City-industry Growth in China

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Abstract

This paper investigates the relevance of two leading theories of city-industry growth (i.e., specialization and diversity theories) in accounting for the fast yet uneven growth of industries in China's cities. Using a comprehensive data set of manufacturing industries in 231 China's cities for the period 1998-2005, we find that specialization promotes city-industry growth, whereas diversity has no effect at all. In addition, we find that specialization is important for the growth of mature industries in China, but diversity is crucial for the development of China's relatively new and fast-growing industries. Our study contributes to the literature by examining the relevance of the specialization and diversity theories for a large and fast-growing developing economy.

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1 Introduction

China has had impressive industrialization and urbanization along with its economic reform in the last thirty years (Woetzel et al., 2008; Henderson, 2009).[1] During this process, however, the growth of industries has been uneven across China's cities. For example, cities such as Shenzhen and Dongguan, which were unheard of thirty years ago, are now the centers of several manufacturing industries such as electronics and telecommunications, while Shanghai has seen its leading position in many manufacturing industries eroded over the past three decades.

What accounts for the city-industry growth in China? To answer this question, we focus on the relevance of two leading theories on the growth of industries in cities. On one hand, Marshall (1890), Arrow (1962), and Romer (1986) posit that the concentration of an industry in a city helps reduce production costs through supply of specialized inputs and knowledge spillover and, therefore, promotes the growth of that industry (in short, the specialization theory).[2] On the other hand, Jacobs (1969) argues that a diversified industrial environment facilitates the transmission of technology and knowledge of different industries, thereby spurring innovations and local industrial growth (in short, the diversity theory). The dramatic and uneven growth of industries in China's cities in the last thirty years allows us to investigate the relevance of the specialization and diversity theories for city-industry growth.

This paper draws on a comprehensive data set of China's manufacturing industries in 231 prefecture-level cities or above for the period 1998-2005. We first regress the city-industry growth rate between 1998 and 2005 on the measures of the city-industry specialization and diversity in 1998. It is found that specialization has a negative and statistically significant coefficient, whereas diversity has a positive and statistically significant coefficient, suggesting that diversity promotes but specialization hinders the city-industry growth in China. However, these results could be biased due to the lack of control for various industry and city characteristics that may correlate with the measures of the city-industry specialization and diversity. To deal with this concern, we include industry and city dummies, and re-estimate the impacts

[1] The number of cities including both prefecture-level cities (*Di Ji Shi* in Chinese) and county-level cities (*Xian Ji Shi* in Chinese) has increased from 191 in 1978 to 652 in 2006 (China Statistical Yearbook, 1994, 2007). The urban population increased from 172 million in 1978 to 577 million in 2006, with its share in the total population rising from 18 percent to 44 percent correspondingly (China Statistical Yearbook, 2007).

[2] For a recent review of the literature on the agglomeration externalities, see Rosenthal and Strange (2004).

of city-industry specialization and diversity on city-industry growth. To our surprise, we find that specialization turns out to have a positive and statistically significant coefficient whereas diversity has a negative and statistically insignificant coefficient, supporting the specialization theory but not the diversity theory. These results remain robust to the alternative measures of key explanatory variables and the use of the panel estimation method.

Our results imply that in China, it is industrial specialization, not diversity, that contributes to the growth of industries in cities. This is in contrast to the findings in the literature using data sets from developed countries. For example, using the data set of the six-largest manufacturing industries in 170 cities of the United States between 1956 and 1987, Glaeser et al. (1992) find support for the diversity theory but not for the specialization theory. A recent theoretical paper by Duranton and Puga (2001) provides a possible explanation for these divergent findings. They argue that new and fast-growing industries can benefit from innovations by being located in diversified cities, but mature industries can lower down their production costs by being located in specialized cities. Indeed, most of China's manufacturing industries are concentrated in mature industries, whereas the driving force for the economic growth in the United States comes from the new and fast-growing industries. To lend further support to this explanation, we follow Henderson et al. (1995) by dividing our sample into two groups of industries: mature industries and fast-growing industries. Consistent with the above explanation and findings by Henderson et al. (1995), we find support for the specialization theory in the mature industries, but support for both the specialization theory and the diversity theory in the fast-growing industries.

This paper is built on a large literature on the growth of industries in cities. In an influential paper, Glaeser et al. (1992) find support for the diversity theory, but not for the specialization theory, in the case of the United States. In a further study on city-industry growth in the United States, Henderson et al. (1995) report evidence for the specialization theory in mature industries, but support for both the diversity and specialization theories in new and fast-growing industries.[3] Our study contributes to the literature by examining the relevance of the specialization and diversity theories for a large and fast-growing developing economy. Our findings suggest that different determinants of the city-industry growth may be at work for economies at different development stages.

This paper is also related to an emerging literature on China's urbanization, covering the determinants of China's urbanization (e.g., Young and

[3] Other studies include Henderson (1997, 2003), Quigley (1998), Maurel and Sedillot (1999), and Combes (2000).

Deng, 1998; Au and Henderson, 2006a; Deng et al., 2008), China's city size distribution (Song and Zhang, 2002), and urbanization and labor productivity (Prud'homme, 2000; Au and Henderson, 2006b). The focus of this paper is on the relevance of the specialization and diversity theories for city-industry growth, the findings of which have important policy implications.

The paper proceeds as follows. Data and variables are discussed in Section 2, and the main empirical findings are reported in Section 3. The paper concludes in Section 4.

2 Data and Variables

Our data is from the *annual surveys of industrial firms* (ASIF) conducted by the National Bureau of Statistics of China for the period of 1998 to 2005. These annual surveys cover all state-owned enterprises, and those non-state-owned enterprises with annual sales of five million RMB (Chinese currency) or more. The number of firms covered in the surveys varies from over 146,000 to approximately 250,000.

Our study requires precise location and industry information of our sample firms. The data set provides information on the address and regional codes of each firm. During the sample period, however, China's administrative boundaries and consequently its county, city, or even provincial codes experienced some changes. For example, new counties were established, while existing counties were combined into larger ones or even elevated to cities. From 1998 to 2005, the number of counties in China increased from 2,496 to 2,862 (a total of 366), while the number of changes in the county codes was 648. From 1998 to 2005, the number of prefecture-level cities or above increased from 231 (4 municipalities, 15 vice provincial cities, and 212 prefecture-level cities) to 287 (4 municipalities, 15 vice provincial cities, and 268 prefecture-level cities). Using the 1999 National Standard (promulgated at the end of 1998 and called GB/T 2260-1999) as the benchmark codes, we convert the regional codes of all the firms to these benchmark codes to achieve consistency for the regional codes in the whole sample period.

Panel A of Table 1 shows the top five cities in terms of total manufacturing employment in 1998 and the top five manufacturing industries within each of these cities. Shanghai is the largest city with a total manufacturing employment of 2,277,312, followed by Tianjin (1,187,517), Beijing (1,128,643), Guangzhou (911,877), and Suzhou (857,509) in descending order. However, only two of these five cities - Shanghai (2,512,396; ranked #1 in 2005) and Suzhou (1,809,360; ranked #4 in 2005) - remained among the top five by 2005 (see Panel B of Table 1). The three new cities that made it to the top five were: Shenzhen (2,240,594; ranked #2), Dongguan (1,978,994; ranked #3), and Ningbo (1,384,581; ranked #5). Note that three of the top five largest cities in 2005 are located in the Yangtze River Delta, while the other two are located in the Pearl River Delta, implying the importance of these two regions to the Chinese economy.

For each firm in the data set, there is also information on its primary two-digit, three-digit, and four-digit industry codes. However, in 2003, a new classification system for industry codes (called GB/T 4754-2002) was adopted to replace the old classification system (called GB/T 4754-1994) that had been used from 1995 to 2002. To achieve consistency in the industry codes for the whole sample period (1998-2005), we convert the industry codes in the 2003-2005 data to the old classification system by using a concordance table (in the case of a new four-digit code corresponding to an old four-digit code or several new four-digit codes corresponding to an old four-digit code) or by assigning a new code for an old code based on product information (in the case of several old four-digit codes corresponding to a new 4-digit code).

Panel A of Table 2 shows the top five manufacturing industries in terms of total manufacturing employment in 1998 and the top five cities in each of these industries. Textile is the largest manufacturing industries with a total manufacturing employment of 5,023,305, followed by nonmetal mineral products (3,902,075), raw chemical materials and chemical products (3,406,740), ordinary machinery equipment (3,165,430), and transport equipment (3,142,490) in descending order. However, only two of these five industries - textile (5,093,714; ranked #1 in 2005) and nonmetal mineral products (3,695,468; ranked #3 in 2005) - remained among the top five by 2005 (see Panel B of Table 2). The three new industries that made it to the top five were electronics and telecommunications (4,283,408; ranked #2), electric equipment and machinery (3,455,391; ranked #4), and garment and other fiber products (3,337,773; ranked #5). It is interesting to note that there were some degrees of coagglomeration among the five top industries of 2005, that is, electronics and telecommunications industry and electric equipment and machinery industry, and textile industry and garment and other fiber products industry.

The dependent variable for our study is the logarithm of growth rate of employment or output[4] of industry i in city c between 1998 and 2005 (denoted by G_{ic}), where industry i is from the 29 two-digit manufacturing industries,[5] and city c is from the 231 prefecture-level cities or above. Specifically, for

[4] Constant value of output is used.

[5] In a robustness check, we examine the relevance of the specialization and diversity theories of city-industry growth at the more disaggregate four-digit industry level.

the construction of G_{ic}, we aggregate the employment or output of all the firms in industry i and city c from our data set for both 1998 and 2005,[6] and calculate the logarithm of its growth rate accordingly. A list of the two-digit industries is provided in Appendix A, and a list of the 231 cities is shown in Appendix B.

The top five city-industry pairs in 1998, shown in Panel A of Table 3, are transportation equipment in Shanghai, electronics and telecommunications in Shenzhen, machinery and equipment in Shanghai, smelting and pressing of ferrous metals in Shanghai, and electrical equipment and machinery in Shanghai in descending order. By 2005, the top five city-industry pairs (shown in Panel B of Table 3) have become electronics and telecommunications in Shenzhen, electronics and telecommunications in Suzhou, electronics and telecommunications in Shanghai, raw chemical materials and chemical products in Guangzhou, and electronics and telecommunications in Dongguan. In terms of the growth rate between 1998 and 2005, the top five city-industry pairs are: petroleum refining in Xuchang, timber processing in Yulin, garment in Longyan, stationery, educational and sports goods in Shenyang, and chemical fibers in Lanzhou, whereas the bottom five city industry pairs are: leather and furs products in Harbin, chemical fibers in Jinan, timber processing in Xingtai, rubber products in Nanning, and rubber products in Urumqi (see Table 4 for details). These dramatic changes (e.g., from four of the top five city-industry pairs in 1998 located in one region, Shanghai, to four of the top five city-industry pairs in 2005 located in one industry, electronics and telecommunications) illustrate the fast and uneven industry growth in China's cities, affording us an ideal setting to investigate the relevance of the city-industry growth theories.

Our key explanatory variables are *Specialization* and *Diversity*, corresponding to the two leading theories of industry growth in cities. For industry i in city c, we measure the degree of specialization by the employment (or output) share of the industry in the city over the corresponding share of the industry in the national total. Specifically, it takes the following form:

$$Specialization_{ic} = \frac{y_{ic}/y_c}{y_i/y} \tag{1}$$

where y_{ic} is the employment (or output) of industry i in city c; y_c is the total employment (or output) in city c; y_i is the total employment (or output) of industry i; and y is the total employment (or output) of all those industries

[6] In 1998, the number of manufacturing firms in the 231 cities was 124,854, or about 91% of the total sample. By 2005, the corresponding number increased to 224,286, or about 94% of the total sample.

and cities. Hence, $Specialization_{ic} > 1$ indicates that city c is more specialized in industry i relative to the national average. Studies using this measure of specialization include Glaeser et al. (1992) and Henderson (1997).

For industry i in city c, we measure the extent of diversity by one minus the sum of the square of employment (or output) share of all industries other than industry i in the same city c. Specifically,

$$Diversity_{ic} = 1 - \sum_{k \neq i} s_{kc}^2 \tag{2}$$

where s_{kc} is the employment (or output) share of industry k in city c. A higher value of $Diversity_{ic}$ implies a greater extent of diversity. Studies using this measure of diversity include Henderson et al. (1995), Henderson (1997, 2003), and Gao (2004).

As in Glaeser et al. (1992), we include the following control variables in the regressions. The first control is the initial city-industry employment (or output) measured by the logarithm of employment (or output) in industry i and city c in 1998, which is used to account for the possible catching-up effects. The second one is the logarithm of average wage in industry i and city c in 1998 as a control for the possible effects caused by the relocation of firms to low-wage areas or the migration of workers to high-wage areas. The last one is the the degree of competition of industry i in city c in 1998, which is measured by the number of firms per worker of industry i in city c over the number of firms per worker of industry i in the national total (à la Glaeser et al., 1992). Alternatively, the degree of competition is measured by the negative value of the Herfindahl Index of industry i and city c. In our robustness checks, we also include some additional control variables for industry and city characteristics (Section 3.4).

Table 5 lists the summary statistics of all the variables, and Table 6 gives the correlations of the key variables.

3 Empirical Analysis

3.1 Main Results

To investigate the relevance of the specialization and diversity theories on the city-industry growth in China, we estimate the following equation:

$$G_{ic} = \alpha + \beta \cdot Specialization_{ic} + \gamma \cdot Diversity_{ic} + X_{ic}^{'} \cdot \zeta + \varepsilon_{ic} \tag{3}$$

where X'_{ic} is a vector of control variables. To deal with possible heteroskedasticity issues, we use the White-robust standard errors.

The benchmark estimation results, in which $Specialization_{ic}$ and $Diversity_{ic}$ are measured by employment data, are reported in Table 7. Columns 1-2 use $Specialization_{ic}$ and $Diversity_{ic}$ separately, and Column 3 includes both of them together. It is found that $Specialization_{ic}$ has a negative and statistically significant coefficient, while $Diversity_{ic}$ has a positive and statistically significant coefficient. These findings imply that industries grow faster in cities with higher city-industry diversity but lower city-industry specialization, lending support to the diversity theory but not to the specialization theory.

These results, however, could be biased due to the lack of control for various industry and city characteristics that may correlate with the measures of city-industry specialization and diversity, that is, $E(Specialization_{ic} \cdot \varepsilon_{ic}) \neq 0$ and $E(Diversity_{ic} \cdot \varepsilon_{ic}) \neq 0$. To deal with this possible concern, we then include industry and city dummies, and re-estimate equation (3). As shown in Column 4 of Table 7, once the industry and city dummies are included, our early results become completely reversed.[7] Specifically, $Specialization_{ic}$ turns out to be positively and statistically significantly correlated with industry growth in cities, but $Diversity_{ic}$ does not have any significant impact on industry growth in cities. These findings imply that city-industry specialization promotes industry growth in cities, while city-industry diversity has no effect at all.

The complete reversal in our regression results when industry and city dummies are included implies the importance of accounting for industry and city characteristics. Specifically, the omitted variables are expected to be negatively correlated with the measure of specialization but positively correlated with that of diversity. One important determinant for city-industry growth in China is the industrial policies adopted by the local city officials. It is well documented that under the centrally-planned economy local bureaucrats were instructed to pursue well-diversified economies even at suboptimal scales (called *Xiao Er Quan* in Chinese), partly for the national defense strategy (e.g., Henderson, 2009). Such pursuit of small but diversified local economies has persisted during China's economic reform. This is because the promotion prospects of China's local officials depend on the local economic development, and for risk-diversification concerns, local officials tend to mimic one another in developing what is considered as strategically impor-

[7] As there is little evidence for multicollinearity between our key explanatory variables and other control variables (specifically, the VIF value for *Specialization* is 1.14 and that for *Diversity* is 1.13), henceforth we only list the estimation results when our key explanatory variables are included together to save space.

tant industries. Indeed, virtually every Chinese city has its economic and development zones. In other words, local city officials favor industrial diversity rather than industrial specialization. The omission of such variables would naturally lead to over-estimated impacts of diversity, but under-estimated impacts of specialization.

3.2 Robustness Checks

In this sub-section, we conduct a series of robustness checks on our aforementioned regression results.

Output data. Some studies in the literature have used output data to measure city-industry specialization and diversity (e.g., Gao, 2004). We therefore use output data to measure the dependent variable and all the relevant explanatory variables, and repeat the analysis. Column 1 of Table 8 summarizes the estimation results, and it is clear that our main results (i.e., shown in Column 4 of Table 7) remain robust.

Alternative measure of competition. Our measure of *Competition* in the benchmark estimation follows that of Glaeser et al. (1992), that is, the number of firms per worker of a given industry in a given city over the number of firms per worker of the industry in the national total. For robustness check, we use the negative value of the Herfindahl Index to measure the degree of competition. Regression results are reported in Column 2 of Table 8 when employment data are used, and in Column 3 of Table 8 when output data are used. Clearly, the results are similar to our earlier findings.

4-digit industry level analysis. Thus far, our analysis is at the 2-digit industry level to be comparable to the literature (e.g., Glaeser et al., 1992). However, for a fast-growing economy like China, industrial dynamic could be different from those relatively mature economies like the U.S., especially at a more disaggregated level. Meanwhile, there is a concern whether our contrasting findings are driven by the definition of the industry, i.e., 2-digit level. To address these concerns, we carry out an estimation at a more disaggregated level, that is, 4-digit industry level. Regression results are reported in Column 1 of Table 9. Evidently, we find a much similar results.

Panel estimation. Our main results show the importance of controlling for industry and city characteristics that may correlate with the measures of city-industry specialization and diversity. While the inclusion of industry and city dummies is one way to deal with this problem in the literature (e.g., region dummies are used in Henderson et al., 1995 for each industry estimation; whereas industry dummies are used in Gao, 2004), an alternative way is to use the panel estimation in which industry-city dummies are included to account for all possible time-invariant omitted variables (e.g., Henderson, 1997, 2003). Thus, for robustness check, we use the panel estimation (with six-year city-industry growth, the longest possible panel setting in our data set) and report the regression results in Column 2 of Table 9. It is found that specialization has a positive and statistically significant impact on six-year city-industry growth, consistent with our earlier results.

Sample attrition. The ASIF data set that we have used does not include small private firms (those non-state-owned firms with annual sales less than five million RMB). This may raise a concern of sample attrition, that is, the computed city-industry growth rate may not well capture the real growth rate. To address this concern, we use the two available data sets of China's industry census, conducted in 1995 and 2004 respectively, which cover all manufacturing firms in China in these two census years. We then regress the ten-year city-industry growth rate on the level of specialization, diversity and competition in 1995 along with other initial controls. Regression results are reported in Column 3 of Table 9. Clearly, we find consistent findings, that is, specialization has a positive and statistically significant impact on city-industry growth whereas diversity does not have any statistically significant impact. These results reassure us that our baseline results are not affected by the truncation nature of the ASIF data set.

3.3 Mature versus Fast-growing Industries

Our study shows that in China, industries grow faster in cities with greater industrial specialization. This is in contrast to the findings obtained using data from developed countries, for example, the support for the diversity theory but not for the specialization theory found by Glaeser et al. (1992) in the case of the United States. One possible explanation for the divergent findings is based on the theoretical argument put forward by Duranton and Puga (2001). They propose that new and fast-growing industries can benefit from more innovations by being located in diversified cities, but mature industries can lower their production costs by being located in specialized cities. Along with globalization, developed countries become specialized in new and fast-growing industries, while developing countries focus on mature industries. Hence, industrial diversity in cities is important for city-industry growth in developed countries, while specialization is crucial for city-industry growth in developing countries.

Following the logic of the above explanation, we would expect that specialization is important for mature industries in China, but diversity is crucial for its relatively new and fast-growing industries. As in Henderson et al. (1995), we divide our sample into two sub-samples of industries: mature and fast-growing industries. Specifically, mature industries are defined as those three-digit industries that experienced employment drop during the sample period (1998-2005), whereas fast-growing industries are defined as those three-digit industries that had employment more than doubled during the sample period. For the list of those mature and fast-growing industries, see Appendix C. The regression results are shown in Table 10, with column 1 for the mature industries and column 2 for the fast-growing industries. Indeed, we find strong support for the specialization theory in the mature industries, but for both the specialization and the diversity theory in the fast-growing industries. These results are similar to those found by Henderson et al. (1995).

3.4 Uncovering Industry and City Characteristics

Recall that our findings on the relevance of the two theories for city-industry growth are completely reversed once the industry and city dummies are included, from Column 3 of Table 7 (i.e., support for the diversity theory but not for the specialization theory) to Column 4 of Table 7 (support for the specialization theory but not for the diversity theory). This highlights the importance of accounting for industry and city characteristics in estimating the relevance of the different theories for city-industry growth.

To uncover those industry and city characteristics, we carry out two series of exercises. First, we keep the city dummies, but replace the industry dummies by the stepwise inclusion of industry-level variables such as capital intensity, average age, concentration, average productivity, debt to asset ratio, average import tariff rate, priority industry, SOE ratio, and privatization ratio. Regression results are reported in Table 11. It is found that along with the stepwise inclusion of industry characteristics, the coefficient of specialization changes from negative and statistically significant to positive and statistically significant. The coefficient of diversity remains positive but becomes statistically insignificant. The regression results when all general industry-level variables are included are close to what we obtain with the industry dummies, suggesting that these nine industrial characteristics capture most of the industry characteristics that may correlate with the measures of city-industry specialization and diversity.

Second, we keep the industry dummies but replace the city dummies by the stepwise inclusion of city-level variables such as per capita income, population density, realized FDI, road density, students in higher education, financial development, and coastal city (a dummy variable taking a value of 1 if a city is a coastal city). The regression results are reported in Table 12. It is found that along with the stepwise inclusion of city characteristics, the coefficient of specialization changes from negative to positive but remains statistically insignificant. The coefficient of diversity remains positive and statistically significant. The regression results suggest that these general city-level characteristics only capture part of the city characteristics that may correlate with the measure of city-industry specialization but not that of city-industry diversity. As discussed in Section 3.1, the policies adopted by local city officials are expected to have significant impacts on city-industry growth. Future studies should be directed at understanding the motives of local city officials and classifying and incorporating city-industry policies into the analysis.

4 Conclusion

China has had fast yet uneven growth of industries in cities in the last thirty years. This prompts us to investigate what accounts for the city-industry growth in China. In this paper, using a comprehensive data set of manufacturing industries in 231 China's cities for the period 1998-2005, we examine the relevance of the two leading theories for industry growth in cities (i.e., the specialization theory by Marshall, Arrow, and Romer, and the diversity theory by Jacobs). We find that city-industry specialization promotes industry growth in cities, while city-industry diversity has no effect at all. These results lend support to the specialization theory but not for the diversity theory. They have direct policy suggestions for fostering industrial agglomeration and regional specialization in China, given that there is evidence suggesting that the partial reform approach adopted by the Chinese government in the last thirty years has led to local protectionism and insufficient specialization of industrial activities (Young, 2000; Bai et al. 2004; Lu and Tao, 2009).

It is also important to point out that our findings on the importance of city-industry specialization are in contrast to the findings obtained using data from developed countries, for example, the support for the diversity theory but not for the specialization theory found by Glaeser et al. (1992) in the case of the United States. One possible explanation for the divergent findings is that different determinants of the city-industry growth may be at work for economies at different development stages. Specifically, industrial diversity in cities is important for the new and fast-growing industries, which are the drivers of economic growth in developed countries, while specialization is crucial for the growth of mature industries in cities, which constitute most of the economic activities in the developing countries.

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Table 1. Five largest cities

Panel A. Five largest cities in 1998

City	Employment (person)	Five largest industries
Shanghai	2,277,312	Transportation equipment, Ordinary machinery equipment, Smelting and pressing of ferrous metals, Electric equipment and machinery, Electronics and telecommunications
Tianjin	1,187,517	Transportation equipment, Electronics and telecommunications, Raw chemical materials and chemical products, Smelting and pressing of ferrous metals, Textile
Beijing	1,128,643	Smelting and pressing of ferrous metals, Electronics and telecommunications, Transportation equipment, Nonmetal mineral products, Special equipment manufacturing
Guangzhou	911,877	Garment and other fiber products, Leather and furs and related products, Electric equipment and machinery, Transportation equipment, Raw chemical materials and chemical products
Suzhou	857,509	Textile, Raw chemical materials and chemical products, Garment and other fiber products, Ordinary machinery equipment, Electronics and telecommunications

Note: calculation is based on the 1998 Survey of Industrial Firms conducted by NBS of China.

Panel B. Five largest cities in 2005

City	Employment (person)	Five largest industries
Shanghai	2,512,396	Electronics and telecommunications, Transportation equipment, Ordinary machinery equipment, Electric equipment and machinery, Raw chemical materials and chemical products
Shenzhen	2,240,594	Electronics and telecommunications, Electric equipment and machinery, Plastic products, Metal products, Garment and other fiber products
Dongguan	1,978,994	Electronics and telecommunications, Electric equipment and machinery, Education and sports goods, Leather and furs and related products, Garment and other fiber products
Suzhou	1,809,360	Electronics and telecommunications, Textile, Electric equipment and machinery, Garment and other fiber products, Metal products
Ningbo	1,384,581	Textile, Electric equipment and machinery, Ordinary machinery equipment, Garment and other fiber products, Metal products

Note: calculation is based on the 2005 Survey of Industrial Firms conducted by NBS of China.

Table 2. Five largest industries

Panel A. Five largest industries in 1998

Industry	Employment (person)	Five largest cities
Textile	5,023,305	Shanghai, Suzhou, Shaoxing, Wuxi, Nantong
Nonmetal mineral products	3,902,075	Foshan, Beijing, Chongqing, Zibo, Tangshan
Raw chemical materials and chemical products	3,406,740	Shanghai, Nanjing, Jilin, Tianjin, Chongqing
Ordinary machinery equipment	3,165,430	Shanghai, Dalian, Wuxi, Beijing, Chongqing
Transportation equipment	3,142,490	Shanghai, Changchun, Shenyang, Shiyan, Tianjin

Note: calculation is based on the 1998 Survey of Industrial Firms conducted by NBS of China.

Panel B. Five largest industries in 2005

Industry	Employment (person)	Five largest cities
Textile	5,093,714	Suzhou, Shaoxing, Ningbo, Hangzhou, Jiaxing
Electronics and telecommunications	4,283,408	Shenzhen, Suzhou, Dongguan, Shanghai, Huizhou
Nonmetal mineral products	3,695,468	Zibo, Foshan, Quanzhou, Zhengzhou, Shanghai
Electric equipment and machinery	3,455,391	Shenzhen, Dongguan, Foshan, Shanghai, Ningbo
Garment and other fiber products	3,337,773	Shanghai, Quanzhou, Jiaxing, Guangzhou, Suzhou

Note: calculation is based on the 2005 Survey of Industrial Firms conducted by NBS of China.

Table 3. Five largest city-industry pairs by employment

Panel A. Five largest city-industry pairs in 1998

City	Industry
Shanghai	Transportation equipment
Shenzhen	Electronics and telecommunications
Shanghai	Machinery and equipment
Shanghai	Smelting and pressing of ferrous metals
Shanghai	Electrical equipment and machinery

Note: calculation is based on the 1998 Survey of Industrial Firms conducted by NBS of China.

Panel B. Five largest city-industry pairs in 2005

City	Industry
Shenzhen	Electronics and telecommunications
Suzhou	Electronics and telecommunications
Shanghai	Electronics and telecommunications
Guangzhou	Raw chemical materials and chemical products
Dongguan	Electronics and telecommunications

Note: calculation is based on the 2005 Survey of Industrial Firms conducted by NBS of China.

Table 4. Growth of City-Industry pairs

Panel A. Five Fastest-Growing City-Industry pairs

Rank	City	Industry	Log(employment growth)
1	Xuchang	Petroleum refining	5.54
2	Yulin	Timber processing	5.02
3	Longyan	Garment	4.95
4	Shenyang	Stationery, educational and sports goods	4.85
5	Lanzhou	Chemical fibers	4.75

Note: calculation is based on the Annual Surveys of Industrial Firms (1998-2005) conducted by NBS of China.

Panel B. Five Slowest-Growing City-Industry pairs

Rank	City	Industry	Log(employment growth)
1	Harbin	Leather and furs products	-4.92
2	Jinan	Chemical fibers	-4.27
3	Xingtai	Timber processing	-4.23
4	Nanning	Rubber products	-4.19
5	Urumqi	Rubber products	-4.17

Note: calculation is based on the Annual Surveys of Industrial Firms (1998-2005) conducted by NBS of China.

Table 5. Summary statistics of all variables

Variable	Mean	Standard deviation	NO of observati ons
Log of city-industry employment growth for all industries	-.049	1.015	5,406
Log of city-industry output growth for all industries	1.021	1.274	5,345
Log of city-industry employment growth for mature industries	-.415	1.167	6,231
Log of city-industry employment growth for fast-growing industries	.553	1.401	1,744
Specialization using employment data for all industries	1.208	1.934	5,406
Specialization using output data for all industries	1.310	2.385	5,345
Specialization using employment data for mature industries	2.069	5.056	6,231
Specialization using employment data for fast-growing industries	1.930	5.609	1,744
Diversity using employment data for all industries	.884	.080	5,406
Diversity using output data for all industries	.858	.111	5,345
Diversity using employment data for mature industries	0.939	0.061	6,231
Diversity using employment data for fast-growing industries	0.930	0.072	1,744
Competition a la Glaeser et al. (1992) using employment data for all industries	1.876	3.377	5,406
Competition a la Glaeser et al. (1992) using output data for all industries	6.361	35.015	5,345
Competition as the negative value of Herfindahl Index using employment data for all industries	.332	.289	5,406
Competition as the negative value of Herfindahl Index using output data for all industries	.384	.301	5,345
Competition as the negative value of Herfindahl Index using employment data for mature industries	.287	.363	6,231
Competition as the negative value of Herfindahl Index using employment data for fast-growing industries	.592	.421	1,744
Log of City-industry initial average wage for all industries (10,000RMB)	1.700	.512	5,406
Log of City-industry initial average wage for mature industries (10,000RMB)	1.668	.599	6,231
Log of City-industry initial average wage for fast-growing industries (10,000RMB)	1.491	.808	1,744
Log of City-industry initial employment for all industries	7.899	1.626	5,406
Log of City-industry initial output for all industries (10,000RMB)	12.095	1.995	5,345
Log of City-industry initial employment for mature industries	7.083	1.550	6,231
Log of City-industry initial employment for fast-growing industries	5.597	1.517	1,744
Industry characteristics			
Average age	13.210	2.826	29
Concentration (CR8)	.004	.005	29
Average productivity (total output/total employment, 1,000RMB/worker)	38.750	28.375	29
Debts to asset ratio (%)	64.300	3.949	29
Capital intensity (total fixed assets/total employment, 1,000RMB/worker)	68.602	175.099	29
Average import tariff rate in 2002 (%)	13.436	7.283	29

Priority industry (10^{th} Five-year Plan of China)	0.471	0.499	29
SOE ratio in employment (%)	41.815	20.295	29
Privatization ratio (the change in SOE ratio between 1998 and 2002, %)	9.365	3.198	29
City characteristics			
Students in higher education (per 10,000 persons)	97.168	101.587	226
Realized FDI ($100 million)	2.025	4.734	228
Road density (road area/territory area, %)	30.399	45.396	228
Population density (1,000 persons/km^2)	1.256	1.060	228
Per capita income (household disposable income, 1,000RMB/person)	8.857	9.839	225
Financial development (loan balance/GDP, %)	96.755	224.527	226
Coastal city (0-1 dummy)	0.184	0.388	231

Note: data sources include the Annual Surveys of Industrial Firms (1998-2005) and the industry census (1995 and 2004) conducted by the NBS of China.

Table 6. Correlations of key variables

	Log of city-industry employment growth for all industries	Specialization using employment data for all industries	Diversity using employment data for all industries	Competition a la Glaeser et al. (1992) using employment data for all industries
Log of city-industry employment growth for all industries	1.000			
Specialization using employment data for all industries	-.104	1.000		
Diversity using employment data for all industries	.017	.146	1.000	
Competition a la Glaeser et al. (1992) using employment data for all industries	.311	-.164	-.079	1.000

Note: calculation is based on the Annual Surveys of Industrial Firms conducted by China's National Bureau of Statistics (NBS). We measure the degree of specialization by the employment (or output) share of an industry in a city over the corresponding share of this industry in the national total. For an industry in a city, we measure the extent of diversity by one minus the sum of the square of employment (or output) share of all industries other than this industry in the same city. The degree of competition is measured by the number of firms per worker of an industry in a city over the number of firms per worker of this industry in the national total (à la Glaeser et al., 1992).

Table 7. Main results

Dependent variable: Log of city-industry employment growth				
	Without dummies			With dummies
	(1)	(2)	(3)	(4)
Specialization	-.024		-.025	.050
	(-3.21)		*(-3.36)*	*(3.57)*
Diversity		.820	.843	-.445
		(4.09)	*(4.20)*	*(-0.72)*
City-industry initial employment (log)	-.085	-.109	-.099	-.230
	(-7.19)	*(-8.82)*	*(-8.02)*	*(10.00)*
Competition	.073	.071	.071	.058
	(7.37)	*(7.25)*	*(7.29)*	*(5.80)*
City-industry initial average wage (log)	.459	.452	.456	.388
	(14.91)	*(14.74)*	*(14.84)*	*(10.21)*
Constant	-.265	.004	-.044	1.284
	(-2.55)	*(0.03)*	*(-0.37)*	*(4.86)*
City dummies	No	No	No	Yes
Industry dummies	No	No	No	Yes
Adjusted R^2	.151	.153	.155	.376
Number of observations	5,406	5,406	5,406	5,406

Note: Robust t statistics are in parentheses beneath estimated coefficients. We measure the degree of specialization by the employment (or output) share of an industry in a city over the corresponding share of this industry in the national total. For an industry in a city, we measure the extent of diversity by one minus the sum of the square of employment (or output) share of all industries other than this industry in the same city. The degree of competition is measured by the number of firms per worker of an industry in a city over the number of firms per worker of this industry in the national total (à la Glaeser et al., 1992).

Table 8. Robustness checks using output data and an alternative measure of competition

Dependent variable	Log of city-industry output growth	Log of city-industry employment growth	Log of city-industry output growth
	Competition a la Glaeser et al. (1992)	Competition as negative Herfindahl Index	Competition as negative Herfindahl Index
	(1)	(2)	(3)
Specialization	.061	.076	.083
	(5.08)	*(4.75)*	*(5.93)*
Diversity	.654	-.467	.897
	(1.22)	*(-0.72)*	*(1.57)*
City-industry initial employment/output (log)	-.356 *(-16.95)*	-.369 *(-16.77)*	-.463 *(-21.05)*
Competition	.006	.260	.443
	(6.00)	*(3.42)*	*(5.34)*
City-industry initial average wage(log)	.111	.397	.165
	(2.31)	*(9.93)*	*(3.37)*
Constant	6.414	2.750	7.941
	(19.38)	*(10.70)*	*(22.69)*
City dummies	Yes	Yes	Yes
Industry dummies	Yes	Yes	Yes
Adjusted R^2	.400	.376	.387
Number of observations	5,345	5,406	5,345

Note: Robust t statistics are in parentheses beneath estimated coefficients. We measure the degree of specialization by the employment (or output) share of an industry in a city over the corresponding share of this industry in the national total. For an industry in a city, we measure the extent of diversity by one minus the sum of the square of employment (or output) share of all industries other than this industry in the same city. The degree of competition is measured by the number of firms per worker of an industry in a city over the number of firms per worker of this industry in the national total (à la Glaeser et al., 1992).

Table 9. Robustness checks using 4-digit industry data, panel estimation, and industry census data

Dependent variable: Log of city-industry employment growth			
	4-digit industry	Panel estimation	Industry census data
	(1)	(2)	(3)
Specialization	.008	.108	.042
	(7.17)	*(3.72)*	*(2.39)*
Diversity	0.326	-.544	-.715
	(-0.20)	*(-0.78)*	*(-1.11)*
City-industry initial employment (log)	-0.401	-1.178	-0.275
	(-39.21)	*(-31.00)*	*(-11.20)*
Competition as negative value of Herfindahl Index	.024	.161	.001
	(6.32)	*(1.65)*	*(1.90)*
City-industry initial average wage (log)	.289	.191	-0.011
	(19.22)	*(5.79)*	*(-0.44)*
Constant	1.389	8.770	6.052
	(0.84)	*(26.18)*	*(8.05)*
City dummies	Yes		Yes
Industry dummies	Yes		Yes
Industry-city dummies		Yes	
Number of observations	23,838	10,276	5,526

Note: Robust t statistics are in parentheses beneath estimated coefficients. We measure the degree of specialization by the employment (or output) share of an industry in a city over the corresponding share of this industry in the national total. For an industry in a city, we measure the extent of diversity by one minus the sum of the square of employment (or output) share of all industries other than this industry in the same city. The degree of competition is measured by the negative value of Herfindahl Index of an industry in a city.

Table 10. Subsamples

Dependent variable: Log of city-industry employment growth		
	Mature industries	Fast-growing industries
	(1)	(2)
Specialization	.020	.026
	(4.22)	*(3.21)*
Diversity	-2.779	10.918
	(-1.53)	*(2.23)*
City-industry initial employment (log)	-.303	-.425
	(-18.66)	*(-12.52)*
Competition as negative value of Herfindahl Index	.025	.045
	(6.16)	*(4.19)*
City-industry initial average wage (log)	.366	.296
	(11.64)	*(4.54)*
Constant	3.944	-9.328
	(2.19)	*(-1.96)*
City dummies	Yes	Yes
Industry dummies	Yes	Yes
Adjusted R^2	.319	.486
Number of observations	6,231	1,744

Note: Robust t statistics are in parentheses beneath estimated coefficients. We measure the degree of specialization by the employment (or output) share of an industry in a city over the corresponding share of this industry in the national total. For an industry in a city, we measure the extent of diversity by one minus the sum of the square of employment (or output) share of all industries other than this industry in the same city. The degree of competition is measured by the negative value of Herfindahl Index of an industry in a city.

Table 11. Industry characteristics

	Dependent variable: Log of city-industry employment growth							
	Without industrial characteristics	With industrial characteristics						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Specialization	-.006	-.001	-.006	.001	.008	.009	.022	.022
	(-0.58)	*(-0.10)*	*(-0.61)*	*(0.09)*	*(0.73)*	*(0.88)*	*(2.02)*	*(2.01)*
Diversity	1.161	1.122	.744	.633	.465	.431	.200	.247
	(1.75)	*(1.71)*	*(1.16)*	*(0.99)*	*(0.73)*	*(0.68)*	*(0.32)*	*(0.39)*
Common control variables								
City-industry initial employment (log)	-.145	-.149	-.128	-.142	-.151	-.155	-.181	-.177
	(-10.54)	*(-11.06)*	*(-9.51)*	*(-10.29)*	*(-10.65)*	*(-10.54)*	*(-10.61)*	*(-10.16)*
Competition	.061	.063	.063	.061	.061	.060	.059	.062
	(7.27)	*(8.14)*	*(8.07)*	*(7.85)*	*(7.78)*	*(7.69)*	*(7.43)*	*(7.23)*
City-industry initial average wage (log)	.280	.333	.357	.364	.381	.383	.387	.395
	(7.59)	*(8.35)*	*(8.98)*	*(9.15)*	*(9.45)*	*(9.48)*	*(9.63)*	*(9.72)*
Industrial characteristics								
Capital intensity (1,000RMB/worker)		-.001	-.001	-.001	-.001	-.001	-.001	-.001
		(-3.74)	*(-3.66)*	*(-3.29)*	*(-2.85)*	*(-2.92)*	*(-2.74)*	*(-2.49)*
Average age (years)			-.038	-.036	-.033	-.034	-.032	-.028
			(-10.92)	*(-10.46)*	*(-8.95)*	*(-8.66)*	*(-8.28)*	*(-6.04)*
Concentration (CR8)				-35.44	-34.45	-35.21	-37.11	-34.23
				(-4.60)	*(-4.48)*	*(-4.63)*	*(-4.91)*	*(-4.32)*
Average productivity (1,000RMB/worker)					-.001	-.001	-.002	-.001
					(-2.26)	*(-2.25)*	*(-3.41)*	*(-2.35)*
Debts to asset ratio (%)						.347	-.627	.217
						(1.13)	*(-1.69)*	*(0.39)*
Average import tariff rate (%)							.011	.007
							(4.35)	*(2.56)*

Priority Industry							.154	.168
(0-1 dummy)							*(4.35)*	*(4.32)*
SOE ratio								-.309
(%)								*(-2.35)*
Privatization ratio								-.438
(%)								*(-0.77)*
Constant	.635	.651	.903	1.045	1.046	.882	1.536	1.037
	(3.14)	*(3.25)*	*(4.43)*	*(5.15)*	*(5.17)*	*(3.58)*	*(5.40)*	*(2.87)*
City dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry dummies	No	No	No	No	No	No	No	No
Adjusted R2	.315	.319	.337	.341	.342	.342	.345	.346
Observations	5,406	5,402	5,402	5,402	5,402	5,402	5,402	5,402

Note: Robust t statistics are in parentheses beneath estimated coefficients. We measure the degree of specialization by the employment (or output) share of an industry in a city over the corresponding share of this industry in the national total. For an industry in a city, we measure the extent of diversity by one minus the sum of the square of employment (or output) share of all industries other than this industry in the same city. The degree of competition is measured by the number of firms per worker of an industry in a city over the number of firms per worker of this industry in the national total (à la Glaeser et al., 1992).

Table 12. City characteristics

Dependent variable: Log of city-industry employment growth								
	Without regional characteristics	With regional characteristics						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Specialization	-.013	-.006	-.003	.001	.004	.004	.001	.001
	(-1.99)	*(-0.88)*	*(-0.45)*	*(0.01)*	*(0.62)*	*(0.50)*	*(0.19)*	*(0.16)*
Diversity	.783	.792	.754	.727	.823	.984	.866	.778
	(3.78)	*(3.86)*	*(3.67)*	*(3.54)*	*(4.03)*	*(4.23)*	*(4.09)*	*(3.65)*
Common control variables								
City-industry initial employment (log)	-.103	-.127	-.133	-.142	-.159	-.160	-.133	-.132
	(-6.69)	*(-7.84)*	*(-8.07)*	*(-8.38)*	*(-9.45)*	*(-8.52)*	*(-7.37)*	*(-7.34)*
Competition	.079	.073	.072	.071	.068	.064	.069	.069
	(6.84)	*(6.43)*	*(6.35)*	*(6.26)*	*(6.24)*	*(5.63)*	*(6.21)*	*(6.12)*
City-industry initial average wage (log)	.533	.458	.458	.444	.455	.433	.400	.394
	(16.25)	*(12.60)*	*(12.63)*	*(12.11)*	*(12.51)*	*(11.51)*	*(10.35)*	*(10.19)*
Regional characteristics								
Per capita income (1,000RMB/person)		.127	.124	.100	.189	.291	.283	.278
		(5.17)	*(5.03)*	*(3.77)*	*(6.53)*	*(9.75)*	*(6.23)*	*(5.46)*
Population density (1,000 persons/km^2)			.250	.218	.702	.765	.629	.608
			(2.17)	*(1.90)*	*(5.47)*	*(5.52)*	*(3.95)*	*(3.14)*
Realized FDI ($100 million)				.088	.185	.155	.133	.132
				(3.43)	*(6.54)*	*(5.35)*	*(4.06)*	*(4.69)*
Road density (%)					-.000	-.000	-.000	-.000
					(-7.78)	*(-8.15)*	*(-1.86)*	*(-1.71)*
Students in higher education (10,000 persons)						-.045	-.030	-.032
						(-2.49)	*(-2.82)*	*(-2.06)*
Financial development (%)							.174	.164
							(7.50)	*(6.98)*
Coastal city (0-1 dummy)								.131
								(3.92)
Constant	-.084	-.874	-.834	-.535	-1.16	-1.77	-1.37	-1.28
	(-.583)	*(-4.33)*	*(-4.10)*	*(-2.23)*	*(-4.65)*	*(-6.81)*	*(-6.26)*	*(-5.83)*

City dummies	No	No	No	No	No	No	No	No
Industry dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R2	.218	.219	.220	.233	.234	.242	.252	.254
Observations	5,406	5,270	5,270	5270	5270	4,637	4,637	4,637

Note: Robust t statistics are in parentheses beneath estimated coefficients. We measure the degree of specialization by the employment (or output) share of an industry in a city over the corresponding share of this industry in the national total. For an industry in a city, we measure the extent of diversity by one minus the sum of the square of employment (or output) share of all industries other than this industry in the same city. The degree of competition is measured by the number of firms per worker of an industry in a city over the number of firms per worker of this industry in the national total (à la Glaeser et al., 1992).

Appendix A. A list of 29 two-digit manufacturing industries

Food processing
Food production
Beverage production
Tobacco processing
Textile industry
Garments & other fiber products
Leather, furs, down & related products
Timber processing, bamboo, cane, palm fiber & straw products
Furniture manufacturing
Papermaking & paper products
Printing & record pressing
Stationery, educational & sports goods
Petroleum processing, cooking products, gas production & supply
Raw chemical materials & chemical products
Medical & pharmaceutical products
Chemical fibers
Rubber products
Plastic products
Nonmetal mineral products
Smelting & pressing of ferrous metals
Smelting & pressing of nonferrous metals
Metal products
Machinery & equipment manufacturing
Special equipment manufacturing
Transportation equipment manufacturing
Electrical equipment & machinery
Electronic & telecommunication equipment
Instruments, meters, cultural and office machinery
Other manufacturing

Note: Industries in this table are ranked according the sequence of industries in Chinese Standard of Industrial Classification (GB/T 4754-1994).

Appendix B. A list of 231 prefecture-level cities or above

Beijing (1)	Dalian	Heihe	Bengbu	Dongying	Xiangfan	Zhongshan	Suining	**Qinghai (1)**
Beijing	Anshan		Huainan	Yantai	Ezhou	Dongguan	Neijiang	Xining
	Fushun	**Shanghai (1)**	Maanshan	Weifang	Jingmen	Shanwei	Guangan	
Tianjin (1)	Benxi	Shanghai	Huaibei	Jining	Xiaogan	Heyuan	Leshan	**Ningxia (3)**
Tianjin	Dandong		Tongling	Taian	Huanggang	Yangjiang	Yibin	Yinchuan
	Jinzhou	**Jiangsu (13)**	Anqing	Dezhou	Xianning	Qingyuan	Nanchong	Shizuishan
Hebei (11)	Yingkou	Nanjing	Huangshan	Weihai		Jieyang		Wuzhong
Shijiazhuang	Fuxin	Wuxi	Fuyang	Liaocheng	**Hunan (12)**	Yunfu	**Guizhou (3)**	
Tangshan	Liaoyang	Xuzhou	Chuzhou	Linyi	Changsha		Guiyang	**Xinjiang (2)**
Qinhuangdao	Panjin	Changzhou	Suzhou	Laiwu	Zhuzhou	**Guangxi (9)**	Liupanshui	Urumqi
Handan	Tieling	Suzhou		Rizhao	Xiangtan	Nanning	Zunyi	Karamay
Xingtai	Chaoyang	Nantong	**Fujian (8)**		Hengyang	Liuzhou		
Baoding	Huludao	Lianyungang	Fuzhou	**Henan (15)**	Shaoyang	Guilin	**Yunnan (3)**	
Zhangjiakou		Huaiyin	Xiamen	Zhengzhou	Yueyang	Wuzhou	Kunming	
Chengde	**Jilin (8)**	Yancheng	Putian	Kaifeng	Yiyang	Beihai	Yuxi	
Cangzhou	Changchun	Yangzhou	Sanming	Luoyang	Changde	Fangchenggang	Qujing	
Langfang	Jilin	Zhenjiang	Quanzhou	Pingdingshan	Chenzhou	Qinzhou		
Hengshui	Siping	Taizhou	Zhangzhou	Anyang	Yongzhou	Yulin	**Tibet (1)**	
	Liaoyuan	Suqian	Nanping	Hebi	Huaihua	Guigang	Lhasa	
Shanxi (6)	Tonghua		Longyan	Xinxiang	Zhangjiajie			
Taiyuan	Baishan	**Zhejiang (10)**		Jiaozuo		**Hainan (2)**	**Shaanxi (7)**	
Datong	Baicheng	Hangzhou	**Jiangxi (7)**	Puyang	**Guangdong (21)**	Haikou	Xian	
Yangquan	Songyuan	Ningbo	Nanchang	Xuchang	Guangzhou	Sanya	Tongchuan	
Changzhi		Wenzhou	Jingdezhen	Luohe	Shaoguan		Baoji	
Jincheng	**Heilongjiang (11)**	Jiaxing	Pingxiang	Sanmenxia	Shenzhen	**Chongqing (1)**	Xianyang	
Shuozhou	Harbin	Huzhou	Jiujiang	Shangqiu	Zhuhai	Chongqing	Yanan	
	Qiqihar	Shaoxing	Xinyu	Nanyang	Shantou		Hanzhong	
Inner Mongolia (4)	Jixi	Jinhua	Yingtan	Xinyang	Foshan	**Sichuan (13)**	Weinan	
Hohhot	Hegang	Quzhou	Ganzhou		Jiangmen	Chengdu		
Baotou	Shuangyashan	Zhoushan		**Hubei (11)**	Zhanjiang	Zigong	**Gansu (5)**	
Wuhai	Daqing	Taizhou	**Shandong (15)**	Wuhan	Maoming	Panzhihua	Lanzhou	
Chifeng	Yichun		Jinan	Huangshi	Huizhou	Luzhou	Jiayuguan	
	Jiamusi	**Anhui (12)**	Qingdao	Shiyan	Zhaoqing	Deyang	Jinchang	

Liaoning (14)	Qitaihe	Hefei	Zibo	Jingzhou	Chaozhou	Mianyang	Baiyin
Shenyang	Mudanjiang	Wuhu	Zaozhuang	Yichang	Meizhou	Guangyuan	Tianshui

Note: cities are defined according to 1999 National Standard (promulgated at the end of 1998 and named GB/T 2260-1999) Classification System.

Appendix C. Mature and fast-growing industries

	Industry	SIC (GB/T 4754-1994)
Mature	Food processing	131, 132, 133
	Food production	143, 144, 145, 149
	Beverage production	151, 155, 159
	Tobacco processing	162, 169
	Textile industry	171, 172, 174, 176, 177
	Papermaking & paper products	222
	Printing & record pressing	231
	Raw chemical materials & chemical products	261, 262, 263, 265
	Medical & pharmaceutical products	271
	Chemical fibers	281, 185
	Rubber products	291, 292, 293, 295, 298, 299
	Nonmetal mineral products	311,313
	Smelting & pressing of ferrous metals	321, 322
	Smelting & pressing of nonferrous metals	331, 332
	Metal products	345
	Machinery & equipment manufacturing	351, 352, 358, 359
	Special equipment manufacturing	361, 362, 363, 364, 367
	Transportation equipment manufacturing	371, 376, 377, 378
	Instrument, meters, cultural and office machinery	422, 423, 426
Fast-growing	Electronic & telecommunication equipment	413, 414, 415, 416, 418
	Metal fabric manufacturing	341
	Plastic products	302,305, 307, 308
	Stationery, educational & sports goods	242, 245
	Furniture manufacturing	211, 212, 213, 214, 219
	Bamboo, vine, palm and grass products	202, 204
	Leather, furs, down & related products	191, 192
	Garments & other fiber products	181, 182
	Knitwear products	178

Note: Industries in this table are from Chinese Standard of Industrial Classification (GB/T 4754-1994).