INTERNATIONAL INTEGRATION OF CHINESE REGIONS AND INDUSTRIAL LOCATION

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Abstract:

This paper has two main objectives : first, to evaluate and to analyse the spatial concentration of industry in China; second, to estimate a link between the openness of China and this concentration.

We are interested in the evolution of industrial location to study the regional specialisations.

To explain increasing disparities we perform an econometric investigation, derived from the economic geography models, to test the impact of foreign trade on industrial location between the Chinese regions.

Résumé

L'objectif de ce papier est double : d'une part évaluer et analyser la concentration spatiale de l'industrie en Chine et d'autre part estimer une relation entre l'ouverture internationale de la Chine et cette concentration.

Plus précisemment, nous nous intéressons à l'évolution de la localisation industrielle et ceci afin d'étudier l'évolution des spécialisations régionales.

L'observation d'un accroissement des disparités nous conduit à tester, dans la logique des modèles d'économie géographique, un lien de causalité entre l'importance du commerce international et les choix de localisation.

JEL Classification : R3 – P2

Key words : geographic economics – localisation – regions – China
Mots clés : Economie géographique – localisation – régions – Chine.

INTRODUCTION

Research carried out on international integration has revealed a direct link between openness and the localisation of industries. The articles produced by Krugman (1991c) and by Venables (1996) have aroused new interest in the spatial organisation of industry. More precisely, we consider the fact that the increase in international trade is expressed by an increase in the concentration of industrial localisation. We are therefore interested in the importance of forces of localisation, both centripetal and centrifugal.

Relatively few tests have been carried out on these models, especially with regard to developing or transitional economies.

The aim of this paper is to test the hypothesis that international openness is linked to the geographical concentration of activities in the case of China. Indeed, over the last few years, the country has experienced significant economic reforms which can be seen notably in its strong increase in international trade.

In part one, we will analyse the evolution of inter-regional disparities and regional specialisation using localisation indicators.

The second part is devoted to an econometric analysis, in sample data for the Chinese regions, of the relation between openness and regional specialisation.

I – THE SPATIAL DYNAMICS OF INDUSTRY IN CHINA

I-1: The specificities of Chinese regional policy

I-1-1: The evolution of political strategies of industrial localisation

The size of China and the strategic stakes which have been the origin of numerous conflicts explain the constant interest over the centuries in the regional question.

At the beginning of the communist regime in 1949, most industry was concentrated in the coastal regions, especially Shanghai, Jiangsu and Liaoning, and inland from these regions, in certain urban centres. The rest of the country was, for the most part, agricultural.

The policy adopted by Mao was inspired both by the Soviet experience and by a concern for military security.

The existing imbalances were thus seen as inefficient on an economic level and dangerous on a military level.

Indeed, on the one hand, the natural resources of the inner regions were poorly exploited and their use by distant industries was very expensive; the latter would have required a relatively well-developed system of transport, which was not the case.

On the other hand, industries which were established in the coastal regions, and especially near the ports, would be vulnerable in the case of a military attack.

The strategy of Mao's government was, thus, to implement a balanced regional development and to encourage the establishment of a relative regional autonomy. This resolution can be seen in the very first five-year plan covering the period 1953-1957. Nearly two thirds of the projects, most of which were carried out with aid from the Soviet Union, were localised in inland regions (Yang, 1997). Not one of the projects which received Soviet financing was established in the coastal regions. For example, during the period 1953-1980, 59.4% of State company investments were made in inland regions, the remaining 40.6% going to the coastal provinces.

As these new companies had, in general, been developed close to raw material sources or towns, in general, we consider the industrial policy implemented within the framework of the first plan to be relatively coherent.

Nevertheless, the policies of the central government were sometimes discriminatory. We know, for example, that during the first plan for 1953-1957, industrial investments were, for the most part, destined for regions which were already industrialised, in particular Shanghai, Liaoning and Tianjin (Jian, Sachs and Warner, 1996).

The next period was that of the "great leap forward", whose objective with regard to industrial growth was centred on heavy industry, notably steel and aluminium. However, as the main concern was military security, most investment was seen in the armaments sector. The policy adopted was called the "third front", each "front" corresponding to a group of regions: coastal, central and western.

The policy of the "third front" consisted of strong investments in the western regions (Naughton, 1988). This was carried out in two periods. The first, from 1964 to 1966 concerned Sichuan, Hubei and Gansu. During the second period, 1969 to 1972, the

investments were localised in the following regions: Sichuan, Hubei, Shaanxi, Henan and Guizhou.

The investment was in the heavy industry sector, as well as in research and development, and its aim was more military security than economic growth.

These policies, of course, led to a lack of regional specialisation and no desire for economies of scale, each region being encouraged to have the greatest range of production. In general, the investments over this period were made on a regional basis, without any real national coherence.

This policy was first relaxed at the beginning of the 70s with the re-opening of relations between China and the United States. The "third front" programme was slowed noticeably and evidence of openness was seen in the increase of imports from western countries, notably equipment. This new programme gave rise to regional imbalances, the imports being allocated according to investments, half of which were localised in the coastal regions.

The second change came about in 1978 with the implementation of reforms introducing elements of a market economy.

One of the fundamental elements of the strategy with regard to regional policy was the exploitation of comparative advantages. The sixth and seventh five-year plans stipulated the importance of priority development of the coastal regions, which were already the most industrialised areas. Their task was to develop consumer goods industries with high value added; to improve the technological content of traditional industries; and to transfer activities with high energy consumption or high pollution levels to less industrialised regions. The central regions were to produce energy and raw materials, and continue activities in the agricultural sector.

As for the western regions, they were to concentrate on agriculture, forestry, transport, certain raw materials and transformation industries.

The aim was more a complementarity of regional production than auto-sufficiency (Yang, 1997).

This new policy was implemented through a strategy of attracting foreign investment (the first law dealing with joint ventures was promulgated in 1979). Four Special Economic Zones were created: Shenzen, Zhuhai, and Shantou in the Guandong region, and Xiamen in the Fujian region. They offered special incentives for foreign investments. These initial measures were continued by the designation of 14 coastal towns open to foreign investment, and then a certain number of development zones.

Even if Special Economic Zones were to be subsequently created in other regions, the coastal regions clearly benefited from preferential treatment.

Currently, it would appear that the authorities once more aim to re-balance investments between the regions and envisage the suppression of judicial and fiscal privileges of the coastal regions with regard to international investment.

The regional dimension is, thus, of great importance in Chinese economic policy, which, even with central planning, has always relied on regional components (cf. Qian and Xu, 1995, for example).

As of 1979, one of the first measures to reflect the desire to evolve towards a market economy was increased economic decentralisation. The use of resources was thus entrusted to various inferior levels of the hierarchy, the central government hoping that this would lead to a more rapid evolution towards the market and that an ever smaller part of the economy would be planned.

From that year on, reforms in the agricultural sector, as well as of collective enterprises, greatly changed possibilities for development, both in agriculture and industry, by increasing productivity in the former and allowing a certain degree of spatial diffusion in the latter, notably thanks to migrations. Rural industrial development was high and was the origin of an increase in regional disparities (Sun and Dutta, 1997).

I-1-2: Regional protectionism

These evolutions cannot be understood, however, without considering a Chinese particularity: the existence of regional protectionism. This is a result of the commercial wars that we observed between the regions during the 1980s for certain products, such as wool. In order to satisfy local demand by local production, the authorities controlled the movement of goods by introducing quotas. In certain regions, such as Xinjiang, 48 kinds of product were subjected to quantitative restriction at the beginning of the 1990s (Lee, 1998). Numerous other examples lead to the belief that, from this point of view, the local governments didn't always use vectors of liberalisation of exchange and greater integration.

In this context, local protectionism would seem to have been the only way for the inland provinces to be able to develop a productive system.

Indeed, given the development strategy of the coastal regions, had the inland regions opened up to the products of the former, the competition encountered would have been too strong and

they would not have been able to offer competitive prices. They were thus encouraged to develop light industries as well.

By going against specialisation on the basis of a comparative regional advantage, this phenomenon of local protectionism should have led to a strong diversification in the productive apparatus of each region.

In fact, it was the coastal regions, the most open and with the highest growth, that suffered most from the protectionism on the part of the other regions, and at the same time that practised it least.

Two main reasons can be given for this situation (Lee, 1998):

- the first comes from the fact that the fiscal reform of 1994 penalised the rich regions much more than the poor ones, the former, thus, having less need to protect themselves (of the 11 regions with a budgetary excess between 1980 and 1989, 9 were coastal regions); furthermore, the aim of this fiscal reform was to fight against regional protectionism;

- the second reason concerns the application of substitution policies for imports in the least industrialised regions in order to promote the "fledgling" light industries.

The succession of reforms and their implications for the decentralisation process led to an evolution in the responsibility of local governments and an increasing role in the determination of an industrial policy. Two parallel movements can be noted:

- an evolution in economic organisation by the market, and

- a transfer of economic policy decisions from the central government to local governments.

I-2: Concentration or dispersion of industry

The spatial distribution of Chinese production is linked to the evolution of the mobility of factors and products, and also to the evolution of exchange costs. The liberalisation of international trade, and migrations should allow companies to further exploit economies of scale and conglomeration and, with this in view, to group together.

This study is particularly interesting in the case of China where, unlike most countries, there is a weak industrial concentration. Numerous manufacturers producing the same good are scattered across the whole country. For example, in China there are 8000 independent cement manufacturers, whereas there are only slightly more than 1500 in the rest of the world (Huchet, 1999).

Several coefficients permit the measurement of the concentration or the dispersion of activities in the area (Jayet, 1993).

We chose the Isard coefficient, which has served as the basis of numerous works (see, for example, Kim, 1995 and Krugman, 1991c)[1]. We reason, then, in relative terms, concentration being considered in relation to a national norm.

The statistics used are drawn from the *China Industrial Economic Statistical Yearbook* and cover the period 1988-1994.

I-2-1: The spatial concentration of industry

The aim is to know if, in each sector, there has been a concentration of activities in certain regions or, on the contrary, dispersion across the entire national territory.

We have retained a list of 30 sectors.

We thus calculated the following indicator:

$$I_j = \sum_R \left| \frac{VA_{jR}}{VA_{jN}} - \frac{VA_R}{VA_N} \right|$$

with:

VA: value added,

R: regions,

j: sectors,

N: nation.

It is an indicator of spatial concentration in industrial sectors. It permits us to see if a region is "over- or under-represented" in one industry compared to its level of representation in national production. In other words, the higher the figure is, the higher the spatial concentration of the sector.

Bearing all this in mind, it is highly improbable that the evolutions observed as of 1988 are a result of the changes in Chinese regional policy.

In general, from 1988 to 1994, a quite clear tendency towards more marked spatial concentration can be seen.

Of the 30 sectors, there are only 6 (chemical products, metallurgical products, petroleum extraction, power generation and transformation of wood) for which the indicator falls. On the other hand, in the majority of cases, inter-regional distribution shows an increase in the over-representation of certain regions.

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[1] In the next step, supplementary calculations will be made, acting as a comparison, using other indicators, notably the Herfindhal indicator.

The most marked localisation appears for the logging and transport of timber on the one hand, and for the extraction of petroleum and natural gas on the other (cf. appendix 5), sectors where three regions produce approximately 65% of the total (in 1994). In both cases, the main producing region is Heilongjiang; as regards wood, Jilin and Inner Mongolia each assure about 14% of the value added. In the second case, the regions concerned are Shandong and Liaoning.

Another sector which proves to be highly concentrated is tobacco, as nearly 40% of the value added is produced in Yunnan.

The smallest differences with regard to inter-regional distribution can be seen in the following sectors: chemical products, metals, non-metal mineral production, energy and printing.

In general, it is impossible to explain the degree of the concentration according to whether or not the sector is planned.

I-2-2 Regional specialisation

Similarly, a specialisation indicator has been formulated for each region over the period 1988-1994.

It is calculated as follows:

$$I_R = \sum_j \left| \frac{VA_{jR}}{VA_R} - \frac{VA_{jN}}{VA_N} \right|$$

with:

VA: value added

R: region

j: sector

N: nation

This indicator measures the difference between the weight of a sector in regional value added, and its weight in national value added. It is normally used to measure regional specialisation. The higher the indicator, the more the region is specialised.
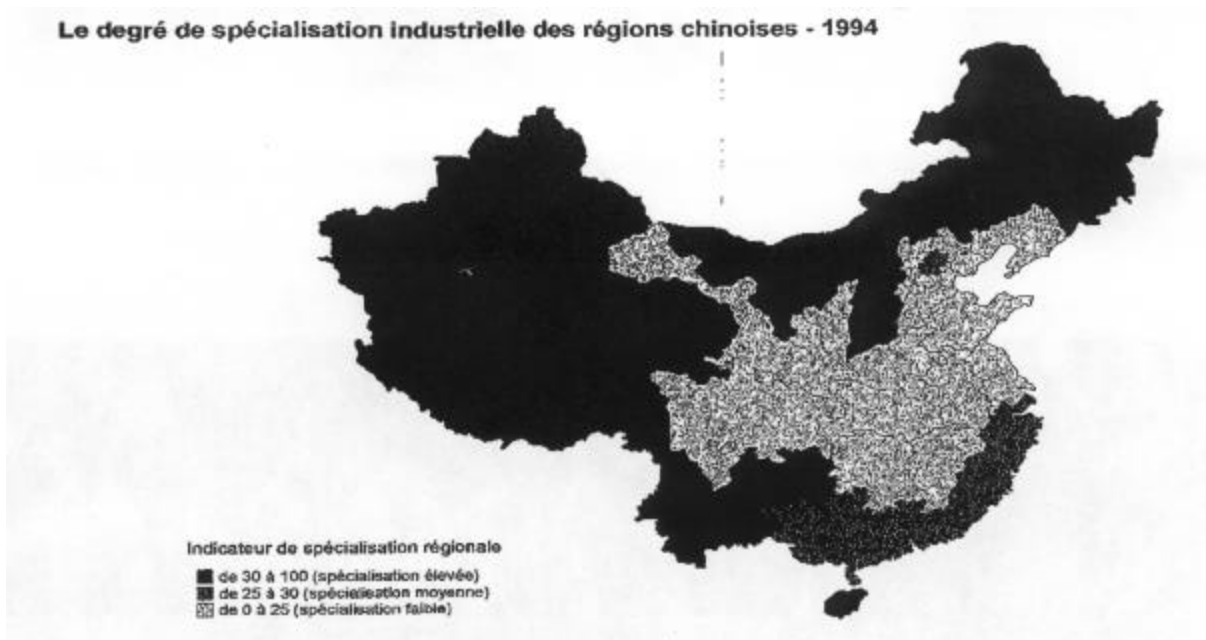
The results, presented in appendix 6, show an opposition on the basis of the geographic position of the regions, which permits the distinction of three levels of specialisation in 1994:

- regions with low specialisation: $I_R < 25$,

- regions with medium specialisation: $25 \leq I_R \leq 30$

- regions with high specialisation: $I_R > 30$

We can note a geographical proximity within each specialisation, as the map below shows.

The regions with medium specialisation (indicator within the range 25 to 30) are coastal regions in the south and central regions with a very diverse production. The regions in the north and west are the most specialised.

Le degré de spécialisation industrielle des régions chinoises - 1994

Indicateur de spécialisation régionale
- de 30 à 100 (spécialisation élevée)
- de 25 à 30 (spécialisation moyenne)
- de 0 à 25 (spécialisation faible)

Sources: UMR views based on calculations made by J-F. Brun and M-F. Renard, do not reproduce.

With the exception of Henan and Hubei, there is an increase in specialisation, which is not, however, particularly striking in general and which appears in particular as of 1993.

With the exception of Tibet, which can be considered as a special case, the most specialised region is Yunan, as more than 60% of industrial value added comes from tobacco. Next come Heilongjiang, with 36% of value added coming from petroleum extraction, Hainan with 22% of the value added in alimentation, and Xinjiang with 27% of value added coming from petroleum extraction and 21% from textiles.

In this category of highly specialised regions with an indicator over 30, there are several regions whose localisation coefficient falls between 30 and 40, and who concentrate their production in three or four sectors. This is the case in Shanxi, a central region which draws 22% of its value added from the treatment of ferrous metals, 12% from the chemical industry, and 12% from mechanical construction. Regions in a similar position: Ningxia, with 17% of

value added in mechanical construction, 17% in the chemical industry and 11% in alimentation, Qianghai, Jilin, Inner Mongolia.

II – INTERNATIONAL OPENNESS AND LOCALISATION

Is international openness in China linked to the spatial distribution of activities?

In other words, can the evolution of the significance of regional specialisation be explained by the increase in international openness?

Firstly, we want to recap the method proposed by economic theory to deal with this problem.

Secondly, we can attempt to find an econometric estimation for this relationship.

II-1: The theoretical foundations of localisation

To the question 'what determines localisation and subsequently the model of international trade', the answers supplied are essentially based on the differences in the factorial endowments or the differences in technology.

To better understand this process, we should recall that there are three sources of regional specialisation:

- resources, found within the framework of the Heckscher-Ohlin model. Production and exportation are intensive for the abundant resource;

- technology, as proposed by Ricardian and neo-Ricardian models,

- increasing output: this implies the existence of external economies or economies of scale, implying that only a few large companies satisfy the demand.

Observation of the facts has shown that these explanations prove to be highly insufficient. Numerous authors stress the primary importance of past experience (Venables, 1996) which provides no economic foundation for the fact that an industry was implanted previously in a region.

If there is one domain where the idea of "path dependence" is indisputable, it is localisation. Historic determination is present at all geographic levels and for all types of industry in industrialised countries (Krugman, 1991b).

Research was thus oriented towards other explanations, based on the analysis of conglomerative and dis-conglomerative forces. The works of Marshall has thus been rediscovered.

The choice of localisation is the result of opposition between centrifugal and centripetal forces.

The former oppose concentration and reflect the immobility of certain factors, such as the soil, natural resources and often, on an international level, people. Moreover, on the supply side, production must be carried out where there is a workforce, and on the demand side, the dispersion of buyers prevents the concentration of markets, it being in the producers' interest to be localised near the consumers (Krugman, 1998).

Concentration is limited by its cost, for example in terms of property allowance; this could encourage de-concentration, as do all external diseconomies engendered by the phenomena of congestion.

In the case of centripetal forces, we can refer to Marshall's classification (1920). If we eliminate localisation resulting from proximity to natural resources, there are three main categories of force.

Firstly, it is in the industries' interest to group together in order to benefit from what we will later call an industrial atmosphere, "The mysteries of the trade become no mysteries; but are as it were in the air, and children learn many of them unconsciously. Good work is rightly appreciated, inventions and improvements in machinery, in processes and the general organization of the business have their merits promptly discussed : if one man starts a new idea, it is taken up by others and combined with suggestions of their own; and thus it becomes the sources of further new idea." (Marshall, 1920, p.271). It is thus a case of technological externalities resting mainly on the diffusion of information.

Secondly, the concentration of industries permits the existence of a labour market which offers a large choice of specific qualifications. " In all, but earliest stages of economic development a localized industry gains a great advantage from the fact that it offers a constant market for skill. Employers are apt to resort to any place where they are likely to find a good choice of workers with the special skill which they required; while men seeking employment naturally go to places where there are many employers who need such skill as theirs and where therefore it is likely to find a good market" (Marshall, 1920, p.271).

Finally, the third force of localisation relies on the existence of a market size effect permitting upstream and downstream liaisons. Places with easy access to the big markets are preferred for the production of goods subject to economies of scale. In particular, an important local market permits in-situ production of intermediary goods, thus lowering costs for the buyers. It is in this way that local sub-contracting relations, either of capacity or speciality, are created,

permitting a kind of internalisation of risks of market fluctuation. This also permits the establishment of stable relations in the purchase and sale of intermediary goods, limiting the transaction costs and the problems of agency. Marshall summarised his demonstration as follows: "we will resume our inquiry as to how far […] the economies of production on a large scale must needs be *internal*, and how far they can be *external*" (Marshall, 1920, p.277).

The question of localisation has experienced new and abundant developments thanks to imperfect competition being taken into account. More precisely, it is the recognition of the existence of increasing returns to scale which permits us to explain the unequal distribution of activities over the area. Indeed, in the absence of initial differences, the traditional models in perfect competition and with constant returns present an equal spatial distribution of production.

On the contrary, the models in imperfect competition provide elements which explain a situation with no comparative advantage of one area over another, and where different productions nevertheless develop. This phenomenon will lead to a centre-periphery relation based on the following mechanisms (Krugman, 1991a).

There are two types of production:

- agriculture, with constant returns and an intensive use of soil, and whose distribution thus depends on the kind of soil present;

- industry, with increasing returns, which is distributed across a limited number of sites according to economies of scale.

All things being equal, the preferred sites are those which have the greatest local demand. This comes in part from agriculture. Industrial production may therefore have a similar distribution to that of the soil.

How far will this phenomenon of concentration go?

If mass production is developed, it results in more significant economies of scale. If, at the same time, transport costs fall, the link between production and soil distribution is broken.

The attraction of a location depends, then, on the significance of the local market and on the availability of the goods and services produced. A region could thus, with a small initial difference, increase its population to the detriment of others.

Interaction between increasing returns, transaction costs and demand results in a tendency for companies and workers to group together (Ottaviano and Puga, 1997).

The question this raises is thus how this spatial organisation evolves?

The answers generally provided are based on explanations in terms of cumulative causality, described by Myrdal, and liaison effects as described by Hirschman, and applied to regional growth by Pred.

The interactions between cost of exchange, increasing returns to scale at company level and upstream-downstream liaisons create the possibility for cumulative causality, bringing about the creation of new centres of activity. In this way, Krugman (1998) shows that the productive activity of the central regions is proportionally greater than their significance in terms of grants.

With significant economies of scale, we can imagine a firm based in one single location supplying a national market; it would then choose the location with the biggest market. So local demand will be great in the locations where the majority of industries are situated.

Thus, there is a circularity which tends to maintain an industrial heart once it exists.

This development in considerations on localisation underlines how important it is to take into account the spatial dimension of economic phenomena.

If the applications have, until now, been limited to Europe and the United States, the perspectives of testing on the Chinese economy seem to be particularly promising in that both international openness as well as the transition to an economy using largely market mechanisms engender a change in the organisation of productive systems. This can have an impact on regional disparities and thus have ramifications with regard to economic policy.

II-2: the impact of Chinese openness on industrial localisation

What relations exist between the evolution of localisation and international openness?

This question has been studied by Krugman and Venables (1995) based on the following model.

Let us consider one country with two regions having identical characteristics.

There is only one industry composed of firms n_1 and n_2 situated in regions 1 and 2 respectively. These firms are in a situation of imperfect competition with increasing returns and a variety of products (Venables, 1996). Localisation depends on the supply of factors, products and intermediary goods. The goods produced can be used both as final goods and as intermediary goods by both firms.

Using this model as a basis, we can observe the forces of conglomeration and of dispersion.

The number of firms, and thus the number of entries and exits, depends on the opportunities of making a profit. When the costs associated with trade with the other region are high, the profits will result from the number of firms situated in the same region. There is, then, a factor of dispersion, as the firms produce the same good in both regions in order to satisfy local demand. That means that with significant obstacles to trade, the models of production and exchange are determined by market considerations.

When these costs fall, it is in the firms' interest to move. We observe, then, a factor of localisation which depends on the possibility of exporting the surpluses, and production is determined by the possibility of realising economies of scale, which results can be seen as phenomena of conglomeration.

This model predicts that increased international openness should lead to a spatial concentration of industry by reducing the costs of international trade.

It has been the object of little empirical verification. Some tests have been carried out for Europe and the United States, notably to estimate the impact of European integration on the spatial concentration of industry.

In the case of China, as we saw previously, economic policy measures taken within the framework of the reforms are represented by an increase in international openness and a fall in customs duties. According to the preceding model, we should observe an increase in geographic concentration. Moreover, in the case of China, to this exterior openness is added an internal integration resulting from the fall in regional protectionism. There is thus a reduction in transaction costs within the country. We tested Venables' model in the case of China and in order to do this, we tried to determine whether international openness could explain the spatial concentration of industry observed previously.

Nonetheless, this model is situated within the framework of a market economy; thus one of the particularities of China is that it possesses an industrial sector characterised by the simultaneous functioning of market and planning mechanisms. This has an impact on the methods of price fixing and the choice of location.

The techniques of sample data were used as the estimation covers 30 regions for the period 1988-1994. The database was drawn from *China Regional Economy* and the *China Industrial Economic Statistical Yearbook*.

The variables used are as follows:

- the explained variable is the indicator of regional specialisation[2] (I_R).

- the explicative variables are:

- the rate of regional exportation measured by the ratio of exportations to the value added, which represents international openness (EXP/VA).

- economies of scale by sector, estimated by the relatively conventional method of the ratio between the number of jobs in a sector and the total employment in the region (AMITI, 1998). However, in order to avoid the bias introduced by the very low representation of certain sectors in certain regions, the five most important sectors in terms of employment were used. Moreover, the permanence of a certain level of planning was taken into account by distinguishing the sectors according to whether they obey competition rules (ECM) or whether they are in part subject to planning (ECP). We were provided with this information by the State Council Research Centre. It must be noted that this distinction does not necessarily cover a division in terms of types of ownership, State enterprises being able to function according to market logic.

- regional gross domestic product per capita, in order to take into account the size of the regions (GDPP).

- regional consumption per capita; this variable can represent the role of the importance of the local market in the choice of localisation of firms (CONSP).

direct foreign investment measured by the ratio between employment in firms receiving foreign capital and the total employment in the region (IDE).

The classification permitting us to establish the five most important sectors and to calculate the economies of scale variable dates from 1988 (table 1).

A double effect, regional and temporal, was retained in order to understand an unobserved heterogeneity, peculiar to each region and to each year. The temporal effects grasp both the administrative and judicial modifications which, as we have seen, tend to liberalise internal commerce in China and at the same time have an impact on spatial organisation.

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[2] A more rigorous application of the works of Krugman and Venables would have required the use of the indicator I_j. In deed, we can retain two approaches to regional disparities (Johnston, 1999). The first consists in dividing China into three supra-provincial regions. This is the most frequently used approach and often accords a dominant place to the central government's regional policy. The second approach encourages a reasoning based on a diagram of industrial zones in order to explain the spatial concentration of industry. It corresponds to the logic of analysis presented by Krugman (1991c).

Nevertheless, the empirical verification of the relations between openness and localisation based on the second approach supposes that sector statistics, notably concerning exportations, are available, whereas this is not currently true.

Nevertheless, these two approaches are not incompatible and we adopted a logic which could be qualified as intermediary, keeping the 30 regions as a level of analysis.

Moreover, this seems to us to be coherent with the particularity of China, as Chinese industrial diversity has been constructed on a regional basis.

Thus, it is the effects of international exchange, and not of internal integration, which are captured by the openness variable.

An F-test does not permit us to exclude the presence of regional and temporal effects. The model employed is a model with fixed effects. The R^2 adjusted has a value of 0.96.

Table 1

Explained variable : indicator of specialisation

Explicative variables	Coefficients	Student t	P value
EXP/VA	0.046	1.73	0.085
CONSP	0.004	3.01	0.003
GDPP	-0.013	2.38	0.019
IDE	-0.014	2.23	0.027
EMM	-198.7	2.71	0.008
EMP	77.17	4.95	0.000

The results show that, in accordance with the theoretical model, international openness in China has a positive effect on regional specialisation. Furthermore, the results observed for the other regions provide the following information.

The economic importance of the regions is captured in part by the value added, and also by consumption.

The results observed for the two variables refer to a Chinese particularity, that is the fact that the large growth observed since the beginning of the reforms has been accompanied by a very clear increase in the range of products manufactured, probably expressed by the negative sign of the product per capita.

Consumption is positively linked to the level of specialisation. The growth in the size of the internal market is favourable for an increase in regional specialisation.

Direct foreign investments have a negative sign. We should recall that the investments are, for the most part, localised in coastal regions, notably because of the advantages given to the Special Economic Zones. It is not a case, then, of an effect resulting directly from the desire, or the lack of desire, for economies of scale, but of a considered policy coming from the central government.

The relation between the exploitation of economies of scale and regional specialisation varies according to whether it is a case of planned sectors, or rather sectors which obey a market logic. These results are difficult to interpret and require an extension of this study, integrating the different types of company ownership (private, collective or State enterprises).

CONCLUSION

As the works of Krugman and Venables suggest, the choice of increased international openness supposes that industry has a spatial dynamic which is likely to permit the exploitation of economies of conglomeration. This implies an increase in regional disparities with regard to specialisation which would correspond to the development of a competition logic.

Thanks to the statistical analysis of industry in the Chinese regions, an increase in the spatial concentration of production, as well as a tendency towards the accentuation of regional specialisation has been brought to light.

We have tried to link these observations to the evolution of exportations from the Chinese regions. Thanks to econometric analysis, we have been able to demonstrate a positive effect of openness on the degree of industrial specialisation of the regions, as predicted by the theoretical models.

The pursuit of the evolution towards a competitive economy, and the government incentives to exploit regional comparative advantage will only serve to reinforce these tendencies.

The preceding results lead us to think that Chinese industry has still used only a fraction of the possibilities of spatial concentration and economies of conglomeration, and that a significant evolution could result from the liberalisation of migratory movements.

BIBLIOGRAPHY

AMITI M., 1998 : « New Trade Theories and Industrial Location in the E.U. – a survey evidence », *Oxford Review of Economic Policy*, vol.14, n°2.

JAYET H.,1993 : *Analyse spatiale quantitative*, Economica, Bibliothèque de Science Régionale.

JIAN T., SACHS J.D., WARNER A.M., 1996 : « Trends in Regional Inequality in China », *China Economic Review*, vol.7 (1).

KIM S., 1995 : « Expansion of markets and the geographic distribution of economic activities : the trends in U.S. regional manufacturing structure, 1860-1987 », *Quarterly Journal of Economics*, November.

KRUGMAN P., 1991a : « Increasing Returns and Economic Geography », *Journal of Political Economy*, n°3.
                1991b : « History and industry location : the case of the manufacturing belt », *American Economic Review*, May.
                1991c, *Geography and Trade*, MIT Press.
                1998 : « What's new about the new economic geography ? », *Oxford Review of Economic Policy*, vol.14, n°2.

KRUGMAN P. AND VENABLES A., 1995 : « Globalization and the inequality of nations », *Quarterly Journal of Economics,* n°4.

JOHNSTON M.F., 1999 : « Beyond Regional Analysis : Manufacturing Zones, Urban Employment and Spatial Inequality in China », *China Quarterly,* March.

LEE P.K., 1998 : « Local Economy Protectionism in China's Economic Reform », *Development Policy Review*, vol.16.

LIU X., SONG H. and ROMILLY P., 1997 : « An empirical investigation of the causal relationship between openness and economic growth in China », *Applied Economics*, 29.

MARSHALL A., 1920, : *Principles of Political Economy,* 8th edition, Macmillan and Con London.

NAUGHTON B., 1988 : « The Third Front : Defense Industrialization in the Chinese Interior », *The China Quarterly, S*eptember.

OTTAVIANO G.I.P. AND PUGA D., 1997 : « L'agglomération dans l'économie mondiale », *Economie Internationale*, n°71, 3rd quarter.

QIAN Y. and XU C., 1993 : « The M-form hierarchy and China's Economic Reform », *European Economic Review*, 37.

SUN H. and DUTTA D., 1997 : « China's economic growth during 1984-93 : a case of regional dualism », *Third World Quarterly,* vol.18, n°5.

VENABLES A.J., 1996 : « Localization of Industry and Trade Performance », *Oxford Review of Economic Policy*, vol.12, n°3.

YANG D.L., 1997 : *Beyond Beijing. Liberalization and the regions in China* , Routledge.

APPENDIX 1 : LIST OF REGIONS

1-Beijing (bei)
2-Tianjin (tia)
3- Hebei (heb)
4-Shanxi (sha)
5-Neimeng (imo)
6-Liaoning (lia)
7-Jilin (jil)
8-Heilongjiang (hei)
9- Shangai (sha)
10- Jiangsu (jia)
11- Zejiang (zhe)
12-Anhui (anh)
13- Fujian (fuj)
14-Jiangxi (jix)
15-Shandong (shd)
16-Henan (hen)
17-Hubei (hub)
18- Hunan (hna)
19-Guangdong (gua)
20-Guandxi (gux)
21-Hainan
22 -Sichuan (siu)
23- Guizhou (gui)
24- Yunnan (yun)
25- Tibet (tib)
26-Shaanxi (saa)
27- Gansu (gan)
28- Qianghai (gin)
29- Ningxia (nin)
30- Xinjiang (xin)

APPENDIX 2 : LIST OF SECTORS

1-Beverage manufacturing industry
2- Chemical fibres
3- Chemical materials and products manufacturing industry
4- Clothing and other chemical fibre products manufacturing
5- Coal mining and preparation
6- Cultural educational and sports articles manufacturing industry
7- Electric equipment and machinery manufacturing industry
8- Electronic and telecommunications equipment manufacturing industry
9- Ferrous metals mining and preparation
10- Food manufacturing industry
11- Furniture manufacturing industry
12- Instruments, metres and other measuring equipment manufacturing industry
13- Leather, furs and manufactured goods
14- Logging and transport of timber and bamboo
15- Universal machine manufacturing industry
16- Medical and pharmaceutical products
17-Metal products
18- Non-metal mineral products
19- Paper making and manufactured goods
20- Petroleum and natural gas extraction
21- Plastic manufactured goods
22-Power generation, steam and hot water production and supply
23- Printing and record medium manufacturing industry
24- Rubber manufactured goods
25- Running water production and supply
26- Smelting and pressing of ferrous metals
27- Textile manufacturing industry
28- Timber processing, bamboo, cane, palm fibre and straw products
29- Tobacco manufacturing industry
30- Transportation equipment manufacturing industry

APPENDIX 3 : ISARD INDICATOR FOR THE LOCALISATION SECTORS

Sectors	S1	S2	S3	S4	S5	S6	S7	S8
1988	38.17	76.24	26.37	37.27	78.84	80.57	35.18	56.15
1989	37.96	71.84	26.43	42.24	76.97	82.09	31.70	52.48
1990	34.92	68.73	28.36	44.63	76.53	84.23	31.95	58.46
1991	34.96	66.73	23.34	47.78	77.35	84.92	34.10	66.27
1992	33.21	64.04	23.46	52.72	80.13	83.37	34.43	64.44
1993	36.54	74.75	20.93	60.52	80.56	87.51	39.64	71.04
1994	38.22	71.20	22.60	60.02	78.53	84.10	38.72	75.46

	S9	S10	S11	S12	S13	S14	S15
1988	98.38	29.87	30.08	48.72	34.28	138.76	21.80
1989	98.88	31.53	31.01	50.31	37.62	141.48	21.42
1990	92.28	30.59	35.18	48.40	45.70	141.70	22.72
1991	86.95	31.40	34.37	49.33	47.82	141.08	24.07
1992	87.48	29.59	35.56	51.94	53.09	144.13	25.17
1993	77.40	32.13	35.78	58.09	48.70	147.17	29.68
1994	83.74	33.17	38.69	60.18	55.12	148.45	31.09

	S16	S17	S18	S19	S20	S21	S22	S23
1988	27.34	26.45	27.16	26.98	129.20	38.68	34.29	24.04
1989	27.56	25.66	25.10	28.40	127.84	40.70	31.47	24.21
1990	28.14	26.06	24.78	30.03	125.96	44.09	35.88	23.18
1991	28.02	26.44	24.46	28.80	134.68	46.48	32.83	24.27
1992	32.21	26.62	24.57	31.21	131.70	46.52	29.16	23.07
1993	32.09	22.50	26.30	39.44	115.89	42.64	37.29	27.77
1994	33.38	24.39	28.84	41.11	115.10	46.98	27.34	24.46

	S24	S25	S26	S27	S28	S29	S30
1988	24.30	46.35	61.52	37.85	60.19	67.45	44.67
1989	24.91	55.52	62.84	37.33	63.38	70.79	44.59
1990	27.82	57.48	64.14	41.52	61.88	72.24	48.12
1991	26.98	81.09	71.61	40.80	58.48	75.37	48.05
1992	29.78	71.26	63.98	40.22	59.32	80.93	54.21
1993	41.18	52.81	63.26	46.81	49.59	83.03	47.84
1994	32.50	55.27	68.61	48.58	49.75	92.55	51.60

Regions	1	2	3	4	5	6	7	8
1988	25.52	18.39	16.38	34.23	27.57	20.42	24.58	43.89
1989	24.90	20.43	16.67	34.51	24.06	19.68	25.00	42.98
1990	28.70	18.39	15.16	36.16	28.47	20.68	26.60	47.71
1991	24.98	21.77	15.01	37.82	29.85	20.67	25.64	47.65
1992	26.70	24.14	15.06	38.75	30.87	18.45	31.50	47.75
1993	25.46	20.14	17.57	36.80	35.21	21.37	30.71	48.98
1994	25.63	20.96	18.55	39.37	32.15	20.82	33.54	52.13

	9	10	11	12	13	14	15
1988	22.17	20.60	20.93	18.71	24.70	16.12	15.95
1989	21.56	20.79	20.66	15.72	24.92	13.72	15.75
1990	22.38	22.93	22.26	17.36	22.87	16.23	15.56
1991	23.24	22.84	22.25	16.93	24.30	16.35	16.19
1992	21.49	22.53	23.00	17.05	23.74	15.91	16.09
1993	24.88	24.16	26.81	20.59	27.80	19.52	17.72
1994	25.84	24.83	26.48	18.25	28.39	17.51	16.66

	16	17	18	19	20	21	22	23
1988	16.94	20.01	15.64	23.74	20.09	45.99	10.44	30.84
1989	16.53	18.69	15.65	22.90	19.71	47.18	10.92	31.51
1990	15.93	17.94	17.61	24.17	21.83	50.21	9.64	32.46
1991	15.84	17.58	18.92	25.21	22.74	47.79	12.62	33.26
1992	16.48	18.72	18.74	25.98	21.42	42.23	12.92	34.93
1993	15.81	15.97	18.22	27.25	25.61	42.70	14.59	28.32
1994	15.16	18.09	19.15	28.49	26.17	47.20	16.92	30.45

	24	25	26	27	28	29	30
1988	41.25	73.70	20.59	16.10	29.35	28.65	37.21
1989	45.51	63.21	21.06	14.96	28.02	27.66	33.90
1990	47.17	61.17	20.14	18.96	28.77	30.58	31.66
1991	47.89	60.34	20.67	22.82	25.07	30.18	35.38
1992	48.01	60.35	19.92	18.50	23.38	33.07	36.46
1993	47.43	57.81	22.21	22.49	31.19	35.27	38.50
1994	56.41	63.69	21.12	22.95	33.70	35.62	45.20