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WHY TVES HAVE CONTRIBUTED TO INTERREGIONAL IMBALANCES IN CHINA

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ABSTRACT

The major objectives of this paper are to shed some light on the mechanism that generates interregional economic imbalances among communities in rural China. Central to this issue is the development of township and village enterprises (TVEs) because the presence of secondary industry is closely associated with the economic welfare of the people residing in rural communities. In rural Jiangsu, for example, spatial disparities have become more pronounced over the past two decades. This fact suggests that the influence of initial conditions—historical and geographical advantages of industrial frontrunners—has not been erased but rather continues to persist. This is attributed to a variety of factors, including the less efficient use of TVE resources in poor areas, the decentralized fiscal system, and agglomeration economies. In short, the socialist regime of self-reliance that still lingers in China's rural society traps less advanced areas in poverty.

KEYWORDS: economic imbalance, rural China, "past-dependency", institution, allocation efficiency, agglomeration economies

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1. INTRODUCTION

The degree of spatial disparity in per capita income in rural China is surprising given the country's strong ideological commitment to equality and its powerful redistributional system (Byrd and Gelb 1990). A sharp contrast is often noted between the coastal provinces that have enjoyed high economic growth in recent decades and the hinterlands where agriculture is still the main industry (Wang 1990). But it is also worth noting the striking disparities that occur even within provinces and counties. In reality, the nonagricultural sectors of very few rural communities have evolved enough to pull those economies out of poverty.

This study sheds some empirical light on the mechanisms that generate such interregional economic imbalance. Central to this issue is the development of township and village enterprises (TVEs)[1] because the presence of rural industry is closely associated with the economic welfare of the people residing in rural communities. Thus, analyzing the forces that give rise to economic inequality is nearly equivalent to identifying why TVEs have developed in some regions and not in others.

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[1] TVEs are a general name for nonagricultural enterprises located in rural areas. They are broadly categorized into two groups; one comprises collectively owned enterprise run by township and village governments and the other comprises nonpublic enterprise established by farmers solely or jointly after the reform and open policy was initiated at the end of 1970s. This dichotomy, however, has become less valid since the early 1990s because collectively owned enterprises have been increasingly privatized as a result of the more liberal market environment following Deng Xiaoping's "southern tour" in 1992.

This paper will emphasize the dependence of economic development on past agricultural accumulation (so-called "past-dependency"), institutional aspects of the socialist regime (self-reliance under the decentralized fiscal system), TVE managerial priorities, and the economic externalities based on industrial clustering.

It is traditionally believed that TVEs operate not merely to pursue profits but also to provide local people with job opportunities and to fill government coffers. In a way, collectively owned enterprises are not so much independent economic units as subordinate factories under the immediate control of local governments. Some rural economies poorly endowed with resources and technology may fail to take off economically because of the poor performance of local TVEs or because the social responsibilities assigned to TVEs may hinder the growth of TVEs themselves. In contrast, other economies blessed with favorable conditions for rural industrialization may successfully follow a sustainable development trajectory led by TVEs.

2. EMPIRICAL QUESTIONS AND HYPOTHESES

The central government of China has regulated farmers' migratory movement, in particular from rural to urban areas, since the late 1950s when the People's communes were established. Even inside rural areas, the People's communes prohibited farmers from changing their occupations and dwelling places. Thus China's rural industrialization was characterized by the principle of "leaving the farm but not the community." That decision to retain rural people in their localities is one of the most dominant factors in explaining the huge income difference between urban and rural residents. But, given the mitigation of such restrictions and the dissolution of the People's commune system, the spatial

inequality among rural communities cannot be solely ascribed to the migratory immobility of the labor force. This study examines alternative explanations for widening spatial disparities, including historical, institutional, and internal and external economic factors.

THE CONTRIBUTION OF AGRICULTURE AND PAST-DEPENDENCY

It is well known that collectively owned enterprises categorized into the "southern Jiangsu model"[2] were established through capital accumulation of collective activities under the guidance of local cadres. TVEs that started operating before or after the open and reform policy as suppliers of farm material and daily necessities successfully moved on to industrialization thereafter. However, rural communities poorly conditioned for agricultural production failed to keep abreast with industrial frontrunners. It is a matter of empirical question to what extent the course of economic development depends on the past and how the initial conditions are locked into the current contours of the local economy.

THE INSTITUTIONAL ASPECTS OF THE SOCIALIST REGIME

Reallocating resources among regions may lessen the significance of historical and geographical advantages initially afforded industrial frontrunners and give latecomers a chance to catch up. In this sense, lifting the labor movement restrictions does much to narrow the income disparity. But the capital market is still thinly developed and highly segmented in contemporary China. China's decentralized fiscal system is also accompanied by lack of mobility in fiscal funds and the central government's inability to

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[2] What distinguishes the "southern Jiangsu model" from the "Wenzhou and Pearl River model" is the way in which they raised initial funds. Although collectively owned enterprises were not predominant in terms of their number, their employees and turnover outstripped those of private enterprises (PEs) during the nascent period of TVE development. The regions where PEs evolved throughout the early reform period are confined to Wenzhou in Zhejiang provinces and some limited areas of Fujian and Guangdong provinces.

manage macroeconomic policy (Bahl 1998).[3] In addition, so-called advance-deposit linkages in which increasing savings deposits in advanced regions are lent on a priority basis to the local industry impede the interregional flow of funds, and thereby exacerbate financial imbalances (Hioki 1996; Ohashi 2000; Tajima 2000; and Whiting 1999).

Indeed, the decentralized fiscal system has motivated some regions to promote rural industry.[4] But due to the food self-sufficiency scheme, backward regions often have no choice but to give priority to agricultural production over enterprise development.[5] Local governments faced with these constraints unavoidably channel scarce resources exclusively to farm production in order to cater to the needs of local people. Surplus TVE funds, if any, go scarcely beyond the administrative boundary because they constitute an integral part of maintaining the local bureaucracy. Thus, it is hypothesized that interregional economic imbalances may be ascribed to a failure of resource reallocation associated with the socialist regime of self-reliance (Nakagane 1996). More importantly, the need to self-finance the equipment of industrial overhead capital would deprive backward regions of the chance to set up rural industry, which in turn exacerbates interregional inequalities.

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[3] Although the decentralized system formally ended with the tax sharing system put in place after 1994, many features of fiscal contracting continue to exist because the central government made allowances for the vested interest of local governments.

[4] Lin and Liu (2000) used econometric methods to show that the decentralized fiscal system contributed to economic growth, but its impact on interregional imbalances is beyond the scope of their analysis.

[5] The feature of self-sufficiency in rural China has not yet faded away even though the market has been liberalized. Instead it has intensified since the central government enacted the rice sack governor's responsibility system in 1995. That system requires provinces to balance the supply and demand of grain and maintain the stability of the grain market.

LOCAL CADRES' POLICY PRIORITY: TVE INVESTMENT AND EMPLOYMENT

Historically, TVEs were the economic organizations that local cadres used to dominate every sphere of property rights. The cadres were the sole authority in the rural community and held great sway over the TVE management, exercised the right of asset transfer, and claimed the residual income. Even since TVEs were privatized, local cadres have taken the initiative to boost their local economy because their income, tenure in the office, and advancement are closely linked to local economic performance (Oi 1999). Nevertheless, local cadres are not just concerned with industrialization in their jurisdiction. They also show a serious commitment to other policy goals such as full employment of local people and the provision of public goods and services (Rozelle and Bisvert 1994).

Then comes the question of how local cadres prioritize policy goals in light of TVE investment and employment. The past two decades witnessed the diversion of resources away from building social infrastructure in favor of TVE investments that yield short-term returns. Such behavior can be interpreted as the natural consequence in a capital-scarce society with a decentralized and self-supporting fiscal system. But overinvestment in TVEs results in the undersupply of public goods and services (including industrial overhead capital), which in turn is detrimental to the long-term sustainable growth of TVEs. Furthermore, deceleration of TVE progress is likely to impoverish local governments' coffers because TVEs are the major income earners of rural communities.

Another point to consider in this context is how local cadres'—as TVEs' virtual owners—decide on the allocation of labor. It is generally believed that local cadres assume social responsibility for guaranteeing job opportunities to local people (Wu, Wang, and Xu 1990). What's more, they guide factory managers in recruiting local people for

TVE jobs and encourage them to hire at least one member from each household for fear of uneven income distribution within the community. By the same token, TVE managers cannot dismiss employees without the permission of the cadres, even when the TVE suffers from overstaffing. On the part of employees, those who are conscious of their status as nominal owners of collectives take their employment in TVEs for granted (Kung 1999). As with overinvestment in TVEs, securing jobs for local people at the expense of enterprise profits may undermine the fiscal basis of local governments.

These points suggest the following hypothesis. The economic welfare of local people depends largely on how local cadres make TVE managerial decisions on investment and employment. The worse TVEs perform in poor areas as a result of inefficient allocation of resources, the more severely the income disparity manifests itself.

EXTERNAL ECONOMIES BASED ON INDUSTRIAL CLUSTERING: AGGLOMERATION ECONOMIES

It is hypothesized that agglomeration economies that accrue to individual enterprises from their own industrial cluster play a significant role in aggravating interregional income disparities in China. In general, such externalities stem from knowledge spillovers, the advantages of thick markets for specialized skills, and the backward and forward linkages associated with large local markets (Fujita, Krugman, and Venables 1999).

However, at least two specific elements strengthen agglomeration economies.[6] One is the lack of fiscal transfer among regions associated with the fusion of local governments with TVEs. Another is increasing returns to scale given the indivisibility of industrial overhead capital (Jimenez 1995). These elements translate into a situation in which social infrastructure is sufficiently provided for by rural communities where enterprises intensively cluster. Put another way, the indivisibility of overhead capital interacts with the immobility of funds for public investment to produce a major obstacle to industrialization in backward communities.

These agglomeration effects can be portrayed as follows. If the production function of enterprises is defined as

$$q = f(l, k, n), \tag{1}$$

where n is the number of enterprises in one community, then in the event that $\partial q/\partial n > 0$, economies of agglomeration can be said to exist (Kanemoto 1990).

[6] See Krugman (1991) and Fujita, Krugman, and Venables (1999) on a mechanism that generates industrial clustering. With regard to economic development, refer to Otsuka and Sonobe (2001). According to an analysis of Krugman, whether enterprises cluster or not depends on economies of scale at the plant level, the share of manufacturing in the national economy, and transportation costs. The objective of his papers is to shed some theoretical light on the causes of the regional core-periphery relationship (relying on Murphy, Shleifer, and Vishny (1989)) that makes increasing returns to scale compatible with a competitive market. The existence of nonpecuniary externalities is not considered because of its elusiveness. On the other hand, the reasoning of this paper is based on a hypothesis that the performance of TVEs takes a turn for the better when economies of scale with respect to public capital work on them. Paternostro (1997) reckons that the clustering of enterprises facilitates the exhibition of scale economies at the plant level.

3. STUDY AREA AND INTERREGIONAL INEQUALITY

The empirical studies in this paper draw mostly on county data from Jiangsu province. Jiangsu is located in the eastern coastal region of China and borders on Shanghai in the southeast. The Chang Jiang River partitions the province between southern Jiangsu and northern and central Jiangsu. The total area comprises 102,600 square kilometers of flat topography and is densely populated with more than 71.2 million.

Table 1—The decomposition of differences in per capita income between each region and the northern rural region, Jiangsu province

		North	Central		South	
	b [a]	Urban	Urban	Rural	Urban	Rural
Income difference (1990)[b]	-	2.7	4.8	1.5	4.6	2.5
(1999)	-	3.1	4.4	1.7	5.7	4.2
Secondary industry/GNP (%)	36.8[c]	72	48	136	45	79
Tertiary industry/GNP (%)	0.98	1	0	0	0	0
Land productivity of agriculture (yuan/mu)	2.59 [c]	15	30	65	21	18
SOEs/industrial production (%)	4.85	13	4	-4	5	-6
Central dummy (D_C)	-171	0	-5	-39	0	0
South dummy (D_S)	367 [c]	0	0	0	11	26
Urban dummy (D_U)	496	33	14	0	15	0
Residual	-	-34	9	-58	3	-18
$\overline{R}^2$, Total (%)	0.86	100	100	100	100	100

Notes: The percentage contribution of relevant variables to the income difference can be measured on the basis of the following equation:

$$1 = \sum_{i=1}^{4} b_i \frac{\Delta X_i}{\Delta Y} + \sum_{j}^{C,S,U} b_j \frac{D_j}{\Delta Y} + \text{residual} \qquad (D_j = 0 \text{ or } 1),$$

where Y , and X_i denote per capita income (yuan) and its explanatory variables, respectively.

[a] b is the estimated coefficient of the equation above obtained from a regression model.

[b] The difference in income is calculated as the ratio given northern rural as the base case.

[c] Indicates that the estimated parameters are significant at the 5-percent level.

people (as of year-end 1999). It is blessed with favorable natural conditions that provide the base for agriculture, fishery, and livestock farming. Nevertheless, what most marks this province is its mushrooming growth of TVEs—ahead of others—over the past quarter century.

Viewed in this light, Jiangsu is hardly representative of China. But bringing this province into focus has some advantages. The first important point is that the official statistical data on TVEs are available on a county basis, so it is possible to estimate the production function for specific years. Even more important is that the analysis of Jiangsu helps explain the whole picture of the spatial economic disparity in rural China. As will be shown later, central and southern Jiangsu are relatively wealthy because of the collectively owned enterprises set up there in an earlier period; northern Jiangsu is lagging far behind and remains impoverished. Most important of all is that TVEs in this province, which had been established originally as collectively owned enterprises, transformed their ownership to private. The empirical analyses here (apart from cases mentioned otherwise) rely exclusively on the *Jiangsu Statistical Yearbook.*

Table 1 shows the results of a decomposition analysis of differences in per capita income given northern rural Jiangsu as the base case. For example, the table indicates that in 1990 per capita income in the rural south was 2.5 times that of the rural north and that secondary industry explains 79 percent of that difference. In other words, the presence of secondary industry is the most important factor in accounting for this regional disparity. Secondary industry is even more important in accounting for the per capita income difference between the rural central and rural north regions. Agricultural productivity is

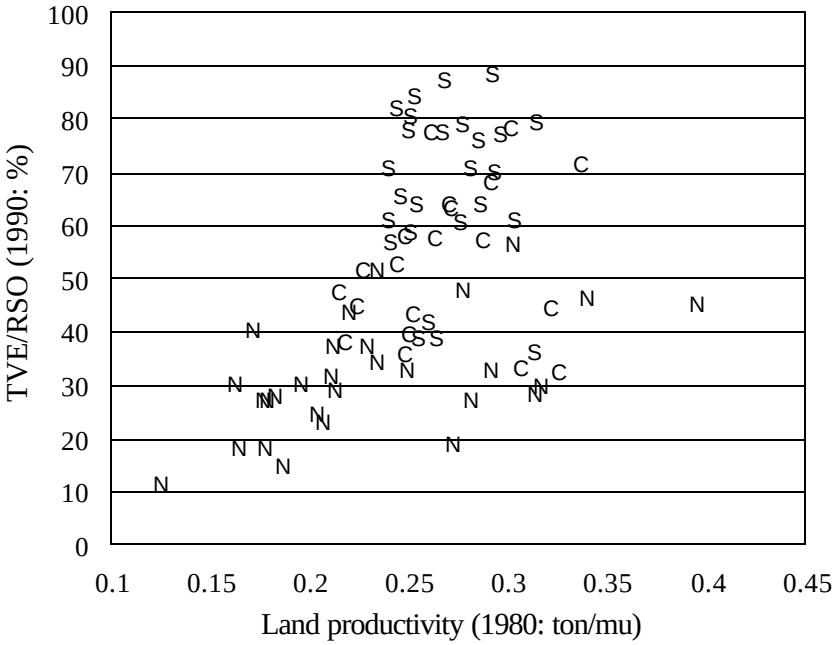
also a significant contributor, whereas the presence of tertiary industry and state owned enterprises (SOEs) have very little impact. Unexpectedly, the contribution of regional dummy variables is so small as to be cancelled out by a residual for some regions.

4. METHODS AND EMPIRICAL RESULTS

THE INITIAL CONDITIONS

The impact of initial conditions can be illustrated by plotting county level data on land productivity (measured as grain output) in 1980 against the ratio of TVE output to rural social output (TVE/RSO) in 1990 (Figure 1). Land productivity in 1980 is used as a surrogate for initial agricultural surpluses while the TVE/RSO ratio in 1990 captures the extent to which TVEs have subsequently developed within counties. A positive correlation supports the widespread view that agriculture serves as a resource reservoir for rural industrialization. More generally, this phenomenon corresponds exactly to the "factor

Figure 1—"Factor contribution" of agriculture



Note: N means north, C means central, and S means south.

contribution" of agriculture to modern sectors (Kuznets 1965 and Mellor 1995). In contrast, there were few if any money transfers from industry to agriculture at the time, especially as TVEs were still developing.

A more careful examination of Figure 1 shows that other ingredients (other than the factor contribution) are relevant to industrial breakthrough. In particular, the TVE/RSO ratio in some southern counties (marked by S in the figure) are high at 60–90 percent even though they had relatively low land productivity of 0.25–0.30 tons per mu (15 mu = one hectare). Other researchers have suggested the following explanations: a massive inflow of skilled labors from Shanghai; the early development of roads, railways, and water transportation; the germination of household industry even before the reform period; and

the ease of subcontracting with SOEs in the surrounding areas (Murakami, Liu, and Otsuka. 1996 and Zhang, Findlay, and Watson 1994).

Table 2 shows the calculated values of Theil's index of inequality for some key economic variables among Jiangsu's rural counties. The distribution of both industrial output and budget revenue among counties are highly out of balance compared with income and budget expenditures. A glance at the indexes of per capita fiscal revenue and expenditures seemingly shows that fiscal transfers ease the intercounty budgetary imbalance. Yet, that is not necessarily the case because the data do not include the "extra budgets" of local governments.[7] More noteworthy is the clear trend of widening inequality that emerged between 1990 and 1995, suggesting that the influence of initial conditions had not been erased and instead persisted until the mid-1990s.

Table 2—Theil's inequality indexes for some key economic indicators among rural counties

	1990	1995	1999
Per capita GDP	0.183	0.334	0.330
Per capita industrial output	0.428	0.564	0.526
Per capita budget revenue	0.428	0.488	0.458
Per capita budget expenditure	0.138	0.263	0.196

Source: *Jiangsu Statistical Yearbook* (China Statistical Press).

THE INSTITUTIONAL ASPECTS: SELF-RELIANCE

Table 3 shows the fiscal condition and investment in fixed assets of Jiangsu province in 1999. By international standards, the ratio of fiscal budget to gross domestic

[7] Before a drastic reform in the tax and fiscal system was undertaken in the mid-1990s, the central governments allowed local governments to accrue extra revenue (a so-called "extra budget") through fees, surcharges, retained profits, and other revenues, and gave them discretion to spend it. Accordingly, they

product (GDP) is extremely small in China for every administrative level from the central down to township.[8] The table demonstrates that Jiangsu is not exceptional given that the percentage of revenue to provincial GDP in 1999 is no more than 8.8 percent—below the international standard. One might quickly conclude that public goods and services are extremely undersupplied.[9] However, that would be a faulty observation because the extra budget, mostly composed of enterprise remittances, covers the costs of public works.

This two-tier fiscal system (the formal budget and the extra budget) contributed to interregional fiscal imbalances because—until the drastic reform of the tax and fiscal system in 1994—the extra budget was at the disposal of local governments.[10] In addition, even rural counties that are fiscally destitute generally do not receive fiscal subsidies (see Table 3). Under these circumstances, the important questions are: how do rural communities finance industrial infrastructure for TVE development, and to what purposes are fiscal transfers directed?

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became all the more interested in the promotion of local industry for their fiscal interests.

[8] According to the World Bank's World Development Indicators, in 1997, the average ratio of a central government's revenue to the national GDP was 10.1 percent and 21.5 percent for low-income and lower-middle-income countries, respectively. China's ratio is no more than 5.8 percent. In the era of the administration of Mao Zedong fiscal money under the extremely centralized fiscal system financed most capital related to economic activities (Lin and Liu 2000).

[9] According to the *Jiangsu Statistical Yearbook 2000*, around 60 percent of investment in fixed capital is financed by owned capital, followed by domestic loans (15 percent). The fiscal coverage is only 2.3 percent.

[10] The State Council "decreed that all extra-budgetary funds are public fiscal revenue subject to state control and are not proprietary resources to be used at the discretion of local governments or agencies" in 1996 (Whiting 2001). In spite of that local governments are levying another "extra-budget" termed "comprehensive fee" on local enterprises.

Table 3—Fiscal condition and investment in 1999 (billion yuan)

	Province	County total	Rural county total
Total revenue	68.0	61.6	28.6
Total expenditure	52.9	39.2	20.8
Capital construction	3.8	1.9	0.3
Farming and rural water conservation	3.5	1.5	0.9
Science, education, culture, and health care	15.4	8.3	6.0
Other	30.1	27.5	13.5
Total investment in fixed assets	274.3	-	-
Capital construction	74.9	-	-
By state-owned units	64.3	-	-
Real estate development	33.1	-	-
By state-owned units	17.2	-	-
Rural collective	48.2	-	-
By state-owned units	0.0	-	-
Provincial GDP	769.8	-	-

Source: Jiangsu Statistical Yearbook.
Note: State-owned units encompass the government sector.

To begin with, it is assumed that local cadres, as representatives of local people, allocate the formal budget expenditure (E) to maximize their utility:

$$\max_{I_1, I_2, I_3, S} \quad U = [I_1 - \bar{I}_1]^{a_1}[I_2 - \bar{I}_2]^{a_2}[I_3 - \bar{I}_3]^{a_3} S^{1-a_1-a_2-a_3} \quad \text{s.t.} \quad I_1 + I_2 + I_3 + S = E \quad , \qquad (2)$$

where I_j, $\bar{I}_j$ $(j = 1, 2, 3)$, denote investments in agriculture, capital construction, and social welfare (such as science, education, culture, and health care), respectively, beyond required minimum investments $\bar{I}_j$, (or RMI), in each of these items, and S denotes non-investment expenditures, such as subsidy grants, officers' salaries, and the like. By solving equation (2), we have

$$\frac{I_i}{E} = a_i + \frac{(1-a_i)\bar{I}_i - a_i\bar{I}_j - a_i\bar{I}_k}{E} \qquad (i, j, k = 1, 2, 3; i \neq j, j \neq k, k \neq i), \qquad (3)$$

$$\frac{S}{E} = 1 - a_1 - a_2 - a_3 - \frac{(1 - a_1 - a_2 - a_3)[\bar{I}_1 + \bar{I}_2 + \bar{I}_3]}{E}. \qquad (4)$$

The sign of $d(I_i/E)/dE$ depends on the "policy preference (a_i)" of local cadres and the relative magnitude of the RMI. On the other hand, we always have $d(S/E)/E > 0$ (or equivalently, $d[(I_1 + I_2 + I_3)/E]/dE < 0$), meaning that the share of ordinary expenditure (total investment) rises (declines) with the fiscal budget size. The subsidy rate, measured by the ratio of fiscal grant (revenue minus expenditure) to fiscal expenditure, is included in the equations as an additional explanatory variable to capture the impact of fiscal transfers.

Assuming that both the policy preference parameters and the RMI per capita are constant across observations, equations (3) and (4) were estimated with E (on a per capita

Table 4—Estimation results for the expenditure share equations

		Intercept	$1/E$	Subsidy	Dummy			R^2
				Rate	Central	South	City	
Farming and rural water conservation	1990	0.12 (5.6)	-0.61 (-0.4)	0.00 (0.4)	-0.02 (-1.8)	0.02 (1.9)	-0.07 (-3.8)	0.40
	95	0.08 (5.4)	-0.45 (-0.2)	0.02 (2.6)	-0.01 (-1.1)	0.01 (0.9)	-0.02 (-1.8)	0.27
	99	0.06 (2.2)	-3.51 (-0.5)	0.02 (2.0)	-0.01 (-0.6)	0.02 (1.5)	-0.02 (-1.1)	0.15
Capital construction	1990	0.02 (2.7)	-0.95 (-2.0)	0.00 (1.5)	0.00 (0.5)	0.01 (2.2)	0.02 (3.0)	-
	95	0.04 (1.9)	-4.30 (-1.6)	-0.01 (-0.7)	0.00 (0.2)	0.00 (0.4)	0.03 (2.6)	-
	99	0.06 (2.7)	-14.0 (-2.3)	0.04 (3.7)	-0.00 (-0.1)	0.02 (1.2)	0.06 (3.9)	-
Science, education, culture, and health care	1990	0.29 (11.4)	7.96 (4.4)	-0.01 (-0.7)	0.00 (0.3)	0.00 (0.1)	-0.07 (-3.3)	0.65
	95	0.16 (7.1)	27.3 (8.2)	-0.00 (-0.1)	-0.00 (-0.1)	0.00 (0.3)	-0.05 (-3.0)	0.82
	99	0.20 (5.6)	34.4 (3.7)	0.01 (0.8)	0.02 (1.1)	-0.00 (-0.2)	-0.08 (-3.4)	0.73
Other	1990	0.58 (19.1)	-6.40 (-2.9)	0.00 (0.0)	0.01 (0.9)	-0.03 (-1.9)	0.12 (4.7)	0.66
	95	0.71 (23.6)	-22.6 (-5.2)	-0.01 (-0.9)	0.01 (0.6)	-0.02 (-0.9)	0.03 (1.6)	0.65
	99	0.69 (15.7)	-16.9 (-1.5)	-0.08 (-3.8)	-0.01 (-0.5)	-0.03 (-1.4)	0.04 (1.4)	0.53

Source: *Jiangsu Statistical Yearbook*.
Note. Figures in parentheses are *t*-values.

basis) and the subsidy rate specified as explanatory variables. Given the estimated parameters, the value of $\bar{I}_j$ $(j = 1, 2, 3)$ was calculated. As the sum of the share of expenditures is necessarily equal to unity, Zellner's seemingly unrelated regression method was employed with this restriction imposed on the parameters. The model was estimated using the county data of Jiangsu province for 1990, 1995, and 1999. Since the county data

do not include the extra-budget items, then negative values of $\bar{I}_j$ likely correspond to situations where the extra-budget covers the RMI for some items.

Table 4 shows the estimation results for the share equations. A general observation is that poor counties are inclined to dispense most of their fiscal money on projects that are irrelevant to industrial promotion. Moreover, fiscal transfers are directed to agricultural investment and capital construction, but they are not sufficiently large to improve the fiscal imbalance. As is evident from Table 5, the formal budget mainly covers the costs of social welfare, while the extra-budget covers the RMI of capital construction and agriculture. The fact that extra-budget revenues finance investments in industrial infrastructure has a negative impact on the interregional disparity of TVE development because there are few if any extra-budget sources of revenue in poor areas for the local authorities to exploit.

Table 5—Estimated required minimum investment (yuan per head)

	1990	1995	1999
Agriculture	-3.0 ~ 1.4	-0.2 ~ 2.6	-6.8 ~ -1.7
Capital construction	-5.9 ~ -0.6	-6.2 ~ -3.1	-18.4 ~ -12.0
Social welfare	11.1 ~ 16.6	32.5 ~ 35.6	39.3 ~ 45.3

TVE MANAGERIAL DECISIONMAKING

Investment

In order to test whether TVEs are managed in economically efficient ways, we derive an investment function based on the stock price maximization principle and formulate the enterprise growth function, drawing on Aoki and Itami (1985).

Suppose that TVE profit is given by

$$p = pf(l, k, n) - wl .$$

It is tenable to look on product price (p) as given to every TVE manager, while the determination of the wage rate (w) will be discussed later. Suppose further that $100x$ percent of the profit has to be invested every period for the enterprise to grow at rate g . The enterprise growth function is assumed to meet the conditions (Uzawa 1969):

$$g' > 0, \quad g'' < 0, \quad g(0) = 0, \quad \text{and} \quad g(1) < i ,$$

where i denotes the interest rate. The value of the enterprise (the stock price) is defined as the discounted present value of net cash flows:

$$V_0 = \int_0^{\infty} [(1-x)pe^{gt}]e^{-it}dt = \frac{(1-x)p}{i-g} .$$

For collectively owned enterprises, local government is the claimant of dividends. The condition that maximizes the value of the enterprise (discounted present value of fiscal revenue) with respect to the investment rate is given

$$g' = \frac{i-g}{1-x} . \qquad (5)$$

County data on enterprise investment was used to calculate annual average changes in the gross capital stock between 1990 and 1993 and the following TVE growth function was estimated by regression analysis:

$$\ln g = \underset{}{-0.958} + \underset{(-15.0)}{0.307} \ln x + \underset{(4.8)}{0.121} D_C + \underset{(1.9)}{0.301} D_S - \underset{(5.0)}{0.288} D_U \qquad (-3.7)$$
$$\overline{R}^2 = 0.57 . \qquad (6)$$

The figures in parentheses are *t*-ratios. The coefficient estimates of the dummy variables are based on using the northern rural areas as the base case (see Table 1 for definition of the dummy variables). The coefficients suggest that enterprises located in central and southern Jiangsu grow faster than those in the northern region given the same investment rate. This cannot be overemphasized because these results—combined with the previous finding that the presence of secondary industry is responsible for per capita income differences—explain much of the widening interregional imbalances led by TVEs.

Solving equation (5) using the estimated parameters of equation (6) gives the equilibrium rates of investment and enterprise growth. Table 6 shows that the two rates are far higher in advanced regions than in less advanced ones. It also shows that the actual investment rate is far greater than the equilibrium value for all observations. Most noteworthy is that such a tendency is all the more pronounced for less advanced regions. This phenomenon may mirror local cadres' strategy in poor areas of prioritizing enterprise growth to keep up with industrial frontrunners. But as previously mentioned, overinvestment in TVEs always undermines the local fiscal position because if the investment rate does not meet equation (5), it vitiates the discounted present value of fiscal revenue[11].

[11] To be precise, overinvestment in TVEs does not necessarily mean underinvestment in public works. In order to know whether an additional public investment is necessary, the rate of returns has to be estimated.

Table 6—The equilibrium of investment and growth rates

	Northern	Central	Southern
$g(1)$	0.38	0.43	0.52
x	0.47	0.49	0.67
$g(x)$	0.30	0.35	0.46
x^*	0.18	0.24	0.49
$g(x^*)$	0.22	0.28	0.42

Employment

The labor customs that linger in rural China are a legacy of the People's commune system. Suppose that only TVEs and agriculture provide employment opportunities for local people in rural areas. Further let N and $L(=\sum l)$ be the number of the potential labor force and the total employment of TVEs in one community, respectively. Thus $N-L$ are self-employed by agriculture. Those who get a job in TVEs with probability L/N are paid at wage rate w, otherwise they earn $\tilde{w}\,(<w)$ from farming. Their expected utility is defined as follows:

$$u \equiv \frac{L}{N}u(w)+\left(1-\frac{L}{N}\right)u(\tilde{w})\,.$$

Now consider the case in which the Nash bargaining solution (NBS) (Nash 1950) determines the wage rate and the aggregate employment level of TVEs. Local cadres solve the following problem:

$$\max_{w,L} \quad \Psi \equiv (p-\tilde{p})[Nu-Nu(\tilde{w})]\,. \qquad (7)$$

where $\tilde{p}$ denotes enterprise profit obtained from the outside option. On the other hand, since those who have rural family registration are entitled to contracted farmland, it is entirely reasonable to look on earnings from agriculture as their outside option. Local people have no opportunity to represent their interest in the TVE management because local cadres are unilateral decisionmakers. Yet local cadres' egalitarianism and inclination to favor local people would attach to TVEs some characteristics reminiscent of cooperative firms.

Provided that utility is a linear function of wage income, the solutions to equation (7) are given as follows:

$$w = \frac{1}{2}\left(\tilde{w} + \frac{pF - \tilde{p}}{L} \right), \tag{8}$$

$$w = \frac{1}{2}\left(p\frac{\partial F}{\partial L} + \frac{pF - \tilde{p}}{L} \right), \tag{9}$$

where F stands for the aggregated production function of the enterprises. It is obvious from equations (8) and (9) that so long as $\tilde{w} < w$ then the equilibrium labor input given by the NBS is always larger than the counterpart that the profit maximization principle dictates.

The production function represented by equation (1) is specified for TVEs as the following flexible trans-log form:

$$\begin{aligned} \ln q = {} & a_0 + a_L \ln l + a_K \ln k + a_n \ln n + b_{LK} \ln l \ln k + b_{Ln} \ln l \ln n + b_{Kn} \ln k \ln n \\ & + \frac{1}{2}\left[b_{LL} (\ln l)^2 + b_{KK} (\ln k)^2 + b_{nn} (\ln n)^2 \right] + b_C D_C + b_S D_S + b_U D_U . \end{aligned} \tag{10}$$

(See Table 1 for definition of the dummy variables.) If the relative share of labor is denoted by l $(= wl/pq)$, equations (8) and (9) reduce to:

$$l = \frac{1}{2}\left[1 - \frac{\tilde{p}}{pq} + \frac{\tilde{w}l}{pq}\right] \equiv \frac{1}{2}\left[1 - \frac{\tilde{p}}{pq} + \tilde{l}\right] \qquad (11)$$

$$l = \frac{1}{2}\left[1 - \frac{\tilde{p}}{pq} + \frac{\partial \ln q}{\partial \ln l}\right] = \frac{1}{2}\left[1 - \frac{\tilde{p}}{pq} + a_L + b_{LK}\ln k + b_{Ln}\ln n + b_{LL}\ln l\right] \qquad (12)$$

These can be represented by the following two equations:

$$l = e_1 + e_2\tilde{l},$$

$$l = a_L' + b_{LK}'\ln k + b_{Ln}'\ln n + b_{LL}'\ln l.$$

If the determination of labor input and the wage rate follows the NBS model, then we can hypothesize that:

$$\text{H}_1\text{: } e_1 = \frac{1}{2}\left[1 - \frac{\tilde{p}}{pq_M}\right],\ e_2 = \frac{1}{2},\ \left[1 + a_L - \frac{\tilde{p}}{pq_M}\right] = 2a_L'$$

$$b_{LK} = 2b_{LK}',\ b_{Ln} = 2b_{Ln}', \text{ and } b_{LL} = 2b_{LL}',$$

On the other hand, if producers maximize profit with respect to labor input as price-takers, then the hypothesis is:

$$\text{H}_2\text{: } a_L = a_L',\ b_{LK} = b_{LK}',\ b_{Ln} = b_{Ln}', \text{ and } b_{LL} = b_{LL}'.$$

A simultaneous estimation of the production function and labor share equation can be used to test the null hypotheses, with output, labor input, and the wage rate regarded as endogenous variables. The source of data is the *Jiangsu Statistical Yearbook*. The labor input is measured as total employment, while capital input is measured as gross fixed assets at constant prices. The null hypothesis of H_1 was rejected by the Wald's Chi-square test at the 1-percent significance level, while H_2 was not rejected even at the 5-percent significance level. Table 7 shows the estimated results.

Table 7—Estimated results for the production functions

	(a)		(b)			(a)		(b)
Equation 10					***Equation 11***			
a_L	0.387	(45.7)	0.386	(45.0)	e_1	0.437	(33.4)	-
a_K	0.594	(28.2)	0.593	(27.0)	e_2	-0.380	(-4.4)	-
a_n	0.080	(3.3)	0.092	(3.8)	$\overline{R}^2$	0.23		-
b_{LK}	-1.015	(-2.3)	-0.099	(-7.2)	***Equation 12***			
b_{Ln}	0.003	(0.0)	-0.008	(-1.5)	a_L'	0.396	(4.5)	-
b_{Kn}	-0.015	(-0.1)	-0.013	(-0.3)	b_{LK}'	-0.081	(-6.0)	-
b_{LL}	1.379	(2.0)	0.155	(7.3)	b_{Kn}'	-0.001	(-1.5)	-
b_{KK}	0.773	(2.7)	0.114	(2.6)	b_{LL}'	0.126	(5.9)	-
b_{nn}	-0.060	(-0.9)	-0.061	(-1.0)	$\overline{R}^2$	0.25		-
b_C	0.125	(4.6)	0.112	(4.1)				
b_S	0.168	(6.0)	0.154	(5.8)				
b_U	0.035	(1.2)	0.022	(0.8)				
$\overline{R}^2$	0.96		0.95					

Note: Figures in parentheses are *t*-values. In model (b), the parameter restrictions of H_2 are imposed, whereas they are not in model (a).

The columns (a) and (b) in the table correspond to the results without and with the parameter restrictions represented by H_2, respectively. Based on the results of (b), the MPL (marginal value product of labor) was estimated. Its mean value weighted by the relative quantity is approximately equal to the wage rate for TVEs. Thus it can be concluded that TVEs, on average, determine their labor input in such a way as to maximize their profits.[12]

Yet a closer look at the estimated results reveals regional variations. Regressing the surplus rate of agricultural labor[13] on the MPL of TVEs over the wage rate (MPL/w) leads to the following result:

$$\mathrm{MPL}/w = \underset{(6.0)}{1.034} - \underset{(-2.0)}{0.247}\, surplus + \underset{(3.2)}{0.162}\, D_C + \underset{(1.9)}{0.052}\, D_S + \underset{(1.2)}{0.074}\, D_U \,, \qquad \overline{R}^2 = 0.23$$

where $surplus = 1$ means 100 percent. The average value of the surplus rate for Jiangsu province is 0.427, while it is 0.478 for northern Jiangsu and 0.376 for the rest of the province. This result indicates that a rise in the surplus rate makes it more likely that TVEs are overstaffed. More importantly, judging from the estimated parameters of the dummy variables, TVEs in northern rural counties hire surplus labor beyond the optimal point, no matter what the agricultural labor condition. Thus, TVEs' adherence to the traditional labor custom, which prevails especially in poor communities, challenges TVE productive efficiency. And, as is the case with over-investment in TVEs, violating profit maximization undermines the fiscal condition of local government.

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[12] Although this result disagrees with Gregory and Meng (1995) and Weizman and Xu (1994), it agrees with Murakami, Liu, and Otsuka (1996) and Hondai and Luo (1999).

[13] The surplus rate is calculated on the basis of the agricultural production function.

AGGLOMERATION ECONOMIES

TVEs exhibit economies of agglomeration ($\partial q/\partial n > 0$). That is, an individual TVE turns a geographical concentration of its own enterprises (an industrial cluster) to its advantage. The effect of these economic externalities can be stated quantitatively. The total differentiation of enterprise profit is given by

$$dp = qdp - ldw + \left(p\frac{\partial f}{\partial l} - w \right) dl + p\frac{\partial f}{\partial k}dk + p\frac{\partial f}{\partial n}dn .$$

Table 8—The measurement of agglomeration economies

	# of firms	MPL/w	Original p	Normal p	$p(\partial f/\partial n)$
Basic enterprises	235	0.87	62	64	80
200–400	319	0.94	141	146	111
400–600	478	1.02	275	285	97
600–800	714	1.05	404	417	69
800–1,000	849	1.24	562	597	62
1,000–	1,281	1.02	418	420	26
	200–400	400–600	600–800	800–1,000	1,000–
dp	82	221	353	533	356
qdp	28	82	120	257	113
ldw	-13	-34	-55	-68	-72
$p(\partial f/\partial k)dk$	60	152	253	300	261
$p(\partial f/\partial n)dn$	7	22	35	44	54
$p(\partial f/\partial n)dn/dp$ (%)	8.8	9.8	10.0	8.2	15.1

Note: Profits and $p(\partial f/\partial n)$ are measured in thousand yuan and yuan, respectively.

Table 8 lists the results of a decomposition analysis that breaks dp into various factors given a county where enterprises cluster least as the base case.[14]

[14] The decomposition is carried out after estimating dp and labor input that meets the marginal product

Not surprisingly, the contribution of dk is among the largest. Because the wage rate is higher in areas where enterprises cluster, dw helps decrease the regional differences in profit. Given a lack of data, qdp is estimated as a residual. The percentage contribution of $p(\partial f/\partial n)dn$ to dp increases with industrial clustering with the exception of the second largest category and reaches 15.1 percent for the largest one. It follows that TVEs located in industrial counties get more economic benefits than those in backward region. In other words, TVEs in poor areas are less able to exploit such externalities because of their own small cluster.

5. CONCLUSIONS

Inter-regional income disparities have widened in recent decades in rural China, including between rural areas within the same province. The rapid growth of TVEs has been an important contributing factor, and this study has identified and shed some empirical light on the underlying reasons in Jiangsu province. These factors include a) the initial impact of agroclimatic and locational conditions on agricultural growth, b) the less efficient use of TVE resources in poor areas because of greater concern with local employment problems, c) the decentralized fiscal system that requires local governments to generate most of their own fiscal revenue, and d) externalities associated with agglomeration economies.

The reallocation of resources in pursuit of positive profit is likely to lessen the significance of the initial conditions for economic development. It should also pave the

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principle. Thus, the term of $(p\partial f/\partial l - w)dl$ is equal to zero. The adjusted profit is termed the normal

way for less advanced regions to catch up with industrial frontrunners. But in fact, TVEs located in advanced areas are superior to those in less advanced areas in terms of investment efficiency and enterprise growth rates. Over the past two decades in rural Jiangsu, instead of narrowing, regional imbalances have become more pronounced.

TVEs located in poor areas are shouldering far more responsibilities than those in rich areas because they are providing local people with job opportunities at the expense of profit maximization. In addition, local cadres in less advanced areas are shortsightedly overinvesting in TVEs. Such behavior leads to less efficient use of capital and labor and reduces the performance of TVEs. Reduced profits in turn limit the ability of local governments to invest in infrastructure and public services since under the decentralized fiscal system in China they depend on TVE profits to finance most of their expenditures. Reduced investment in public goods in turn contributes to slower long run growth in TVEs.

The institutional aspects affecting interregional economic imbalances cannot be overlooked. The socialist regime of self-reliance (the decentralized fiscal system) reinforces a positive relationship between enterprise growth and the provision of industrial infrastructure in economically advanced areas. In contrast, that causality traps less advanced areas in a vicious circle of poor enterprise growth and inadequate industrial infrastructure. Thus increasing returns to scale concerning industrial overhead, the decentralized fiscal system, and the fusion of governments with enterprises all interact to produce agglomeration economies.

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profit in Table 8.

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