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The Case of Jiangsu Province

Abstract: *This article investigates the effect of industrial linkages on firm performance in Chinese development zones, using Jiangsu Province as a case study. An ordered response model based on the dependent variable being ordinal was developed. The empirical results reveal an insignificant relationship between industrial linkages and firm performance. Our interpretation of this finding mainly lies with the global and domestic challenges that have changed the way participating firms operate and organize in the development zones of Jiangsu. When many other economic factors take precedence over industrial linkages in driving superior firm performance, firms feel it less important to get closer to their suppliers or customers, therefore weakening the impact of industrial linkages. Although this article primarily focuses on development zones in Jiangsu Province, the findings and discussion will provide insights for other development zones in China that may be, reviewing their development strategies because most of them have similar development problems.*

A development zone is a designated area within a country where firms gather together to participate in various economic activities promoted by a set of policy instruments not generally applicable to the rest of the country (Ge 1999). Given this definition, participating firms in development zones are much influenced by government-specific

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policies and, at the same time, tend to be highly agglomerated and interdependent. One widely observed agglomeration phenomenon in development zones involves industrial linkages, that is, clusters of vertically related firms. Theoretically, the more that related firms cluster together, the lower the cost of production, and the greater the market in which the firms can sell. Even though firms in the same cluster area may differ significantly in their relative factor intensities, there are still potential advantages to the close proximity of buyers and sellers because cluster firms are able to attract more suppliers and customers than a single firm.

While evidence regarding the importance of industrial linkages in the process of agglomeration is abundant, the full importance of the industrial linkages that drive the economic performance of firms in development zones is not always clear, especially in East Asian nations. In this regard, China provides an interesting empirical study. Historically, Chinese development zones evolved from the "experimental fields" during the implementation of economic restructuring and opening-up policies in the 1980s, to the "high grounds" of the export-oriented economy of the 1990s, and the "boosters" for current technological upgrades and industrial structure adjustments. Development zones are one of China's key economic engines and have made a remarkable contribution to its economic strength by improving economic competitiveness and promoting national development. Chinese central and local governments attach great importance to development zones and for this reason grant them generous incentive packages, such as advantageous geographic locations, improved infrastructure and facilities, duty-free status, tax holidays, and simplified administrative procedures and regulations. From the standpoint of participating firms in development zones, these incentives can all be translated into lower production costs and, all else being equal, higher potential profits. Chinese development zones are often accompanied by clustering of industrial activities, such as better access to markets and suppliers, labor pooling, and easy flow of technological expertise. In terms of industrial linkages, cluster firms are expected to easily augment their competitive advantages by improving customer and supplier linkages and/or backward and forward linkages and promoting the development of distinctive business cultures to increase interfirm communication and understanding. These cluster gains have mostly been static, but the degree of dynamic gain varies greatly from case to case among development zones and even among participating firms, as suggested by relevant empirically based studies. With the explosive boom of development zones since the early 1990s, many problems associated with labor costs, land-use planning, regional protectionism, and abuse of policy and administrative systems have emerged and overshadowed their contributions to regional and national economic development. With China's accelerated integration into the world economy, development zones created to grant preferential treatment to foreign investors will gradually lose their competitive advantages over other areas in China. Under these changing circumstances, many researchers and policymakers have begun to think about the impact these changes will have on development zones and what strategy can help to sustain the development of these areas.

Despite a considerable amount of research work available on Chinese development zones, few empirical studies have been done at the firm-level scale to explore the relationship between industrial linkages and firm performance. We believe that understanding how to maintain a firm's competitiveness and improve its performance is strategically important because participating firms are the principal components of development zones. Their superior performance is key to the sustainability of development zones. To provide firm managers and policymakers with the knowledge and insight necessary to harness current and potential challenges, we are interested in exploring the driving forces of the economic performance of the big and small enterprises in development zones. We pay special attention to the impact of industrial linkages, given that firms may differ in proximity to supplier/resources and other resources available to them.

To achieve this purpose, we collected firm-level data by surveying the participating firms located along the Yangtze River in the development zones of Jiangsu Province, and then adopted a variety of formal econometric methods to conduct an empirical analysis. There are three reasons why we chose Jiangsu Province as the subject of our study. (1) Access to regional industrial data is easily available. (2) The Yangtze River Delta is an area where development zones are concentrated. Because China has not balanced the distribution of its development zones, over 70 percent of its development zones are concentrated in 30 percent of the national area. Over 60 percent of state-level development zones are in less than 20 percent of the national area, and 65 percent of the provincial-level development zones are in about 15 percent of the national area.[1] (3) In terms of economic power, the Yangtze River Delta is considered a key barometer of the Chinese economy, and Jiangsu is an engine of the Delta's economic growth as one of the strongest and most flourishing provincial economies. Therefore, understanding the characteristics of firm performance in Jiangsu's development zones will help us to make an objective assessment and offer development proposals with important implications for other development zones in China, since most of them share similar characteristics.

By running an ordered logistic regression, we found a positive but nonsignificant effect of industrial linkages on firm performance in the development zones of Jiangsu Province. This empirical finding is associated with current global and domestic situations that have changed the way participating firms operate and organize in some Chinese development zones. When many other significant variables prevail over industrial linkages in driving superior firm performance, firms feel it less important to get closer to their suppliers or customers, thus leading to an insignificant effect of industrial linkages on firm performance.

Literature Review

Industrial linkages are an important indicator of agglomeration. The concept of agglomeration, which refers to the spatial concentration of people and economic activities, can be traced back at least to the intellectual legacy of Marshall (1890),

who stated that the geographical concentration of economic activities can have a snowball effect whereby new entrants tend to agglomerate to benefit from higher diversity and specialization in production processes. In the century since Marshall's view was put forward, the discussion of industrial clusters has attracted the attention of both practitioners and academics. As summarized by Bekele and Jackson (2006), agglomeration advantages studied by classical scholars generally involve three sets: external economies of scale, industrial linkages, and the mechanism that gives economic advantages to individual firms agglomerating in a certain locality with other similar and related firms.

The literature in economic geography and allied fields has emerged from, and is heavily dependent on, this strand of classical work. Recognizing industrial linkages as an important agglomeration factor in the industrial cluster, a growing number of economists have engaged in a variety of investigations seeking to document and substantiate the expected impacts, contributing to a wide range of academic disciplines and policy circles (Cella 1984; Parr 1999; Sonis, Hewings, and Guo 2000). A great many researchers, attempting to account for the regional and national agglomeration of economic activities, have suggested that selected regions—especially those in which industries are linked in transaction-intensive networks—are capable of exerting powerful push effects on national or regional economic development (Fujita and Thisse 2002; Krugman 1991, 1995; Krugman and Venables 1996). At the firm-level scale, many other scholars have accepted the notion that linkage benefits derived from cluster occupancy lead to superior firm performance because of savings on transportation costs, shared infrastructure, increased availability of labor, forward and backward linkages, and/or knowledge and technology spillovers (Debaere, Lee, and Paik 2009). Interesting arguments about the positive impact of industrial linkages can also be found in a sizable number of empirical studies on industrial clustering. In a study of the semiconductor industry in Southeast Asia, Scott (1987) showed that production units in Manila's semiconductor complex in the mid-1980s were clustered and were intricately linked to minimize transaction costs. In similar fashion, a variety of studies have highlighted positive externalities and productive effects of industrial clusters in East Asia, where many of the most vibrant industrial districts are located in large city regions. For example, Singapore, Seoul, Hong Kong, Beijing, and Shanghai harbor many specialized industrial districts that draw on dense local supplies of skilled labor, educational and research facilities, and infrastructure. Levy (1991) contends that the transaction-cost hypothesis provides a powerful explanation for the emergence of localized subcontracting networks in Taiwan, while Park (1994) found that high-technology firms in South Korea cluster together because of high levels of access to technical labor.

Paradoxically, however, in the case of Malaysia, Rasiah's (1994) empirical study of the machine-tool industry underscores the connection between subcontracting and localization. This indicates that some of the benefits of industrial linkages may be offset by higher production costs resulting from the greater competition among

firms for land, labor, and other inputs. Coincident with higher productivity, rents and wages may increase and transportation costs may arise due to congestion. Therefore, the net benefits of industrial interdependence may be marginal for the sectors with low-skilled labor and standardized technologies. In other words, as the demand for higher-quality production factors and more advanced technology is intensified, many other economic effects might prevail over industrial linkages in driving superior firm performance. Current theory in economic geography lends some support to this view by acknowledging the importance of institutional factors in promoting localized growth and development. In many countries, including those in East Asia, governments have played a notably directive role in assigning investment to different localities and setting up development zones and other local-development schemes, thereby shaping regional economic outcomes (Porter 1990). Within the context of China, Rong (2004) studied four classical development models of small and medium-sized enterprises and found that the policies and services provided by governments and social organizations are conducive to the growing cluster development of enterprises. Empirical evidence from a set of studies of other countries also stresses the impact of governmental and organizational support for the promotion of industrial clustering. For instance, Meyer-Stamer (1999) studied the history of industrial clustering in Santa Catarina, a Brazilian state, and demonstrated that successful development of industries depends not only on national and local government policies and institutional arrangements, but also on the enterprises and industry associations that take part in cooperation and interaction.

Given the positive and negative sides of industrial linkages, it is therefore uncertain, at this point, how important industrial linkages are in influencing firm performance in an industrial cluster. With its history of centralized economic planning and the rapid expansion in the number of development zones, China presents an especially interesting case, as detailed studies on industrial linkages in the development zones of China are relatively limited. Very often, the research literature related to our understanding of development zones is based on aggregation formation. That is, theoretical analysis and empirical documents on the role of development zones mainly arise from the perspective of macro-data research. By contrast, data-based micro-enterprises are the driving forces of the zone-to-business gathering. Although there are some studies confirming the existence of agglomeration, few studies look into the effects of industrial linkages as an indicator of agglomeration on firm performance, especially in Chinese development zones, at the firm-level scale.

The empirical analysis in this article makes use of questionnaire data collected from enterprises in China's development zones. First, we quantitatively evaluate the connection between industrial linkages and firm performance, a rarely tested issue of research at the firm level, based on the regression results obtained from estimating an ordered logistic model. Second, most of the literature on industrial agglomeration and economic performance has been concerned with empirical situations in advanced developed countries. In this article, we demonstrate not only

that the cluster approach is as useful in the context of a developing country as it is in Western situations, but that it can also shed insight on critical dilemmas of development that are specific to a developing country. In particular, in an attempt to promote successful behavior by firms and to increase the sustainability of Chinese development zones, we focus on the most flourishing economic region in China, the Yangtze River Delta. In short, our investigation includes policymakers very concerned with promoting regional and national economic growth, as well as firm managers eager to pursue sustainability of firm growth in development zones.

Econometric Modeling

In light of the literature discussed above, we construct a linear regression model that is particularly designed for estimating the relationship between firm performance and industrial linkages. The econometric model takes the following form:

$$Y = \beta_0 + \beta_1 * IL + \beta_2 * V + \beta_3 * \alpha + \varepsilon, \quad (1)$$

where Y symbolizes the firm's performance, and IL stands for the variables of industrial linkage. To overcome the potential econometric challenges of omitted variable bias and the problem of endogeneity, we include V as a vector for the firm-level control variables which are likely to influence firm performance, as justified by a considerable number of studies with different research focuses. These include firm size (Lee 2009), firm age (Hannon and Freeman 1989), ownership structure of firms (Jones, Kalmi, and Mygind 2003), intensity of inputs (Hall 1999), human capital of workers (Marimuthu, Arokiasamy, and Ismail 2009), and characteristics of business owners/managers (Colombo and Grilli 2005; Hyungrae and Lee 1996; Mengistae 2006). In addition, we control for city effects (the α term), recognizing that the development zones in our study may have a potential issue of locational heterogeneity.

Firm performance measurement is an issue that often attracts debate. Many researchers have relied on objective measures in terms of turnover, profitability, export sales, productivity, maintenance efficiency, on-time delivery, lead-time, capacity utilization, and quality. While conventional wisdom would credit objective measures with higher accuracy and objectivity, a sizable number of researchers have relied on the use of subjective performance measures for the following reasons: (a) the difficulty of obtaining objective performance data; (b) performance data shaped by industry-specific factors are inappropriate for cross-industry comparisons; and (c) the strong correlation between objective and subjective measures. With the support of local governments in Jiangsu Province, we were able to collect perceptual data based on top managers' subjective assessments of the performance of their firms in terms of product success, sales and market share growth, and profitability on a five-point Likert-type scale ranging from 1 = "poor" to 5 = "excellent." The use of perceptual measures is not without precedent. Researchers have found that measures

of perceived organizational performance data are positively correlated with objective measures of firm performance (Dollinger and Golden 1992; Powell 1992).

Since the variable of firm performance is ordinal and has more than two levels, we have a choice between ordered logistic regression (ordered logit) and ordered probit models. According to Heij, de Boer, Franses, Kloek, and van Dijk (2004), the basic set-up of an ordered response model arises from a relationship between the outcome y_i and the index function:

$$y_i^* = x_i'\beta + \mu_i, \qquad E(\mu_i) = 0 \tag{2}$$

The observed outcome of y_i is associated with the index Y_i^* by means of $(m-1)$ unknown threshold values $\tau_1 < \tau_2 \cdots < \tau_{m-1}$ in the sense that:

$$\begin{aligned} &y_i = 1 \quad \text{if } -\infty < y_i^* \le \tau_1, \\ &y_i = j \quad \text{if } \tau_{j-1} < y_i^* \le \tau_j,\ j = 2,\ldots,m-1, \\ &y_i = m \quad \text{if } \tau_{m-1} < y_i^* < \infty. \end{aligned} \tag{3}$$

Let F be the cumulative distribution function of ε_i, then we can express the model in terms of probabilities:

$$\begin{aligned} p_{ij} = P(y_i = j) &= P(\tau_{j-1} < y_i^* \le \tau_j) = P(y_i^* \le \tau_j) - P(y_i^* \le \tau_{j-1}) \\ &= F(\tau_i - x_i'\beta) - F(\tau_{i-1} - x_i'\beta),\ j = 1,\ldots,m. \end{aligned} \tag{4}$$

Given the above definition for p_{ij}, the log likelihood function for ordered logistic regression becomes:

$$\log(L(\beta, \tau_1, \ldots, \tau_{m-1})) = \sum_{i=1}^{n}\sum_{j=1}^{m} y_{ij} \log(p_{ij}) = \sum_{i=1}^{n} \log(p_{iy_i}), \tag{5}$$

where $y_{ij} = 1$ if $y_i = j$, and $y_{if} = 0$ if $y_{ij} \neq j$. The function F should be specified, and in practice one often takes the stand normal or the logistic distribution.

Data and Variables

Prior to estimating the parameters in our ordered response model, we investigated our survey data for 244 firms located along the Yangtze River in the development zones of Jiangsu Province in the year 2005. The questionnaire was divided into three parts: firm profile, complementary information about the firm, and personal attributes of the firm owner. The profile of firms included firm ownership, size, age, status of performance, and type based on input-intensity. The complementary information on the enterprise's basics included motivations for entering a development zone, the relationship between upstream and downstream enterprises, human

capital resources, firm satisfaction with policies and services of government and development zone authorities, and experience with technology upgrading. The personal traits of the firm owner included information about gender, age, educational level, income, tenure, and work experience of relevant service.

As summarized in Table 1, the surveyed enterprises in the development zones along the Yangtze River were located in eight cities: Suzhou, Jiangyin, Nanjing, Changzhou, Taizhou, Zhenjiang, Yangzhou, and Nantong. Of the 244 firms, 97 were located in the first four cities located in the south of Jiangsu Province, while 147 were in the other four cities in the north of Jiangsu. There were 55 in Changzhou and 56 in Nantong. Zhenjiang, Yangzhou, and Jiangyin had 39, 35, and 28 firms, respectively. In short, the firms in these five cities accounted for 87.3 percent of the total number of firms in the sample. The total of 144 sampled enterprises were mainly distributed in one of three industries: textiles, raw chemical materials and chemical products, and machinery and electronic equipment manufacturing, accounting for 59.2 percent of the total sample. In terms of firm ownership, there were only ten state-owned and collective enterprises in the sampled development zones. The shares owned by private investors, foreign investors, Hong Kong-, Macao-, and Taiwan-invested enterprises, and joint-stock enterprises were almost the same, with 56, 68, 53, and 40, respectively. From the perspective of firm size, mid-sized and small enterprises dominated. There were 109 medium-sized and 95 small enterprises, accounting for 84.6 percent of the total sample, with only 4 super-sized and 33 large enterprises in the sample. Therefore, the development zones in the study were able to maintain healthy competition without the existence of oligopolies or monopolies in the zones. As a result, their economic performance was less dependent on the composition of monopoly profits. In addition, about half of the enterprises in the development zones of interest were new entrants. Only 6 firms started to operate before the year 1980, 109 firms started during the 1980s and 1990s, and 120 enterprises entered later. To some extent, the development zones along the Yangtze River are mainly populated by young companies.

In our empirical model, as described in Table 2, the dependent variable (*PERFORM*) represents firm economic performance and is measured by choosing a set of five ordered responses: poor, fair, good, very good, and excellent. We are particularly interested in investigating the effect of industrial linkages on firm performance. Hence, a dummy variable (*FLINK1*) is created with the value of 1 for firms in development zones clustered with their suppliers in the same location. Another dummy variable (*FLINK2*) is created with the value of 1 for firms in development zones located close to the customers who would like to purchase the goods and services they provide.

To control for the potential problem of omitted variable bias, we include as many factors as possible that influence firm performance. Here, we consider control variables related to company profile, complementary information on the company, and personal traits of the firm owner. The variables describing the basic profile of enterprises include:

Table 1

Firm Sample Profile

	All Firms	*CZ*	*TZ*	*YZ*	*SZ*	*NJ*	*JY*	*ZJ*	*NT*
Number of firms	244	55	17	35	5	9	28	39	56
By size									
Super-sized	4	0	0	0	0	0	1	1	2
Large	33	3	2	3	3	5	5	6	6
Medium-sized	109	30	6	14	1	3	12	17	26
Small	95	22	8	18	1	1	10	13	22
By ownership									
State-owned	1	0	0	0	0	1	0	0	0
Collective	9	2	2	1	0	0	2	1	1
Private	56	18	6	11	0	1	3	9	8
Foreign investment	68	6	1	9	4	4	9	9	26
Hong Kong, Macao, and Taiwan-funded	53	14	1	7	1	3	8	11	8
Joint-stock	40	9	6	5	0	0	4	7	9
Others	14	6	0	2	0	0	2	2	2
By firm age									
Started before 1980	6	1	0	0	0	0	1	1	3
Started before 1990	23	12	1	4	0	1	1	2	2
Started before 2000	86	18	6	1	1	3	6	17	34
Started before 2010	120	23	9	27	4	5	19	17	16
By sector									
Mining	1	0	0	0	0	0	0	1	0

Food, tobacco, and beverage production	4	0	0	0	0	0	0	0	4
Textile	50	18	1	3	3	0	6	2	17
Leather, furs, down, and related products	2	0	0	0	0	0	0	0	2
Chemical fiber	1	0	0	1	0	0	0	0	0
Papermaking & paper products	2	0	1	0	0	0	1	0	0
Printing and record medium reproduction	1	1	0	0	0	0	0	0	0
Petroleum processing & voking<<?>> processing	2	1	0	0	0	0	0	1	0
Raw chemical material & chemical products	31	6	2	3	1	4	7	3	5
Medical and pharmaceutical products	3	0	1	0	0	0	1	0	1
Rubber products	3	0	0	0	0	0	0	1	2
Plastic products	9	2	2	0	0	0	0	2	3
Nonmetal mineral products	2	0	0	0	0	0	0	1	1
Ferrous metal mining and dressing	5	0	1	1	0	0	2	1	0
Nonferrous metal ores mining and dressing	6	1	0	2	0	0	0	2	1
Metal products	17	5	0	2	0	0	3	3	4
Machinery and electronic equipments	63	15	6	14	1	4	4	10	9
Electricity, gas and water production and supply	7	1	0	1	0	0	1	2	2
Others	34	5	2	8	0	1	3	10	5

Note: *CZ* stands for Changzhou, *TZ* for Taizhou, *NJ* for Nanjing, *SZ* for Suzhou, *JY* for Jiangyin, *ZJ* for Zhenjiang, *NT* for Nantong, and *YZ* for Yangzhou.

Table 2

Definition of Variables

Variable	Definition
PERFORM	Economic performance of firm (ordinal variable)
CZ	Changzhou (dummy variable)
TZ	Taizhou (dummy variable)
YZ	Yangzhou (dummy variable)
SZ	Suzhou (dummy variable)
NJ	Nanjing (dummy variable)
JY	Jiangyin (dummy variable)
ZJ	Zhenjiang (dummy variable)
NT	Nantong (dummy variable)
FLINK1	Closeness to firm's suppliers (dummy variable)
FLINK2	Closeness to firm's customers (dummy variable)
FTEC	Technological updating or innovation (dummy variable)
FAID	Government funding of R&D (dummy variable)
FSATF	Firm's satisfaction with governmental policies and services in development zone (dummy variable)
ECON1	Percentage of workers directly from local region
ECON2	Percentage of general technical personnel directly from local region
ECON3	Percentage of senior technical staff directly from local region
ECON4	Percentage of middle-level managers directly from local region
ECON5	Percentage of senior managers directly from local region
YEAR	Firm age
YEAR2	Square term of firm age
LABOR	Labor-intensive firm (dummy variable)
CAPITAL	Capital-intensive firm (dummy variable)
KNOW	Knowledge-intensive firm (dummy variable)
S1	State-owned firm (dummy variable)
S2	Collective firm (dummy variable)
S3	Private firm (dummy variable)
S4	Foreign investment firm (dummy variable)
S5	Hong Kong, Macao, and Taiwan-funded firm (dummy variable)
S6	Joint-stock firm (dummy variable)
S7	Other types of firm (dummy variable)
SIZE1	Super-sized firm (dummy variable)
SIZE2	Large firm (dummy variable)
SIZE3	Medium-sized firm (dummy variable)
SIZE4	Small firm (dummy variable)
EDU1	Firm owner with high school degree or below (dummy variable)
EDU2	Firm owner with associate degree (dummy variable)

Variable	Definition
EDU3	Firm owner with bachelor degree or above (dummy variable)
RTIM2	Tenure in current company
RTIM2S	Square term of tenure
RTIM1	Work experience of relevant service
RTIM1S	Square term of work experience
AINCOME	Annual income received by respondent as a firm owner/manager (ordinal variable)

1. Size of firm. Participating firms are divided into four groups: super-sized, large, medium-sized, and small. Each category is matched with a dummy variable: SIZE1, SIZE2, SIZE3, and SIZE4.

2. Ownership of firm. Firms are categorized as state-owned, collective, private, foreign investment, Hong Kong-, Macao-, and Taiwan-funded, joint-stock companies, or other. Correspondingly, seven dummy variables were generated: S1, S2, S3, S4, S5, S6, and S7, respectively.

3. Type of firm. Based on the intensity of production factors, firms were grouped as labor-intensive, capital-intensive, or knowledge-intensive. Three relevant dummy variables were created to capture each group: LABOR, CAPITAL, and KNOW.

4. Age of firm. In order to look at the interrelation between the firm's age (YEAR) and its performance in the development zones of interest, the square term (YEAR2) was added, since this relationship is more likely to be quadratic.

The second type of control variables include the proportion of employees who are local, calculating that employment of local staff may be more conducive to business because of their network of relationships. Hence, we examined the impact of workers, general technical personnel, senior technical staff, middle-level managers, and senior managers, all of whom directly come from local regions. In the regression, we generated five variables (*ECON1*, *ECON2*, *ECON3*, *ECON4*, and *ECON5*) to represent these five groups, respectively, with each measured by the percentage of total employment in the firm. To investigate how technological opportunities may generate cumulative advantages for clusters, the participating firms in the study were surveyed as to whether they had completed technological updating or innovation recently, and whether they received any governmental support for their inventive or innovative activities. The answers helped us to add two more dummy variables (*FTEC*) as well as (*FAID*) in order to understand the economic effects of technological progress and government funding of R&D on firm performance. To verify that highly satisfied firms in the development zones are more efficient, we generated a dummy variable (*FSATF*) that assumes the value of 1 if the answer is yes to any of the following questions, such as whether the firms is

satisfied with government policies/services, whether the services the firm receives are in line with its initial expectations, whether the firm keeps in good contact/communication with governmental agencies, and whether the firm has received satisfactory service from industrial associations.

In the last type of control variables, we take into account the characteristics of business owners (or managers).

1. Level of education. In terms of human capital theory, educational levels increase the ability of owners and thus improve the economic performance of their enterprises. Three dummy variables were used: EDU1 equals 1 for owners who have received a high school degree or below, EDU2 equals 1 for those who have an associate's degree, and EDU3 equals 1 for owners with a bachelor's degree or above.

2. Work experience of relevant service (RTIM1).

3. Tenure in the current company (RTIM2). Several studies have revealed that experience fosters firm performance, as competence-enhancing activities implied by aging favor the implementation of established routines, or allow entrepreneurs to better recognize and exploit new technological opportunities (Acemoglu, Aghion, Lelarge, Van Reenen, and Zilibotti 2006; Cohen and Levinthal 1990). On the other hand, aging may negatively affect firm performance because of inertia (Miller 1991). As founders-managers grow older, they may become more conservative, more reliant on their own sources of information for making decisions, less likely to take risks, and less flexible in handling conflicts (Van Praag 2003). Due to these contrasting effects of aging, we gathered the empirical evidence on the effects of work experience and tenure of firm owners/managers on firm performance. The regression also includes the square terms for these two variables (*RTIM1S* and *RTIM2S*), to study whether work experience and tenure have increasing or decreasing marginal effects over time.

Finally, since information was collected from eight different cities in Jiangsu Province, we created seven dummy variables (*CZ*, *TZ*, *NJ*, *SZ*, *JY*, *ZJ*, *NT*, and *YZ*) for Changzhou, Taizhou, Nanjing, Suzhou, Jiangyin, Zhenjiang, Nantong, and Yangzhou, respectively, in order to capture the city fixed-effects.

Table 3 provides the basic descriptive statistics for all the variables. As reported, these statistics, in terms of the mean, standard deviation, minimum, and maximum, are quite standard without the disturbance of outliers or extreme values, forming the basis of every quantitative analysis of data in our study.

Empirical Results and Analysis

In order to analyze the impact of industrial linkages on firm performance, we adopted an ordered logistic regression, given the fact that the variable of firm performance

Table 3

Basic Descriptive Statistics for All Variables

Variable	Mean	Str.deviation	Min	Max
PERFORM	3.5	0.7498148	1	5
CZ	0.2254098	0.4187108	0	1
TZ	0.0696721	0.255117	0	1
YZ	0.1434426	0.3512442	0	1
SZ	0.0204918	0.1419665	0	1
NJ	0.0368852	0.1888675	0	1
JY	0.1147541	0.3193801	0	1
ZJ	0.1598361	0.3672072	0	1
NT	0.2295082	0.4213809	0	1
FLINK1	0.173913	0.3799536	0	1
FLINK2	0.1556604	0.3633911	0	1
FTEC	0.5931373	0.4924574	0	1
FAID	0.2540984	0.436248	0	1
FSATF	0.9628099	0.1896195	0	1
ECON1	0.72055	0.2700497	0.02	1
ECON2	0.7423958	0.2612946	0.02	1
ECON3	0.6428481	0.3182778	0.01	1
ECON4	0.744153	0.281564	0	1
ECON5	0.7246541	0.3106196	0.01	1
YEAR	7.225532	7.603712	0	47
YEAR2	109.7787	258.5111	0	2,209
LABOR	0.2459016	0.4315057	0	1
KNOW	0.2581967	0.4385423	0	1
S1	0.0041494	0.0644157	0	1
S2	0.0373444	0.1899989	0	1
S3	0.2323651	0.4232196	0	1
S4	0.2821577	0.4509863	0	1
S5	0.219917	0.4150522	0	1
S6	0.1659751	0.3728326	0	1
S7	0.0580913	0.2344028	0	1
SIZE1	0.0165975	0.1280236	0	1
SIZE2	0.1369295	0.3444883	0	1
SIZE3	0.4522822	0.4987536	0	1

(*continued*)

Table 3 (*Continued*)

Variable	Mean	Str.deviation	Min	Max
SIZE4	0.3941909	0.4896932	0	1
EDU1	0.2	0.4008919	0	1
EDU2	0.5044248	0.5010903	0	1
EDU3	0.2876106	0.4536534	0	1
RTIM2	6.426484	6.468174	0.4	37
RTIM2S	82.94594	171.1593	0.16	1,369
RTIM1	11.08257	8.26836	0.33	40
RTIM1S	190.8811	269.4294	0.1089	1,600
AINCOME	4.357466	1.315571	1	9

as a dependent variable is a response variable with five ordered levels. One of the assumptions underlying ordinal logistic regression is that the relationships between each pair of outcome groups are the same. In other words, ordinal logistic regression assumes that the coefficients describing the relationships between the lowest and all the higher categories of the response variable are the same as those describing the relationship between the next-lowest category and all higher categories. This is called the proportional odds assumption or the parallel regression assumption. Hence, prior to estimation, we need to test whether this assumption holds true. For this purpose, we perform a likelihood ratio test with the null hypothesis stating that there is no difference in the coefficients between models. As expected, we get a nonsignificant result with the *p*-value greater than the significance level of 5 percent. This means that we have not violated the proportional odds assumption. Since there is only one set of coefficients, we are able to move on and run an ordered logistic model to describe the relationships between each pair of outcome groups.

To solve the problem of multicollinearity, we drop the variables *NJ*, *SZ*, *S1*, *S7*, *SIZE2*, and *EDU1*. To overcome the potential problem of heteroskedasticity, we turn to the computation of robust standard deviations to avoid the biased standard errors and test statistics. As far as the measure of the goodness of fit is concerned, the likelihood ratio X^2 of 86.86 with a *p*-value of 0.000 suggests that our model as a whole is statistically significant, as compared to the model with no predictors, while the pseudo-R^2 is 0.4246, indicating that this model fits the outcome data in a good way.

Effect of Industrial Linkages on Firm Performance

To answer our major research question, we look at the coefficients on industrial linkages represented by *FLINK1* and *FLINK2*. As reported in Table 4, these coefficients are positive and therefore consistent with the basic mechanism of

industrial linkages that brings about the agglomeration of economic activities and consequently leads to positive firm performance. However, industrial linkages are not statistically significant at a 5 percent significance level. This empirical result is complemented by the collected answers of firm owners/managers to our survey questions. As tabulated, among 207 surveyed firms located in the development zones of Jiangsu Province, 82.6 percent of the firms did not choose to locate close to their upstream firms (suppliers) in the same zone. Among the 212 surveyed firms in these areas, 84.4 percent of the firms did not to choose to stay close to the downstream firms (customers) that would like to purchase their goods or services. This phenomenon leads us to believe that development zones may not function as a major channel through which firms feel highly motivated to get closer to their upstream or downstream customers. Table 5 confirms this belief by ranking all of the motives of firms in the development zones of interest from scale 1 to scale 7.[2] The highest motivation for participating firms to enter a development zone is to obtain the preferential policies/treatments granted by the central government or local governments. By contrast, the surveyed firms are less motivated to enter a development zone simply to pursue industrial linkages.

In light of these different motives, we take a step further to explore why many firms do not intend to take advantage of the traditional gains of industrial linkage when entering the development zones in Jiangsu Province. We come up with several reasons. First, although industrial linkages do not serve an important role in the development zones of Jiangsu, this does not mean that firms in these areas do not have a close relationship with their customers and/or suppliers. As Table 6 lists, contacts between firms in the development zones of Jiangsu Province and their upstream/downstream firms mainly rest with product quality and market information. The upstream and downstream enterprises contribute a lot to the technological upgrading of firms in the development zones. When the collected data are compiled, it can be inferred that, rather than simply choosing development zones as a carrier of industrial linkages, firms in the zones are able to smoothly communicate and share their ideas on how to carry out transactions through many other channels.

Second, the benefits of industrial linkages could be tempered by the high cost of clustering, including increased market competition if products are more homogeneous and/or locally consumed, and if scarce input resources tend to be exhausted very quickly. In Jiangsu Province, there has been a consistent increase of labor costs, long undervalued. As a result, the previous low-cost strategy is no longer sustainable and an increase in relative factor costs might cause significant job losses. Going beyond this evidence, a number of development issues associated with economic inefficiency remain. Since the "development zone fever" of the 1990s, an explosive boom of development zones has generated a loss of arable land, abuse of the policy and administrative systems, uncoordinated urban sprawl, ineffectiveness of infrastructure and services, real estate speculation, and even environmental deterioration. When wage rates increase, tax breaks are reduced, and many other production costs go up, firms in the development zone will face

Table 4

Regression Results (Based on Subjective Measure)

	Ordered logistic estimation			Ordered probit estimation			OLS regression		
		Robust			Robust			Robust	
PERFORM	Coef.	Std. err.	P > z	Coef.	Std. err.	P > z	Coef.	Std. err.	P > z
CZ	–1.842	1.869	0.324	–0.869	0.905	0.337	–0.313	0.402	0.441
TZ	–4.345	2.281	0.057	–2.222	1.107	0.045	–0.719	0.475	0.136
YZ	–1.683	2.562	0.511	–0.784	1.063	0.461	–0.306	0.508	0.549
JY	–0.911	1.776	0.608	–0.444	0.925	0.631	–0.192	0.424	0.652
ZJ	–0.019	1.572	0.991	0.066	0.798	0.935	–0.015	0.363	0.967
NT	–1.420	1.894	0.453	–0.628	0.939	0.503	–0.254	0.440	0.566
FLINK1	1.753	1.202	0.145	0.925	0.588	0.115	0.330	0.253	0.197
FLINK2	0.511	1.363	0.708	0.240	0.644	0.710	0.084	0.302	0.782
FTEC	0.519	0.803	0.518	0.335	0.397	0.399	0.073	0.181	0.688
FAID	3.272	0.987	0.001	1.845	0.457	0.000	0.585	0.189	0.003
FSATF	9.545	2.712	0.000	5.113	1.131	0.000	1.592	0.441	0.001
ECON1	1.512	2.526	0.549	0.543	0.987	0.582	0.216	0.432	0.620
ECON2	2.409	2.255	0.285	1.322	1.049	0.208	0.474	0.442	0.290
ECON3	0.847	1.747	0.628	0.690	0.881	0.434	0.238	0.379	0.534
ECON4	–7.540	3.520	0.032	–4.030	1.614	0.013	–1.370	0.680	0.049
ECON5	3.261	2.794	0.243	1.566	1.155	0.175	0.522	0.536	0.336

YEAR	–0.133	0.116	0.251	–0.076	0.055	0.163	–0.020	0.025	0.434
YEAR2	0.002	0.002	0.461	0.001	0.001	0.459	0.000	0.001	0.702
KNOW	0.749	0.804	0.351	0.389	0.393	0.322	0.129	0.176	0.465
LABOR	2.048	1.788	0.252	0.927	0.693	0.181	0.350	0.302	0.252
S2	5.304	2.144	0.013	2.799	1.094	0.011	0.823	0.468	0.085
S3	5.394	1.362	0.000	2.966	0.701	0.000	0.920	0.266	0.001
S4	3.887	1.223	0.001	2.157	0.641	0.001	0.641	0.267	0.020
S5	3.147	1.313	0.017	1.771	0.628	0.005	0.527	0.279	0.064
S6	5.365	1.367	0.000	3.009	0.674	0.000	0.934	0.267	0.001
SIZE1	–2.852	1.841	0.121	–1.621	0.883	0.066	–0.472	0.398	0.241
SIZE3	–2.719	1.307	0.038	–1.653	0.684	0.016	–0.468	0.329	0.161
SIZE4	–1.210	1.429	0.397	–0.861	0.717	0.229	–0.229	0.342	0.506
EDU2	–1.768	0.905	0.051	–0.963	0.436	0.027	–0.299	0.190	0.121
EDU3	0.045	1.200	0.970	–0.107	0.616	0.862	–0.002	0.269	0.995
RTIM2	0.042	0.187	0.823	0.010	0.102	0.920	0.005	0.047	0.919
RTIM2S	–0.008	0.008	0.299	–0.004	0.004	0.357	–0.001	0.002	0.506
RTIM1	0.585	0.176	0.001	0.325	0.083	0.000	0.101	0.034	0.004
RTIM1S	–0.018	0.005	0.000	–0.010	0.003	0.000	–0.003	0.001	0.003

Table 5

Rankings Based on Motives for Entering Regional Development Zones

Motive	*CZ*	*TZ*	*JY*	*ZJ*	*NT*	*YZ*	*NJ*	*SZ*	Entire sample
Direct access to raw material	7	7	6	6	6	7	6	6	6
Concern with labor quality and cost	5	1	5	5	4	5	2	3	5
Preferential tax by government	1	2	1	2	1	1	3	2	1
Land policies by government	3	3	2	1	2	2	5	5	2
Infrastructure	2	4	4	3	3	3	1	4	3
Potential domestic markets	4	5	3	4	5	4	4	1	4
Opportunity for cooperation with leading companies	6	6	7	7	7	6	7	7	7

Note: *CZ, TZ, JY, ZJ, NT, YZ, NJ,* and *SZ* stand for the development zones in Changzhou, Taizhou, Jiangyin, Zhenjiang, Nantong, Yangzhou, Nanjing, and Suzhou, respectively.

Table 6

Contact Modes

Contact with upstream firms	Votes	Contact with downstream firms	Votes
Meet requirements for reliable quality	142	Meet requirements for reliable quality	120
Update technology	43	Update technology	62
Expedite response service	69	Expedite response service	66
Provide financial support	28	Deliver goods in time	84
Provide market information	83	Provide financial support	34
Other supports	3	Provide market information	121
Missing data	60	Other supports	4
		Missing data	52

more intensified competition for scarce resources. Some firms may close down and move to places where they can acquire cheaper production factors and more generous incentive packages.

Third, the above development issues have also increased the complexities of development-zone planning and management. This is not confined to attracting foreign investment. The imperative issues are more related to providing a livable environment for firms within these areas. Tremendous pressures have been imposed on local governments as well as development zone authorities to improve their managerial capacity to cope with the increasing dynamics and uncertainties generated by the current spatial and social transformation of the development zones. In the case of Jiangsu Province, its local governments and authorities have responded by raising standards for attracting foreign investment and relevant industries. Consequently, many newly established foreign-funded enterprises have chosen to settle in underdeveloped areas of northern Jiangsu Province, together with unqualified enterprises that failed to pass governmental standards. Fourth, the accession to the World Trade Organization (WTO) in 2001 implied that globalization would now be an irreversible trend in China. As many researchers argue, providing considerable benefits to foreign/domestic investors in development zones limits new investment in national and local economies and fails to address the country's socioeconomic, labor, land, and regional problems (Wong and Tang 2005). These policies will be curtailed soon, and many other preferential policies will be neutralized or even eliminated in the near future. With China's rapid integration into the global economy, the continuing contribution of development zones to regional development and the superior performance of participating firms become questionable. If development zones lose their competitive advantage, firms will have more geographical choices

and development zones will face an increasing number of competing locations that offer comparable conditions to industrial investors.

Effect of Other Determinants of Firm Performance

Changing global and domestic conditions may have caused certain development zones to lose their advantages over other areas, including nondevelopment zones, and to some extent have weakened the impact of industrial linkages in these zones. If so, firms will have to respond by changing the way they operate and organize, especially when many other significant factors take precedence over industrial linkages to improve firm performance. According to our regression results, although industrial linkages are not significant, we find that, among all the control variables, *SIZE3*, *S2*, *S3*, *S4*, *S5*, *S6*, *ECON4*, *FAID*, *FSATF*, *RTIM1*, and *RTIM1S* are statistically significant. This suggests that firm owners/managers are less likely to consider the issue of whether their firms should get closer to their customers or suppliers to be a top priority. These significant results deserve special attention because they shed light on our study of industrial linkages by providing insightful policy/management implications.

First, relative to the large-sized companies chosen as a base group, firms of other sizes appear not to perform well in the development zones of Jiangsu. This comparison reflects the fact that medium and small firms in these zones are less efficient, experienced, and skillful to tackle a variety of operating difficulties, such as dealing with financial problems, building trust with new customers, or competing against large multinationals. Hence, to encourage enterprises to become bigger and stronger, the authorities in the development zones need to provide a more favorable environment for small and medium-sized enterprises, such as designing a layout to support enterprises in more flexible and with more open vision, and /or expanding direct financing channels.

Second, as far as firm ownership is concerned (represented by variables *S1–S7*), we note that state-owned companies are less competitive and productive than other types of companies in the Jiangsu zones. The major reason is that state-owned companies in these zones are less productive and unable to catch up with quality standards, and consequently they cannot compete with other firms effectively. This suggests that it is necessary for the development zones to figure out other efficient ways to strengthen the relations of these enterprises with state-owned enterprises and to promote their competitiveness.

Third, in terms of the proportion of employees who are local (*ECON*), we find that middle-level managers are less business savvy. The possible scenario might be that top managers are generally appointed by a parent company and are not familiar with the local rules of game, therefore leading to problems of economic inefficiency.

Fourth, although a number of studies have emphasized the importance of technological efforts for competitive advantages, this article reveals that governmental

funding for innovative activities (denoted by *FAID*) has a greater impact than technological capability on firm performance in the development zones of Jiangsu (Zhao and Zhang 2007). This finding is consistent with the record of Chinese government programs supporting technological progress in the past. However, a majority of firms in the development zones of Jiangsu belong to traditional industries. They have not popularized and applied the achievements made in science and technology, and consequently have failed to improve their innovative activities to serve their economic construction in a significant way.

Fifth, when we turn our attention to the variables describing the personal characteristics of owners (managers), including education, age, work experience, and tenure, we find that the only significant impact on firm performance results from work experience in related services (*RTIM1*). The insignificance of education, age, and turnover might be because most firms in the development zones still do not place much emphasis on technological progress and innovation. As a result, the variables capturing the performance of entrepreneurship have not become a main engine for superior firm performance in the development zones. However, we do find that the additional effect of work experience on firm performance is significant and increases as the number of years spent in relevant service rises. More interestingly, given the negative coefficient of the square of *RTIM1*, we further note that work experience has a diminishing effect as the number of years of service gets longer. This evidence supports the point already made by other economists, indicating that founders/managers tend to be more conservative, less likely to confront risks, and less flexible in handling conflict when they stay too long in a company or business.

Finally, the control variable used to describe firm satisfaction with the development zones of Jiangsu Province (*FSATF*) implies that the development zones are generally acknowledged to have played a very positive role. This in spite of rapid economic globalization and domestic situations presenting varied challenges to the sustainable development of these zones. Hence, firms are still, on average, satisfied with the basic services provided in the development zones—a carryover from government-led economic growth, with a high motivation to take advantage of favorable provisions of financial and tax-preferential policies and other investment benefits granted in development zones. Ultimately, a choice selection will winnow out the traditional gains of industrial linkage (close to markets for products and/or production elements).

Robustness Checks

So far we have focused on the subjective measure of perceived organizational performance. To check the robustness of our empirical results, we employ an alternative measure of firm performance. Economic theory and empirical evidence have shown a close link between firm performance and manager compensation in China, as sales growth is significantly linked to manager compensation and managers

Table 7

Regression Results (Based on Objective Measure)

	Ordered logistic estimation			Ordered probit estimation			OLS regression		
AINCOME	Coef.	Robust std. err.	P > z	Coef.	Robust Std. err.	P > z	Coef.	Robust Std. err.	P > z
CZ	–0.266	1.319	0.840	0.127	0.677	0.852	0.326	0.660	0.624
TZ	–2.673	1.989	0.179	–1.245	0.946	0.188	0.630	0.829	0.451
YZ	–2.453	1.532	0.109	–1.229	0.774	0.112	0.799	0.750	0.292
JY	–0.711	1.512	0.638	–0.358	0.711	0.614	0.309	0.659	0.641
ZJ	–1.084	1.126	0.336	–0.443	0.597	0.458	0.177	0.540	0.744
NT	–0.321	1.389	0.817	–0.019	0.684	0.978	0.126	0.642	0.845
FLINK1	0.044	1.259	0.972	–0.077	0.513	0.880	0.220	0.524	0.676
FLINK2	1.075	1.123	0.338	0.591	0.529	0.264	0.380	0.551	0.493
FTEC	0.070	0.714	0.922	0.067	0.331	0.839	0.112	0.345	0.748
FAID	1.434	0.862	0.096	0.719	0.388	0.064	0.428	0.376	0.260
FSATF	3.343	1.940	0.085	1.671	0.812	0.040	0.811	0.825	0.330
ECON1	–3.063	1.798	0.088	–1.823	0.774	0.018	1.645	0.897	0.072
ECON2	2.939	1.670	0.079	1.713	0.800	0.032	1.271	0.791	0.114
ECON3	–0.254	1.729	0.883	–0.029	0.765	0.970	0.211	0.782	0.788
ECON4	–0.448	2.775	0.872	–0.137	1.258	0.914	0.167	1.323	0.900

ECON5	2.185	2.054	0.287	0.883	0.878	0.315	0.636	0.919	0.492
YEAR	–0.085	0.139	0.541	–0.067	0.055	0.222	0.064	0.057	0.268
YEAR2	0.000	0.003	0.878	0.000	0.001	0.910	0.000	0.001	0.962
KNOW	0.898	0.751	0.232	0.543	0.338	0.109	0.374	0.335	0.270
LABOR	–0.209	1.222	0.864	–0.276	0.541	0.609	0.428	0.601	0.480
S2	2.813	1.727	0.103	1.387	0.814	0.088	0.895	0.711	0.214
S3	0.469	1.080	0.664	0.162	0.531	0.760	0.038	0.514	0.941
S4	0.819	1.125	0.467	0.368	0.514	0.475	0.195	0.477	0.684
S5	1.094	1.087	0.314	0.436	0.524	0.405	0.102	0.499	0.839
S6	1.941	1.025	0.058	0.972	0.518	0.061	0.679	0.477	0.161
SIZE1	1.931	1.315	0.142	1.251	0.734	0.088	1.188	0.853	0.170
SIZE3	0.334	0.882	0.705	0.191	0.442	0.665	0.088	0.447	0.845
SIZE4	0.060	1.187	0.959	–0.043	0.545	0.937	0.050	0.545	0.927
EDU2	0.641	0.719	0.373	0.435	0.336	0.195	0.426	0.330	0.202
EDU3	0.422	0.868	0.627	0.194	0.427	0.649	0.169	0.402	0.676
RTIM2	–0.332	0.246	0.178	–0.201	0.105	0.055	0.172	0.102	0.098
RTIM2S	0.018	0.009	0.062	0.011	0.004	0.011	0.010	0.004	0.018
RTIM1	0.348	0.176	0.001	0.201	0.065	0.002	0.138	0.062	0.031
RTIM1S	–0.007	0.005	0.000	–0.004	0.002	0.015	0.003	0.002	0.084

are penalized for making negative profits (Kato and Long 2004). This perspective suggests that the annual income of top managers/owners (denoted by *AINCOME*) can be an objective variable to measure firm performance. To adopt the same logit regression approach, we break the variable of *AINCOME* into the following nine categories: (1) less than RMB5,000, (2) RMB5,000–8,000, (3) RMB8,000–10,000, (4) RMB10,000–30,000, (5) RMB30,000–50,000, (6) RMB50,000–100,000, (7) RMB100,000–200,000, (8) RMB200,000–500,000, and (9) above RMB 500,000. Compared to benchmark results, there is no change in the sign or significance of the estimated coefficients on industrial linkages. Meanwhile, at the 10 percent significance level, we still find important roles played by *FAID*, *FSATF*, and *RTIM* in this alternative regression, confirming that, rather than industrial linkages, there exist many other contributing factors that can lead to better firm performance.

Additionally, we ran ordered probit regressions as well as OLS regressions, using either the subjective or the objective measure of firm performance. As shown in Table 4 and Table 7, the empirical results regarding the effect of industrial linkages still remain insignificant. In summary, these robustness checks are consistent with our key research hypothesis that the impact of current industrial linkages on firm performance has been weakened in some Chinese development zones.

Conclusion

This article investigates the effect of industrial linkages on the performance of firms in Chinese development zones. We conducted a survey of firms located in the development zones of Jiangsu Province and then developed a well-grounded econometric model derived from existing economic theory, taking into account features of the available survey data. After running an ordered logistic regression with potential econometric problems controlled, we examined our regression results to sort out the important determinants of firm performance, and, particularly, to interpret how industrial linkages affect performance at the firm level.

Our empirical work reveals an insignificant relationship between industrial linkages and firm performance in the case of Jiangsu Province. We find that developmental problems and challenges posed by the current rapid growth of globalization have changed the way participating firms operate and organize. When many other economic effects take precedence over industrial linkages in driving superior firm performance, firms in the Jiangsu development zones feel it less important to get closer to their suppliers or customers, thereby weakening the impact of industrial linkages on firm performance.

Coordinating our discoveries, we propose that when the role of industrial linkages becomes less important in a development zone, policymakers and firm owners/managers should be more concerned with other significant determinants of firm performance. These include improving efficiency to handle operating difficulties, creating a more sound investment climate to attract private firms, collective firms, and foreign-investment-funded firms, hiring more middle-level managers from local

regions to expand a business network, increasing government funding to support technological upgrading, and boosting the entrepreneurship of top management teams. According to our benchmark results, these positive factors will vastly contribute to the continued growth of firm performance, despite the insignificance of industrial linkages in some development zones.

We would like to mention some limitations of our study relating to design, data, and methodology. We collected the needed data using survey methodology, which is not as fine-grained as scenario construction or in-depth case studies. Despite this fact, the difficulty of observing attitudes, responses, and opinions, along with the desire to sample a large number of firms, means that surveys are still particularly useful in our research. Our sample consists only of firms in the development zones of a specific region, rather than the entire country. This limitation, however, is partially mitigated because Jiangsu Province in the Yangtze River Delta is a good representative of the most flourishing economic regions where the majority of China's development zones are located. The use of a large sample that includes a variety of firms also helps to enhance the generalization of the results. The study relies on single respondents from each firm. Although multiple respondents would provide greater reliability, we believe that single respondents who are the owners or top managers of a firm know its characteristics and performance very well. Hence, the use of single respondents is adequate. Last, our research mainly focuses on industrial linkages as an important indicator of agglomeration. While industrial linkages are not a driving factor of firm performance in the case of Jiangsu's development zones, we do not deny the potential importance of other agglomeration factors, such as knowledge and technology spillovers. However, these factors are beyond the scope of this study given the data limitation.

Notes

1. See "Research Report of Chinese Development Zone Industry, 2009," available at www.scribd.com/doc/15642951/Research-Report-of-Chinese-Development-Zone-Industry-2009.

2. The rankings are calculated based on weighing factors that are estimated values indicating the relative importance or impact of each item in a group as compared to the other items in the group. Here, we assign 7 to the first selected motive, 6 to the second selected motive, and so on, until 1 to the last selected motive. For instance, in terms of the category of "Direct Access to Raw Material," five firms consider it the first motive, 4 firms choose it as the second motive, 3 firms select it as the third motive, and then 4 firms, 5 firms, 3 firms, and 1 firm, respectively, based on the order of its importance. Hence, the weight is 112 (= [5*7] + [4*6] + [3*5] + [4*4] + [5*3] + [3*2] + [1*1]).

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