# Agriculture change in the Hebei Province (China): a capitalist agriculture at the stage of overcoming the land constraint

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IRSA XI World Congress of rural sociology
RC-40 Working Group: "From Peasant Agronomy to capitalist/Industrial agriculture"
July 25-30, 2004 Trondheim, Norway

Abstract

After a long period of collective production, the Chinese agriculture underwent a dramatic change in 1978 which liberalized significantly the agricultural production. In the implementation of the "responsibility system", farmers were ensured of the right of using land with a distribution procedure based upon the family size. A recent survey in the Province of Hebei (Northern China) provides updated information on the current situation of the agriculture which might be valid in many other provinces. The process of liberalization engaged for a quarter of century enabled the farmers to achieve a generalized and high level of mechanization/motorization. Most cultural operations are now mechanized or motorized in farms whose holding size remains tiny. Such a mechanization level requires less labor commitment while more incomes are needed to pay the investment engaged. All farms are committed in off-farm activities, although the wives of the farm heads are seldom concerned, but farmers' total incomes remain relatively low. The farm size is nevertheless growing up, thanks to the running of an officious land market to which few farmers are benefiting. With regard to some economic indicators, farms having access to additional land demonstrate better performance. This observation sustains the justification of the recent policy of authorizing land exchanges and sales. As this measure would not help all farms to increase significantly their holding size, complementary measures are needed to preserve the farms' viability. The assistance to farmers in committing themselves in high added value activities should be considered.

Keyword : China, land, family agriculture, income, policy

## Introduction

In 1978, China set up a new agriculture reform consisting in shifting from a collective agriculture to a family-based individual agriculture through the implementation of the Responsibility system. This shift is now well documented even out of China and it is considered to be at the origin of a dramatic productivity progress in the agriculture sector (Findlay, et al., 1993, Harrold and Lall, 1993, Huang, 1993, Dong and Qing, 1994, Nygaard, 1995, Walder, 1996, Whyte, 1996, Zhang, 1996, Zhao, 1997, Gale, et al., 2002). During the 1978-1997 period, the Chinese economy was subjected to a dramatic global growth and a change in its structure. The agriculture sector declined (Calow, 1993) and it accounted for less than 15% to the GDP in 2003. Within this trend of relative decline of the agriculture, it makes sense to clarify how the farm structure is evolving, how capitalized farming is and to what extent the farming activities can help family agriculture remains viable (Goodland, 1993).

A recent survey in Hebei Province, in the Yellow River Valley and located in the North close to Beijing the capital, provides data to capture an insight that might be valid for many rural areas since this Province is representative in many terms (average farm size, share of rural population…etc.). This survey was basically implemented to assess the adoption of Genetically Modified Varieties (GMVs) of cotton since Hebei Province is traditionally producing cotton, it accounted significantly to the national production before its decline resulting from the phenomenon of resistance of a cotton pest to some insecticides[1] against which GMVs were introduced.

The data from the survey point out that the Chinese agriculture remains a family one. The average farm tenure size remains tiny but is slightly growing. The conduct of the farm activities no longer requires full-time commitment from the family members owing to the somewhat high degree of mechanization and to the intense recourse to input use that may help save labor: unveiling the capitalized feature of the current Chinese agriculture. All farms are concerned by off-farm activities the whole year, but the wives of farm-holdings heads are seldom involved. The off-farm activities contribute significantly to the income of the farm families but the income from agriculture remains nevertheless dominant. The farming income relies mainly upon crop productions. The average level of the farmers' income remains low, as compared to the income of urban populations and the gap keeps on widening. The access to rented land helps to improve the income from agriculture but only few farmers actually benefit.

After a short introduction on the implemented survey the third section deals with the farm structures and the farm activities. The real access the farmers have to various markets, the intensification level and the strong commitment in off-farm activities are features which make the Chinese agriculture little representative of the developing countries' ones. The fourth section analyses to what extent an additional access to land can actually help to improve the farmers' livelihood.

## Main characteristics of the survey

The survey was conducted in the Hebei Province, in the Northern part of China, in the Yellow River valley. This province belongs to the locations which contributed significantly to the Chinese cotton production. The occurrence of a severe resistance of the cotton bollworm *Helicoverpa armigera* in the beginning of the 1990s has interrupted the progress of the production (Table 1). The continuation of the cotton production was threatened and challenged the search for technical solution. The Hebei Province was the first province where the commercial diffusion of Bt-cotton varieties took place and eventually led to a remarkable re-birth of the cotton production there (Fok, et al., 2004).

Table 1. evolution of the cotton production in the Hebei Province

| | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 |
|---|---|---|---|---|---|---|---|---|---|
| Hebei | 511 | 626 | 577 | 536 | 571 | 634 | 306 | 192 | 390 |
| National | 3541 | 4245 | 4149 | 3788 | 4507 | 5673 | 4510 | 3739 | 4342 |
| Production share | 14,4% | 14,8% | 13,9% | 14,2% | 12,7% | 11,2% | 6,8% | 5,1% | 9,0% |
| | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
| Hebei | 370 | 258 | 249 | 270 | 223 | 298 | 419 | 402 | |
| National | 4768 | 4202 | 4603 | 4501 | 3828 | 4417 | 5320 | 4920 | |
| Production share | 7,8% | 6,1% | 5,4% | 6,0% | 5,8% | 6,7% | 7,9% | 8,2% | |

The survey was conducted with the aim of capturing the farmers' cultivation practices and the economic results in using the Genetically Modified Varieites (GMVs) of cotton in connection with the farm structures, their command in the chemical control with reference to pest pressure, and their feelings regarding the efficiency and the sustainability of the GMV use. The survey covered seven counties in the 5 most important districts in the cotton production of the province (Cangzhou, Handan, Hengshui, Shijiazhuang and Xingtai). One village was

[1] Resistance of the cotton pest, *Helicoverpa armigera*, or American Bollworm, to pyrethroid-based insecticides.

selected per country with one exception (2 villages in the county of Feixiang). In spite of the rapid adoption of the GMVs in Hebei Province, the farmers of some villages have more background in using these varieties. This is the case of the farmers in the areas selected for the seed multiplication of the American varieties. The characteristics of the survey are summarised in.

Table 2. Villages of the survey

| District | County | Village | Number of farms |
|---|---|---|---|
| Cangzhou | Hejian | Fang Ya | 26 |
| HanDan | Feixiang | XiJing Ke | 30 |
| HanDan | Feixiang | ShiJiaBao | 33 |
| HengShui | Jingxian | DaWangZhuang | 26 |
| HengShui | Shenzhou | Sun Zhuang | 25 |
| HengShui | Wu Yi | XiGuan | 38 |
| ShiJia Zhuang | XiJi | LiangMianChang* | 11 |
| XingTai | guangzong | Chen Zhuang | 29 |

* seed multiplication

## Farms structures, activities and connections to markets

### *Tiny farms*

The size of the farm families fluctuates from 3.5 to 4.7 according to the villages surveyed. These families are cultivating on average 0.6 to 1.0 ha Table 3. These figures are consistent with those of recent studies in the same province (Huang, et al., 2003a). With reference to the period 1978-1997, the cultivated area per capita globally increases but rather marginally in most of the villages.

Table 3. Farm sizes

| Village | Family members | Cultivated area (ha) | Cultivated area/capita 'ha) |
|---|---|---|---|
| Chen Zhuang | 4,7 | 0,9 | 0,20 |
| DaWangZhuang | 4,0 | 0,7 | 0,18 |
| Fang Ya | 4,0 | 0,7 | 0,17 |
| ShiJiaBao | 4,3 | 0,8 | 0,18 |
| Sun Zhuang | 4,0 | 0,7 | 0,17 |
| XiGuan | 3,5 | 1,0 | 0,28 |
| XiJing Ke | 4,5 | 0,6 | 0,13 |

The survey covered a total population of 844 people with some imbalance in favor of the male fraction, and which derives mainly from the youngest part of the population (Table 4). This is a singular feature that other studies yet pointed out[2].

[2] A reason could be associated to the implementation the policy of rural family planning: if the first child of the farmer couple is a boy, they are not allowed to have another child; while if the first child of the couple is a girl, then they are allowed to have one more child. But this reason might not be sufficient to explain the imbalance observed.

Table 4. Farms demography (number of people in farms)

| Age | Female | Male | All |
|---|---|---|---|
| ≤5 | 14 | 9 | 23 |
| ≤10 | 18 | 32 | 50 |
| ≤15 | 43 | 40 | 83 |
| ≤20 | 60 | 69 | 129 |
| ≤25 | 55 | 67 | 122 |
| ≤30 | 18 | 21 | 39 |
| ≤35 | 35 | 31 | 66 |
| ≤40 | 40 | 39 | 79 |
| ≤45 | 39 | 37 | 76 |
| ≤50 | 38 | 41 | 79 |
| ≤55 | 34 | 29 | 63 |
| ≤60 | 6 | 15 | 21 |
| ≤65 | 3 | 1 | 4 |
| ≤70 | 2 | 2 | 4 |
| ≤75 | 3 | 2 | 5 |
| >75 | 1 | | 1 |
| | 409 | 435 | 844 |

## *Individual and capitalised agriculture*

The conduct of the farming activities has become very individual. There is not any farmers' organization in dealing with the cotton activities, from sowing to harvest and commercialization, in spite of the importance of this cash crop. This is opposite to what is observed in many cotton producing countries, like in Africa, and it can be associated to the negative perception of the collective phase, before 1978, which restrained a lot the individual initiatives.

Farmers are rather well equipped with cultivation machineries (Table 5). Nearly all farmers are equipped with tractors or sowing machines but for the other machineries, only few of them have. The machineries that seem to be important individually possess, except tractor, are sowing machines and motorized sprayers.

Table 5. Significant level of mechanisation and motorization

| | Number of farmers having | Machine/farmer |
|---|---|---|
| Tractor & 3-wheel tractor | 213 | 1,0 |
| Sowing machine | 36 | 0,2 |
| Plough | 5 | 0,0 |
| Plastic film fiwing machine | 5 | 0,0 |
| Motorised sprayer | 44 | 0,2 |
| Reaping machine | 16 | 0,1 |

Nearly all the farmers declared renting machineries in addition to what they possess. Indeed, Table 6 shows that the numbers of the farms who use machineries of various types are higher than the ones who possess them. The renting service is widespread regarding the plough, the sowing and the reaping.

Table 6. A common practice of renting machineries

| | Farms having | Farms using |
|---|---|---|
| Motorized sprayer | 44 | 75 |
| Plastic film fixing machine | 2 | 2 |
| Plough | 5 | 108 |
| reaping machine | 16 | 171 |
| Sowing machine | 36 | 205 |
| Three-wheels tractor | 43 | 40 |
| Tractor | 170 | 207 |
| Stem crusher | | 3 |
| other | | 1 |

Except one of them, all farmers implemented sowing with machines. They all have sprayers for insecticide, a significant portion has motorized sprayer (at around 30% of the surveyed farms). The cost differential is high since a knapsack cost only 30 Yuan against 500 yuan for the motorized one. Most of them have sprayers for herbicides (Table 7).

Table 7. Farmers' equipment in sprayers

| | Insecticide sprayer | Herbicide sprayer |
|---|---|---|
| Number farms not having | 0 | 28 |
| Number farms having | 210 | 182 |

## *1.1. Sources of agricultural incomes and cropping system*

Crop production accounts mainly to the agricultural income of the farmers, 67% on average, although there is a great variation between the surveyed villages (Table 8). The share from non-agricultural activities could contribute significantly to the total income in some villages. It is worth noting that animal production contributes little to the total income.

Table 8. Income shares of agricultural activities

| | Chen Zhuang | DaWangZhuang | Fang Ya | LiangMianChang | ShiJiaBao | Sun Zhuang | XiGuan | XiJing Ke | Total |
|---|---|---|---|---|---|---|---|---|---|
| Crop % of total income | 77% | 43% | 50% | 92% | 76% | 79% | 54% | 84% | 67% |
| Cotton % of crop income | 95% | 33% | 46% | 85% | 46% | 68% | 26% | 76% | 55% |
| Fruit % of crop income | 2% | 1% | 1% | 0% | 0% | 0% | 3% | 0% | 1% |
| Vegetables % of crop income | 0% | 0% | 0% | 0% | 0% | 0% | 7% | 0% | 1% |
| Other crops % of crop income | 16% | 46% | 48% | 8% | 22% | 20% | 39% | 16% | 29% |
| Animal prod. % total income | 5% | 8% | 1% | 0% | 2% | 2% | 2% | 0% | 3% |

Cotton production is the main cash crop for all villages, representing 53% of the cultivated area (Table 9) but some of them have become very specialized in cotton growing, either they are involved in seed production of Bt cotton or not. Cotton, maize and wheat are the main if not exclusive crops encountered in the surveyed villages. Except for 10 farmers, wheat and maize are relayed-cropped (Table 10). There is little variation in the yield each cereal achieves either it is relayed cropped or not with another. The total yield of cereal is around 6400 kg/ha which is close to the one achieved in Europe.

Table 9. Cotton share in the cultivated areas

| | Total |
|---|---|
| Chen Zhuang | 82% |
| DaWangZhuang | 61% |
| Fang Ya | 34% |
| Liang Mian Chang | 92% |
| ShiJiaBao | 50% |
| Sun Zhuang | 49% |
| XiGuan | 50% |
| XiJing Ke | 52% |
| Total | 53% |

Table 10. Production and yield of food crops

| | | Relayed cropped | |
|---|---|---|---|
| | | No | Yes |
| maize | Total production, kg | 1021 | 1529 |
| | Yield, kg/ha | 3500 | 3364 |
| wheat | Total production, kg | 831 | 1400 |
| | Yield, kg/ha | 2969 | 2938 |
| Soyabean | Total production, kg | 320 | |
| | Yield, kg/ha | 1453 | |

## *Good connection to service provision*

The Chinese farmers are not representative of the smallholders of developing countries in terms of the access to markets. They are very connected to the market and suffer little from market imperfection as it is in many developing countries. In terms of supply of inputs, only few of them mention facing a lack of supply (Table 11). The main constraint being pointed out pertains to the lack of capital which could be interpreted as the farmers' eagerness to get involved in more economic activities. Farmers seldom suffer from any constraint in the communication network.

Table 11. The farmers' opinions according to the constraints being felt

| | Total |
|---|---|
| Lack of capital | 81 |
| lack of information | 6 |
| Lack of supply of input | 10 |
| Lack of time | 3 |
| Lack of traffic | 7 |
| weather | 4 |
| other | 1 |
| no constraint mentioned | 108 |
| Total | 220 |

The Chinese farmers have a close access to input providers. Half of them can accede physically to agricultural inputs within less than 1 kilometer (Table 12). They have the choice in the nature of the input providers. These providers may be public organisms pertaining to research implementation, extension or technical service: they account for around 40% of the total number of the transactions the farmers have with input suppliers (Table 13). The frequency of the transactions they have with private organisms specialized in input and seed supply is nearly similar. It is worth noting that there is a significant percentage of kind of exchanges betweens relatives, neighbors or other people of the villages.

Table 12. Distribution of the farmers according to their distance to their input providers

| | Number of farmers |
|---|---|
| Up to 1 km | 103 |
| 1 to 2.5 km | 43 |
| 2.5 to 5 km | 63 |
| 5 to 7.5 km | 2 |
| Total | 211 |

Table 13. Diversity of the input providers the farmers can accede to

| | Number of farmers concerned |
|---|---|
| **Transaction with Public organisms** | **267** |
| Crop protection station | 54 |
| Other services of the Department of agriculture | 62 |
| Extension service & technical staff | 96 |
| Research institute | 55 |
| **Transaction withPrivate organisms** | **293** |
| farming input company | 36 |
| Merchant | 173 |
| Seed company | 84 |
| **Other transactions** | **126** |
| Relative or neighbours | 125 |
| other | 1 |
| **Total** | **686** |

Thanks to this diversity of input suppliers, only 22% of the farmers actually obtain their farming input with only one supplier (Table 14). Some farmers can have up to 7 distinct input suppliers, but most of them limit themselves to 2-5 suppliers (60%). All farmers declare obtaining their inputs on time and they proceed totally individually without any grouping of their purchases.

Table 14. Distribution of the farmers according to their number of input suppliers

| No. Suppliers | Chen Zhuang | DaWangZhuang | Fang Ya | LiangMianChang | ShiJiaBao | Sun Zhuang | XiGuan | XiJing Ke | Total |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 8 | 17 | | 3 | | 17 | | 1 | 46 |
| 2 | 16 | 9 | 11 | 8 | | 8 | | 11 | 63 |
| 3 | 5 | | 10 | | 2 | | | 11 | 28 |
| 4 | | | | | 10 | | | | 10 |
| 5 | | | 5 | | 17 | | 2 | 1 | 25 |
| 6 | | | | | 3 | | 6 | | 9 |
| 7 | | | | | | | 29 | | 29 |
| 8 | | | | | | | 1 | | 1 |
| Total | 29 | 26 | 26 | 11 | 32 | 25 | 38 | 24 | 211 |

When asked about the reasons in retaining their input suppliers, only three reasons come out at equal level. Farmers are motivated as much as by the input price, by the convenience to obtain them and by the concern of the input quality (Table 15). It is noteworthy that the farmers are less concerned by the quality of the inputs they purchase, this could be an indication of some success in the fight[3] against the distribution of fake products which prevailed few years ago.

Table 15. Distribution of the farmers' reasons in selecting their input suppliers

| | Total |
|---|---|
| cheapness | 92 |
| convenience | 98 |
| Quality guaranty | 93 |
| Total | **283** |

All the favorable features in obtaining agricultural inputs make the Chinese farmers in far better conditions than their counterparts in most of the developing countries. In this regard, China is little comparable to developing countries and extrapolation of some positive

[3] Providers responsible of distributing fake products were fined severely and had to compensate the farmers' loss.

achievements (like in relation with the diffusion of GM varieties of cotton) would be abusive (Fok, et al., 2004). The only thing that the Chinese farmers have in common with their counterparts in the developing countries is the lack of specific input credit: they have to pay cash all of their agricultural inputs. This is an indication of the shortfall of the credit system in rural areas.

According to our survey, it is rather common for the farmers to have the plough service and the mechanical sowing being implemented on service basis (respectively 56% and 71% of the surveyed farmers). Mechanical harvest, for wheat, is also frequent on the service basis (40%). The rent fees are quite differentiated according to the service provided. They seem to be determined according to the investment level of the machines involved and to the service implementation speed (Table 16). Harvest machine is capital intensive and can most help save labor, so that the rent fee is the highest. The plough service is intermediate in the fee level for the implementation is rather low. Sowing and spraying are medium capital intensive but can be implemented rather quickly, so the rent fees are the lowest.

Table 16. Rent fees for various cultivation practices (average and standard deviation)

| | No. Of cases | Average rent fee (Yuan/mu) |
|---|---|---|
| Ploughing | 118 | 17,7 (7,3) |
| Sowing | 151 | 9,5 (2,4) |
| Spraying | 34 | 11,0 (11,8) |
| Harvest | 87 | 30,6 (3,4) |

## *Land market is taking place?*

Owing to the agricultural reform which took place in 1978 and which turned the back to the collective farming previously implemented, the farmers got the right to use land which remains the property of the State. The land use right was allocated firstly for fifteen years before being extended later on to fifty years. Meanwhile, the family structures have evolved and a significant number of rural families stopped farming leaving the land allocated to them un-farmed. This phenomenon gave rise to the set up of kind of informal land market through which some farmers obtained leased land in addition to the land for which they got the right to use (what we call in short "owned land"). In our survey, we observe that the proportion of the farmers having actually access to leased land is very variable between villages (Table 17). The farmers who get additional land from leasing may have smaller size of "owned land", but not necessarily, and which fluctuates from 0.4 ha to 0.8 ha. The size of the additional land obtained from leasing varies from 0.2 to 0.7 ha, leading to a total cultivated area of 0.7 to 1.2 ha, while this area is 0.5 to 1.0 ha for the farmers who have no additional land.

Table 17. Characteristics of the land leasing

| | %Farms having leased land | Farms with no leased land | | | Farms with leased land | | | |
|---|---|---|---|---|---|---|---|---|
| | | Area owned_land (ha) | Fee for owned land (Yuan/mu) | Total cultivated land (ha) | Area owned_land (ha) | Area leased land (ha) | Total cultivated land (ha) | Land rent fee, Yuan/mu average (std deviation) |
| Chen Zhuang | 34% | 0,8 | 36 | 0,8 | 0,8 | 0,3 | 1,2 | 141(34) |
| DaWangZhuang | 58% | 0,5 | 70 | 0,5 | 0,5 | 0,4 | 0,9 | 98(7) |
| Fang Ya | 15% | 0,7 | 40 | 0,7 | 0,5 | 0,2 | 0,7 | 40(0) |
| ShiJiaBao | 19% | 0,7 | 42 | 0,7 | 0,6 | 0,7 | 1,2 | 80(0) |
| Sun Zhuang | 8% | 0,6 | 66 | 0,6 | 0,7 | 0,2 | 0,9 | 100(0) |
| XiGuan | 0% | 1,0 | 50 | 1,0 | | | | |
| XiJing Ke | 38% | 0,5 | 50 | 0,5 | 0,4 | 0,3 | 0,7 | 200(0) |

Even for the land obtained from the State, a fee is to be paid every year, equal for all the farmers of a same village but which may vary between villages. For the additional land obtained from leasing, the rent fee is usually higher, sometimes far higher than the official one related to the allocated land. There used to be little variation within the same village, but

the variation between the villages could be very substantial: this is because of the quality/productivity of the land.

Our survey tends to confirm that an officious land market is taking place with a price regulated by the demand and the offer. This land market enables many farmers with initially more limited land size to alleviate this constraint and help other farmers to farm on more land.

## *Part-time, family but somewhat women's led agriculture*

It is not easy to assess to what extent the family members in the farms are involved in the implementation of the field works. Figures obtained from asking directly the farmers give an idea (Table 18) which is not necessarily correct since the involvement could be very occasional. Only in 8 out of the 210 farms, the wives declare not taking part to the fieldworks. Through the answer obtained regarding the decision maker in the farms, the information could be misguiding as well. Nearly all the farmers answered that the men were the decision makers but this could be a conventional answer owing to the Chinese culture. Only a small proportion of the farms claim that the women had a decision-making role, either individually or jointly with their husbands (Table 19) in spite the fact that the women had a rather significant education level (Table 20): the women seldom have not attended school, nevertheless half of them have only a primary school level. As compared to developing countries, this situation appears yet to be very positive.

Table 18. Family members involved in fieldworks (averages and std deviation)

| | No. Family members | No. Going to field |
|---|---|---|
| Chen Zhuang | 4,4 (1,2) | 3,4 (1,3) |
| DaWangZhuang | 4,0 (1,0) | 2,5 (0,7) |
| Fang Ya | 4,4 (1,2) | 2,2 (0,8) |
| LiangMianChang | 4,0 (0,0) | 2,0 (0,0) |
| ShiJiaBao | 4,1 (1,3) | 2,9 (1,0) |
| Sun Zhuang | 3,9 (1,0) | 2,1 (0,3) |
| XiGuan | 3,5 (0,6) | 2,2 (0,6) |
| XiJing Ke | 4,2 (0,9) | 2,6 (0,8) |

Table 19. Mode of decision making in the farms

| Decision making mode | No. Of farms concerned |
|---|---|
| Collectively | 29 |
| By the House head | 165 |
| By the Wife | 17 |
| Total | 211 |

Table 20. Distribution of the farmers' wives according to their school education

| Involved_in_field | Not attended school | Primary school | Secondary school | high school | Total |
|---|---|---|---|---|---|
| No | 1 | 4 | 2 | 1 | 8 |
| Yes | 9 | 111 | 73 | 9 | 202 |
| Total | 10 | 115 | 75 | 10 | 210 |

The women are involved in all fieldworks but they have a balanced view on the evolution of their field workload. What makes the difference with the other family members is the involvement in off-farm activities. Most of the farms have only one member involved in such activities (Table 21). There is only a small minority of farms with no people involved in off-farm activities, and when they are, these activities seldom concern women (Table 22).

Table 21. Distribution of the farms according to the number of family members involved in off-farm activities

| Village | Farms having members with off-farm activities | | |
|---|---|---|---|
| | one member | two members | Total |
| Chen Zhuang | 28 | 1 | 29 |
| DaWangZhuang | 22 | 4 | 26 |
| Fang Ya | 18 | 3 | 21 |
| LiangMianChang | 3 | | 3 |
| ShiJiaBao | 20 | 8 | 28 |
| Sun Zhuang | 23 | 2 | 25 |
| XiGuan | 35 | 3 | 38 |
| XiJing Ke | 22 | 2 | 24 |
| **Total** | **171** | **23** | **194** |

The farmers' involvement in the off-farm activities is rather continuous. All along the year, the people involved in these activities are concerned for around 85% of them, either for the farms' heads or for their sons (Table 23).

Table 22. Women are seldom involved in off-farm activities

| Village | Family members involved in off-farm activities | | | | |
|---|---|---|---|---|---|
| | House head | Wife | Children | none | Total |
| Chen Zhuang | 6 | 1 | 9 | 14 | 30 |
| DaWangZhuang | 17 | | 12 | 1 | 30 |
| Fang Ya | 12 | | 11 | 1 | 24 |
| ShiJiaBao | 23 | | 13 | | 36 |
| Sun Zhuang | 9 | 1 | 10 | 7 | 27 |
| XiGuan | 23 | 2 | 13 | 3 | 41 |
| XiJing Ke | 17 | 1 | 3 | 5 | 26 |
| **Total** | **107** | **5** | **71** | **31** | **214** |

Table 23. Frequency of the off-farm activities

| Off-farm period calendar month | No. Of farms according to the Family members involved | | |
|---|---|---|---|
| | Husband | Son | Wife |
| 1 | 70 | 51 | 1 |
| 2 | 72 | 55 | 3 |
| 3 | 94 | 77 | 4 |
| 4 | 94 | 75 | 4 |
| 5 | 82 | 68 | 4 |
| 6 | 60 | 58 | 3 |
| 7 | 81 | 67 | 5 |
| 8 | 84 | 71 | 5 |
| 9 | 83 | 73 | 6 |
| 10 | 77 | 64 | 4 |
| 11 | 99 | 73 | 4 |
| 12 | 78 | 58 | 4 |

The extent of the involvement of the farmers' families in the off-farm activities leads us to point out that the farming is only getting them occupied on a part-time basis. Nearly all the farmers indicate not requiring temporary labour during the cropping season. As the women are concerned rarely by the off-farm activities, they appear to be the most permanent workers in the fields. This is a justification to claim that the farming has become mainly women-led (Fok, 2004)which is consistent with historical observation (Benjamin and Brandt, 1995).

The off-farm activities the farmers hold are mostly little qualified. Only few of them are running business on their own. Most of them are employed as manual workers or in jobs with skills they developed from their farming activities (Table 24). For this reason, although the farmers are rather strongly involved in non-agricultural activities, the income they get back is not dominant albeit significant (30%). The contribution is higher in families where two members are involved in non-agricultural activities but only a small proportion of families are in this case (Table 25).

Table 24. Types of off-farm activities

| Type of off-farm activities | Total |
|---|---|
| Businessman | 18 |
| Managing transportation | 19 |
| Carpentor | 5 |
| Construction | 30 |
| Factory worker | 19 |
| Farm machine drivers | 11 |
| Security guard | 2 |
| Temporary jobs | 50 |
| Other | 20 |
| Total | 174 |

Table 25. Contribution of off-farm activities to the farmers' total income

| | Number of family members involved in off-farm activities | | |
|---|---|---|---|
| | 1 | 2 | Total |
| Chen Zhuang | 15% | 20% | 16% |
| DaWangZhuang | 44% | 60% | 46% |
| Fang Ya | 52% | 57% | 53% |
| LiangMianChang | 10% | | 10% |
| ShiJiaBao | 20% | 39% | 25% |
| Sun Zhuang | 17% | 50% | 20% |
| XiGuan | 37% | 67% | 39% |
| XiJing Ke | 16% | 15% | 16% |
| **Total** | 28% | 47% | 30% |

Due to the farmers families' involvement in non-agricultural activities, a differentiation of rural families is occurring at three levels: at the scale of rural area or community, there are ‘farmers’ connected at least partly to agricultural activities and rural dwellers who are not; at the household scale, there are members involved in agricultural and those who are not; at the level of a family member, he/she can be totally connected to agricultural activities or only partly (Liang, 1997). This 3-layer situation can be regarded as positive to finance accumulation both at the family level and rural area level. From this view point, the family agriculture sounds like an engine for further development in rural areas.

## Limited impact of increasing the land size to correct the income gap

### *Positive effect of acceding to more land*

The fact that some farmers have access to leased land from other families who have given up farming enables them mainly to get more specialized in the cotton growing. The area under cotton is significantly higher for these farmers (Table 26), the increase of the cotton area

ranged from 26% to 100%. This is because cotton growing is profitable in a Province where it benefits from the used of GMVs and a favorable price (Fok, et al., 2004). Consequently, the farmers who got leased land obtained higher income net of the cash expenses (Table 27). There is some variation between villages due to the extent of the farmers' specialization in growing cotton. With regard to the farmers who do not have access to leased land, the ones who have achieve similar yield but with slightly higher production cash expenses.

Table 26. Influence of leased land on cotton specialisation

| Village | Average cotton areas in farms | | Total |
|---|---|---|---|
| | without leased land | with leased land | |
| Chen Zhuang | 9,4 | 17,6 | 12,2 |
| DaWangZhuang | 2,2 | 4,4 | 3,5 |
| Fang Ya | 3,0 | 3,8 | 3,1 |
| ShiJiaBao | 3,8 | 10,5 | 5,1 |
| Sun Zhuang | 4,5 | 8,0 | 4,8 |
| XiGuan | 3,0 | | 3,0 |
| XiJing Ke | 4,8 | 6,9 | 5,6 |
| **Total** | **4,3** | **8,7** | **5,3** |

Table 27. Income from cotton production (in CNY)

| Village | Have leased land ? | | | | | |
|---|---|---|---|---|---|---|
| | No | | | Yes | | |
| | Yield | Prod_cashcost | Income_netcashcost | Yield | Prod_cashcost | Income_netcashcost |
| | kg/mu | CNY/mu | CNY | kg/mu | CNY/mu | CNY |
| Chen Zhuang | 241 (15) | 185 (12) | 7 807 (3 133) | 242 (16) | 216 (26) | 13 527 (2 617) |
| Fang Ya | 228 (17) | 221 (14) | 1 897 ( 898) | 226 (20) | 255 (92) | 2 435 (1 874) |
| ShiJiaBao | 286 (24) | 209 (24) | 3 214 (1 334) | 252 (11) | 244 (20) | 7 063 (3 665) |
| Sun Zhuang | 256 (14) | 268 (17) | 2 765 (1 227) | 277 ( 3) | 302 (2) | 5 953 ( 308) |
| XiJing Ke | 230 (31) | 235 (25) | 3 008 (1 910) | 247 ( 8) | 288 (26) | 4 441 (2 046) |
| Total | **251 (30)** | **221 (33)** | **3 656 (2 712)** | **245 (17)** | **253 (48)** | **7 631 (4 898)** |

The access to more land clearly helps the farmers to get higher income. This constraint is being taken into consideration by the Chinese government which decided to liberalize the market of the land use right. The Law of Farmland Tenure in Rural Areas of The People's Republic of China was approved by the Congress in August 29 of 2002 and was issued by the President on the same day to be put in force since March 1 of 2003. In the law, 11 items under one section are about the transfer of the ownership of lease-holding right of farmland. By the act, any means of transfer is legal, as long as the transfer is conducted on a fair and equal base with negotiation, willingness and payment involved, the land would not be used for non-agricultural purpose, the new owner is capable of managing the land and the valid duration of the transfer contract would not exceed the duration of the lease-holding right. This is a change within the existing system that few scholars advocated earlier(Dong, 1996).

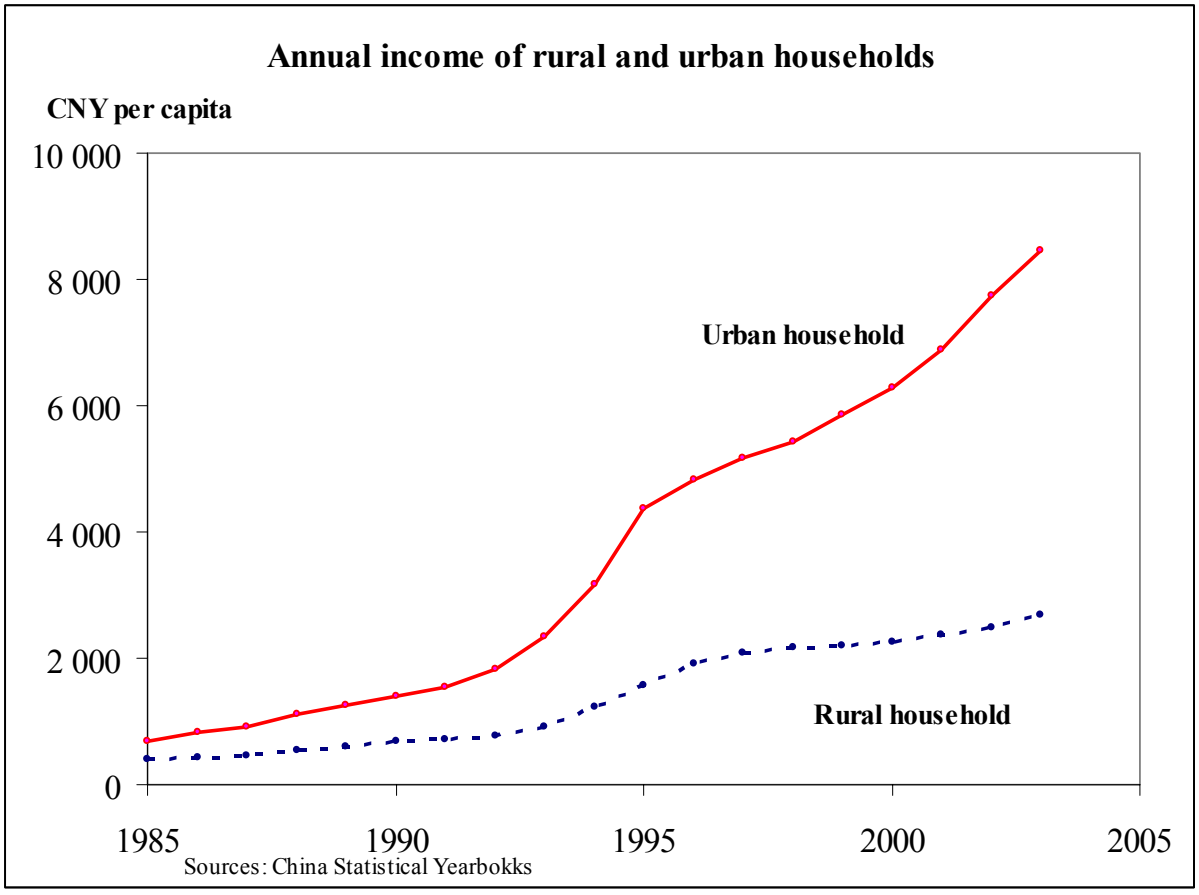
The new legal frame is favorable to enable those rural people keeping on farming to achieve higher income. Nevertheless, our survey shows that the number of farmers who achieve so far to expand the land they use is still limited. Only less than 25% of the farmers succeeded in getting more land through leasing. Additional analysis is needed to check whether all the land made available from the people who have yet abandon farming has been leased. Besides, the legal frame should induce higher demand for the land whose price will significantly increase. Such an increase would nevertheless not reverse the land profitability owing to the current level of land productivity.

## *Agriculture as a source of widening income gap at the expense of farming families*

It is reported that the rural households achieved a nominal annual income per capita of CNY 2476 in 2002 (the data for 2003 is not yet definitive) (Anon., 2003, The United States-China

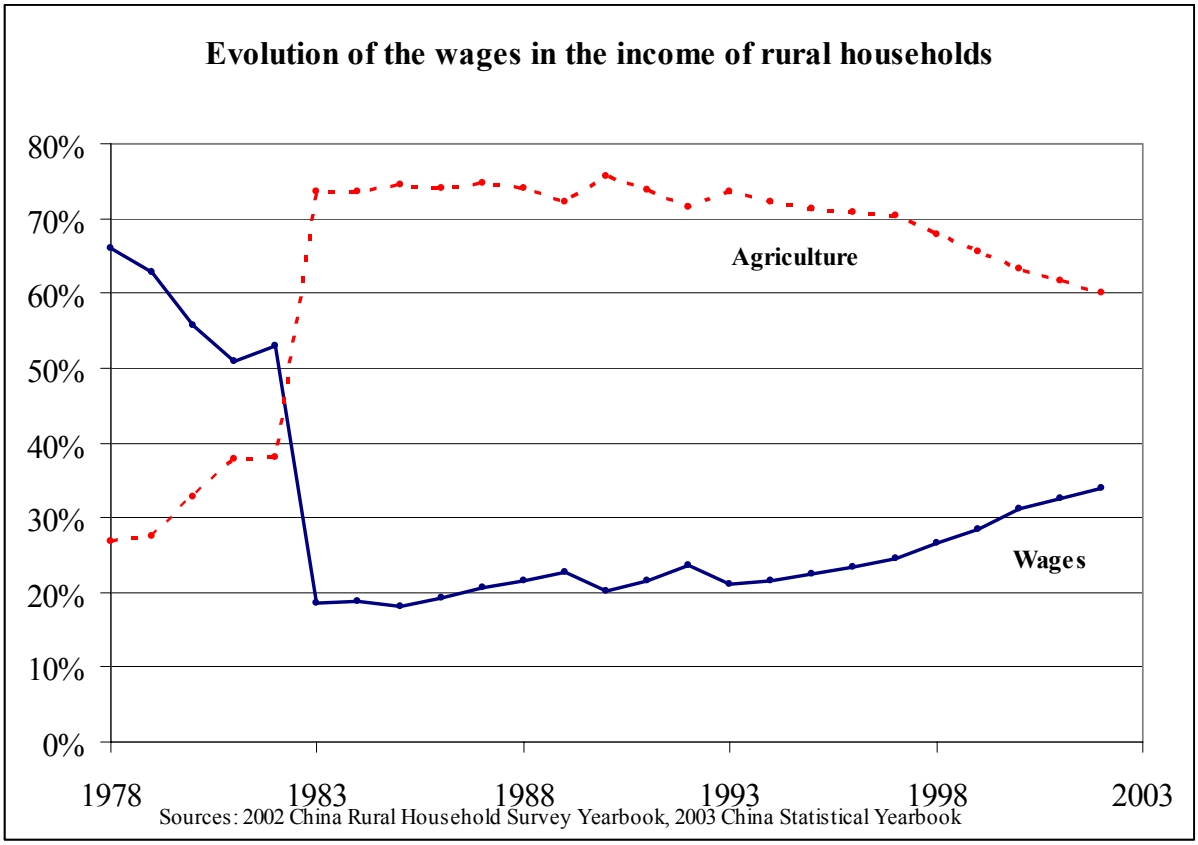
Business Council, 2004). This income is far lower than the one of urban households with a figure of CNY 7731 for the same year. Furthermore, it is obvious that the income gap at the expense of the rural households is getting wider and wider (Figure 1). During the 1995-2002 period, the income of rural households increased 56% while the increase was 76% for the urban households. This differentiated evolution of the incomes is a factor of increasing inequality and of relative poverty of rural population (Han, 2004) and is considered as the major challenge to overcome in the next future (Gale, et al., 2002)

Figure 1. Widening income gap between rural and urban households




More interesting is the evolution of the various sources of income to rural households. Four sources are commonly identified: wages, family business (agriculture), property income and transfer income. The two latter account very marginally, for this reason we focus on the evolution of the first two sources of income (Figure 2). Till 1983, few years after the launch of the reform of the agriculture sector, wages amounted mainly to the rural households' income. It was after the generalization of the implementation of the agricultural reform that the income from the farmers' business represents the major share of the total income. However, it comes out that a new change started taking place, from 1990s, through which the income share of wages, resulting from off-farm activities, is increasing again. Agriculture still accounts more to the total income, as we observed through our survey, but the share of the wages is getting close to the one of agriculture.

Figure 2. Decreasing contribution from agriculture to the rural households' income




In our survey, the average income (net of production cost) per capita in 2002 was CNY 2335, with a slight advantage for the households having obtained leased land. With reference to the national average recalled above (CNY 2476), we can point out that the total agricultural income in cotton areas, like Hebei Province, is higher since the income per capita from cotton is already close to the national average of total agricultural income (Table 28). In these areas, cotton contributes notably to the agricultural share of the rural household total income.

Table 28. Income per capita from cotton production

| | have leased land? | | |
|---|---|---|---|
| | No | yes | Total |
| Chen Zhuang | 3004 | 3568 | 3171 |
| DaWangZhuang | 5196 | | 5196 |
| Fang Ya | 2356 | 2159 | 2328 |
| ShiJiaBao | 2565 | 2957 | 2649 |
| Song Zuang | 1501 | 2192 | 1567 |
| XiJing Ke | 1239 | 1513 | 1344 |
| **Total** | **2268** | **2565** | **2335** |

## *Ways identified to improve income*

Few research works focused on the ways the farmers found to improve their income. A survey covered more than 700 farm households (Liang, 1997) enabled to observe that there are three ways for the farm households to increase their income: through the increase of the farming productivity by a better command in intensification, through the increase of the farm tenure size, and through the involvement in non-agricultural activities. The data we introduced above pointed out the positive impact from the increase of the cropped land. The only reservation is

that only part of the farmers can have access to more land and there is a threat that the differentiation process which is already taking place between farmers will get enlarged.

The productivity increase can also result from better command in the crop intensification, in particular in the framework of a technology introduction. In the specific case of Hebei Province where GMVs of cotton was introduced, it is observed that the pesticide use can be reduced very significantly. Nowadays, an average number of 5-7 sprays is sufficient (Pray, et al., 2002, Huang, et al., 2003b) to control cotton bollworms while up to 20, if not more were needed. According to our survey, the number of chemical sprays to control the cotton pests is still high and indicates that there is room for further decrease and consequently better productivity.

Table 29. Break down of the insecticides sprays according to the pest controlled

| | | Chen Zhuang | DaWangZhuang | Fang Ya | ShiJiaBao | Song Zuang | XiJing Ke |
|---|---|---|---|---|---|---|---|
| 2002 | Against Aphids | 7,7 | 3,0 | 5,2 | 3,8 | 2,3 | 5,6 |
| | Against bollworms | 5,4 | 3,5 | 7,4 | 4,2 | | 5,0 |
| | against red spider | 4,3 | 2,5 | 2,0 | 3,2 | 2,0 | 5,0 |
| 2003 | Against Aphids | 3,5 | 3,0 | 9,8 | 4,6 | 2,5 | 5,2 |
| | Against bollworms | 5,5 | 3,1 | 3,5 | 5,4 | | 5,4 |
| | against red spider | 3,3 | 2,3 | 2,4 | 4,0 | 2,5 | 4,5 |

It is in the area of the chemical fertilizer where better efficiency could be expected reasonably. It is well known that the Chinese agriculture is using intensively chemical fertilizers but in an unbalanced way, in favor of nitrogen then phosphorous, but at the expense of potash (Réseau national d'expérimentation des engrais en Chine, 1985, Stone, 1986, Lu, et al., 1996). A correction of the current imbalance will imply lower fertilizing cost and less harm to the environment.

Although the contribution from the first two ways should not be overlooked, (Liang, 1997) concluded that the final solution for the farmers to alleviate their poverty could be from being more involved in non-agricultural activities: this is a challenge to upgrade the rural industry structure. This statement is sustained by the fact that the relatively lower profitability of farm production could not be changed fundamentally within the background of the high level of rural labour surplus while the resource amount allocated per capita is very limited. In Dongguang county of Hebei province, the ratio of net value of production in non-agriculture rural sectors over that in agriculture is 5.7:1. The survey conducted in 1996/97 enabled to have an insight on the farmers' income sources through their involvement in agricultural production and non-agricultural production. The (Table 30) points out clearly that the commitment in the non-agricultural activities pays back far more since these activities are at the root of a better income index. Furthermore, it is also very clear that food grain production is not very attractive as compared to industrial crops like cotton. This is a threat to the success of food production that China achieved earlier and question the Chinese food security (Brown, 1991, Aubert, 1996, Liu, 1996, Gale, et al., 2002).

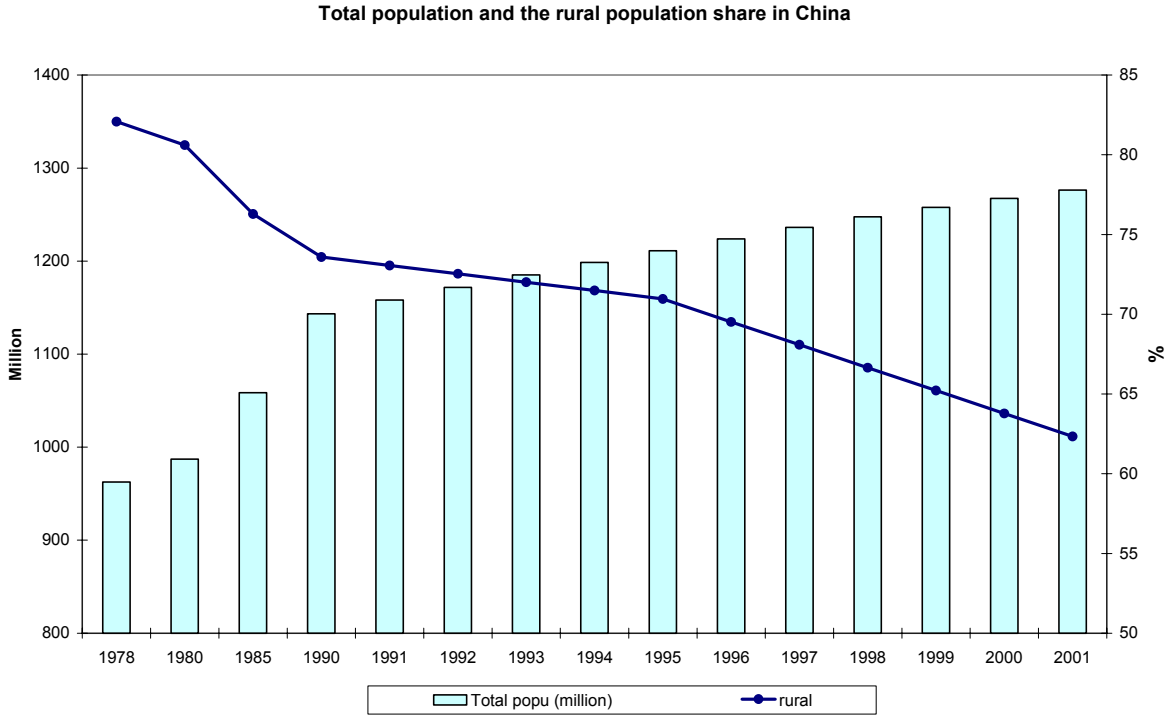
Table 30. Income index according to the activities sectors

| Village | Income from food grain production | Income from overall crop production | Income from overall farm production | Income from all industries |
|---|---|---|---|---|
| Donhguang county | 1 | 1.49 | 1.54 | 1.69 |
| Yaozhuang | 1 | 1.58 | 1.73 | 2.05 |
| Quzhuang | 1 | 2.35 | 2.59 | 3.40 |
| Qinyi | 1 | 2.33 | 2.39 | 6.22 |
| Qianrulin | 1 | Not available | 1.22 | 5.56 |

The spill-over effects of the development of the non-agricultural activities (what are called in China rural 2nd and 3rd sector industries) would be very positive to the agriculture productivity. The first effect derives from the absorption of the rural labor surplus which will help free more land and made it available for the increase of farm tenure size. The second effect results from a higher demand of a higher proportion of the population with no agricultural activities which has besides a higher income. The rural population is engaged into a decrease trend since the implementation of the agriculture reform in 1978, but there are still 62,3% of the total population living in rural areas. The Figure 3 shows that the decline of the population share in rural areas is experienced at a higher rate than the population growth rate, evidencing a demographic move out of the rural areas.

With regard to the general case of developing countries, China is already specific in achieving the promotion of the 2nd and 3rd economic sectors which absorb an increasing share of the farmers' labor surplus: more than 50% of these sectors' labors come from farm people, with more than 60% in the manufacturing services and around 80% in the construction branch (XinHua Web, 2004). A further enhancement of these economic sectors is needed owing to the farmers' desire to catch up their income gap. In this prospect, the processing of farm products could play an important role. In most rural areas of China, the lacks in capital, technology, energy and raw materials compose the limiting factors for the development of the 2nd and 3rd economic sectors. Hence activities that are less demanding in capital, technology and energy and those utilize local materials and are labor intensive have a higher potential. The processing of farm products fit these conditions by a) adding value to the locally available farm products; b) Utilizing farm products in an integrated way to avoid wastes and losses; c) promoting specialized regional agricultural production.

Figure 3. Accelerating decline of the population share in rural areas




## *A new policy still insufficient?*

The current situation of the farming economy and of the rural economy is taken into account recently by the Government of China. For the first time, this government issued an official policy document devoted specifically to increase the farmers' income. The new policy is widely publicized as it was extensively reproduced in all the major newspapers in the country

and a specific press conference was organized to help understand the basic principles of the policy (XinHua Web, 2004).

It is noteworthy that the income increase is regarded as the cornerstone of the agriculture policy instead of the output objectives. It is considered that without taking into account the farmers' income purpose, it would be inefficient to expect improve the agriculture outputs.

We can consider that the whole policy lies upon four major principles. One is to implement a reduction of the taxes the farmers are subjected to so far. The agricultural tax is reduced 1% while the tax for special agricultural production is suppressed. The second principle is to sustain the farming profitability through the increase of the farm tenure size. In this regard, the liberalization of the land market is expected to achieve a better use of the land, under the reservation that some land must remained preserved and not open to economic production. The third principle is to sustain the farming productivity through more investment in agriculture. The fourth principle is to further increase the involvement of the farmers' population in the 2nd and 3rd economic sectors, by making these sectors furthermore developed and better assisted by the banking system.

We can observe that the new policy takes into account some recommendations put forward by some research works. Owing to the dynamism of the economic developed China demonstrated since 1978, one can of course be optimistic about a new stage of the economic development in rural areas and a new change in the economic structure in these areas. Nevertheless, agriculture remains taxed after having contributed for so long to the development of the other economic sectors and reduce poverty in urban areas (Fan, et al., 2001). It is still very costly[4] for rural families to have their children attending universities. In spite of the income gap the farm families are suffering, they still benefit from no preferential treatment in education or welfare. There is no scholarship allocation based upon economic criteria in China. The farmers in China are the only social group not benefiting from any retiring fund.

It seems that the need to reverse the trend in favor of the farmers is not yet felt as necessary in China. Further research should examine, with reference to many other countries which implemented financial transfer to the agricultural sector, whether the levels of the relevant economic indicators achieved in China might lead this country to contemplate this financial transfer. With now enough distance to the Agriculture Policy in the European Union, it is obvious that the financial transfer would not be sufficient to preserve the social role of the agriculture sector. In addition to enhancing more processing activities in the rural areas, it would be relevant for the Chinese farmers to learn more about the European experiences in eco-tourism, in labeling regional products…

## Conclusion

The Chinese agrculture has little in common with the one of most developing countries China still claim to belong. This reality should prevent from extrapolating too quickly some outcomes achieved in China, like the successful adoption of GMVs which is presented as evidence that GMVs are well suited to developing countries as well.

The Chinese farmers have a rather perfect access to various markets, except for credit. In spite of tiny farms, there is a significant level of mechanisation/motorization. The recourse to mechanized/motorized operations on service-basis is quite common against the payment of fees whose levels are adjusted to the types of operations to implement. The level of input use is also high, in particular with regard to chemical use, this feature sustains the view of a capitalized Chinese agriculture.

[4] It costs around 10 000 to 15 000 CNY per year (or 1000-1500 €), which is more expensive than in public universities in France.

Nearly all farms are concerned by off-farms activities, through one to two family members, at any period of the year. The commitment in off-farms activities is not seasonal, from this standpoint the Chinese agriculture has become a part-time one. The income from agriculture remains however dominant likely because farmers can accede only little qualified off-farm jobs. Women are seldom concerned by off-farm activities. They are the most permanent family members committed in farming, for this reason we point out that the Chinese agriculture is mainly women-led although this is not yet enough regarded as such in China.

Farmers have got access officiously to more land than the one allocated to them, through leasing land which is no longer used by those families who have given up farming. This access is far from being generalized; our survey indicates that only 25% of the farms succeeded in extending the land they cultivated. This access helped to increase the cultivated land somewhat significantly and the additional land is devoted exclusively to grow more cotton in Hebei Province. This phenomenon enables to increase notably the income from agriculture since cotton growing is far more profitable that food production.

Comparatively to the income of the urban families, the farmers' income is low and the gap is getting wider and wider. The income share from agricultural is decreasing in the farming families' total income. This is an indication that the new official measures to allow increase the cultivated land will have limited impact even for the few families who can actually accede to. For the first time in China, the Government issued a policy devoted specifically to increase the farmers' income through legalizing the transaction on the land-use right and the enhancement of the farmers' involvement in non-agricultural activities. Nevertheless, agriculture remains taxed in spite of some tax cut being decided and farmers' families are taxed as they benefit little from social welfare. The new policy might not be sufficient to really reduce the income gap at the expense of the farm families without contemplating the correction of the welfare imbalance. Additional research work is needed to check whether the change of the economic structure enables China to implement an inversion of the financial transfer in favor of the farmers through modalities that must take into account the lessons learnt in many other countries which adopted this transfer, like the European Union.

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