Modern China
http://mcx.sagepub.com

What Has Spilled Over from Chinese Cities into Rural Industry?

Yusheng Peng

Modern China 2007; 33; 287
DOI: 10.1177/0097700407301481

The online version of this article can be found at:
http://mcx.sagepub.com/cgi/content/abstract/33/3/287

Published by:
SAGE Publications
http://www.sagepublications.com

Modern China
Volume 33 Number 3
July 2007 287-319
© 2007 Sage Publications
10.1177/0097700407301481
http://mc.sagepub.com
hosted at
http://online.sagepub.com

What Has Spilled Over from Chinese Cities into Rural Industry?

Yusheng Peng
CUNY Graduate Center
Brooklyn College

Rural industry in China has played an important role in driving national economic growth and facilitating economic reform over the past two decades. One prominent feature of rural industrialization in China is its geographic concentration around urban centers. Existing literature suggests that the dynamic growth of rural industries should be examined in the context of urban agglomeration because it is an integral part of the post-reform urban expansion. This study considers three possible mechanisms: (1) capital trickle-down from state-owned enterprises in the city, (2) technology spillovers embodied in urban technical personnel moonlighting in and commuting to nearby rural firms, and (3) urban consumer market potential. Statistical analysis of a large county-level data set (1985-91) shows that cities with a large stock of technical personnel and high consumer market potential tend to foster rural nonagricultural growth in the surrounding counties, whereas cities with a high concentration of state industrial capital tend to suppress it. Concentration of state industrial capital discouraged rural industrialization because city officials who were used to milking state banks via local state firms may have drained funds out of surrounding rural counties.

Keywords: *rural industrialization; agglomeration; spillovers; urbanization; growth model*

Township and village enterprises, or TVEs, have been a defining feature of China's market transition process. Their dynamic growth in the past two decades not only changed the socioeconomic landscape of the

Author's Note: Early drafts of this article were presented at the Seminar of Rural China Studies at Renmin University, the Political Sociology Workshop at Stanford University, and the East Asian Study Workshop at the University of Chicago, and I wish to thank the other participants. For helpful comments, I am indebted to Kathryn Bernhardt, Philip Huang, Li Peilin, Li Qiang, Lin Hui, William Parish, Andy Walder, Zhao Dingxin, and Zhe Xiaoye.

countryside but also propelled the high growth rate of the national economy as a whole, improved overall economic efficiency by outpacing the state industrial sector in productivity growth and correcting its structural distortion, and, most importantly, played a crucial role in the smooth transition from a planned economy to a market economy.[1] As Barry Naughton (1995b) points out, China has become market-oriented through rapid growth of the nonplanned rural industry sector rather than transformation of the state-owned sector. It would not be an overstatement to say that without the buffer zone provided by two decades of rural industrial growth, the dramatic transformation of China's state-owned enterprises (SOEs) since the mid-1990s would have been much more costly, if possible at all.

The increasingly important role of rural enterprises is clearly shown by national statistics. From 1985 to 1995, with inflation, the value added of TVEs was growing at an average annual rate of about 34 percent, while the GDP was growing at an annual rate of 20.4 percent;[2] from 1995 to 2002, the TVE growth rate slowed down to 20.6 percent and the GDP growth rate to 8.7 percent.[3] In the mid-1990s, rural enterprises accounted for about a quarter of the national GDP; by the early 2000s, this sector was producing a third of the national GDP (Nongyebu, 2003; Guojia tongji ju, 2003).

One much discussed (and deplored) feature of China's rural industry is its geographic clustering around cities and along the coast. As marvelous as the transformative impacts of rural industrialization are, so far rural industrialization has transformed only a small portion of the vast countryside. Dwight Perkins (1990) and Barry Naughton (1995a, 1995b) have provided the most insightful analysis of this phenomenon by placing it in the context of China's urban growth patterns (for comparative analyses, see also Blank and Parish, 1990; Parish, 1994). They have pointed out that throughout the 1960s and 1970s, the Chinese central planners seemed fixated on a development strategy of industrialization without urbanization. Through pre-reform urban industrial growth, a great potential for expansion accumulated, but the antiurban strategy of the central planners prevented its release. The post-reform dynamic growth around urban centers was, to a large extent, the fulfillment of the urban expansion potential. Using county-level data, I have shown elsewhere that spatial proximity to urban centers had a large positive impact on non-agricultural growth rates in Chinese counties (Peng, 1999). The finding has clearly demonstrated the effects of urban agglomeration, but it raises another question: What has spilled over from the cities into the surrounding rural industries? And, more particularly, who has fulfilled the economic potential of the suburbs?

The purpose of this essay is to empirically explore specific linkages between urban economic potentials and non-agricultural growth in the surrounding

countryside from 1985 to 1991. I will show that non-agricultural growth rates were higher around urban centers with high purchasing power and large stocks of technical personnel, but lower around cities with high concentration of state industrial capital. The negative association between urban industrial capital and non-agricultural growth suggests that SOE capital did not spill out into suburbs and may actually have deterred rural industrialization in the surrounding countryside. I interpret the finding as reflecting local institutional legacies of treating SOEs as cash cows and funneling rural savings into urban state firms.

Historical Contexts

The traditional Chinese rural economy was highly diversified and well developed in commercial and handicraft industrial activities (Zhang Shiwen, [1936] 1991; Fei, 1939). Many researchers (Fei, 1989; Naughton, 1995a; Eyferth, 2003) point out that collectivization of agriculture and tightened state control of the rural economy actually de-industrialized the countryside, because the Communist government, like the previous Nationalist government, believed in the concentration of industry in large cities. There is one exception to this largely correct observation: the Communist Party did experiment with dispersed rural industrialization during the Great Leap Forward period (Wen, 2000: 220-23).

Zealously following Mao Zedong's call for "commune industrialization" (*gongshe gongye hua*), every people's commune in China rushed to set up small steelmaking furnaces and industrial workshops, with disastrous results. Against the backdrop of this failure and the ensuing three years of famine, the Chinese government formulated rigid policies that froze the division of labor between cities and countryside and severely restricted off-farm activities by the peasants. Farmers were instructed to focus on food production, particularly grain cultivation (the "grain first" policy), and to leave the mission of industrialization to the cities under centralized state investment. By the mid-1960s, rural non-farm employment had dropped to an all-time low, accounting for only 3 percent of the total rural labor force (Guojia tongji ju, 1987: 80).

Through the system of mandatory procurement of major agricultural products and "scissors price differentials" between industrial and agricultural products, the state siphoned agricultural surplus into state-controlled industrial investment (Oi, 1989; Wen, 2000). Little harvest beyond subsistence was left in the villages. The grain-first policy choked off farmers'

alternative sources of income. Given the acute shortage of farmland in China, farmers were forced to intensify labor input by such means as switching from single-cropping to double- or triple-cropping, at diminishing marginal returns, thus worsening the agricultural "involution" that dominated the Chinese rural economy for centuries (Huang, 1985, 1990). Consequently, Chinese peasants were impoverished during the collective era. As the economic gap between the rural and urban population grew, cities were walled off from the countryside to prevent farmers from entering and urban industries from branching out into or subcontracting with the countryside.

In the early 1970s, the State Council proposed the goal of mechanizing agriculture in ten years. To facilitate rural mechanization, the state decided to allow the communes and brigades to set up and run collective enterprises, later known as the commune-brigade enterprises (CBEs). These CBEs were allowed to operate only in "five small industries" (small iron and steel mills, small coal mines, small shops of agricultural machinery, small cement factories, and small fertilizer factories) and were subject to the "three localizations" policy: reliance on localized raw materials, localized production, and localized marketing. They were to serve agriculture and rural residents, and urban markets were off-limits. Obviously CBEs were encouraged only as auxiliaries to agriculture rather than as an alternative development strategy to provide employment for the rural population. Rural cadres working in CBEs often ran the political risk of being labeled "capitalist roaders." Despite these constraints, rural industry experienced a strong albeit uneven recovery in the 1970s (Sigurdson, 1977; Perkins, 1977; Wong, 1988; Ho, 1994). By 1978, on the eve of China's economic reform, rural non-agricultural employment accounted for nearly 10 percent of the rural labor force (Guojia tongji ju, 2003: 414, 448). This figure was still low compared with both the pre-Communist era and international standards. Other Asian countries at a similar level of development have a much higher level of non-agricultural activities (Blank and Parish, 1990; Ho, 1994).

Toward the end of 1978, Deng Xiaoping launched his reform program that started a new phase in China's rural industrialization. In January 1979, the Central Party Committee (CPC) released Circular No. 1, "Decisions Regarding Several Issues in Speeding up Agricultural Development," which not only stipulated changes in state purchasing policies of agricultural products but also included clauses about rural marketization (the reopening of rural markets and seasonal fairs), agricultural diversification, and encouragement of the development of commune-brigade enterprises. Late that year the State Council issued the Provisional Regulations on the Development of Commune-Brigade Enterprises, which expanded the operational scope

of CBEs to include construction, transportation, commercial activities, and businesses in the service sector such as hotels and restaurants (Zhang Yi, 1990a).[4]

The success of the agricultural reforms has been widely acclaimed, but their indirect impact on rural industrialization has received much less attention. I see the agricultural reforms aiding rural industrialization via two mechanisms: by increasing farmers' income and by freeing farmers from the bondage of the collectives.

First, the changes in property relations boosted agricultural production and rural income. Literature on China's agricultural reforms usually emphasizes that the most important was the Household Responsibility System (HRS), which contracted out the collectively owned farmland to peasant households. HRS was first experimented with in 1978 by farmers in Anhui with the acquiescence of local officials; after the central government embraced the measure, it was implemented across the country (Perry and Wong, 1985; Lin, 1988, 1992; Dong, 1999). Long-term contracts for farmland shifted the basic units of production and accounting from the team to the household, and thereby solved the problems of shirking and monitoring that had afflicted team production (Lin, 1988, 1990, 1992).

Equally important but receiving less attention was the institutional change in the mandatory procurement system of agricultural products. Mandatory procurement of agricultural products was essentially a hidden tax, because the prices were set low by the state. Prior to the reform, the state used political coercion to exact "over-quota sales" from production teams with good harvests (Oi, 1989). This practice in effect deprived the production teams of their claim to residual harvests. The CPC's Circular No. 1 specified a 20 percent increase in the state mandatory procurement prices and an additional 50 percent increase for over-quota purchases (Zhonggong zhongyang, 1992). In practice, the farmers "negotiated" with the state on over-quota sales (Sicular, 1988). Whereas the HRS granted peasant households the rights to residual control, and increases in mandatory procurement prices reduced the hidden tax burdens, the free negotiation of over-quota sales secured farmers' rights to residual harvests.[5] According to Oliver Hart (1995), the coupling of residual control and residual income is the most important institutional mechanism for incentive alignment. The combination of these reform measures led to consecutive bumper harvests and the rapid growth of peasants' income in the early 1980s.[6]

The growth of peasants' income contributed to rural industrialization via two channels, as it both provided startup funds for rural industries and increased market demand for consumer products and services. On the one

hand, farmers deposited a portion of their new earnings as savings in the Rural Credit Co-ops (RCCs). Even though they were designed to siphon rural savings into urban industries, RCCs played an important role in funneling agricultural savings into investment in rural enterprise during the reform era. Deposits in RCCs grew rapidly throughout the 1980s, and more than half of the RCC credits were loaned to the burgeoning rural enterprises (Deng and Xu, 1994). On the other hand, after two decades of stagnant or declining living standards, Chinese farmers quickly embarked on improving their material living conditions, which were harshly criticized by their urban cousins as symptoms of backward and stupid peasant mentality. The rural housing boom in the 1980s created a huge demand for construction materials (cement, bricks, and prefabricated building blocks). Many rural enterprises hit their first bucket of gold by making bricks. For instance, residents of the famous Huaxi village in Jiangsu turned their first brick kiln into a shrine-like tourist attraction, symbolizing and glorifying their arduous starting point.

Second, the return to household farming exposed a huge rural labor surplus, which had been hidden in the widespread shirking under team production and involutional labor intensification. Rural reform freed the peasantry from tight collective control and turned it into potential wage labor. This rural surplus labor had two possible outlets: it could either enter rural enterprises as peasant workers or peasant entrepreneurs or it could enter the city as "floating" migrants. For decades, the Communist government seemed to have an "antiurban" mentality, wary of rural–urban migration lest urban population growth eat away at its industrial accumulation (Naughton, 1995a). In the early 1980s, the government saw rural enterprises as an alternative to large-scale rural–urban migration and urged farmers to "leave the soil but not the village; enter the factory but not the city." Peasant entrepreneurs and rural enterprises flourished, catering not only to the emerging rural consumer markets but also to urban markets. By the mid-1990s, rural non-farm employment (including self-employment) reached over 160 million, or one-third of the total rural labor force; it then stagnated at this level. By 2005, rural non-farm employment increased to 188 million, or about 40 percent of the total rural labor force (calculated from Guojia tongji ju, 2006, table 4-5).

Impressive as the growth of TVE employment has been, TVEs have only alleviated rather than eliminated rural unemployment pressure. As Philip Huang (2006) has noted, their spectacular growth in the 1980s absorbed only the natural growth of the rural labor force. China's total rural labor force increased from about 320 million in 1980 to 490 million in the year

2000 (Guojia tongji ju, 2003: 127). For the total of 130 million hectares (or about 2 billion *mu*, and declining) of farmland, at most 150 million farmers are needed at the current level of agricultural technology (Huang, 2006). This calculation still leaves about 150 million farmers redundant on the farms. Rural–urban migration is inevitable. Starting in the early 1980s, waves of migrant peasants swarmed into the cities, filling the vacuum of the severely underdeveloped urban service sector in businesses such as restaurants, convenience stores, grocery retailing, and barbershops or picking up menial jobs that the urbanites tended to avoid, such as construction work, sanitation, and garbage collection. Even though the peasants were denied urban registration and hence urban privileges, they were carving out an alternative type of citizenship through their daily tillage and toil (see Solinger, 1999). It is estimated that there are currently about 100 million migrant farmers in the cities (Lu, 2005: 260).

The year 1984 was another turning point in the central government's policies regarding rural enterprises. In the early 1980s, scholars and policy makers debated whether the "blind growth" of rural enterprises should be left unchecked, with some worrying that it was competing for resources (land, capital, and labor) with agriculture and with the state industrial sector. It was not until 1984 that the central government decided to fully endorse and support rural enterprises (Wong, 1988: 9-11; Zhang Yi, 1990a; Ho, 1994: 23-27). The State Council's Circular No. 4 of 1984 was particularly significant because it extolled rural enterprises as an "important supplement" to state-owned enterprises and stipulated that the two should be treated equally. It also explicitly encouraged links between urban SOEs and TVEs, allowing joint ventures, subcontracting, and outsourcing. Thus, it officially opened up the emerging urban free markets to peasant entrepreneurs and allowed the latter access to state-controlled commercial agencies. The "three localizations" restriction was as good as vaporized.

We should note that Circular No. 4 also coined the term *xiangzhen qiye*, or "township-village enterprises" (TVEs), in place of the old term "commune-brigade enterprises" (CBEs), and defined it broadly to include both collectively owned and privately owned rural enterprises. In 1985, collective TVEs—that is, those owned and run, at least formally, by township or village governments—accounted for 73 percent of the total TVE value added and 60 percent of the TVE workforce. The privately owned rural enterprises (including self-employed individuals) were catching up fast, however, and they surpassed the collective sector in value added and employment ten years later (Guojia tongji ju, 2003: 448-49). The collective TVEs maintained healthy growth rates in output and employment (but not

in number of enterprises) until the mid-1990s, when they started being either privatized or incorporated.[7]

In January 1985, the CPC and the State Council issued "Ten Policies to Reinvigorate the Rural Economy." One of these policies was to encourage the movement of urban technical personnel to rural areas and the cooperation of urban research units with TVEs:

> With approval from their work units, all types of technical personnel should be allowed to take up jobs in the rural areas while keeping their posts in their original work units. Scientific and technical personnel, except those employed in the Party or state organizations, should be allowed to provide services to the rural areas in their free time and receive monetary payment according to contracts, as long as doing so would not interfere with their normal duties. Scientific research and development units, universities and colleges, and urban SOEs may undertake R&D projects from, transfer technological products to, and provide technical consultation to rural units, or set up "joint operations of research and production." (Zhonggong zhongyang, 1992: 330)

In the same year, the National Science and Technology Commission launched the "Sparks Program" (*xinghuo jihua*) to encourage the diffusion of industrial and agricultural technology into rural areas. Urban research units were called on to reorient their R&D efforts to the needs of rural areas and to serve the rural economy (see http://www.cnsp.org.cn).

These policy changes have created the environment favorable for urban–rural skill spillovers, SOE-TVE cooperative linkages, and urban market agglomeration to take effect. How did these three processes actually unfold in structuring the geographic patterns of rural enterprises in China?

Theory and Hypotheses

Urban agglomeration is governed by two forces: the centripetal force of aggregate increasing return to scale and transport savings on the one hand and the centrifugal force of congestion and rising rents on the other. The micro mechanisms for urban external economies are (1) more efficient provision of input materials and services, (2) more efficient operation of the labor market (better matching of skills and jobs), and (3) knowledge spillovers—that is, faster circulation of information and innovations. The optimal city size obtains when the benefits of urban external economies balance the costs of urban congestion (Henderson, 1988; Fujita, Krugman, and Venables, 1999).

Specifying an inverted-U shape of real income per worker against city size (total employment), Chun-chung Au and J. Vernon Henderson (2006a, 2006b) find that most Chinese cities were and still are undersized. They conclude that migration restrictions limited city growth and resulted in large productivity and income losses.

Au and Henderson's econometric analyses substantiate observations by Perkins (1990) and Naughton (1995a, 1995b) that China's command economy had distorted its urbanization process. Throughout the 1960s and 1970s, Chinese central planners pursued a development strategy distinct from that followed by both industrialized and industrializing countries. On the one hand, to minimize the labor costs of industrialization, China decided to limit the growth of cities while vigorously pursuing an industrialization drive. Rural–urban migration was essentially forbidden, and the urban sprawl common in other developing economies was effectively curtailed. Pre-reform Chinese cities tended to be compact, separated from the surrounding countryside by sharp and abrupt physical boundaries and lacking any transitional suburban zone (Naughton, 1995a). On the other hand, after decades of investment-driven growth, SOEs in the cities had accumulated strong potential to expand beyond the city boundaries but were held back by bureaucratic restrictions on land use and by the high cost of hiring permanent city workers. Thus, great growth potentials were created in the hinterland immediately surrounding cities. Deng's economic reform unleashed the economic dynamism in the peri-urban areas that were poised to take off.

The key insight from Perkins's and Naughton's analyses is that the bulk of rural industrialization during the reform era was really suburban industrialization and an integral part of the urban development pattern. Thus, Perkins and Naughton seem to suggest that rural industrial growth at least partially made up for the previous distortion by clustering around urban centers to capture the benefits of urban scale externalities. In other words, rural industrial growth follows the logics of urban agglomeration. Indeed, Perkins and Naughton interpret the spatial clustering of TVEs around urban centers in light of financial, technological, material, and marketing linkages of TVEs with cities, particularly urban SOEs. In the following I consider three possible mechanisms of urban-rural "spillovers."

SOE Capital and TVE Growth

Perkins and Naughton argue not only that bureaucratic planning and urban SOE growth created a potential for economic takeoff in the suburban zone but also that SOEs directly contributed to TVE growth in the surrounding

countryside during the reform era. For instance, Naughton observes that "it is striking how *little* the general regional distribution of rural enterprises differs from that of urban enterprises. Rural industries do not grow where there are no urban industries. They grow up in the same general regions that urban industries grow" (Naughton, 1995b: 154). He reasons that "city factories sponsor and support rural firms through subcontracting, joint-ventures, and investment" to cut costs and to find land to grow on. They are attracted by opportunities in the nearby countryside, where land and labor are cheap and government oversight loose (Naughton, 1995a: 83). Thus, the post-reform dynamism of TVE growth can be largely attributed to the joint venture and subcontracting linkages with urban SOEs. This line of argument, which I call the "capital trickle-down" hypothesis, has found support among Chinese scholars (Tao, 1988; Yan, 1993).

Despite my previous subscription to Perkins's and Naughton's analyses (see Peng, Zucker, and Darby, 1997; Peng, 1999), I now propose a competing hypothesis: a high level of state industrial investment in a city may actually deter rural industrialization in the region. High concentration of state investment is usually associated with privileges in the redistributive system—that is, being placed high in the priority list of the central planners. Officials and SOE managers who had been showered with moneys from the state had vested interests in the old system and tended to be slow to embrace the ethos of the market economy. Edward Steinfeld (1998) observes that while fiscal contracts between the central government and regional governments did increase the incentive of local officials to generate revenue, different localities responded in different ways. In regions with a long history of heavy state investment, such as the rust belts of the northeastern provinces, officials did not have an incentive to grow rural industry and actually considered rural industry "beneath their positions" (Steinfeld, 1998: 240). Their high "positions" come from a dependency on state investment. Treating SOEs in their jurisdiction as cash cows, they milked the SOEs dry and then encouraged the latter to turn to the state banks for loans whose repayment was usually indefinitely postponed. Not wanting to share the free pie, these officials would discourage their SOEs from developing joint ventures and subcontracting with rural enterprises. By contrast, in regions that were low on the central planners' priority list, such as China's agricultural south, officials have learned to look for other sources of economic growth and saw TVE development as a new tax base. Lacking large numbers of SOEs to serve as conduits to soft bank loans, they had to focus on building favorable market institutions to attract overseas investors and domestic entrepreneurs.

This line of argument strikes me as more consistent with the behavioral logic of city bureaucrats and SOE managers, at least before the mid-1990s. Even when the dismal performance of SOEs turned them from cash cows into money pits, city officials were quick to subsidize failing SOEs, simply for the sake of maintaining employment. SOE managers learned that they could maximize their welfare more effectively by bargaining for subsidies and soft loans than by cutting costs and improving efficiency. Market principles would have dictated the movement of capital from the unprofitable urban SOEs to the more profitable rural TVEs, but the state-owned financial institutions were not run on market principles. Municipal governments, which had effective controls over the state financial institutions before the mid-1990s, were widely reported to have coerced local branches of state banks to inject new funds into failing SOEs (Lin, Cai, and Li, 2001; Peng, 2001). The larger the stock of SOE capital assets, the larger the amount of bank loans needed to support it. Most counties were under the jurisdiction of a prefecture-level or province-level city. The municipal government could vacuum up rural bank savings via administrative means and eventually direct them into failing urban SOEs. Thus, startup entrepreneurs in rural areas overshadowed by a high concentration of urban SOEs would find little bank credit available. Only rural areas near cities that were not dominated by SOEs had a chance to absorb rural savings and rapidly industrialize.

This reasoning can be dubbed the "capital-draining" hypothesis, and it is supported by a comparison of Liaoning in the northeast with Guangdong and Fujian in the southeast. The success story of the Yangzi River delta may seem to contradict this hypothesis, because Shanghai has a very high concentration of SOE capital. But close scrutiny reveals that the contradiction is only apparent: the suburban counties of Shanghai, such as Qingpu and Songjiang, lagged behind southern Jiangsu counties, such as Wuxi and Jiangyin, in TVE development. Further confirmation is provided by the Wenzhou model, where private entrepreneurs prevail (Liu, 1992).

The capital trickle-down hypothesis may have exaggerated the positive impact of the cooperative ties between SOEs and TVEs. First, the prevalence of SOE-TVE joint operations (*lianying*) may have been blown out of proportion. In the 1980s, SOEs were allowed to join only with collective TVEs. Therefore, this story was mostly limited to southern Jiangsu, where collective TVEs dominated. But even in southern Jiangsu, no more than 4 percent of TVEs actually had cooperative relationships with SOEs (Yan, 1993: 140). Nationwide, the figure is negligible: in 1997 (the only year for which data is available) just 4,000 TVEs, which accounted for 0.4 percent

of total TVE employment and 0.7 percent of total value added, had ties with SOEs (Nongyebu, 1998: 107, 183). The much-lauded cooperative linkages between SOEs and TVEs were thus more exceptional than essential.

Second, insofar as joint ventures and subcontracting ties did exist between SOEs and TVEs, they may not have been healthy for the latter's growth. TVEs represented a new species of enterprise, operating on entirely different principles from SOEs, and the marriage between the two may have been less than blissful. For instance, TVE managers are primarily concerned with the long-term growth of the firm, whereas SOE managers are more interested in wages and bonuses. This difference in managerial style alone may preclude mutually satisfying joint operations. The trickle-down of old equipment and subcontracting of outdated production processes may have helped some rural enterprises in the 1970s and early 1980s, but by the 1990s, most SOEs were running in the red. Those TVEs that rely on subcontracting ties with SOEs risk sinking with them. Overall, a high level of capital concentration in the urban industrial sector is not auspicious for the surrounding countryside, because it is the manifestation of urban privileges that have been tenaciously guarded and clung to.

Technological Spillovers

To set up enterprises beyond handicrafts operation, farmers need industrial technology that cannot be homegrown. SOEs have accumulated a large amount of human capital, which remains largely underutilized because of inefficient management. In the 1970s, the growth of commune-brigade enterprises relied heavily on the technical expertise and skills of sent-down youth and rusticated rightist intellectuals (Zhang Yi, 1990b). In 1978, sent-down youth started returning to the cities and rusticated intellectuals began to be reinstated in their urban jobs, leaving behind a technical void in rural enterprises. Thus, rural entrepreneurs and managers had to go to the city to seek technical help. Since the early 1980s, especially after the central government launched the "Sparks Program" and allowed urban employees to take long leaves without pay, skilled workers, researchers, and university professors have started to "plunge into the sea of market opportunities" by consulting, moonlighting, or taking up full-time jobs in rural enterprises. Such spillovers of urban skilled workers into rural areas played an important role in the phenomenal growth of TVEs (Naughton, 1995a, 1995b; see also Ma, Wang, and Liu, 1994: 1370-76).

Li Peilin and Wang Chunguang (1993) identified three stages or (strategies) of technological acquisition by rural enterprises: "borrowing brains,"

"hiring brains," and "training brains." In the 1980s, most rural enterprises were able neither to attract nor to afford urban technical personnel on a full-time basis; to solve technical difficulties, they had to turn to individuals engaged in occasional consulting or weekend moonlighting. In this way they were borrowing brains from urban SOEs, universities, and research institutes.

After ten years of fast growth, many rural enterprises started hiring brains—that is, urban technical and managerial personnel (including retirees and fresh college graduates)—with high salaries and benefits. Especially after Deng Xiaoping's southern tour in 1992, throngs of intellectuals from universities and research institutes, as well as technical and managerial personnel from SOEs, plunged into the booming non-state sector spearheaded by the TVEs. It is estimated that by early 1993, 3 million urban residents had taken up jobs in rural areas (*China Daily*, February 9, 1993).

In the third stage, rural entrepreneurs began training brains by sending their employees to large SOEs or universities for special training. In my own fieldwork, I met with successful peasant entrepreneurs who themselves had had little education, had learned the importance of formal schooling in running a modern corporation, and made a point of sending their children to top colleges—sometimes even overseas. Starting in the late 1990s, many TVEs completed the "primitive accumulation" stage (labor-intensive low-tech sweatshops producing shoddy fake goods) and began technological upgrading and managerial modernization. Some now even offer internationally competitive salaries and benefits to attract top-level talent. The founding peasant entrepreneurs have retired to background posts, such as chairman of the board of directors.

Obviously, urban skill spillovers were important for TVE growth, particularly at the early stage of development. I point out elsewhere that the aggregation of rural industry around urban centers reflects mainly localized technological spillovers embodied in skilled workers and technical personnel from the state-owned enterprises who were moonlighting or were on leaves of absence, or had retired from their urban work units and taken new jobs in nearby rural enterprises (Peng, Zucker, and Darby, 1997).[8] This skill spillover effect tends to be localized because of urban residents' well-documented special status. The value of being an urban resident has remained high, and city folks are reluctant to give up their residence with its privileges, such as good hospitals and good schools. Job offers from TVEs within commuting distance allow them to enjoy both the high salaries offered just beyond the city boundaries and their urban privileges and conveniences. Thus, the peri-urban regions have a technological advantage over remote areas.

Urban Market Potential

Urban SOEs were oriented toward heavy industry and did not produce adequate consumer products and services (Lin, Cai, and Li, 1996). City dwellers were either supplied with a narrow range of shoddy consumer products or plagued with a perennial shortage of even the basic daily necessities, such as clothing, soap, towels, kitchen utensils, electrical fans, and so on. TVEs seized this market and catered to the needs of urban consumers. The rural market may have been important, too; but it is dispersed all over the country, and the local consumer market is very limited. Urban centers serve as transportation hubs connecting dispersed rural markets. For a rural enterprise to grow to a reasonable size, it has to tap into the urban or even international market.

As long as rural enterprises mainly cater to urban markets, they probably will remain relatively close to the cities so that they can maintain easy access to urban consumers and market information. This is the standard market potential argument. Fifty years ago, Chauncy Harris (1954) found that the manufacturing belts in the United States coincided closely with regions with high market potential (consumer purchasing power). Textbooks on spatial economics (e.g., Fujita, Krugman, and Venables, 1999) point out that savings on transportation draw manufacturers toward the urban centers while rising rents drive them out. For Chinese farmers, land is almost free because traditional farming generates dismal returns on their land. Farmland near the cities should fetch a very high rent, but farmers are not allowed to transform their farmland into commercial use without permission. Setting up factories is a way to legitimately turn the high rent on their land into profits (Wen, 2000; Pei, 2002). The entrepreneurial peasants in Shenzhen, for example, simply constructed factory buildings and rented them to Hong Kong or Taiwanese manufacturers (Zhe, 1997).[9] The collective ownership of land and restriction on land sales may tie rural entrepreneurs to land in their own villages, working against urban agglomeration.

Data and Measures

The unit of analysis in this study is the county. By "county" I mean those county-level units, including county-level cities (*xianji shi*), that had not been upgraded to or annexed into a prefecture-level city (*diji shi*) by the end

of 1991. By "urban centers," I mean those cities at prefecture level or above. All the data used in this study come from the following published sources:

1. Historical output data drawn from *Summary Statistics of the Rural Economy of Chinese Counties, 1980-87* and *1991* (Guojia tongji ju, 1989, 1993).
2. Education data from the 1990 population census compiled and made available online by William Skinner (http://citas.csde.washington.edu).
3. Geographical coordinates of counties from *Encyclopedia of Chinese Counties* (Minzhengbu, 1991).
4. Socioeconomic data of 1989 on cities from *Statistical Yearbook of Chinese Cities, 1990* (Guojia tongji ju, 1990). These city-level data are used for the computation of counties' urban potential indices (see below).
5. Urban capital stock of light and heavy industries from *1985 Industrial Census Data of the People's Republic of China*, vol. 5 (Guowuyuan, 1987).
6. Geographical coordinates of cities from Chen Chao and Wang Xiguang (1991).

County Sample

The 1991 *Summary Statistics of the Rural Economy of Chinese Counties* contains 2,182 county-level units, including 309 county-level cities but excluding 181 agricultural districts within the city proper (*shixiaqu*). A total of 1,886 entries remain after the elimination of counties in Hainan, Tibet, Qinghai, Xinjiang, and Neimenggu, which have data of very poor quality and are in any case irrelevant for the current analysis. Another 20 counties cannot be matched with the 1985 statistical data, the geographical data, or the 1990 population census data because they were merged into a prefecture-level city or became one, or else had boundary changes. Finally, 39 counties are deleted owing to missing values, outliers, or internally inconsistent data. Thus, a clean sample of 1,837 counties is retained for the final statistical analysis. Table 1 presents the basic statistics of key variables.

Unless otherwise specified, each of the following variables was taken from *Summary Statistics of the Rural Economy of Chinese Counties, 1980-87* and *1991*.

Rural population is the year-end total number of people who are registered as rural residents in each county (excluding those with urban registration). All "per capita" values are divided by this variable. In 1991, the average population size of a county was about 475,000 and the average rural population size was around 430,000. From 1985 to 1991, the average rural population growth rate was 1.3 percent. This figure reflects the natural

Table 1
Descriptive Statistics for County-Level Variables Used in Analysis of China

	Rural Population, 1991	Average Years of Schooling, 1990	Farmland per Capita, 1991 (*mu*)	Non-agricultural Output Value per Capita, 1991 (yuan)	Agricultural Output Value, per Capita, 1991 (yuan)	Annual Non-agricultural Growth rate, 1985-91 (%)	Rural Population Growth Rate, 1985-91 (%)
Max.	2,065,000	9.20	42.3	16,238	7,420	89	18
75%	591,000	6.40	1.9	1,077	1,087	29	1.80
50%	363,000	6.00	1.3	558	803	23	1.30
25%	214,000	5.40	1.0	273	607	18	0.80
Min.	4,000	1.30	0.1	27	209	−12	−8.60
Mean	436,000	5.80	1.8	999	913	24	1.30
Std. dev.	297,000	1.03	2.0	1,539	662	9	1.25

$N = 1{,}837$.

population growth minus the reduction in rural population because of urbanization.

Agricultural output is the gross value of output in farming, forestry, animal husbandry, and fishery in a county, excluding household sidelines such as hunting, gathering, and handicrafts. In 1991, the mean and median of agricultural output value per capita were about 900 yuan and 800 yuan, respectively.

Non-agricultural output is the gross output value from individual households or enterprise production in industry, construction, transportation, commerce, and catering in a specific county. This indicator is obtained by subtracting agricultural output from the total output value of rural society.[10] In 1991, the average non-agricultural output per capita was about 1,000 yuan, with the best county (Wuxi xian) reaching more than 16,000 yuan and the lowest only 26.5 yuan. From 1985 to 1991, the average growth rate of non-agricultural output was about 24 percent, lower than the 27.7 percent national average growth rate of TVE output during the same period (Nongyebu, 2003: 9). In the following analysis I interpret this indicator narrowly as rural industrial output, because the bulk of non-agricultural output was from rural industries. In the 1991 data set, both non-agricultural output and rural industrial output are available and the correlation coefficient between their logarithms is 0.98.

Human capital stock is measured as the average years of schooling of all the people six years of age and over in the county (from the 1990 population census). The mean average years of schooling in a county is about 5.8 years, with the highest average 9.2 years and the lowest 1.3 years (Table 1). For industrial workers, the ability to read and understand technical materials is very important. Counties with a relatively well-educated population have a high-quality labor force readily available that can be easily transformed into industrial workers. In an earlier article, I reported that human capital stock is much more important for non-agricultural growth than for agricultural growth (Peng, 1999).

Farmland per capita is the total amount of farmland in *mu* divided by the total rural population. The total rural population includes those who are registered as rural residents in the specified county but may work or live outside of the county; it excludes those who work inside the county but do not have local registration (*hukou*). The average amount of farmland per capita is about 1.8 mu (6 mu = 1 acre) and the median about 1.3 mu (Table 1).

Cotton-producing counties are the 71 counties that have been designated by the government as specialized in cotton production (Guojia tongji ju, 1989: 637). This variable is used as a control variable because, on the one hand, cotton production may boost the local textile and garment industries

and, on the other hand, intense labor in the cotton field may reduce farmers' incentive to seek off-farm employment.

Urban factor potential indices measure aggregate spatial proximity to urban factors of production and urban markets and are adapted from the definition of population potential in John Stewart and William Warntz (1958: 170):

$$\text{Urban Factor Potential Index} = \sum\nolimits_{i} \left(\frac{F_i}{D_{ij}} \right)$$

where D_{ij} stands for distance of county *j* from any city *i* within a 500 km radius of county *j* and F_i stands for the factors of production in city *i*.[11] Arc distance of each county from each city is computed by the midpoints of geographic coordinates, using standard formulas in *Cartography* (Robinson et al., 1995: 50).

By the 1991 definition, there were 187 prefecture-level cities and 3 province-level cities. After I excluded Lhasa (Tibet) because of missing data, and 7 new cities that were not designated as cities in 1985,[12] I used 182 cities to compute the relevant urban potential indices. The following urban potential indices are based on alternative urban factors:

1. *Urban technology potential index*, using the total number of technical personnel and scientists in SOEs, universities, and research institutes in the city proper (Guojia tongji ju, 1990: 693-702).
2. *Urban capital potential index,* using the total fixed and fluid capital assets of industrial SOEs with independent accounting in the city proper (Guojia tongji ju, 1990: 283-92).
3. *Urban capital potential index—light industry*, using the total capital assets of state-owned and collective enterprises in light industries in each city (Guowuyuan, 1987: 182-235).[13]
4. *Urban capital potential index—heavy industry*, using the total capital assets of state-owned and collective enterprises in heavy industries in each city (Guowuyuan, 1987: 182-235).
5. *Urban market potential—personal savings index,* using total personal bank deposits, not including corporate deposits, of all urban residents in the city proper (Guojia tongji ju, 1990: 643-52).
6. *Urban market potential—income index*, using total income of all urban residents in the city proper (Guojia tongji ju, 1990: 643-52).[14]

To all the urban factor potential indices, 1 is added; the index plus 1 is then logged before being entered into regression (only three counties lie beyond a 500-km radius of any city). These urban potential indices are highly correlated, and their correlation coefficients are reported in Table 2.

Table 2
Pearson Correlation Coefficients of Urban Factor Potential Indices of Chinese Counties

	Urban State Industrial Capital Potential (1989)	Urban Light Industrial Capital Potential (1985)	Urban Heavy Industrial Capital Potential (1985)	Urban Technology Potential (1989)	Urban Income Potential (1989)	Urban Savings Potential (1989)
State industrial capital	1.000					
Light industrial capital	0.940	1.000				
Heavy industrial capital	0.983	0.883	1.000			
Urban technology	0.951	0.904	0.964	1.000		
Urban income	0.947	0.962	0.898	0.902	1.000	
Urban bank savings	0.945	0.965	0.884	0.876	0.965	1.00
Mean	3.500	2.100	2.800	2.400	2.600	2.40
Standard deviation	0.870	0.770	0.780	0.800	0.710	0.76

$N = 1{,}837$.

The high correlation coefficient (0.983) between the urban capital potential of state industries and that of heavy industries suggests that most SOEs were in heavy industries, and most heavy industries were owned by the state.

The two urban market potential indices are defined in congruence with those provided by Masahisa Fujita, Paul Krugman, and Anthony Venables (1999: 33). Both urban income and urban bank savings are used to indicate consumer purchasing power potentials in the cities, and the correlation coefficient between the two indices is 0.965. The bank savings index is essentially a measure of accumulated income: in the 1980s, stock markets and the private housing market did not really exist in China, and banks were the only place for people to legitimately "invest" their savings. The two indices yield consistent results in regression analysis. When both are entered into regression equations simultaneously, the income index becomes insignificant. Therefore, only results from the bank savings index are considered.

Provinces. Chinese provinces differ greatly in terms of institutional legacies, pace of reform, and growth dynamics. Therefore, they enter the analysis either as random effects or as fixed effects control variables. The twenty-five provinces are Shanghai, Jiangsu, Zhejiang, Fujian, Guangdong, Guangxi

(southern seaboard), Beijing, Tianjin, Hebei, Shandong, Liaoning, Jilin, Heilongjiang (northern seaboard), Anhui, Henan, Hunan, Hubei, Jiangxi, Shanxi, Yunnan, Guizhou, Sichuan, Shaanxi, Gansu, and Ningxia (inland).

Regression Models

I explore and evaluate the effects of alternative urban potential indices with growth models. Both an OLS (ordinary least square) fixed effects model and a residual maximum likelihood random coefficient model are estimated. The OLS model is specified as

$$\ln G_i = \alpha_0 + \alpha_1 K_i + \alpha_2 T_i + \alpha_3 M_i + \gamma X_i + \varepsilon_i$$

where G stands for the log ratio of 1991 versus 1985 non-agricultural output per capita; K, T, and M stand, respectively, for urban capital, technology, and market potentials; and $\mathbf{X}$ stands for a vector of control variables including average years of schooling, farmland per capita, population growth ratio, lagged (1985) agricultural and non-agricultural output, and dummy variables for provinces.

The hierarchical random coefficient model takes into consideration the fact that Chinese counties are nested under provinces and that there may be clustering (correlated error terms) within each province. Let the subscript ij indicate county i in province j; the random coefficient model is then specified as

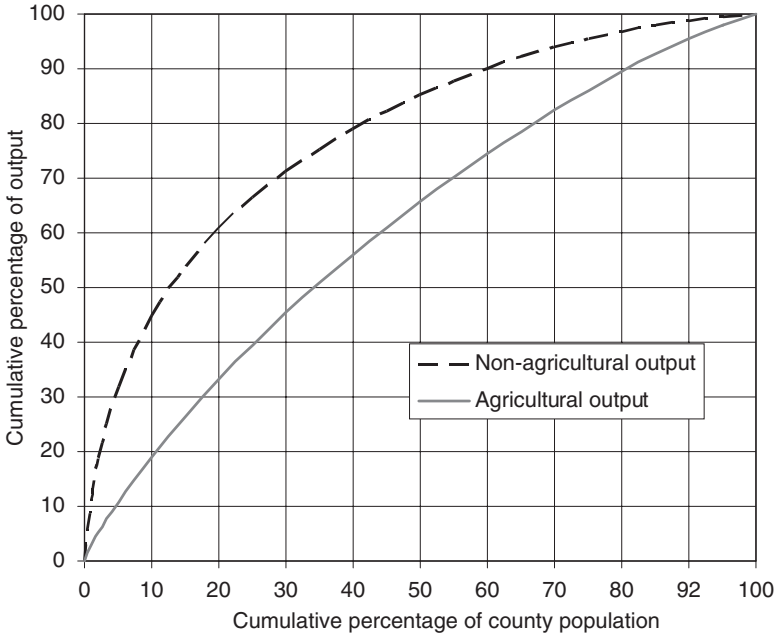
$$\ln G_{ij} = \beta_j + \beta_1 K_{ij} + \beta_2 T_{ij} + \beta_3 M_{ij} + \varphi X_{ij} + \varepsilon_{ij}$$
$$\beta_j = \gamma_0 + \upsilon_j$$

Note that in this model each province has a unique intercept that depends on a general mean (γ_0) and a provincial level random error (υ_j). The province-level random errors correct for the clustering effects within provinces. This model is estimated using the SAS Mixed Model procedure.

Findings

Before examining the regression models, we should first look at some descriptive statistics of the spatial disparity of rural agricultural and non-agricultural output. Figure 1 presents the cumulative percentages of non-agricultural and agricultural output vis-à-vis cumulative percentages of

Figure 1
Cumulative Percentages of Non-agricultural and Agricultural Output in Chinese Counties Normalized to Rural Population (1991)

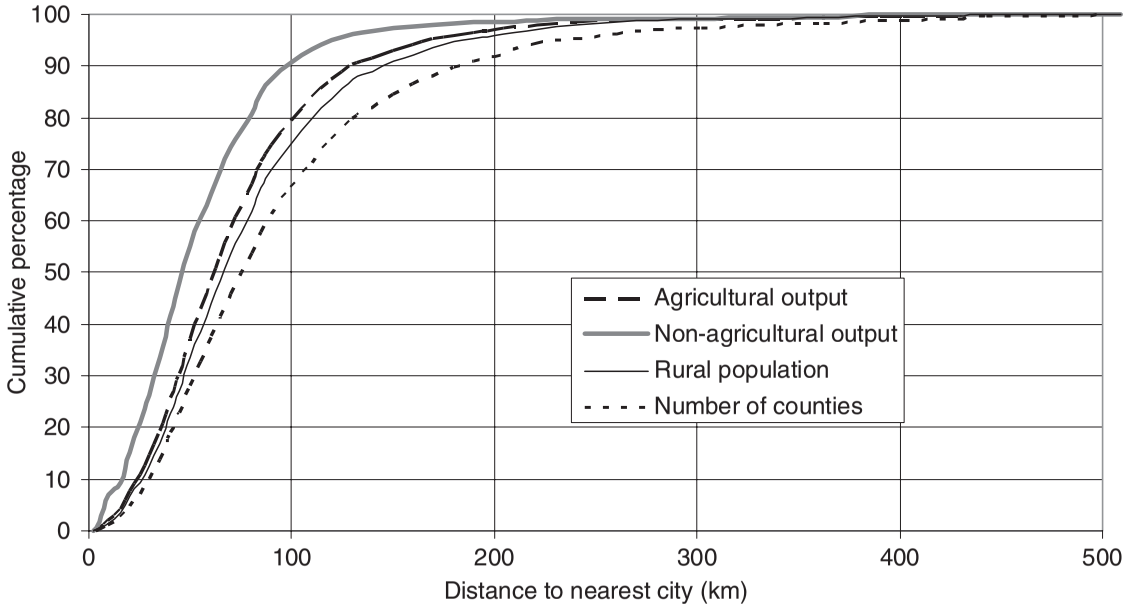


$N = 1{,}837$.

rural population by county.[15] Obviously, non-agricultural output is much more unevenly distributed than agricultural output. The top 10 percent of rural population produced about 45 percent of the total non-agricultural output in 1991, whereas the bottom 50 percent of rural population produced about 15 percent of the total. By comparison, the top 10 percent of rural population produced 20 percent of the total agricultural output and the bottom 50 percent of rural population produced 35 percent of the total.

To offer an intuitive snapshot of urban agglomeration effects, Figure 2 presents the cumulative density of the 1991 non-agricultural output, agricultural output, rural population, and the cumulative percentage of the number

Figure 2
Cumulative Percentages of Non-agricultural Output, Agricultural Output, and Rural Population of Chinese Counties by Distances to the Nearest City (1991)



$N = 1{,}837$.

of counties, plotted against the distance from the nearest prefecture-level or province-level city. Clearly, rural enterprises cluster around cities and do not go very far into the rural hinterland. Some 28 percent of Chinese counties, or 34 percent of the rural population, are located within 50 km of an urban center, producing 37 percent of total agricultural output but 55 percent of the total non-agricultural output.[16] About one-third of the counties, with about a quarter of rural population, are seated beyond a 100-km radius from any urban center, producing 20 percent of the total agricultural output and less than 10 percent of the total non-agricultural output. The outlying rural industries are mostly geographically fixed mining operations. On the one hand, Figure 2 clearly shows the clustering of rural industries around urban centers. On the other hand, it also shows that rural industries in China are relatively dispersed, reflecting that rural entrepreneurs tend to be bound to land in their own villages. From the perspective of urban agglomeration economics (Au and Henderson, 2006b), rural industries in China may fall below the optimal level of spatial concentration.

Table 3 presents the results of a random province coefficient model and two OLS fixed province effects models. In general, all yield consistent findings: (1) significant positive coefficients for urban market potentials, (2) significant positive coefficients for urban technological potential, and (3) significant negative coefficients of urban capital potential. In the following I examine these coefficients in some detail.

First, urban capital potential shows a negative effect on the rural non-agricultural growth rate in both the random coefficient Model 1 and the fixed effect Model 2 of Table 3. This is an interesting finding because it demonstrates that a high level of capital concentration in the urban SOEs actually deterred rural industrialization. This outcome is consistent with the hypothesis that the legacies of high-level state investment tend to dampen local governments' incentive to grow rural industries.

A possible explanation of the negative effect of urban SOE capital is that SOEs are heavy industry oriented, whereas TVEs are mostly in labor-intensive light industries. Economists emphasize agglomeration within the same industry (e.g., Henderson, 1988). Therefore, TVEs in light industry are not very likely to agglomerate with SOEs in heavy industry (via subcontracting or joint venturing). To test for the effects of agglomeration within the same industries, Model 3 replaces the urban capital potential of state industries with those of light industries and heavy industries. The coefficient estimates for the two new urban capital potential indices are still negative, albeit insignificant (or marginally significant at the 0.1 level). The negative coefficient for urban light industries suggests

Table 3
Regression of Log Rural Non-agricultural Growth Rate on Urban Potential Indices in Chinese Counties (1985-91)

	REML Random Coefficient (Model 1)	OLS Fixed Effects (Model 2)	OLS Fixed Effects (Model 3)
Urban state industrial capital potential	–0.210**	–0.206**	
	(3.230)	(3.090)	
Urban light industrial capital potential			–0.158
			(1.800)
Urban heavy industrial capital potential			–0.114
			(1.620)
Urban technology potential	0.176**	0.179**	0.196**
	(3.240)	(3.150)	(2.800)
Urban market potential—personal savings	0.273***	0.260***	0.266***
	(4.100)	(4.020)	(3.470)
1985 agricultural output per capita (log)	0.131***	0.129***	0.138***
	(4.450)	(4.130)	(4.430)
1985 non-agricultural output per capita (log)	–0.240***	–0.246***	–0.238***
	(15.100)	(15.200)	(14.800)
Average years of schooling	0.164***	0.168***	0.166***
	(13.400)	(13.600)	(13.400)
Farmland per capita (log)	–0.038	–0.040	–0.042
	(1.730)	(1.760)	(1.830)
Population growth ratio (log)	–0.102	–0.094	–0.083
	(0.810)	(0.750)	(0.650)
Designated cotton-producing counties	0.037	0.037	0.034
	(0.810)	(0.800)	(0.750)
Province fixed effects (F-test, df = 24)		20.810***	20.610***
–2 REML Log-likelihood	1470.6		
Multiple R^2		0.385	0.384
N	1,837.0	1,837.0	1,837.0

Notes: Figures in parentheses are the absolute values of t-ratios.
*, **, and ***: significance at $p < 0.05$, 0.01, and 0.001, two-tailed.
REML = residual maximum likelihood estimation; OLS = ordinary least squares.

that any additional subcontracting ties within the light industrial sector would not have helped TVE growth.

Second, consistent with the skill spillover argument, urban technology potential has a positive and significant impact on rural non-agricultural growth rates in all three models. It seems that the central government's policy of

encouraging urban technical personnel to take leaves of absence and seek employment in rural areas has paid off. Cities with a large pool of technical personnel appear to generate faster non-agricultural growth in their surrounding counties. Though we cannot rule out possible windfall benefits of knowledge externality, this coefficient mainly reflects easy access to urban talents and better matching of these talents with rural employers.

Third, urban market potential significantly facilitates rural non-agricultural growth, confirming the market potential analysis. The coefficient for urban potential of personal savings is consistently positive and significant in all three models. Thus, the urban consumer market is one important mechanism that draws rural enterprises near cities. The positive coefficient of urban bank savings should be interpreted as a market potential effect rather than as "urban-rural capital trickle-down," because in the 1980s urban state banks rarely extended loans to rural enterprises. Needless to say, a large portion of bank savings must have been capitalized. But the capital funds in the urban banks would most likely have ended up as soft and nonperforming loans to local SOEs.

Fourth, all control variables are correctly signed even though some are insignificant. The positive coefficient of the initial level (1985) of agricultural output on non-agricultural growth demonstrates that income from agriculture provided start-up capital for rural enterprises and created a local demand for consumer products. The negative coefficient for 1985 non-agricultural output indicates a conditional converging growth pattern. That is, given all the same urban potential factors and the same local human capital endowments, initially less-developed counties tend to grow faster than and catch up with the early starters. But this convergence is only theoretical. In actuality, counties near cities grow faster than do remote counties (see Peng, 1999).

Consistent with human capital theory, a better-educated labor force facilitates rural entrepreneurial activities by providing a ready and literate industrial workforce. China's investment in rural mass education has reaped large returns in its rural industrialization process. The amount of farmland per capita and population growth rates show negative but insignificant impacts on per capita non-agricultural growth rates. Designated cotton-producing county status does not have any impact.

Summary

Perkins (1990) and Naughton (1995a, 1995b) have insightfully observed that years of state-controlled industrialization and restrictions on urban

expansion have created huge economic lacunae, and hence potentials for growth, in the immediate hinterland surrounding the cities. The post-reform dynamic growth of rural industries has occurred largely as the economic lacunae were being filled in and suburbs created. It is part of the urban expansion process.

The question, though, remains: what has radiated out from the cities into the countryside? Using published county-level data, I have shown that whereas urban market potential and urban technology potential had significant positive impacts on non-agricultural growth rates, urban industrial capital potential had a negative impact. Contrary to popular belief, TVE growth has not benefited from SOE capital trickle-down. Indeed, a high capital concentration of urban SOEs seems to actually deter rural industrial growth. Thus, the spatial correlation between urban and rural industries is spurious: rural industries cluster around urban centers for the same reasons state industries concentrate in cities—that is, to benefit from urban agglomeration economies.

My "capital-draining" hypothesis explains the negative association between urban capital concentration and non-agricultural growth rates. Cities with a high concentration of state industries may drain away startup capital needed by rural entrepreneurs. I draw this insight from Steinfeld (1998), who argues that in regions with a long history of state investment, such as the rust belts of Liaoning province, city officials had little incentive to grow rural industry: they were locked into the old mentality of treating SOEs as cash cows and milking revenue from state investment. In such regions, municipal officials do not hesitate to funnel rural bank deposits into failing urban SOEs. Only in regions with limited state investment have officials learned to look for alternative sources of revenue and seen TVE growth as a new tax base. It is to be hoped that the transformation of state-owned industry in the late 1990s has forced city officials to abandon their bureaucratic mentality and to embrace market principles.

Rural industries clustered around cities for many reasons; this study has demonstrated two mechanisms. First, TVEs target urban consumers, and geographical proximity to urban consumer markets allows savings on transportation as well as speedy access to market information. The heavy industry-oriented state sector neglected consumer products and services, and the bureaucratically managed SOEs could not meet consumer needs. TVEs quickly entered this market. Second, TVEs near cities benefited from technological spillovers embodied in commuting urban technical personnel who were on leave or retired from their city jobs or were moonlighting during weekends. SOEs in the planning system tended to hoard skilled personnel,

just as they tended to hoard capital, labor, and raw materials. The efficient use of these input factors was not their top priority. Conversely, market-oriented and profit-driven TVEs earnestly and desperately sought out "brains" from the cities. The technical personnel in the overstaffed urban state sector had wasted their talents in the tight straitjacket of bureaucratic control; once freed, they acted as rational individuals and managed to put their training to good use in the burgeoning rural industries.

The past two decades have seen great urban growth in China, as many counties were either annexed into cities or upgraded to the status of county-level cities, and TVEs have played a crucial role in this transformation process. But the productive capacities of the urban SOEs have not "spilled out" into the suburbs. It is peasants and peasant entrepreneurs who have filled in the economic lacunae between the rural–urban boundaries and realized the suburbs' economic potential. If SOEs have played a role in the post-reform growth of suburbs, they have not done it through investing in and supporting rural enterprises. Rather, they may have expanded or relocated to the suburbs by purchasing farmland at below-market prices and hiring cheap rural workers temporarily or on contracts. So far as rural industrialization is concerned, "surrounding the cities from the countryside" is a more appropriate metaphor (Findlay and Watson, 1992).

The growth of the rural industrial sector in China seems to fit the textbook example of the urban agglomeration model: manufacturing sprouts up and clusters around urban centers to benefit from aggregate scale economies. It accompanies the growth of small satellite towns around the urban centers. By challenging their old roles as grain growers and suppliers and expanding their linkages with city proper, rural entrepreneurs and peasant workers are turning into semi-urbanites and transforming their villages into small "satellite towns." The chasm between cities and countryside is a legacy of bureaucratic planning. Market linkages between rural enterprises and the cities have blurred rural–urban boundaries and are integrating the cities with their surrounding countryside. The recent decision by the National Statistical Bureau (Guojia tongji ju) to abandon the distinction between rural and urban enterprises simply attests to rural–urban integration.

The real significance of "rural industrialization" in China is not that the rural areas have been industrialized: in fact, development clusters around urban centers and is an integral part of the urban expansion process. Its real significance is that rural industry is distinct from the urban state industry, is severed from state investment, and is by no means an outgrowth or offshoot of the state industrial sector. It is ironic that the state-owned industrial system, which had been built by siphoning off "surplus" from the agricultural

sector, should in the end have been outpaced by the scrap factories in farmers' backyards. When the state decided to leave farmers the residual harvest during the reform era, farmers used the savings from agricultural growth to create a new industrial sector that in less than two decades has outperformed, outcompeted, and outgrown the state industrial sector. Even though the new industrial sector has intricate technical and market linkages with the cities, its growth has been hindered rather than helped by the state industrial sector.

Notes

1. On the socioeconomic landscape, see Huang, 1990; Ho, 1994; on the growth of the national economy as a whole, see Findlay, Watson, and Wu, 1994; Li and Wang, 1998; on TVEs and productivity growth, see Woo et al., 1994; Jefferson, 1999; on correcting structural distortion in the state industrial sector, see Lin, Cai, and Li, 1996; and on TVEs and the transition from a planned economy to a market economy, see Naughton, 1995b.

2. TVEs include both the collective enterprises owned by township and village governments and private enterprises operated by private entrepreneurs and self-employed households (*getihu*). Because Chinese statistical bureaus did not start collecting data on private rural entrepreneurial activities until 1985, growth rates from 1978 to 1984 are unavailable for the whole sector. In 2004, the National Statistical Bureau (Guojia tongji ju) abandoned the concept as a statistical category altogether, signifying the end of an era; it adopted instead a comparable concept used throughout the world, small and medium-sized enterprises, which does not distinguish the rural from the urban.

3. These growth rates are not deflated. The statistical office does not report constant-priced indices of rural industrial output values, because enterprises below the township level are often unable to convert their output value to constant prices (Wong, 1988: 16). From 1985 to 1995, the inflation rate was high, running more than 10 percent annually; after the mid-1990s, it dropped to zero (Guojia tongji ju, 2003: 313).

4. The 1979 Provisional Regulations were later supplanted by the 1990 Regulations on Collectively Owned Rural Enterprises and the 1997 Laws on Township-Village Enterprises.

5. Wen Tiejun describes the new system as fixed-rent tenancy, and notes an interesting historical detail: farmers in Chuxian, Anhui, experimented with contracts for production (but not farmland) for a long time. In 1977-78 (before the price increases) grassroots officials agreed, at the farmers' request, to fix the state procurement quota before the spring sowing season rather than after the fall harvests, as had been the practice. This change alone led to a doubling in grain output that year (Wen, 2000: 282-84, esp. 282n). The story highlights the importance of residual income rights.

6. In 1985 the state replaced the mandatory procurement system with contract purchasing, which in effect relieved the state from the commitment to purchase over-quota grains at high prices. Grain production began to stagnate in the late 1980s. The income of peasants continued to grow, however, because they diversified to cash crops or to animal husbandry, fisheries, and other sidelines.

7. The success and nature of collective TVEs have generated much academic debate. Some observers view them as a highly innovative institutional form that coupled market incentives with public ownership (Huang, 1990; Walder, 1995; Che and Qian, 1998; Rawski, 1999; Peng, 2001); others believe that these collective enterprises were essentially an organizational hybrid

or private enterprises "wearing red hats" and see them as a transitory institutional form (Nee, 1992; Sachs and Woo, 1997; Woo, 1999). Explanations of the success of collective TVEs focus on either fiscal decentralization (Walder, 1995; Whiting, 2001) or hard budget constraints (Che and Qian, 1998; Lin, Cai, and Li, 2001; Peng, 2001). Collective or private, all rural enterprises have to swim or sink in market competition and are therefore more dynamic and efficient than SOEs.

8. The idea of geographically localized knowledge spillovers originated from Zucker, Darby, and Brewer (1998).

9. In recent years local governments and local officials, driven by a local fiscal crunch and realizing how profitable land can be, have decided to take the land away from the farmers and have thereby basically robbed the latter of their livelihood (Lu, 2005).

10. The official definition of gross output value of the society (or rural society) is the sum of the gross output value of agriculture, industry, construction, transportation and postal services, and commerce (including food catering). Note that it is different from GNP or GDP because it is not net of the value of the intermediate input materials. The Guojia tongji ju started reporting GDP and value added in the mid-1990s. Therefore, earlier GDP and value-added data provided in recent yearbooks and publications are after-the-fact estimates. Roughly speaking, nearly 60 percent of the gross value of agricultural output can be translated into value added and only about 20 percent of the gross value of non-agricultural output is value added.

11. I thank Professors William Parish and Lin Hui for suggesting the use of various urban potential measures.

12. The seven new cities are Shuozhou, Zhoushan, Shanwei, Heyuan, Yangjiang, Qingyuan, and Panzhihua.

13. For unknown reasons, Guowuyuan (1987) does not separately report light and heavy industrial capital assets for fifteen seaboard cities, four special economic zones, and five cities with independent budgets. I estimated the light and heavy industrial capital assets for each of these cities by multiplying the total industrial assets with the provincial share of light and of heavy industrial assets.

14. Because per capita income data are missing from the yearbook for twenty cities, I provided estimates according to the following regression:

$$\ln(\hat{Y}) = -0.148 + 0.965 \ln(X)$$

where X is the average wage of all employees in the state or collective sectors (R-square = 0.6; $N = 171$).

15. Figure 1 illustrates the Lorenz curves of agricultural and non-agricultural output per capita. The curves are produced by first sorting the counties in descending order by per capita output values and then plotting the cumulative shares of agricultural and non-agricultural output against their respective cumulative shares of rural population.

16. The rural industrial output data used in Figure 2 include only production by rural counties and does not include production by farmers within the city proper. If we count the latter, the urban agglomeration effect should be more pronounced.

References

AU, CHUN-CHUNG and J. VERNON HENDERSON (2006a) "Are Chinese cities too small?" Rev. of Economic Studies 73, 3: 549-76.

——— (2006b) "How migration restrictions limit agglomeration and productivity in China." J. of Development Economics 80, 2: 350-88.
BLANK, GRANT and WILLIAM L. PARISH (1990) "Rural industry and nonfarm employment." Pp. 109-39 in Reginald Kwok, William L. Parish, and Anthony Yeh (eds.), Chinese Urban Reform. Armonk, NY: M. E. Sharpe.
CHE, JIAHUA and YINGYI QIAN (1998) "Institutional environment, community government, and corporate governance: understanding China's township-village enterprises." J. of Law, Economics, & Organization 14, 1: 1-23.
CHEN CHAO and WANG XIGUANG [eds.] (1991) Zhongguo xianshi zhengqu ziliao shouce (A handbook of Chinese county and city administrative districts). Beijing: Ditu chubanshe.
China Daily. Beijing.
DENG YINGTAO and XU XIAOPO (1994) Zhongguo nongcun jinrong de biange yu fazhan, 1978-1990 (Innovations and development of rural finance in China, 1978-1990). Hong Kong: Oxford Univ. Press.
DONG FUREN (1999) Zhonghua renmin gongheguo jingjishi (An economic history of the People's Republic of China). Beijing: Jingji kexue chubanshe.
EYFERTH, JACOB (2003) "De-industrialization in the Chinese countryside: handicrafts and development in Jiajiang (Sichuan), 1935 to 1978." China Q., no. 173: 53-73.
FEI, HSIAO-T'UNG (1939) Peasant Life in China: A Field Study of Country Life in the Yangtze Valley. London: Routledge & Kegan Paul.
——— (1989) Rural Development in China: Prospect and Retrospect. Chicago: Univ. of Chicago Press.
FINDLAY, CHRISTOPHER and ANDREW WATSON (1992) "Surrounding the cities from the countryside." Pp. 49-78 in Ross Garnaut and Liu Guoguang (eds.), Economic Reform and Internationalisation: China and the Pacific Region. St. Leonards, NSW: Allen & Unwin.
FINDLAY, CHRISTOPHER, ANDREW WATSON, and HARRY X. WU [eds.] (1994) Rural Enterprises in China. New York: St. Martin's.
FUJITA, MASAHISA, PAUL KRUGMAN, and ANTHONY J. VENABLES (1999) The Spatial Economy: Cities, Regions, and International Trade. Cambridge, MA: MIT Press.
Guojia tongji ju [National Statistical Bureau] (1987) Zhongguo laodong gongzi tongji ziliao 1949-1985 (China labor and wage statistical materials 1949-1985). Beijing: Zhongguo tongji chubanshe.
——— (1989) Zhongguo fenxian nongcun jingji tongji gaiyao 1980-87 (Summary statistics of the rural economy of Chinese counties 1980-87). Beijing: Zhongguo tongji chubanshe.
——— (1990) Zhongguo chengshi tongji nianjian 1990 (Statistical Yearbook of Chinese Cities, 1990). Beijing: Zhongguo tongji chubanshe
——— (1993) Zhongguo fenxian nongcun jingji tongji gaiyao 1991 (Summary statistics of the rural economy of Chinese counties 1991). Beijing: Zhongguo tongji chubanshe.
——— (2003) China Statistical Yearbook 2003. Beijing: Zhongguo tongji chubanshe.
——— (2006) China Statistical Yearbook 2006. Beijing: Zhongguo tongji chubanshe.
Guowuyuan, quanguo gongye pucha lingdao xiaozu bangongshi [Office of Industrial Census, The State Council] (1987) Zhonghua renmin gongheguo 1985 nian gongye pucha ziliao (1985 industrial census data of the People's Republic of China). Vol. 5. Beijing: Zhongguo tongji chubanshe.
HARRIS, CHAUNCY (1954) "The market as a factor in the localization of industry in the United States." Annals of the Association of American Geographers 44: 315-48.
HART, OLIVER (1995) Firms, Contracts, and Financial Structure. Oxford: Oxford Univ. Press.
HENDERSON, J. VERNON (1988) Urban Development: Theory, Fact, and Illusion. New York: Oxford Univ. Press.

HO, SAMUEL P. S. (1994) Rural China in Transition: Non-agricultural Development in Rural Jiangsu, 1978-1990. Oxford: Oxford Univ. Press.

HUANG, PHILIP C. C. (1985) The Peasant Economy and Social Change in North China. Stanford, CA: Stanford Univ. Press.

——— (1990) The Peasant Family and Rural Development in the Yangzi Delta, 1350-1988. Stanford, CA: Stanford Univ. Press.

——— (2006) "Zhiduhua le de 'bangong bangeng' guomixing nongye" (The institutionalized "half worker, half peasant" involuted agricultural system). Dushu, nos. 2-3.

JEFFERSON, GARY H. (1999) "Are China's rural enterprises outperforming state enterprises? Estimating the pure ownership effect." Pp. 153-70 in G. H. Jefferson and I. Singh (eds.), Enterprise Reform in China: Ownership, Transition, and Performance. New York: Oxford Univ. Press.

LI PEILIN and WANG CHUNGUANG (1993) Xin shehui jiegou de shengzhang dian (The growth point of a new social structure). Ji'nan: Shandong renmin chubanshe.

LIN, JUSTIN YIFU (1988) "The household responsibility system in China's agricultural reform: a theoretical and empirical study." Economic Development and Cultural Change 36, 4 (Supplement): s199-s224.

——— (1990) "Collectivization and China's agricultural crisis in 1959-1961." J. of Political Economy 98, 6: 1228-51.

——— (1992) "Rural reform and agricultural growth in China." American Economic Rev. 82, 1: 34-51.

LIN, JUSTIN YIFU, FANG CAI, and ZHOU LI (1996) The China Miracle: Development Strategy and Economic Reform. Hong Kong: Chinese Univ. Press.

——— (2001) State-Owned Enterprise Reform in China. Hong Kong: Chinese Univ. Press.

LIU, YALING (1992) "Reform from below: the private economy and local politics in the rural industrialization of Wenzhou." China Q., no. 130: 292-316.

LU XUEYI (2005) "Sannong" xinlun (New studies on the "three issues of agriculture, rural society, and peasants"). Beijing: Shehui kexue wenxian chubanshe.

MA RONG, WANG HANSHENG, and LIU SHIDING [eds.] (1994) Zhongguo xiangzhen qiye de fazhan lishi yu yunxing jizhi (The historical growth and operational characteristics of TVEs in China). Beijing: Beijing daxue chubanshe.

Minzhengbu [Ministry of Civil Administration] (1991) Zhongguo xianqing daquan (Encyclopedia of Chinese counties). 6 vols. Beijing: Zhongguo shehui chubanshe.

NAUGHTON, BARRY (1995a) "Cities in the Chinese economic system: changing roles and conditions for autonomy." Pp. 61-89 in Deborah S. Davis, Richard Kraus, Barry Naughton, and Elizabeth J. Perry (eds.), Urban Spaces in Contemporary China: The Potential for Autonomy and Community in Post-Mao China. [Washington, DC]: Woodrow Wilson Center Press; Cambridge: Cambridge Univ. Press.

——— (1995b) Growing out of the Plan: Chinese Economic Reform, 1978-1993. Cambridge: Cambridge Univ. Press.

NEE, VICTOR (1992) "Organizational dynamics of market transition: hybrid forms, property rights, and mixed economy in China." Administrative Science Q. 37, 1: 1-27.

Nongyebu, xiangzhen qiye ju [TVE Bureau, Ministry of Agriculture] (1998) Zhongguo xiangzhen qiye nianjian, 1997 (Yearbook of township and village enterprises, 1997). Beijing: Zhongguo nongye chubanshe.

——— (2003) Zhongguo xiangzhen qiye tongji ziliao (1978-2002) (Statistical data of Chinese township and village enterprises, 1978-2002). Beijing: Zhongguo nongye chubanshe.

OI, JEAN C. (1989) State and Peasant in Contemporary China: The Political Economy of Village Government. Berkeley: Univ. of California Press.

PARISH, WILLIAM (1994) "Rural industrialization: Fujian and Taiwan." Pp. 119-40 in Thomas P. Lyons and Victor Nee (eds.), The Economic Transformation of South China: Reform and Development in the Post-Mao Era. Cornell East Asia Series, no. 70. Ithaca, NY: Cornell East Asia Program.

PEI, XIAOLIN (2002) "The contribution of collective landownership to China's economic transition and rural industrialization: a resource allocation model." Modern China 28, 3 (July): 279-314.

PENG, YUSHENG (1999) "Agricultural and nonagricultural growth and inter-county inequality in China, 1985-1991." Modern China 25, 3 (July): 235-63.

——— (2001) "Chinese townships and villages as industrial corporations: ownership, governance, and productivity." American J. of Sociology 106, 5: 1338-70.

PENG, YUSHENG, LYNNE ZUCKER, and MICHAEL DARBY (1997) "Chinese rural industrial productivity and urban spillovers." NBER Working Paper 6202. Cambridge, MA: National Bureau of Economic Research.

PERKINS, DWIGHT [ed.] (1977) Rural Small-Scale Industry in the People's Republic of China. Berkeley: Univ. of California Press.

——— (1990) "The influence of economic reforms on China's urbanization." Pp. 78-106 in Reginald Kwok, William L. Parish, and Anthony Yeh (eds.), Chinese Urban Reform. Armonk, NY: M. E. Sharpe.

PERRY, ELIZABETH J. and CHRISTINE WONG [eds.] (1985) Political Economy of Reform in Post-Mao China. Cambridge, MA: Harvard Univ. Press.

RAWSKI, THOMAS G. (1999) "Reforming China's economy: what have we learned?" China J., no. 41: 139-49.

ROBINSON, ARTHUR H., JOEL L. MORRISON, PHILLIP C. MUEHRCKE, A. JON KIMBERLING, and STEPHEN C. GUPTILL (1995) Elements of Cartography. New York: John Wiley & Sons.

SACHS, JEFFREY D. and WING THYE WOO (1997) "Understanding China's economic performance." NBER Working Paper 5935. Cambridge, MA: National Bureau of Economic Research.

SICULAR, TERRY (1988) "Agricultural planning and pricing in the post-Mao period." China Q., no. 116: 671-705.

SIGURDSON, JON (1977) Rural Industrialization in China. Cambridge, MA: Harvard Univ. Press.

SOLINGER, DOROTHY (1999) Contesting Citizenship in Urban China: Peasant Migrants, the State, and the Logic of the Market. Berkeley: Univ. of California Press.

STEINFELD, EDWARD S. (1998) Forging Reform in China: The Fate of State-Owned Industry. Cambridge: Cambridge Univ. Press.

STEWART, JOHN Q. and WILLIAM WARNTZ (1958) "Macrogeography and social science." Geographic Rev. 48, 2: 165-84.

TAO YOUZHI (1988). Sunan moshi yu zhifu zhi dao (The southern Jiangsu model and the road to prosperity). Shanghai: Shanghai shehui kexueyuan chubanshe.

WALDER, ANDREW (1995) "Local governments as industrial firms." American J. of Sociology 101, 2: 263-301.

WEN TIEJUN (2000) Zhongguo nongcun jiben zhidu yanjiu (Research in the fundamental economic institutions of rural China). Beijing: Zhongguo jingji chubanshe.

WHITING, SUSAN (2001) Power and Wealth in Rural China: The Political Economy of Institutional Change. Cambridge: Cambridge Univ. Press.

WONG, CHRISTINE (1988) "Interpreting rural industrial growth in the post-Mao period." Modern China 14, 1 (Jan.): 3-30.
WOO, WING THYE (1999) "The real reasons for China's growth." China J., no. 41: 115-37.
WOO, WING THYE, WEN HAI, YIBIAO JIN, and GANG FAN (1994) "How successful has Chinese enterprise reform been? Pitfalls in opposite biases and focus." J. of Comparative Economics 18: 410-37.
YAN YINGLONG (1993) "Chengxiang gongye de guangxi" (The relationship between urban and rural industries). Pp. 135-59 in Pei Shuping et al. (eds.), Sunan gongyehua daolu yanjiu (Research on rural industrialization in southern Jiangsu). Bejing: Jingji guanli chubanshe.
ZHANG SHIWEN ([1936] 1991) Dingxian nongcun gongye diaocha (An investigation of rural industries in Ding county). Sichuan: Sichuan minzhu chubanshe.
ZHANG YI (1990a) Zhongguo xiangzhen qiye: jianxin de licheng (Township-village enterprises in China: an arduous journey). Beijing: Falü chubanshe.
——— (1990b) Zhongguo xiangzhen qiye: linghuo de jizhi (Township-village enterprises: flexible management). Beijing: Falü chubanshe.
ZHE XIAOYE (1997) Cunzhuang de zaizao: yige chaoji cunzhuang de shehui bianqian (Remaking of the village: social change in a "super village"). Beijing: Zhongguo shehui kexue chubanshe.
Zhonggong zhongyang, wenxian yanjiushi [Document Office, Central Party Committee] (1992) Xinshiqi nongye he nongcun gongzuo zhongyao wenxian xuanbian (Selected important documents regarding agriculture and rural work during the new era). Beijing: Zhongyang wenxian chubanshe.
ZUCKER, LYNNE, MICHAEL DARBY, and MARILYN BREWER (1998) "Intellectual human capital and the birth of U.S. biotechnology enterprises." American Economic Rev. 88, 1: 290-306.

Yusheng Peng is an associate professor at CUNY Graduate Center (sociology) and Brooklyn College (economics). His related publications include "Agricultural and Nonagricultural Growth and Inter-county Inequality in China, 1985-1991" (1999) and "Kinship Networks and Entrepreneurs in China's Transitional Economy" (2004).