246.1***	1241.9***
N	262025	262025	262025
pseudo R^2	0.036	0.029	0.030
log lik.	-1033752	-1040310	-1039953
chi-squared	76358.2	63241.4	63957.3

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Furthermore, we add interaction terms between Exit_focal_province with RMarket and RDec, where RMarket (RDec) is the ratio of the average level of marketization (Decentralization) in other cities within the same province to the level of marketization (decentralization) in the focal city, to measure the relative degree of marketization (decentralization) in other cities within the same province compared with the focal city. Exit_focal_province*RDec exhibits a positive and significant effect over firm entry in the focal city. High level of firm exit in other cities with relatively better fiscal performance may indicate that in order to upgrade their industrial structure, cities in the same province are deliberately ruling out certain industries, which are therefore forced to move to the focal cities. Likewise, Exit_focal_province*RMarket has a positive and significant effect over firm entry in the focal city. High level of firm exit in other cities within the same province where market is quite competitive may compel firms in certain industries that are unable to survive the market competition in other cities to relocate to the relatively less competitive focal city.

In Table A-1 to A-3 in Appendix, we exclude 2004 and 2008 dataset and run the same

models that we have in Table 2-4, in order to test the robustness of our estimation results. The reason that 2004 and 2008 dataset is excluded has been clarified in Section 3. Compared with the results presented above, these changes produce only minor effects.

6. Conclusion

Following Pe'er and Vertinsky's (2008) work, we focus on industrial renewal and particularly on the capability of a certain geographical region to generate and attract new entrants to offset the destruction caused by firm exit. Our analytical framework that emphasizes the ways in which firm exit creates a stimulus for firm entry, resulting in incremental innovation and productivity increase is complementary to the process of technological change and industrial renewal articulated by Schumpeter who pays more attention towards how new entrants bring in radical innovation and new products, making incumbents' products and technologies obsolete and force them to exit or catch up. Based on this analytical framework, this paper seeks to argue that the articulation between firm exit and entry has been constantly shaped by an assemblage of various factors, including firm characteristics, industrial linkages, regional institutions and geographical proximity.

Using firm-level data of China's industries during 1998-2008, we show that firm exit does stimulate firm entry, as new entrants are enticed by resources released by firm exit. First, characteristics of exiting firm have different impacts over firm entry. Specifically, exits of young and old firms in the focal industry both encourage firm entry, though the latter one has a larger effect since exit of old firms is likely to release more resources, for example more skilled labor, and thereafter attract more new entrants. Likewise, the exits of large, medium and small firms all attract new entrants, but the exit of medium firms has the strongest effect probably due to the fact that medium firms are able to release both a considerable amount of resources and some well-rounded workers. However, exit of young and small firms in all industries may indicate an unfriendly environment for new entrants and therefore give region a bad reputation that frightens new entrants away.

Firm exit in one industry is more attractive for entrants in the same or related industries as they are more capable to utilize the released resources. The articulation between firm exit and entry is also shaped by region-specific factors, since in developing and transitional economies like China decentralization has empowered local authorities to participate directly in the development process as planners, developers and policy-makers, resulting in a geographically uneven institutional and economic landscape. In China, both marketization and decentralization are complex processes, which affect the articulation of firm entry and

exit in different ways, suggesting that any analyses of industrial restructuring and renewal should be situated into a context where market economy has been implemented to different extents and local authorities have different capabilities in steering their economies. Finally, the effect of firm exit over firm entry is also geographically bounded and exhibits a distance decay pattern.

Several policy implications can be derived from the empirical findings. First, localization economies are more important than urbanization economies. Industrial policies should aim to foster spatial sectoral specialization in certain industries, rather than investing in a broad range of industrial sectors. Second, policy makers that seek to attract new entrants should pay more attention to new entrants from industrial sectors that their cities already have or at least are related with their existing industrial structure. Third, policymakers must craft their policies with sensitive attention to the characteristics and processes of small geographical areas as the effect of creative destruction decays as geographical distance increases. Finally, policies that strive to maintain dying firms through subsidies or tax credits should be carefully evaluated, as firm exit stimulate firm entry. This process of creative destruction often results in productivity increase after new entrants redeploy resources released by exiting firms (see also Figure 5(a)). As a result, local authorities should coordinate the exit of underperforming firms through regulatory and tax policies, and facilitate the release of the valuable resources. Additional policies on educational and training programs would also enhance the recycling of released resources.

References

Aghion, Philippe, Richard Blundell, Rachel Griffith, Peter Howitt, and Susanne Prantl. 2004. "Entry and Productivity Growth: Evidence from Microlevel Panel Data." *Journal of the European Economic Association* 2 (2-3): 265–76. doi:10.1162/154247604323067970.

Ahrend, Rudiger, and Joaquim Oliveira Martins. 2003. "Creative Destruction or Destructive Perpetuation: The Role of Large State-Owned Enterprises and SMEs in Romania During Transition." *Post-Communist Economies* 15 (3): 331–56. doi:10.1080/1463137032000139043.

Asheim, Bjørn T., Ron Boschma, and Philip Cooke. 2011. "Constructing Regional Advantage: Platform Policies Based on Related Variety and Differentiated Knowledge Bases." *Regional Studies* 45 (7):

893–904. doi:10.1080/00343404.2010.543126.

Audretsch, David B., and Michael Fritsch. 2002. “Growth Regimes over Time and Space.” *Regional Studies* 36 (2): 113–24. doi:10.1080/00343400220121909.

Audretsch, David B., and A. Roy Thurik. 2001. “What’s New about the New Economy? Sources of Growth in the Managed and Entrepreneurial Economies.” *Industrial and Corporate Change* 10 (1): 267–315. doi:10.1093/icc/10.1.267.

Balland, Pierre-Alexandre, Ron Boschma, and Koen Frenken. 2014. “Proximity and Innovation: From Statics to Dynamics.” *Regional Studies* 0 (0): 1–14. doi:10.1080/00343404.2014.883598.

Bates, Timothy. 2005. “Analysis of Young, Small Firms That Have Closed: Delineating Successful from Unsuccessful Closures.” *Journal of Business Venturing* 20 (3): 343–58. doi:10.1016/j.jbusvent.2004.01.003.

Beck, Thorsten, and Asli Demirguc-Kunt. 2006. “Small and Medium-Size Enterprises: Access to Finance as a Growth Constraint.” *Journal of Banking & Finance* 30 (11): 2931–43. doi:10.1016/j.jbankfin.2006.05.009.

Bishop, Paul, and Peter Gripaios. 2010. “Spatial Externalities, Relatedness and Sector Employment Growth in Great Britain.” *Regional Studies* 44 (4): 443–54. doi:10.1080/00343400802508810.

Boschma, Ron A., and Rik Wenting. 2007. “The Spatial Evolution of the British Automobile Industry: Does Location Matter?” *Industrial and Corporate Change* 16 (2): 213–38. doi:10.1093/icc/dtm004.

Boschma, Ron, and Simona Iammarino. 2009. “Related Variety, Trade Linkages, and Regional Growth in Italy.” *Economic Geography* 85 (3): 289–311. doi:10.1111/j.1944-8287.2009.01034.x.

Boschma, Ron, Asier Minondo, and Mikel Navarro. 2012. “Related Variety and Regional Growth in Spain*.” *Papers in Regional Science* 91 (2): 241–56. doi:10.1111/j.1435-5957.2011.00387.x.

———. 2013. “The Emergence of New Industries at the Regional Level in Spain: A Proximity Approach Based on Product Relatedness.” *Economic Geography* 89 (1): 29–51. doi:10.1111/j.1944-8287.2012.01170.x.

Brandt, Loren, Johannes Van Biesebroeck, and Yifan Zhang. 2012. “Creative Accounting or Creative Destruction? Firm-Level Productivity Growth in Chinese Manufacturing.” *Journal of Development*

Economics 97 (2): 339–51. doi:10.1016/j.jdeveco.2011.02.002.

Brixy, Udo. 2014. "The Significance of Entry and Exit for Regional Productivity Growth." *Regional Studies* 48 (6): 1051–70. doi:10.1080/00343404.2014.895804.

Brock, William A., and David S. Evans. 1989. "Small Business Economics." *Small Business Economics* 1 (1): 7–20. doi:10.1007/BF00389913.

Cannon, Mark D., and Amy C. Edmondson. 2005. "Failing to Learn and Learning to Fail (Intelligently): How Great Organizations Put Failure to Work to Innovate and Improve." *Long Range Planning*, Organizational Failure Organizational Failure, 38 (3): 299–319. doi:10.1016/j.lrp.2005.04.005.

Caves, Richard E. 1998. "Industrial Organization and New Findings on the Turnover and Mobility of Firms." *Journal of Economic Literature* 36 (4): 1947–82.

Clark, Gordon L., and Neil Wrigley. 1997. "Exit, the Firm and Sunk Costs: Reconceptualizing the Corporate Geography of Disinvestment and Plant Closure." *Progress in Human Geography* 21 (3): 338–58. doi:10.1191/030913297674898950.

Cross, Michael. 1981. *New Firm Formation and Regional Development*. Farnborough, Hants: Gower Publishing Company.

Dejardin, Marcus. 2009. "Linking Net Entry to Regional Economic Growth." *Small Business Economics* 36 (4): 443–60. doi:10.1007/s11187-009-9255-x.

Delacroix, Jacques, and Glenn R. Carroll. 1983. "Organizational Foundings: An Ecological Study of the Newspaper Industries of Argentina and Ireland." *Administrative Science Quarterly* 28 (2): 274–91.

Delgado, Mercedes, Michael E. Porter, and Scott Stern. 2010. "Clusters and Entrepreneurship." *Journal of Economic Geography* 10 (4): 495–518. doi:10.1093/jeg/lbq010.

Deng, Ping. 2009. "Why Do Chinese Firms Tend to Acquire Strategic Assets in International Expansion?" *Journal of World Business* 44 (1): 74–84. doi:10.1016/j.jwb.2008.03.014.

Dunne, Timothy, Mark J. Roberts, and Larry Samuelson. 1989. "The Growth and Failure of U. S. Manufacturing Plants." *The Quarterly Journal of Economics* 104 (4): 671–98. doi:10.2307/2937862.

Essletzbichler, Jürgen, and David L. Rigby. 2005. "Technological Evolution as Creative Destruction of

Process Heterogeneity: Evidence from US Plant-Level Data." *Economic Systems Research* 17 (1): 25–45. doi:10.1080/09535310500034168.

Faggio, Giulia, and Jozef Konings. 2003. "Job Creation, Job Destruction and Employment Growth in Transition Countries in the 90s." *Economic Systems* 27 (2): 129–54. doi:10.1016/S0939-3625(03)00036-0.

Fan, C. Cindy. 2005. "Interprovincial Migration, Population Redistribution, and Regional Development in China: 1990 and 2000 Census Comparisons." *The Professional Geographer* 57 (2): 295–311. doi:10.1111/j.0033-0124.2005.00479.x.

Fang, Cai, and Wang Dewen. 2003. "Migration As Marketization: What Can We Learn from China's 2000 Census Data?" *China Review* 3 (2): 73–93.

Fazzari, Steven, R. Glenn Hubbard, and Bruce C. Petersen. 1987. "Financing Constraints and Corporate Investment." Working Paper 2387. National Bureau of Economic Research. http://www.nber.org/papers/w2387.

Fotopoulos, Georgios. 2014. "On the Spatial Stickiness of UK New Firm Formation Rates." *Journal of Economic Geography* 14 (3): 651–79. doi:10.1093/jeg/lbt011.

Frenken, Koen, Frank Van Oort, and Thijs Verburg. 2007. "Related Variety, Unrelated Variety and Regional Economic Growth." *Regional Studies* 41 (5): 685–97. doi:10.1080/00343400601120296.

Fritsch, Michael, and Pamela Mueller. 2004. "Effects of New Business Formation on Regional Development over Time." *Regional Studies* 38 (8): 961–75. doi:10.1080/0034340042000280965.

Government of Canada, Statistics Canada. 2013. "The Daily — Study: Canadian Labour Productivity Differences across Firm Size Classes, 2002 to 2008." August 26. http://www.statcan.gc.ca/daily-quotidien/130826/dq130826a-eng.htm.

grunsven, Leo van, and Floor Smakman. 2005. "Industrial Restructuring and Early Industry Pathways in the Asian 1st Generation NICs: The Singapore Garment Industry." Papers in Evolutionary Economic Geography (PEEG) 0507. Utrecht University, Section of Economic Geography. https://ideas.repec.org/p/egu/wpaper/0507.html.

Gudgin, G. 1978. *Industrial Location Processes and Regional Employment Growth*. Saxon House.

Hahn, Chin Hee. 2000. "Entry, Exit, and Aggregate Productivity Growth." OECD Economics Department

Working Papers. Paris: Organisation for Economic Co-operation and Development. http://www.oecd-ilibrary.org/content/workingpaper/656402673613.

Haltiwanger, John, Ron S. Jarmin, and Javier Miranda. 2012. "Who Creates Jobs? Small versus Large versus Young." *Review of Economics and Statistics* 95 (2): 347–61. doi:10.1162/REST_a_00288.

Han, Sun Sheng, and Clifton W. Pannell. 1999. "The Geography of Privatization in China, 1978–1996*." *Economic Geography* 75 (3): 272–96. doi:10.1111/j.1944-8287.1999.tb00080.x.

Harris, R. I. D., and P. Hassaszadeh. 2002. "The Impact of Ownership Changes and Age Effects on Plant Exits in UK Manufacturing, 1974–1995." *Economics Letters* 75 (3): 309–17. doi:10.1016/S0165-1765(01)00619-X.

Hartog, M., R. Boschma, and M. Sotarauta. 2012. "The Impact of Related Variety on Regional Employment Growth in Finland 1993–2006: High-Tech versus Medium/Low-Tech." *Industry and Innovation* 19 (6): 459–76. doi:10.1080/13662716.2012.718874.

Hassink, Robert. 2005. "How to Unlock Regional Economies from Path Dependency? From Learning Region to Learning Cluster." *European Planning Studies* 13 (4): 521–35. doi:10.1080/09654310500107134.

———. 2007. "The Strength of Weak Lock-Ins: The Renewal of the Westmünsterland Textile Industry." *Environment and Planning A* 39 (5): 1147–65.

He, Canfei, and Fenghua Pan. 2010. "Economic Transition, Dynamic Externalities and City-Industry Growth in China." *Urban Studies* 47 (1): 121–44. doi:10.1177/0042098009346865.

He, Canfei, Yehua Dennis Wei, and Xiuzhen Xie. 2008. "Globalization, Institutional Change, and Industrial Location: Economic Transition and Industrial Concentration in China." *Regional Studies* 42 (7): 923–45. doi:10.1080/00343400701543272.

Heebels, Barbara, and Ron Boschma. 2011. "Performing in Dutch Book Publishing 1880–2008: The Importance of Entrepreneurial Experience and the Amsterdam Cluster." *Journal of Economic Geography* 11 (6): 1007–29. doi:10.1093/jeg/lbq048.

Henderson, I. Vernon. 1994. "Where Does an Industry Locate?" *Journal of Urban Economics* 35 (1): 83–104. doi:10.1006/juec.1994.1005.

Hidalgo, C. A., B. Klinger, A.-L. Barabási, and R. Hausmann. 2007. “The Product Space Conditions the Development of Nations.” *Science* 317 (5837): 482–87. doi:10.1126/science.1144581.

Jacobs, J. 1969. *The Economy of Cities*. New York: Random House.

Joseph Amankwah-Amoah. 2011. “Learning from the Failures of Others.” *Journal of Workplace Learning* 23 (6): 358–75. doi:10.1108/13665621111154386.

Kessides, Ioannis N. 1991. “Entry and Market Contestability: The Evidence from the United States.” In .

Knott, Anne Marie, and Hart E. Posen. 2005. “Is Failure Good?” *Strategic Management Journal* 26 (7): 617–41. doi:10.1002/smj.470.

Loecker, De, Jan, and Jozef Konings. 2004. “Creative Destruction and Productivity Growth in an Emerging Economy: Evidence from Slovenian Manufacturing.” SSRN Scholarly Paper ID 510106. Rochester, NY: Social Science Research Network. http://papers.ssrn.com/abstract=510106.

Luke, Carmen. 2005. “Capital and Knowledge Flows: Global Higher Education Markets.” *Asia Pacific Journal of Education* 25 (2): 159–74. doi:10.1080/02188790500337940.

Madsen, Peter M., and Vinit Desai. 2010. “Failing to Learn? The Effects of Failure and Success on Organizational Learning in the Global Orbital Launch Vehicle Industry.” *Academy of Management Journal* 53 (3): 451–76. doi:10.5465/AMJ.2010.51467631.

Marshall, A. 1920. *Principles of Economics*. London: Macmillan.

Martin, Ron, and Peter Sunley. 2015. “Towards a Developmental Turn in Evolutionary Economic Geography?” *Regional Studies* 49 (5): 712–32. doi:10.1080/00343404.2014.899431.

Mayo, John W., and Matthew N. Murray. 1991. “Firm Size, Employment Risk and Wages: Further Insights on a Persistent Puzzle.” *Applied Economics* 23 (8): 1351–60. doi:10.1080/00036849100000056.

Neffke, Frank, Martin Henning, and Ron Boschma. 2011. “How Do Regions Diversify over Time? Industry Relatedness and the Development of New Growth Paths in Regions.” *Economic Geography* 87 (3): 237–65. doi:10.1111/j.1944-8287.2011.01121.x.

Neffke, Frank, and Martin Svensson Henning. 2008. “Revealed Relatedness: Mapping Industry Space.” Papers in Evolutionary Economic Geography (PEEG) 0819. Utrecht University, Section of Economic Geography. https://ideas.repec.org/p/egu/wpaper/0819.html.

Pe'er, Aviad, and Ilan Vertinsky. 2008. "Firm Exits as a Determinant of New Entry: Is There Evidence of Local Creative Destruction?" *Journal of Business Venturing* 23 (3): 280–306. doi:10.1016/j.jbusvent.2007.02.002.

Pe'er, Aviad, Ilan Vertinsky, and Andrew King. 2008. "Who Enters, Where and Why? The Influence of Capabilities and Initial Resource Endowments on the Location Choices of de Novo Enterprises." *Strategic Organization* 6 (2): 119–49. doi:10.1177/1476127008090007.

Quatraro, Francesco. 2010. "Knowledge Coherence, Variety and Economic Growth: Manufacturing Evidence from Italian Regions." *Research Policy* 39 (10): 1289–1302. doi:10.1016/j.respol.2010.09.005.

Renski, Henry. 2014. "The Influence of Industry Mix on Regional New Firm Formation in the United States." *Regional Studies* 48 (8): 1353–70. doi:10.1080/00343404.2012.722202.

Schamp, Eike W. 2005. "Decline of the District, Renewal of Firms: An Evolutionary Approach to Footwear Production in the Pirmasens Area, Germany." *Environment and Planning A* 37 (4): 617–34.

Schumpeter, J. 1939. *Business Cycles: A Theoretical, Historical, and Statistical Analysis of the Capitalist Process*. New York: McGraw-Hill.

Schumpeter, Joseph A. 1942. *Capitalism, Socialism and Democracy*. New York: Harper & Row.

Storey, David John. 1982. *Entrepreneurship and the New Firm*. Taylor & Francis.

Tobin, J. 1958. "Estimation of Relationships for Limited Dependent Variables." *Econometrica* 26 (1): 24–36.

Walder, Andrew G., Tianjue Luo, and Dan Wang. 2013. "Social Stratification in Transitional Economies: Property Rights and the Structure of Markets." *Theory and Society* 42 (6): 561–88. doi:10.1007/s11186-013-9203-2.

Wei, Yehua Dennis. 2001. "Decentralization, Marketization, and Globalization: The Triple Processes Underlying Regional Development in China." *Asian Geographer* 20 (1-2): 7–23. doi:10.1080/10225706.2001.9684073.

Wei, Y. H. Dennis, Yuqi Lu, and Wen Chen. 2009. "Globalizing Regional Development in Sunan, China: Does Suzhou Industrial Park Fit a Neo-Marshallian District Model?" *Regional Studies* 43 (3): 409–27. doi:10.1080/00343400802662617.

Yang, Rudai, and Canfei He. 2014. "The Productivity Puzzle of Chinese Exporters: Perspectives of Local

Protection and Spillover Effects." *Papers in Regional Science* 93 (2): 367–84. doi:10.1111/pirs.12035.

Zhao, X. B., and L. Zhang. 1999. "Decentralization Reforms and Regionalism in China: A Review." *International Regional Science Review* 22 (3): 251–81. doi:10.1177/016001799761012424.

Appendix:

Results of robust test

Table A-1 Regression Results of Firm Specific Models for All New Firms (Excluding the sample of year 2004 and year 2008)

	All 4-digit sectors						The focal sector	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Exit	0.002***						-0.0002	-0.0008***
Exit_old		0.004***					0.595***	
Exit_young			-0.005***				0.389***	
Exit_large				0.005***				0.472***
Exit_medium					-0.002***			0.940***
Exit_small						-0.020***		0.639***
Market	358.9***	356.3***	349.5***	361.5***	354.5***	343.0***	354.5***	349.8***
Dec	515.1***	472.7***	522.0***	475.4***	533.3***	531.8***	493.5***	510.4***
Urban	-0.571***	-0.698***	-0.450***	-0.743***	-0.439***	-0.482***	-0.244***	-0.144***
Local	0.311***	0.312***	0.311***	0.312***	0.311***	0.311***	0.232***	0.217***
LQ	0.006***	0.006***	0.006***	0.006***	0.006***	0.006***	0.006***	0.004***
Theil	0.246***	0.145**	0.738***	0.307***	0.689***	0.986***	0.248***	0.155**
Industry	included	included	included	included	included	included	included	included
Province	included	included	included	included	included	included	included	included
Year	included	included	included	included	included	included	included	included
_cons	-450.6***	-608.3***	-268.1***	-609.0***	-272.0***	-213.4***	-405.1***	-375.0***
sigma _cons	1102.3***	1101.0***	1102.6***	1100.3***	1102.8***	1101.7***	1036.2***	1033.5***
N	195804	195804	195804	195804	195804	195804	195804	195804
pseudo R^2	0.028	0.028	0.028	0.028	0.028	0.028	0.036	0.036
log lik.	-650071	-649930	-650100	-649872	-650126	-650014	-644907	-644617
chi-squared	37445.6	37727.1	37387.0	37844.1	37336.6	37560.7	47774.7	48354.9

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.00$

Table A-2 Regression Results of Industry Specific Models for All New Firms (Excluding the sample of year 2004 and year 2008)

	(1)	(2)	(3)	(4)	(5)	(6)
Exit_focal	0.536***				0.688***	
$Exit\_focal_{t-2}$		0.292***				
$Exit\_focal_{t-3}$			0.326***			
Exit_related				0.014***		0.030***
Exit_focal*Market					-0.025***	
Exit_focal*Dec					-0.187***	
Exit_related*Market						-0.011***
Exit_related*Dec						-0.008**
Market	356.1***	332.2***	339.3***	358.8***	362.3***	411.9***
Dec	498.5***	467.5***	416.2***	414.0***	512.0***	424.0***
Urban	-0.244***	-0.304***	-0.279***	-0.666***	-0.254***	-0.631***
Local	0.229***	0.260***	0.253***	0.310***	0.233***	0.310***
LQ	0.005***	0.005***	0.006***	0.006***	0.004***	0.006***
Theil	0.166***	0.421***	0.444***	0.0268	0.184***	0.107*
Industry	included	included	included	included	included	included
Province	included	included	included	included	included	included
Year	included	included	included	included	included	included
_cons	1035.6***	1071.7***	1072.7***	1098.5***	1036.0***	1098.4***
N	195804	157828	123305	195804	195804	195804
pseudo R^2	0.036	0.031	0.031	0.029	0.036	0.029
log lik.	-644893	-544749	-446264	-649568	-644863	-649529
chi-squared	47802.6	34348.7	28742.5	38451.3	47862.0	38530.2

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table A-3 Regression Results of Regional Specific Models for All New Firms (Excluding the sample of year 2004 and year 2008)

	(1)	(2)	(3)
Exit_focal	0.511***		
Exit_focal_province	0.041***	0.074***	-0.008
Exit_focal_ province *RDec			0.029***
Exit_focal_ province *RMarket			0.054***
Dec	535.1***		
Market	369.2***		
RDec		380.8***	355.7***
RMarket		189.4***	156.4***
Urban	-0.151***	-0.317***	-0.314***
Local	0.2144***	0.285***	0.279***
LQ	0.005***	0.006***	0.006***
Theil	0.190***	0.619***	0.606***
_cons	-624.0***	-441.1***	-383.4***
sigma _cons	1031.1***	1092.4***	1091.5***
N	195804	195804	195804
pseudo R^2	0.037	0.030	0.030
log lik.	-644298	-648994	-648940
chi-squared	48992.1	39599.2	39707.9

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$