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Reforms, agricultural risks and agro-industrial diversification in rural China:  
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**Abstract**

Since the implementation of the economic reforms in 1978, there is a remarkable diversification trend in rural China characterized by an impressive development of rural enterprises. The main objective of this paper is to understand the forces driving this agro-industrial diversification which has important impact on the employment, incomes and welfare of rural residents. A particular attention has been paid to two categories of factors, agricultural income risks and institutional factors such as the ownership evolution of rural enterprises. Using a panel data of 28 Chinese provinces from 1986 to 2001, we show that the diversification decision is jointly affected by relative return between agriculture and rural industry, climatic risks, price volatility of agriculture products, ownership evolution of rural enterprises marked by the dramatic rise of private enterprises, and government's food security concern. A number of provincial structural variables, such as population density and education achievement of rural labour force, are also found to have significant effects on the agro-industry diversification in rural China.

*Keywords:* Institutions; risks; rural industry; activity diversification; China

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## Reforms, agricultural risks and agro-industrial diversification in rural China: Evidence from Chinese Provinces

Weiyong YANG

### 1. Introduction

Since 1970s, many rural regions of developing world have seen an obvious activity diversification trend. The rural China gives a good example with its prosperous rural enterprises which cover a large range of sectors: food processing, construction, mineral extraction, industry, transport and other services<sup>1</sup>. The remarkable development of rural enterprises since the beginning of the 1980s has led to a great change of rural economic structure. Between 1978 and 2000, the rapid growth of their gross output value at an annual rate of 25 percent (Table 1) has changed radically the traditional picture of rural economy where agriculture dominates. In 1987, the gross output value of rural enterprises exceeded for the first time that of agriculture before reaching 4.81 times of the latter in 2001. Since the late 1990s, rural industry has also become the number one producer of rural added value. In 2000, its added value was as high as 2715.6 billions yuan which represent 64 percent of total rural GDP.

Meanwhile, rural enterprises have created a great number of employment opportunities for abundant rural surplus labour. As shows the Table 3, the rural industry's employment increased from 28.3 millions in 1978 to 130.9 millions persons in 2001, and in percentage from 9.2 to 27.1 percent of the total rural employment (Township and Villages Enterprises Yearbook (TVEY), 2002). As rural industry developed, rural income has increased substantially. Among all income sources, incomes from rural enterprises have been the main contributor of rural income increases during the reform period (Chen, 2000). For instance, in 2000, an average rural resident earned 760 yuan from rural enterprises which accounted for 33.7 percent of his total income. And compared with the preceding year, there was an increase of 36 yuan which had a contribution of nearly 80 percent to total increase of rural per capita income. Moreover, the rise of these enterprises helped to improve welfare of rural residents by providing a bundle of public goods such as roads, schools and sanitary facilities (Oi, 1999).

Given the importance of rural enterprises for rural development, it's crucial to understand this agro-industrial diversification during the reform period<sup>2</sup>. The question we attempt to answer is which factors have driven the structural adjustment of Chinese rural economy. The question is even more relevant as rural economy has been subject to an increasing international competition since its opening-up and in particular since China's recent joining the WTO. A particular attention is paid to two categories of diversification determinants, agricultural risks and institutional factors.

In view of the fact that agriculture has stagnated after the mid-1980s, and agro-industrial diversification was mainly driven by rural enterprise development, we focus our analyses

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<sup>1</sup> Among all these sectors, industry is by far the most important component of rural enterprises, with a share of more than 70% in the total gross output value of all rural enterprises throughout the period of 1978-2000. Therefore, the term rural industry is used in this paper to stand for the whole rural enterprises.

<sup>2</sup> In this paper, the term "agro-industrial diversification" defines the transfer process of rural labour from agriculture to rural industry. Since in all provinces (except three municipalities Beijing, Tianjin and Shanghai, in 1990s) the agriculture remains the number one employer in rural area, an increase in rural industry employment corresponds to an labour diversification.

primarily on the rural industry. Traditionally, these enterprises are known under the name of township and village enterprises (TVEs) which comprise four types: township enterprises, village enterprises, enterprises owned by peasant groups and individual enterprises, as specified by the government's no.4 document of 1984. According to their ownership, we distinguish two groups, one is collective enterprises which include the first two types, and the remaining two types constitute the other group, private enterprises. In order to avoid any confusion, we reserve the term "TVE" exclusively to the first group, namely collective enterprises. Hence, "TVEs" and "collective enterprises" are used interchangeably in this paper. Through a half-century of development history, the ownership pattern of rural enterprise has changed dramatically in accordance with permanent changes of economic and institutional environment.

Therefore, the paper is organized as follows. Section 2 provides a brief presentation of rural enterprise history since 1949. Section 3 analyses the role of a set of factors, in particular risks and institutional elements, on the agro-industrial diversification. Section 4 describes data set and variables constructed for empirical analyses. Empirical results are presented and interpreted in section 5. Finally, section 6 concludes with some policy implications for rural development of China.

## **2. Historical Development of rural enterprises and agro-industrial diversification since 1949**

Rural industrialization dates back to the Mao's period (1949-1978) when repairing workshops and small communal enterprises were set up to support agriculture production. Due to frequent political campaigns during the period, rural industry had a very instable development: a rapid growth in 1950s, failures during the Great Leap Forward period (1958-61), stagnation in the 1960s and a relatively stable development in the 1970s. Between 1952-1978, rural industry gross output value grew from 8.1 to 49.5 billions yuan, and its importance in rural economy rose in the same period, from 17.6 to 35.4 percent of agricultural output (Byrd et Lin, 1994 ; State Statistical Bureau (SSB), 1996).

Since 1978, rural enterprises have entered into a high growth era without precedent. In only a few years, they have taken over agriculture to become the most important driving force of the rural growth. The reforms in agriculture and in fiscal system created a favourable environment for the take-off of rural enterprises in 1980s. The introduction of rural household responsibility system in agriculture production and the resulting dismantlement of People's Communes gave rural workers some freedom to take a job outside the agriculture and to run a family business. Under the decentralization process, local governments became more autonomous and responsible for rural economic development, and fiscal sharing system by ownership of enterprises (Lin et Liu , 1998) provided for local governments very strong incentives to spur their own enterprises, such as TVEs whose taxes and remitted profits made up the main income sources of the governments in many localities (Wong, 1992).

However, the agro-industrial diversification process was not linear during the reform period. As shows the Figure 2, there are wide-spreading fluctuations around an upward trend. This evolution pattern depends on the development path of rural enterprises during two decades which can be divided into five episodes according to macroeconomic conjunctures and institutional context (Table 1).

### *a) Starting period (1979-1983)*

Since 1979, a series of measures have been taken to bolster rural collective enterprises, such as budgetary subsidies and low interest loans of the Agricultural Bank. In this period, real gross output value<sup>3</sup> of Commune and Brigade enterprises grew at an annual rate of 14.7 percent to reach 98.3 billions yuan in 1983, starting from 49.5 billions yuan in 1978. In 1983, their gross output value accounted for 37 percent of agricultural output and their employment amounted to 32.4 millions persons which represented 9.3 percent of total rural employment.

*b) High growth period (1984-1988)*

From 1984 onward, rural industry took off. The No.1 Document of 1984 encouraged not only the development of TVEs but also creations of household cooperatives and individual enterprises. During this period, annual growth rate of rural enterprises rose to 32.5 percent. Starting from a low level of 24.4 billions yuan, private enterprises registered a even more spectacular growth rate as high as 62.9 percent compared with 24.7 percent for TVEs<sup>4</sup>. At the same time, cooperation between rural enterprises of eastern region and those of western region, and between urban centres and rural areas was developed in these years. With the opening-up of the country, rural enterprises played an increasing role in international trade. As a result, at the end of the period, the rural enterprises have acquired an equal importance to the agriculture in terms of gross output value and their share in rural employment tripled from 9.3 percent in 1983 to 27.5 percent in 1988.

*c) Retrenchment period (1989-1991)*

In the late 1988, facing a sharp rise of inflation as well as of economic and social instability, the government decided to interrupt market reforms and to restructure the economy by a restrictive monetary and budgetary policy. In this context, rural industry was attacked under the pretext of unfair competition to state-owned enterprises, illegal enrichment of rural enterprise owners. Besides a reduction of fiscal advantages and preferential loans, the activity scope of rural enterprises was again restricted to a local dimension, such as food processing and local resource exploitation. In this hostile environment, rural industry development slowed down. The growth rate of rural industry dropped to 19 percent for TVEs as well as for private enterprises. As indicated in Table 2 and Figure 4, the number of rural enterprises and their employment registered a remarkable reduction during the two years of 1989-90. As a consequence of widespread close-downs, more than two millions rural industry workers returned to agriculture and the share of rural industry in total rural employment decreased from 27.5 percent in 1988 to 22.1 percent in 1990.

*d) Period of reforms and general prosperity (1992-1996)*

Acceleration of reform process since the southern tour of Deng Xiaoping in 1992 brought rural enterprises into a new era of high growth. From 1992 to 1995, the real gross output value increased at an annual rate of 40.9 percent, and private enterprises continued to grow more rapidly than TVEs, explicitly, 49.1 against 36.4 percent. By 1996, the rural enterprises have become the primary sector of rural economy, creating 1766 billions yuan of added value, 600.8 billions yuan of export and 623.5 billions yuan of taxes. With 135 millions persons

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<sup>3</sup> With 1978 as base year, like other places in this paper.

<sup>4</sup> One of reasons why TVEs' growth rate, quite high at the international standard, was lower than private enterprises is that the formers had a high development level in 1984, 145.4 billions yuan of output, 5 times more than that of private enterprises. Moreover, in relative terms, TVEs dominated their private counterparts throughout the 1980s (Table 4).

employed, rural enterprises represented 30 percent of total rural labour force. As a result, the agro-industrial diversification has reached its highest level of the whole reform period.

*e) Adjustment period (since 1997)*

After entry in force of *Township and Village Enterprises Law* on the 1<sup>st</sup> January of 1997, legal rights of rural enterprises were protected by the State, and ideological obstacles against rural enterprises were removed away. Nevertheless, in this period, difficulties came from external and internal economic factors. On one hand, with national and international market integration, competition among all kinds of enterprises intensified during the 1990s. Some rural enterprises, especially collective ones, had an increasing difficulty to adapt to rapid changes of market conditions. On the other hand, the Asian financial crisis sparked off in the late 1997 deteriorated external environment of rural enterprises heavily involved in foreign trade. Therefore, since 1997, rural enterprises have experienced a difficult period. In terms of real gross output value, rural enterprises grew at only 12.6 percent per year, the lowest rate since 1978. TVEs stagnated completely, only private enterprises continued to show some vitality with an annual growth rate of 22 percent. In other words, the 12.6 percent growth of rural enterprises was entirely driven by the private enterprises. Regarding the employment, the number of employees stagnated with a growth rate below one percent during the period. It seems that labour absorption capability of TVEs has been exhausted in the 1990s, the TVEs' employment has even registered an decrease of 10.8 percent every year since 1997, compensated by an increase of 5.9 percent in the private enterprises. Subsequently, despite a slight recovery in recent years, agro-industrial diversification decreased by 3 percentage points in 2001, compared with the end of the preceding period.

However, this national evolution over time hides important regional disparities on agro-industrial diversification. Given that rural enterprises firstly emerged and prospered in the coastal region, the coastal region had a higher diversification level than the central and western regions which suffered a substantial backwardness in rural industry development. Between 1982-2001, the average agro-industrial diversification level is 0.36, 0.24 and 0.14 respectively for the coastal region, the central and western regions. The Figure 5 traces diversification evolutions of the three regions which show a similar pattern to national evolution (Figure 2). The gaps among the three regions was maintained during the period and tend to widen between the coastal area and the remainder of the country in recent years. Concerning the relative importance, as shows the Table 6, throughout the period 1982-2001, the coastal region accounted for more than 50 percent of total rural industry employment, and over 60 percent of national gross output of the rural enterprises. These temporal and spatial differences are attributable to numerous factors such as risks and institutional evolutions we will examine in detail in the following section.

### **3. Agro-industrial diversification determinants**

The agro-industrial diversification decision is analysed by a simple model of activity choice developed by Bardhan and Udry (1999) and Abdulai and CroleRees (2001). Supposing that in rural area, a rural worker can work either in agriculture or in rural enterprises if he can overcome entry-barrier of the latter such as minimum investment requirement or a specific skill. The decider, a rural household as well as a policy maker of provinces, determines labour allocation between agriculture ( $L_a$ ) and rural industry ( $L_i$ ) in order to maximize a time separable utility function of the form:

$$U_t = E_t \sum_{\tau=1}^T I^{t-\tau} u(C_\tau) \quad (1)$$

where  $E_t$  is the expectations operator given the information set at period  $t$ ;  $I$  is subjective discount rate;  $C$  represents rural consumption level and  $T$  denotes the number of periods.

$W_{ta}F(L_{ta})$  and  $W_{ti}G(L_{ti})$  denote respectively the agricultural income and income derived from rural enterprises, where  $W$  is the return of the activity (such as wage), and  $F$  and  $G$  stand for production function of the two activities, or supply function of rural labour in our simple case.

Then, the first order conditions for labour allocation suggest that the activity choice depends on relative marginal utility of the two activities. That is:

$$\text{if } E \left[ U'(C_t) W_{ta} \frac{\partial F}{\partial L_{ta}} \right] > E \left[ U'(C_t) W_{ti} \frac{\partial G}{\partial L_{ti}} \right], \text{ then } L_{ta} > 0 \text{ and } L_{ti} = 0 \quad (2)$$

where  $U'(C_t)$  denotes the marginal utility of consumption. In other words, if the marginal utility of allocating labour to agriculture were greater than the marginal utility derived from rural industry, rural households would tend to specialize in agriculture, without any labour working in rural enterprises.

$$\text{And if } E \left[ U'(C_t) W_{ta} \frac{\partial F}{\partial L_{ta}} \right] < E \left[ U'(C_t) W_{ti} \frac{\partial G}{\partial L_{ti}} \right], \text{ then } L_{ti} > 0 \text{ and } L_{ta} = 0 \quad (3)$$

In this contrary case, the agriculture would be abandoned in favour of a specialisation in rural industry.

Nevertheless, in reality, there is a third case where agriculture and rural industry are combined. Therefore, the relative return of activities is not the only determinant of activity choice.

### 3.1 Risks and activity diversification

A great number of theoretical studies (Diamond and Stiglitz, 1974; Hadar and Seo, 1990) and empirical works (Alderman et Paxson, 1992; Dercon, 1996 and 1998; Barrett *et al.*, 2001; Reardon *et al.* 1992; Ellis, 1998; Hoogeveen, 2001) have shown the important role of risks in activity choice in rural developing areas. In a developing and transition country like China, risks are abundant in rural area, in particular in agricultural sector. In China, agricultural production is subject to a great extent to climatic hazards (Zhang and Carter, 1994; Yang, 1994). Natural calamities like flood and drought are one of the main reasons of agricultural production reductions. For the period of 1978-2001, these natural disasters affected every year on average 30.8 percent of total sown area and caused serious consequences in 15.5 percent of sown area with a reduction of at least 30 percent of production reduction compared with a normal year (SSB, 1990 and 2002). The climatic risks caused agricultural yields to fluctuate extensively from year to year and one place to another.

In addition to the climatic risks, there are instabilities of agricultural sale price. By reason of incompleteness of reforms and imperfections of market system in the transition period, the retail price of agricultural products was very volatile as illustrates the Figure 6. The price

variability of agricultural products makes agricultural income instable and unpredictable. In addition, the instability of agricultural income may be amplified by a low but positive correlation between climatic risks and price variability<sup>5</sup>.

Due to the absence of credit and insurance market in rural China, agricultural income risks may have serious consequences on welfare of rural residents particularly for the rural poor. Hence, rural households, averse to risks, explore ways to cope with risks. Due to the well-known moral hazard and enforcement problems, rural collective insurance system rarely exists in China. The activity diversification constitutes in this case an important ex ante mechanism to deal with income risks, especially for the poor which have accumulated little wealth over time to smooth consumption. The diversification brings a reduction in income risk if the sources of income have a correlation less than one (Gayant, 2001 ; Hoogeveen, 2001). Many empirical studies (Islam, 1987, Abdulai and Crolerees, 2001 ; Barrett *et al.*, 2001 ; Lanjouw *et al.* 2001) show that the agro-industrial diversification is a effective way for rural residents to relieve income risk incidence, since the rural industry has different characteristics from the agriculture, it can play a counter-cyclic role to the agriculture<sup>6</sup>.

Subsequently, in rural China, taking into account the risks, the decider allocates his labour resources between agriculture and rural industry to equalize the marginal utility in both activities. That is:

$$E\left[U'(C_t)W_{ta} \frac{\partial F}{\partial L_{ta}}\right] = E\left[U'(C_t)W_{ti} \frac{\partial G}{\partial L_{ti}}\right], \text{ with } L_{ti} > 0 \text{ and } L_{ta} > 0 \quad (4)$$

therefore, in the presence of risks, there is a agro-industrial diversification.

Likewise, the diversification decision tends to be altered if there are other risk protection possibilities which make diversification less necessary or attractive for rural households. A series of theoretical and empirical studies (Rothschild and Stiglitz, 1971 ; Rosenzweig and Binswanger, 1993 ; Dercon, 1996) illustrate that wealth, like savings and livestock, can reduce the diversification need if risk aversion is decreasing with wealth and if wealth facilitates ex post consumption smoothing. As a result, in order to secure their livelihood, the poor have a stronger incentive to diversify their activities than their richer counterparts. However, the lack of wealth can constraint the ability of rural household to diversify outside agriculture, for many non agricultural activities have significant entry barriers as minimum investment or human capital requirement. In this case, the wealth can favour agro-industrial diversification. This is particularly true in the case of the diversification for asset accumulation purpose described by Ellis (1998). Anyway, the sign of the wealth effect on diversification is mostly an empirical issue.

### 3.2 Institutional factors and agro-industrial diversification

In a transition country like China, an increasing attention has been paid to the role of institutions in economic development process. After a 30-year painful experience of planned economy, the Chinese government decided in 1978 to introduce gradually market system and

<sup>5</sup> A correlation coefficient of 0.08, non significant at 5%, between the share of sown area seriously affected by natural calamities and annual variability of agricultural product price.

<sup>6</sup> For our data set, gross output value of rural industry and that of agriculture have a high and positive correlation coefficient (0,86) which can be explain by the similar upward trend of this two series. However, this imperfect correlation leaves some room for risk diversification.



ownership reforms. If this evolutionary institutional changing pattern has an advantage of minimizing social cost of reforms, it also leaves to opponents of reforms the time to form influential interest groups to interrupt or reverse reforms (North, 1989 and 1990). Under the path-dependent evolution scheme, Chinese reforms are characterized by frequent stop-and-go which has a knock-on effect on rural enterprise development, and thus, on rural economic structure changes.

### Rural enterprises' ownership evolution over time

In accordance with changes of institutional environment, the ownership forms of rural enterprises have changed considerably during the last two decades of the century: in the 1980s, the dominant form was the collective ownership, specifically the TVEs, while the decade of 1990s was characterized by a impressive rise of rural private enterprises. This ownership evolution is a result of institutional environment changes during the transition of the country from a planned economy to a market economy.

Despite a rapid growth of rural private enterprises from 1984 onward, the TVEs occupied a predominant place in rural industry throughout the 1980s. In 1984, the TVEs represented 76.5 percent of total rural industry employment, and 85.6 percent of total gross output value. In the late 1980s, the TVEs still held the leader place, in terms of both employment and output, namely 50.4 percent and 66.4 percent respectively (Table 3 and 4). In the presence of numerous imperfections in a nascent market system and of important political risks in the 1980s, the TVEs presented many advantages over private enterprises, as facilities to obtain the exploitation licence, local government protection against frequent political attacks during the period, financial support, easy access to loans and crucial input at a preferential price, or outlets for products.

However, in the 1990s, institutional context has completely changed. The reform process has been resumed and accelerated since Deng Xiaoping's tour in southern region in 1992. With the market development in the whole country, the reforms became more and more irreversible and resistant to any backward attempt. In this new context, the TVEs lost gradually the advantages over the private counterparts.

Firstly, the tightening of local government budget constraint, resulting from the introduction in 1994 of an unified management system of budgetary and extra-budgetary resources, reduced considerably local government's ability to support financially the TVEs. Besides, in order to increase revenues, local governments have incentives to bolster all kinds of enterprises under their jurisdiction irrespective of the propriety forms. Therefore, the local governments' attitudes toward private enterprises changed radically in the 1990s. Discriminatory policies against private enterprises were eliminated, meanwhile, a set of measures are adopted to encourage the creation and development of private enterprises in rural China. Secondly, with the reduction of political risks and experience accumulation over time in business management matter, TVEs' managers felt resentful toward government's involvements in the enterprises. Finally, relating to financing issue of rural enterprises, reforms in financial sector in the 1990s have also removed TVEs' privileges. On one hand, the commercialisation of state banks has made banks more independent in their loan distribution policy with regard to local government's influences, and more attentive to profitability of financing projects. Provided a greater dynamic of private enterprises than TVEs (Table 1), credit policy of banks and rural credit cooperatives tends to favour private enterprises rather than TVEs. For example, for the period of 1990-1995, the loans to private enterprises grew on average by 40.78 percent every year, while the annual rate of growth of

loans to the collective sectors declined during the same period. On the other hand, the emergence and proliferation of non-state financial institutions by the mid-1990s, such as “county finance investment companies” (caizheng touzi gongsi), credit associations like the “Individual entrepreneurs and private Business Economic Fund” ( geti siying jingji jijin hui), facilitated largely the access to financing resources for all types of rural enterprises (Oi, 1999). As the Figure 7 illustrates for TVEs, with the vigorous development of rural non-state financial sector, there is a diversification trend of financing sources of rural enterprises, marked by an impressive increase of self-raised funds and by a decline of bank loans and public subsidies.

At the same time, the intrinsic inefficiency of TVEs became more obvious as long as market system developed in the 1990s: conflicts between local governments and enterprise managers, incentive problems of employees, deviation away from profit maximization behavior, lack of financing sources, excessive government interferences, etc. The propriety rights issue lies at the core of all these problems. Ambiguity and inalienability of TVEs’ propriety rights discourage external investors to finance TVEs in which their owner rights are not ensured. Hence, there is a vicious cycle: the lack of financing sources compromises profitability of TVEs, and thus reduce further the self-financing ability for future development.

Under joint effect of advantage loss and aggravation of intrinsic handicaps, collective enterprises encountered increasing difficulties in the 1990s. The TVEs’ growth slowed down, in particular in terms of employment. The labour absorption ability of TVEs reached its maximum level in 1995 (60.6 millions persons) before declining in the following years especially from 1997 (-10.8 percent every year till 2001) (Table 1 and 3). Similarly, the gross output value and added value of TVEs also decreased from 1997. In order to boost the TVE growth, a set of measures, mostly propriety rights reforms, have been carried out in the TVEs. A significant share of small collective enterprises has been sold to private entrepreneurs and thus become entirely private enterprises. Meanwhile, a great number of middle and large TVEs have been transformed into shareholding cooperatives or large stock corporations. This clarification of propriety rights facilitates the participation of outside investors in TVEs’ financing. At the end of 2000, the propriety rights reforms concerned more than 80 percent of TVEs and there were 25 251 stock companies and 162 600 shareholding cooperatives, 85890 of which (52.8 percent of the total) came from collective enterprises.

In contrast to the poor performance of TVEs, the private enterprises prospered in the 1990s. Table 1 shows that the private enterprises always had a higher growth rate than TVEs throughout the 1990s, both in terms of employment and in output. From 1991 to 2001, the annual growth rate of private enterprises was the double of that of TVEs, explicitly, 33.9 percent against 15.2 percent. It’s the same for the employment, the private enterprises’ employment rose at an annual rate of 7.2 percent, while the TVEs’ employment declined by 3.4% every year for the same period. Consequently, the private enterprises have taken over the TVEs to become the most important and dynamic element of rural enterprises. In 2001, the number of private enterprises accounted for 96.8 percent of the total, and their share in total employment, output and added value is also predominant, to be precise, 74.2, 69.6 and 68.9 percent respectively (Table 2-5).

This ownership evolution can have important impact on rural economy diversification. On one hand, the rise of private enterprises injected a new dynamism into rural industrialization, especially at the moment when TVEs stagnated. The private enterprises continued to provide non agricultural job opportunities to rural surplus labour when labour absorption ability of TVEs decreased. Besides a greater vitality of private enterprises relative to TVEs, this better

labour absorption ability of private enterprises is also owing to their higher labour intensity compared with TVEs. As a matter of comparison, in 2000, private enterprises were 1.6 times more intensive in labour than TVEs, that's to say, 72 against 28 employees for one million yuan of fixed capital. On the other hand, the prosperity of private enterprises reflects the changes in attitudes of governments with regard to private enterprises and the evolution of institutional environment, market system development in particular, which would have an noteworthy effect on activity choice. A greater tolerance toward private sector and a more developed market system signify a reduction of administrative restrictions on labour employment and allocation, and thus, an increasing freedom of activity choice for rural households.

### Government's grain policy and agro-industrial diversification

Ever since the foundation of People's Republic of China, the Chinese government kept always a watchful eye on the food security and grain self-reliance issues. Despite the successful reforms in agriculture and opening-up of the country from 1978, the food security remains one of the major concerns of the Chinese government, a fall of grain production is enough to revive its worries about food security. As declared the former vice Prime-Minister, Yao Yilin, "The changes in Chinese grain policy depends essentially on the per capita grain production" (Yao, 1988). For instance, a stagnation of grain production during 1985-1987 led the government to readjust in 1989-1990 the cropping structure by an increase of grain share in sown area.

This short-sighted grain policy can play a role in agro-industrial diversification decision in the way that agriculture can't be abandoned in rural China, at least at provincial level. As illustrated by Rozelle and Boisvert (1994), even in the counties where rural industry prospered, it's imperative to fulfil grain procurement quotas. Therefore, at provincial level, the specialisation in rural industry is not politically feasible, even though the marginal utility in agriculture is lower than that in rural industry and that agriculture is risky. In this case, there is always a diversification situation, that's to say,  $L_{ii} > 0$  and  $L_{ia} > 0$ .

In summary, the agro-industrial diversification can be interpreted as a response to agricultural income risks and to institutional changes in a period of transition from the planned economy to a market economy. Hence, the diversification factors can be summarized in the following function:

$$Divia = D(W, I, R, S)$$

where *Divia* is the agro-industrial indicator measured in terms of employment; *W* represents relative return of two sectors; *I* is the vector of institutional variables such as ownership evolution of rural enterprises; *R* denotes risks of agricultural income and risk related factors as wealth; and finally, *S* is the vector of structural variables reflecting local natural and economic conditions such as degree of trade openness and demographical pressures. The function will be estimated with a provincial panel data we will describe in detail in the next section.

#### **4. Data and variables**

For empirical analyses, we use a panel data set of 28 provinces from 1985 to 2001. Due to the lack of consistent data series, the Tibet is excluded from the data base and the Hainan province is consolidated together with the Guangdong province for Hainan obtained a province status only after 1988. The data come from the officially published yearbooks of

China: *China Statistical Yearbook*, *Township and Village Enterprises Yearbook of China*, *Rural Statistical Yearbook of China*, *China Statistical Yearbook of Price and Urban Household Income and Expenditure*, *China Regional Economy: A Profile of 17 years of Reform and Opening-up* and *Comprehensive Statistical Data and Materials on 50 years of New China*. Using these data, a series of variables are constructed for the estimation of our agro-industrial diversification model.

#### *Dependent Variable*

*Divia* : the agro-industrial diversification indicator measured by the share of rural industry in rural total employment.

#### *Relative return variable (W)*

*Salair* : the ratio between TVEs worker's average wage<sup>7</sup> and agricultural average salary, which measures relative financial attractiveness of the two sectors for rural residents.

#### *Institutional Variables (I)*

Three indicators are constructed to reflect the evolution of institutional environment in both rural industry and agriculture.

*privcol* : the ratio between the private enterprises and TVEs in terms of employment, which is a measurement of ownership evolution within rural enterprises.

*Tailr* : the relative size of private enterprises relative to the size of TVEs in terms of employee number per enterprise, introduced to capture scale effect and changes of government policy on rural private enterprise's size.

*Pgrain* : the arithmetic average of per capita grain production of the two preceding years which is a proxy of government's grain policy and its sensibility about food security.

#### *Agricultural risk Variables (R)*

Two risks which have important impact on agricultural income instability are introduced into our specification, one is production side risk, climatic risks, and the other is the price volatility of agricultural products.

*Calas*: the ratio between the sown area seriously hit by natural calamities with a yield loss of no less than 30 percent compared with the yield of a normal year, and the total agricultural sown area. This indicator measures the extent of natural disasters.

*Vpfood* : the retail price variability of agricultural products, measured by absolute percentage variation of price index in comparison with the preceding year<sup>8</sup>.

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<sup>7</sup> For the reason that wage data for all rural enterprises are not available, we use TVEs' wage which is a good proxy for the whole rural industry to the extent that in many localities, the TVEs' wage serves as a reference for wage setting of private enterprises.

<sup>8</sup> Other price volatility indicators are also constructed, such as variability of state agricultural procurement price, and instability of arithmetic average of retail price and procurement price. These indicators give similar results, so, only the results of *vpfood* variable are presented here.

In addition, two variables representing rural household wealth are also introduced into our model to control the existence of other ex post risk-coping mechanisms.

*Epar* : the saving ratio of an average rural resident, obtained by the following formula : (income-expenditures)/income.

*Anitrait* : the number of draught animals per household. The square of this variable,  $anitrait^2$ , is also introduced into the function in order to capture a possible non-linear relation between diversification and wealth.

*Provincial structural variables(S)*:

*Mci*: the multiple cropping index of arable land, which reflects agronomic conditions of each province and the intensity of agricultural land use.

*Rail* : the railway density variable obtained by dividing the length of railway by the total area of the province. This indicator measures infrastructure development level of a province.

*Densa* : the rural population density index, as the ratio between rural population and the area of the province, which should reflect rural demographic pressure over land.

*Open* : the trade openness indicator which is the ratio between the trade value (import +export) and the province's GDP.

*Educ* : the average number of education years of rural labour force, an indicator of human capital.

*Dum8991* : the dummy variable for the retrenchment period of 1989-1991.

Table 7 presents the descriptive statistics of all variables<sup>9</sup>.

## 5. Estimation results and interpretation

The panel data estimation method allows us to control unobservable and time-invariant factors of each province. The Breusch-Pagan test confirms the significant existence of the individual effect of provinces. In addition, the Hausman specification test indicates that the fixed-effect model is preferred to the random-effect model. In all estimated specifications, all explanatory variables are lagged by one period under the hypothesis that the agro-industrial diversification decision is made at the beginning of the year given the information set available at the end of the preceding year. Besides, this treatment has an advantage of reducing endogeneity problem but at the cost of one year observation loss. Hence, our data set starts effectively from 1986 instead of 1985 to 2001, a period of 16 years.

The estimation results are presented in Table 8. The model explains nearly the half of variations in the agro-industrial diversification. The explicative power of the model is satisfactory, if we take into account the omission of many uncontrollable factors influencing agro-industrial diversification in rural China. Most variables are significant at the usual threshold of 5 percent with the expected sign.

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<sup>9</sup> Variables measuring rural household characteristics such as family size and dependency ratio, as well as a set of interactive variables between risk and institutional factors, are introduced into our specifications, but none of them has a significant effect on agro-industrial diversification. Therefore, these variables are not presented here.

Firstly, it seems that the relative return is an important criterion of the activity choice, since the relative wage between rural industry and agriculture (*salair*) is significantly positive (Regression 1). An increase of wage in rural industry compared with agricultural wage will lead to a reallocation of labour resource from agriculture to rural industry. In addition, this result provides a piece of evidence that with the reduction of administrative restrictions on labour use and the development of labour market in rural China, the decision of labour allocation across activities is increasingly made on the basis of economic criteria such as relative profitability of activities.

Our estimation results confirm the important role of institutional factors in rural agro-industrial diversification. The ownership evolution indicator (*privcol*) has a positive and very significant effect (at 1 percent in all of the three regressions) on the diversification from agriculture to rural industry. As we argued in the section 3, the private enterprises have become the most dynamic element of the rural enterprises and the main contributor of non agricultural employment in rural area since 1990. This variable also reflects indirect effects of some institutional factors like changes of government attitude toward private enterprises and the development of market system. With these institutional changes, an increasing freedom is offered to rural residents to allocate the labour resource across different activities according to economic criterion determined by market mechanisms. As far as the relative enterprise size (*tailr*) is concerned, the increase of private enterprise size compared with TVE size has some positive effect (significant only at 10 percent) on the agro-industrial diversification. It seems that an increase of size of the private enterprises allows to take advantage of scale economies. Additionally, this increase of relative size means a reduction of government's restrictions on the size of private enterprises whose maximum employee number was strictly controlled, especially in the 1980s. This result gives some justification to a recent government policy aiming at bolstering large private enterprises in order to sustain the prosperity of rural industry.

The positive and significant sign of grain policy indicator (*pgrain*) shows that even during the reform period, the government remains watchful on the food security issue. A fall of per capita grain production in two consecutive years will lead the government to re-emphasize grain production by an increase of compulsory procurement quota and a reallocation of productive resources, including labour force, from rural industry back to the agriculture, and vice-versa. For example, the grain production stagnation after 1984 induced the government to reintroduce the administrative measures in order to maintain agricultural production at the expense of rural industry during the subsequent period of 1989-1991. Besides, the harmful effect of reform reversal in 1989-91 is confirmed by a significant and negative sign of the dummy variable for this period (*dum8991*) (Regression 2). As a result of a widespread closedown of rural enterprises during 1989-1991, several millions of rural enterprise employees returned to the agriculture.

Moreover, risk factors enter extensively into the activity choice decision, as shows the significantly positive sign of agricultural risk variables. An increase of climatic risks (*calas*) induces a greater diversification from agriculture to rural industry. The price variability of agricultural products (*vpfood*) has a more pronouncing positive effect than climatic risks, it's significant at one percent in all three regressions while the climatic risks are not significant at 5 percent in the regressions 2 and 3. This difference in terms of robustness can be explained by the fact that the variability of price has a more direct effect on agricultural income than climatic risks whose effect goes through the yield instability. In brief, the work in rural enterprises, which generates a relatively stable monthly cash income, constitutes hence an effective mechanism to cope with the agricultural income risks.

Meanwhile, the wealth affects diversification decision in both positive and negative directions. On one side, the saving ratio (*epar*) has a negative and significant effect (Regression 2 and 3) on agro-industry diversification. This result is consistent with the thesis that an increase of the wealth, especially savings, an ideal financial asset for consumption smoothing owing to its perfect liquidity, reduces the necessity of risk protection by activity diversification, if risk aversion is decreasing in wealth. On the other side, the wealth can release the liquidity constraints of rural households and thus enable them to undertake a more lucrative non-agricultural activity for which entry barriers are often high (Barrett *et al.*, 2001; Woldenhanna and Oskam, 2001). The positive and highly significant sign of draught animal variable (*anitrait*) supports this thesis. As the draught animals are an important productive asset in rural area, this variable reflects somewhat the financing ability of rural households. In addition, a negative and significant sign of the square of draught animals shows a inverted U form relation between the wealth and the diversification (Regression 1). This non-linearity means that the wealth at its low level favours the diversification out of agriculture by lowering entry barriers of non agricultural activities, but beyond a certain threshold level, it reduces the diversification necessity. This negative effect can also be explained by the fact that a very high number of draught animals facilitates the specialisation in agriculture such as in husbandry. According to the coefficients given by the Regression 1, the turning point lies at 1.82 animals per household, largely above the sample mean, 0.59 animal per household. Consequently, for most rural households, especially the poor, the wealth facilitates entrance into non-agricultural activities. In order to assess the overall impact of the wealth on the diversification, we carry out a contribution decomposition analysis for the variables of Regression 2. The decomposition results show that at the mean values of explanatory variables, the positive contribution of draught animals, which explains 15.3 percent of predicted evolution of agro-industrial diversification, is 4 times of the negative effect (4.1 percent) contributed by the saving ratio. Therefore, at the global level, positive effect of the wealth on diversification prevails over its negative effect.

Finally, the agro-industrial diversification is also found to be dependent on structural variables. The multiple cropping index affects negatively the diversification out of agriculture for the reasons that a favourable agronomic condition induces a specialisation in agriculture, and that a high land use intensity retains a substantial amount of labour in the agriculture during the whole year and leaves little labour availability for non-agricultural activities. The positive impact of the railway density (*rail*) implies that a developed infrastructure system contributes to rural industry development by reducing transaction costs and reinforcing rural-urban connexions. The population density (*densa*) is another factor which pushes rural surplus labour to seek a job outside the agriculture in order to relieve high demographic tensions on the limited land resources. The trade openness (*open*) has a expected positive effect implying that the opening-up to international trade bolsters rural enterprises who have been very active participants of international trade since the early age of their development in the 1980s. These two last variables explain why rural enterprises emerged firstly in the populous coastal region highly opened to foreign trade, such as Guangdong, Zhejiang and Jiangsu provinces. In the end, the Regression 3 sheds some light on the significant and positive role of rural labour force education (*educ*)<sup>10</sup>. This means that rural industry requires more educated labour than the agriculture, and education is a significant entry barrier to non agricultural activities in rural China.

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<sup>10</sup> The introduction of the education variable reduces three years of observation since the education data are available only from 1988.

Lastly, the decomposition analysis according to the coefficients of the Regression 1 allows us to assess the relative importance of the four categories variables examined in our model. At the mean values, the relative return explains 7.3 percent of predicted variations of the agro-industrial diversification. The outstanding role of risks and institutional factors is again confirmed, for these two categories of variables have a contribution of 30.1 percent and 23.3 percent respectively. The remainder 39.3 percent is computed to the structural variables.

## 6. Conclusion

Since the implement of economic reform from 1978, rural economy has experienced an irreversible diversification trend marked by a vigorous development of rural enterprises. To well understand this structural change crucial for rural employment, income and welfare, this paper examined the role of a series of factors in agro-industrial diversification, with emphasis laid on the agricultural income risks and the institutional factors. The empirical results with a provincial panel data from 1986 to 2001 confirmed our theoretic analyses under the framework of portfolio choice model, that is, the labour allocation between agriculture and rural industry is determined by relative return of the two sectors and the risk considerations. It seems that during the reform period, with the reduction of government's restrictions on labour allocation, the activity choice is based increasingly on economic criteria. Without a complete credit or insurance markets in rural China, the diversification from agriculture to rural industry serves as a good ex ante means to fight against abundant agricultural income risks. It seems the wealth has an overall positive effect on the agro-industrial diversification on lowering the entry barriers of non-agricultural activities for rural residents, in particular for the poor.

In the context of a transition economy, institutional factors are found to have an important impact on the rural economic structural changes. The evolution of rural enterprise ownership, characterized by a dramatic rise of private enterprises, ensured a rapid and sustained growth of rural enterprise and the non-agricultural employment opportunities for rural residents. However, this diversification process can be negatively affected by the government's vigilant concerns about the food security and a short-sighted grain policy.

Moreover, local economic and natural conditions affect the rural agro-industrial diversification. The demographic pressure pushes the rural residents to seek job opportunities out of the agriculture, while the multiple cropping index encourages agricultural specialisation. The foreign trade openness stimulates rural agro-industrial diversification, as the same for the infrastructure development and rural education level reducing entry cost of non-agricultural activities (Lanjouw *et al.*, 2001 ; Canagarajah *et al.*, 2001).

Ultimately, some policy implications can be drawn from the analyses. It's clear that in order to increase the incomes and to reduce income instability caused by abundant agricultural risks, it's crucial to promote the rural enterprises. Therefore, a number of measures should be carried out. First of all, the market reforms must be continued and further deepened in order to ensure a favourable institutional environment for rural enterprises. Moreover, it's important to establish and develop labour market in rural China and to reduce administrative restrictions on labour allocation so as to leave a greater role to market mechanisms. As the private enterprises are more dynamic than the TVEs since the 1990s, any discriminatory measure against private enterprises should be eliminated so that the private enterprises could compete equitably with the TVEs and the state-owned enterprises. On one hand, the governments of all levels should promote the private enterprises, especially the larges ones. On the other hand, it is time to further deepen the propriety rights reforms in the TVEs, on selling the small ones



and transforming big ones into shareholding cooperatives or stock companies. With national and international agricultural market integration, the China needs a long-term grain policy and with the recent entry to WTO, the food self-reliance policy is not necessary nor desirable. At the same time, measures should be taken to facilitate the participation of rural enterprises in international trade so as to exploit their comparative advantage of low labour cost. Finally, due to entry barriers in non-agricultural sectors, the rural diversification from the agriculture to rural industry also necessitates a favourable credit policy, an efficient non-state financial institutions in rural area, a well-developed infrastructure system and an investment in rural education.

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Table 1 Growth rate of rural enterprises

Periods	Employment			Gross output value <sup>1</sup>		
	Total	TVEs	Private Enterprises	Total	TVEs	Private Enterprises
1978-1983	2.7%	2.7%		14.7%	14.7%	
1984-1988	20.6%	5.3%	49.5%	32.5%	24.7%	62.9%
1989-1991	1.3%	0.5%	2.1%	19.2%	19.0%	19.6%
1992-1996	6.2%	3.6%	8.5%	40.9% <sup>2</sup>	36.4% <sup>2</sup>	49.1% <sup>2</sup>
1997-2001	0.1%	-10.8%	5.9%	12.4%	-0.1%	21.3%
1991-2001	3.1%	-3.4%	7.2%	24.6%	15.2%	33.9%
1984-2001	5.6%	-1.0%	13.0%	25.2%	17.8%	37.4%
1978-2001	6.9%	0.8%		24.4%	18.1%	

1 : The growth rate is computed from the constant gross output value at 1978's industrial output price.

2 : Due to the missing data of gross output value for 1996, the growth rate is calculated for the period of 1992-95.

Source : TVEY, numerous volumes.

Table 2 Number of rural enterprises (in million)

Year	Total	By ownership		In percentage (Total =100)	
		TVEs	Private Enterpri ses	TVEs	Private Enterpri ses
1978	1.52	1,52			
1979	1.48	1,48			
1980	1.42	1,42			
1981	1.34	1,34			
1982	1.36	1,36			
1983	1.35	1,35			
1984	6.07	1,86	4,20	30,7	69,3
1985	12.22	1,85	10,37	15,1	84,9
1986	15.15	1,73	13,43	11,4	88,6
1987	17.50	1,58	15,92	9,0	91,0
1988	18.88	1,59	17,29	8,4	91,6
1989	18.69	1,54	17,15	8,2	91,8
1990	18.50	1,45	17,05	7,9	92,1
1991	19.08	1,44	17,64	7,6	92,4
1992	20.92	1,53	19,39	7,3	92,7
1993	24.53	1,69	22,84	6,9	93,1
1994	18.67	1,64	17,03	8,8	91,2
1995	22.03	1,62	20,41	7,3	92,7
1996	23.36	1,55	21,81	6,6	93,4
1997	20.15	1,29	18,86	6,4	93,6
1998	20.04	1,07	18,97	5,3	94,7
1999	20.71	0,94	19,77	4,5	95,5
2000	20.85	0,80	20,04	3,8	96,2
2001	21.16	0,67	20,49	3,2	96,8

Source : TVEY, numerous volumes.

Table 3 Employment of rural enterprises (in million)

Year	(1) Total	By ownership		In percentage (Total=100)		(2) Rural total	(1)/(2) (%)
		TVEs	Private Enterprises	TVEs	Private Enterprises		
1978	28.27	28.27				306.38	9.2
1979	29.09	29.09				310.25	9.4
1980	30.00	30.00				318.36	9.4
1981	29.70	29.70				326.72	9.1
1982	31.13	31.13				338.67	9.2
1983	32.35	32.35				346.90	9.3
1984	52.06	39.82	12.24	76.5	23.5	359.68	14.5
1985	69.79	43.27	26.52	62.0	38.0	370.65	18.8
1986	79.37	45.41	33.96	57.2	42.8	379.90	20.9
1987	88.05	47.18	40.87	53.6	46.4	390.00	22.6
1988	110.07	48.94	61.13	44.5	55.5	400.67	27.5
1989	93.67	47.20	46.47	50.4	49.6	409.39	22.9
1990	92.65	45.92	46.72	49.6	50.4	420.10	22.1
1991	96.09	47.67	48.42	49.6	50.4	430.93	22.3
1992	106.25	51.76	54.49	48.7	51.3	438.02	24.3
1993	123.45	57.68	65.78	46.7	53.3	442.56	27.9
1994	113.30	58.99	54.31	52.1	47.9	446.54	25.4
1995	128.62	60.61	68.02	47.1	52.9	450.42	28.6
1996	135.08	59.53	75.55	44.1	55.9	452.88	29.8
1997	130.50	53.27	77.24	40.8	59.2	459.62	28.4
1998	125.37	48.29	77.08	38.5	61.5	464.32	27.0
1999	127.04	43.69	83.35	34.4	65.6	468.97	27.1
2000	128.20	38.33	89.87	29.9	70.1	479.62	26.7
2001	130.86	33.72	97.13	25.8	74.2	482.29	27.1

Source : TVEY, numerous volumes.

Table 4 Gross output value of rural enterprises (in billion)

Year	(1) Total	By ownership		In percentage (Total=100)		(2) Agricultural output	(1)/(2)
		TVEs	Private Enterprises	TVEs	Private Enterprises		
1978	49.51	49.51				139.7	0.35
1979	55.23	55.23				169.76	0.33
1980	66.51	66.51				192.26	0.35
1981	73.67	73.67				218.06	0.34
1982	84.63	84.63				248.33	0.34
1983	100.79	100.79				275.00	0.37
1984	169.78	145.38	24.40	85.6	14.4	321.41	0.53
1985	275.50	207.36	68.14	75.3	24.7	361.95	0.76
1986	358.33	255.63	102.70	71.3	28.7	401.3	0.89
1987	494.56	335.76	158.80	67.9	32.1	467.57	1.06
1988	649.57	436.27	213.30	67.2	32.8	586.53	1.11
1989	840.28	558.32	281.96	66.4	33.6	653.47	1.29
1990	958.11	625.38	332.73	65.3	34.7	766.21	1.25
1991	1167.75	773.09	394.66	66.2	33.8	815.7	1.43
1992	1765.97	1177.65	588.32	66.7	33.3	908.47	1.94
1993	3177.69	2042.15	1135.54	64.3	35.7	1099.55	2.89
1994	4537.85	3066.61	1471.24	67.6	32.4	1575.05	2.88
1995	6891.52	4171.13	2720.39	60.5	39.5	2034.09	3.39
1996	7649.59 <sup>a</sup>					2235.37	3.42
1997	8990.06	4384.41	4605.65	48.8	51.2	2378.84	3.78
1998	9669.37	4329.77	5339.59	44.8	55.2	2454.19	3.94
1999	10842.61	4278.90	6563.71	39.5	60.5	2451.91	4.42
2000	11615.03	4027.85	7587.18	34.7	65.3	2491.58	4.66
2001	12604.69	3837.84	8766.85	30.4	69.6	2617.96	4.81

a. The gross output value of 1996 is obtained by multiplying 1995's output value by a growth rate of 11% , the average growth rate for the period of 1995-2000. (TVEY, 2001).

Source : TVEY, numerous volumes.

Table 5 Added value of rural enterprises (in billion)

Year	(1) Total	By ownership		In percentage (Total=100)		(2) National GDP	(1)/(2) (%)
		TVEs	Private Enterprises	TVEs	Private Enterprises		
1995	1459.52	935.88	523.64	64.1	35.9	5847.81	25.0
1996	1765.93	1025.85	740.08	58.1	41.9	6788.46	26.0
1997	2074.03	1004.94	1069.10	48.5	51.5	7446.26	27.9
1998	2218.65	997.13	1221.51	44.9	55.1	7834.52	28.3
1999	2488.26	991.33	1496.93	39.8	60.2	8206.75	30.3
2000	2715.62	942.49	1773.14	34.7	65.3	8944.22	30.4
2001	2935.64	911.78	2023.86	31.1	68.9	9593.33	30.6

Source : TVEY, numerous volumes.

Tableau 6 Regional disparities in rural enterprise development (in percentage)

Year	Employment			Gross output value		
	coast	centre	west	coast	centre	west
1982	61.8%	27.5%	10.6%			
1983	61.9%	27.4%	10.8%			
1984	59.7%	28.6%	11.7%			
1985	53.2%	32.5%	14.3%			
1986	53.0%	32.2%	14.8%			
1987	53.2%	31.9%	14.9%	64.6%	25.5%	9.8%
1988	52.7%	32.3%	15.0%	66.8%	23.8%	9.4%
1989	51.9%	33.0%	15.1%	66.2%	24.8%	9.0%
1990	51.7%	32.8%	15.5%	66.0%	24.6%	9.3%
1991	51.6%	32.9%	15.5%	66.5%	24.0%	9.5%
1992	51.6%	32.7%	15.6%	68.3%	22.9%	8.8%
1993	50.5%	33.5%	16.0%	67.7%	23.3%	9.0%
1994	53.9%	33.8%	12.3%	69.0%	23.8%	7.2%
1995	51.0%	32.6%	16.5%	64.3%	25.4%	10.3%
1996	50.2%	35.7%	14.1%	na <sup>1</sup>	na <sup>1</sup>	na <sup>1</sup>
1997	49.5%	35.4%	15.1%	61.0%	30.2%	8.9%
1998	51.3%	33.6%	15.1%	62.7%	28.5%	8.8%
1999	51.8%	34.2%	14.0%	63.3%	28.0%	8.7%
2000	51.4%	33.9%	14.7%	64.4%	26.4%	9.2%
2001	52.4%	32.6%	15.0%	66.6%	23.8%	9.5%

Note : The coastal region includes 12 eastern provinces : Beijing, Tianjin, Hebei, Liaoning, : Shanghai, Jiangsu, Zhejiang, Fujian, Shandong, Guangdong, Guangxi, Hainan ; The Centre : Shanxi, Inner Mongolia, Jilin, Heilongjiang, Anhui, Jiangxi, Henan, Hubei, Hunan ; The western region (without Tibet): Sichuan, Guizhou et Yunnan, Shaanxi, Gansu, Qinghai, Ningxia and Xinjiang.

1. The data are not available for 1996.

Source : TVEY, numerous volumes.



Table 7 Descriptive statistics of the variables

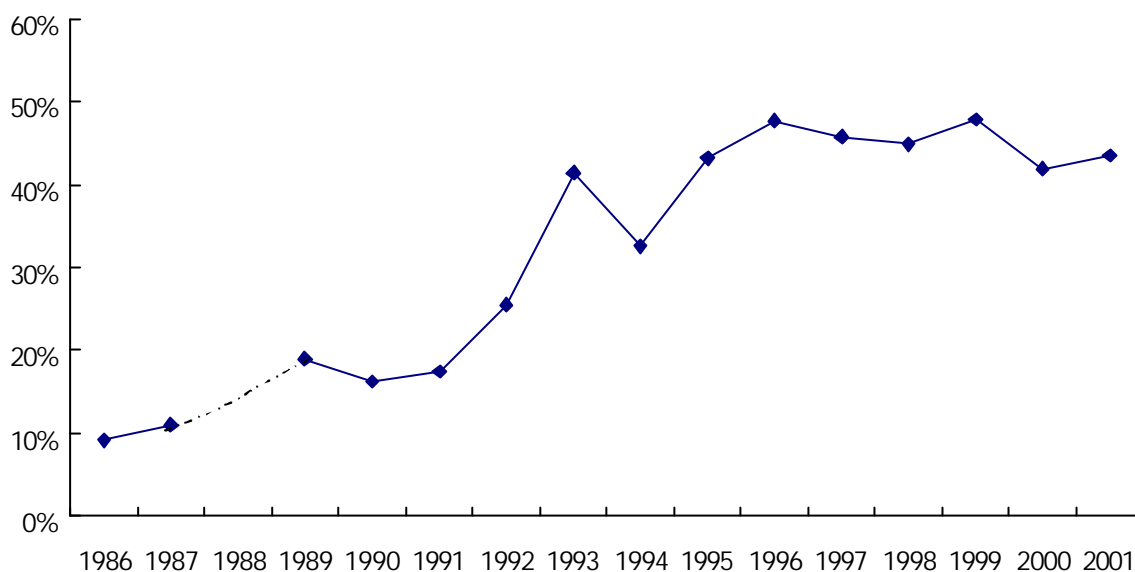
Variables	Observation	mean	Standard Error	Min	Max
Divia	560	0.26	0.16	0.02	0.83
Salair	474	0.86	0.22	0.32	1.74
Privcol	501	1.60	1.37	0.00	11.07
Calas	605	0.21	0.13	0.00	0.68
Vpfood	475	0.11	0.10	0.00	0.41
Tailr	500	0.10	0.05	0.02	0.64
Pgrain	670	0.05	0.02	0.02	0.17
Epar	662	0.18	0.10	-0.28	0.48
Anitrait	473	0.59	0.41	0.00	2.13
Mci	670	0.01	0.01	0.01	0.03
Rail	661	0.02	0.05	0.00	0.39
Densa	671	0.02	0.02	0.00	0.08
Open	664	0.16	0.24	0.00	1.87
Educ	391	6.20	0.83	3.58	7.98

Tableau 8 Estimation results

Dependent Variable : <i>divia</i> , the agro-industrial diversification			
Variables	Regression 1	Regression 2	Regression 3
Salair1	0.04 (2.28) <sup>1</sup>	0.04 (2.05)	0.04 (1.90)
Privcoll1	0.04 (10.20)	0.04 (10.53)	0.03 (8.15)
Tailr1	0.11 (1.89)		
Pgrain1	0.82 (2.81)	0.66 (2.29)	0.77 (2.02)
Calas1	0.05 (2.00)	0.05 (1.80)	0.05 (1.62)
Vpfood1	0.11 (3.82)	0.10 (3.64)	0.11 (3.54)
Epar1		-0.09 (-2.45)	-0.11 (-2.24)
Anitrait1	0.25 (4.72)	0.11 (4.74)	0.10 (3.47)
Anitrait1 <sup>2</sup>	-0.07 (-3.32)		
Mci1	-3.39 (-2.38)	-3.34 (-2.31)	-2.64 (-1.48)
Rail1	1.00 (2.62)	0.95 (2.51)	0.35 (0.73)
Densa1	4.72 (2.71)	4.31 (2.53)	4.14 (1.93)
Open1	0.15 (6.34)	0.14 (5.81)	0.17 (4.18)
Educ1			0.03 (2.09)
Dum8991		-0.03 (-4.42)	
Constant	-0.10 (-1.72)	0.01 (0.11)	-0.16 (-1.70)
Observations	443	444	360
R <sup>2</sup> within	0.45	0.46	0.39
Method	Fixed effect	Fixed effect	Fixed effect

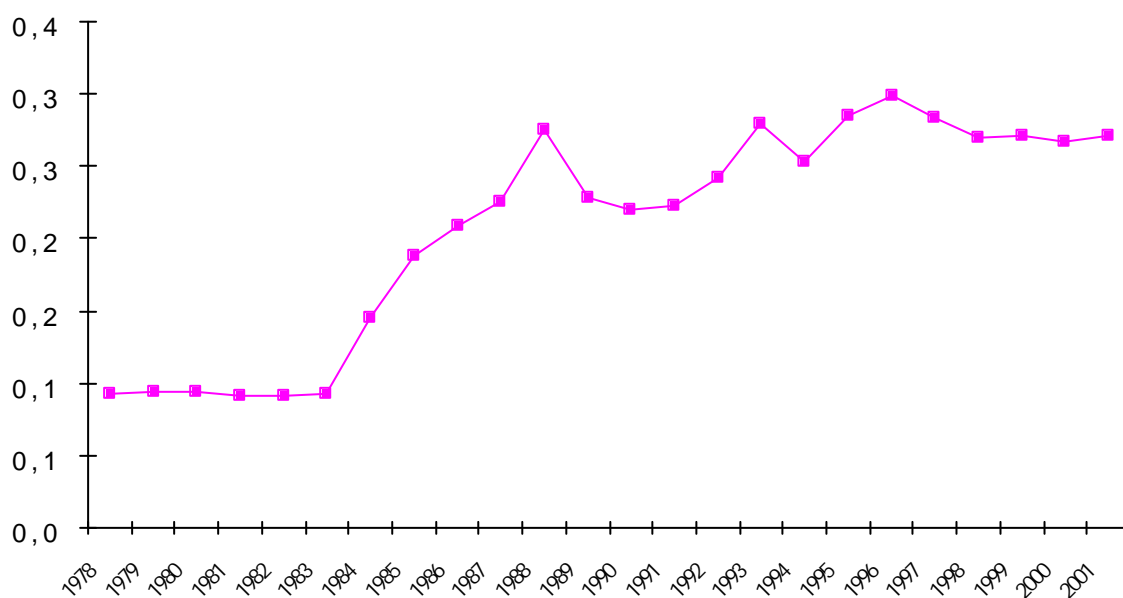
(1) : The T-Student values are in brackets.

Figure 1 Evolution of the share of rural enterprises in national total export



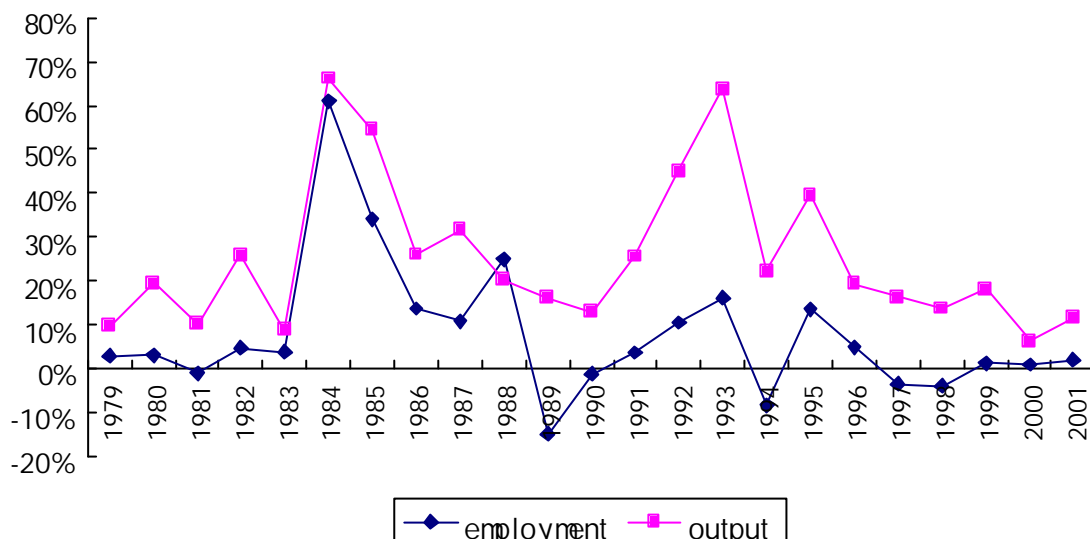
Source : TVEY, numerous volumes.

Figure 2 Evolution of the share of rural enterprises in rural total employment



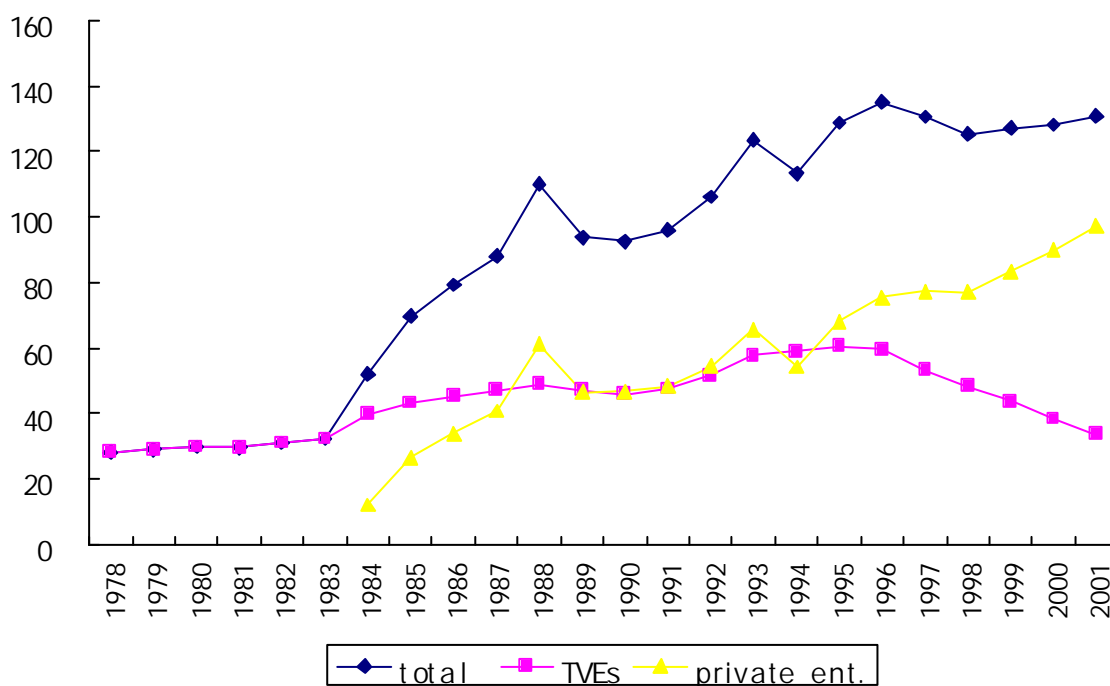
Source : TVEY, numerous volumes.

Figure 3 Annual growth rate of rural enterprises



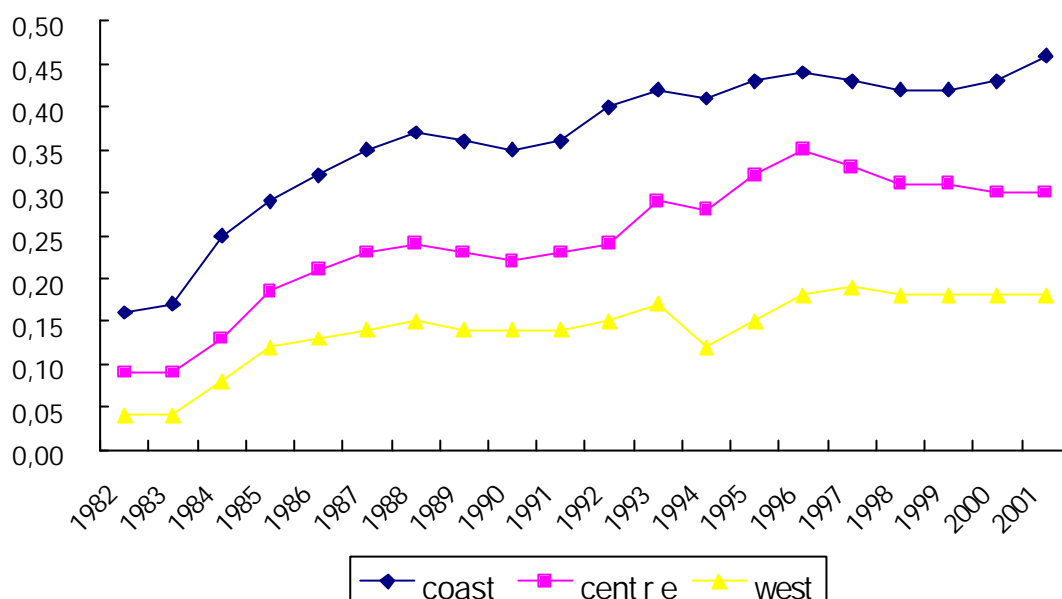
Source : TVEY, numerous volumes.

Figure 4 Employment of rural enterprises by ownership



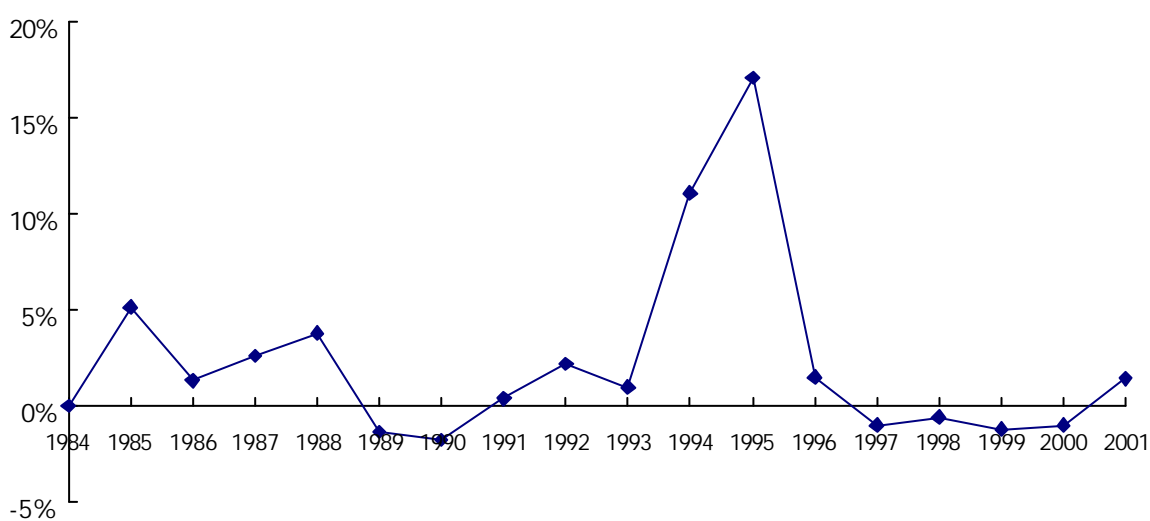
Source : TVEY, numerous volumes.

Figure 5 Agro-industrial Diversification: regional disparities



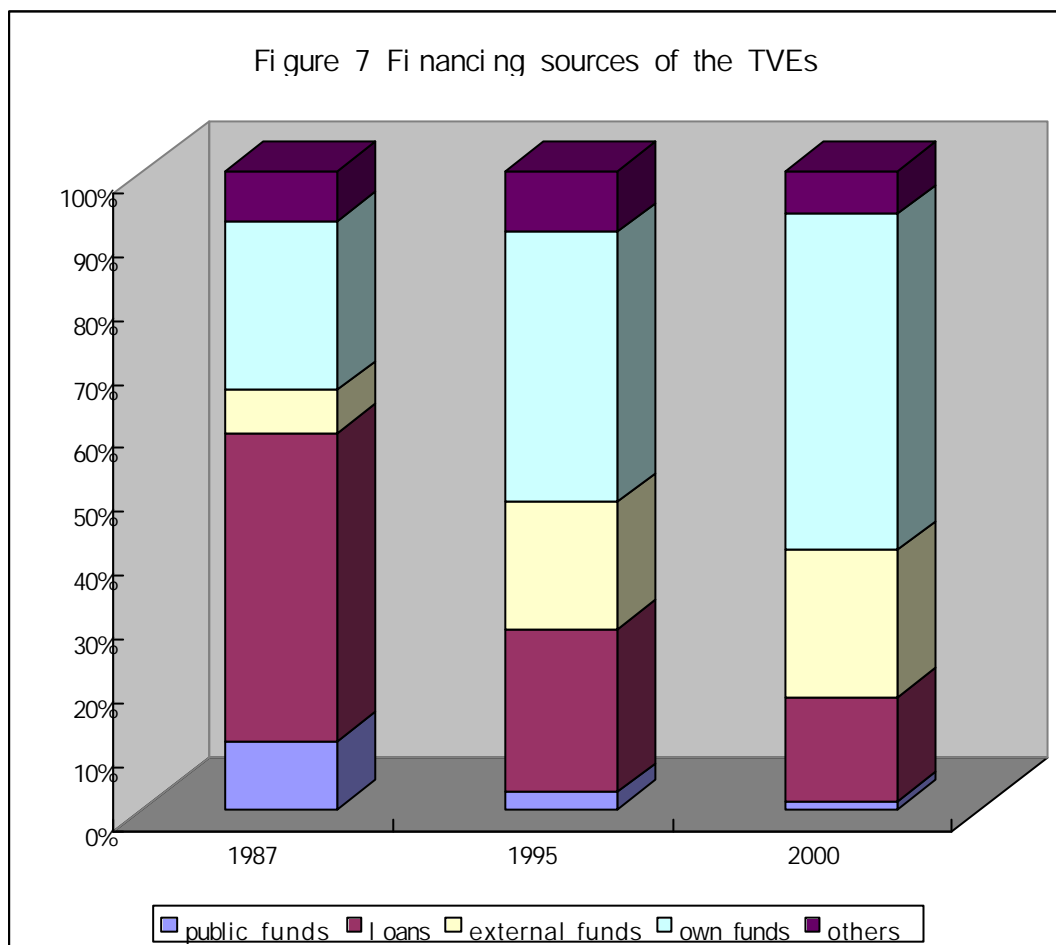
Source : TVEY, numerous volumes.

Figure 6 Fluctuations of agricultural products retail price index



Note : The real growth rate compared with the preceding year.

Source : China price yearbook, numerous volumes.



Source : TVEY, numerous volumes.