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A Fragmented China: Measure and Determinants of Chinese Domestic Market Disintegration*

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Sandra Poncet

This paper studies the degree of integration of China's domestic market and investigates the determinants of inter-provincial trade barriers under the rubric endogenous trade policy theory. I rely on industry-level trade flows extracted from provincial input-output tables to develop a model that analyzes the magnitude and evolution of Chinese provinces' engagement in domestic trade by computing all-inclusive indicators of trade barriers. Results underline that over the 1990s, not only was China's domestic market fragmentation along provincial borders great, but it also has become more severe at least between 1992 and 1997. The investigation of province-level and industry-level trade barriers confirms the relevance of applying the framework of endogenous protection to explain the level of impediments to trade between Chinese provinces. Findings emphasize that provinces' domestic trade protection pursues a dual objective of socio-economic stability preservation and fiscal revenues maximization.

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1 Introduction

The economic reforms initiated by Chinese authorities in the late 1970s promoted spatial domestic market integration alongside state withdrawal, economic modernization and international openness. They broke dramatically with the Maoist introverted development strategy. In pre-reform China, the emphasis was placed on planning, autarky and regional self-sufficiency. China's duplicative domestic market was referred to as cellularized along the provincial borders (Donnithorne, 1972). Some reforms, notably trade and financial opening to the World economy moved forward very quickly. Achievements in internal reforms are less obvious. Specifically, some authors express their concerns about the degree of economic integration between Chinese provinces.

The magnitude of regional integration in China and the transformation of the country into a unified, fair and regulated market as it joins the World Trade Organization take on particular importance, since China's international opening can only be effective if free access and free movement of goods are granted between provinces.

Relying on indirect analyses of price and provincial economic structures data, Young (2000) makes the extreme assertion that, over the past 20 years of economic reform, China has evolved into "a fragmented internal market with fiefdoms controlled by local officials". This claim was put forward early on based on similar data by World Bank (1994)'s report on China's internal market development. Huang (2003) bears out the same thesis of decreasing inter-regional economic integration.

Local protectionism is a topical issue as proven by the recent directive issued in April 2001 by China's State Council to outlaw regional blockades in market activities.1 It is however hard to move beyond the anecdotes and to obtain a concrete measure of intra-national protections.

The claim of increasing fragmentation in China is received with skepticism by China's specialists. Reports of rising regional trade barriers run strongly counter to the perception of informed observers of the Chinese economy. Notably they fly in the face of the visibly successful efforts by both foreign multinationals and emerging Chinese enterprises to build national distribution networks and establish nationally recognized brands.

Overturning conventional wisdom requires very solid empirical work. So far, papers supporting the counter-intuitive thesis of decreasing integration in China suffer from the lack of direct data and interpretation problems. Provincial input-output (IO) tables are the only sources of data that enable to perform a direct study on the degree and evolution of domestic trade integration in China. Zhou (1996) and Naughton (2003) examine inter-provincial trade flows extracted from provincial IO tables. However, these analyses are limited to the year 1987 and 1992 respectively, falling short of analyzing the evolution of impediments to trade within China since the deepening of the reforms. Poncet (2003) rely on data for 1987, 1992 and 1997 to compare the magnitude and evolution of Chinese provinces' engagement in domestic and international trade at the aggregate level. The author shows that Chinese provinces' greater involvement in international trade went hand in hand with a decrease in inter-provincial trade flow intensity between 1987 and 1997. Even if Chinese provinces still rely more on goods from the rest of the country than on international imports, provincial borders matter more and more inside the country in the sense that they imply greater discontinuities in the Chinese domestic market.

In this paper, I verify that the reduction in provincial market integration identified at the aggregate level is also observed at the industry level and proceed to investigate the determinants of internal trade barriers in the light of endogenous trade policy

theory.

I tackle the issue of regional integration within China head-on by relying on the disaggregation of inter-provincial trade flows into 21 comparable industries of tradable goods in 1992 and 1997. I compute all-inclusive indicators of province-level and industry-level trade barriers for 1992 and 1997 using the border effects method.

The literature on border effects was pioneered by McCallum (1995) to measure the trade-diminishing effects of the Canada-US border. It has been adapted to evaluate the degree of integration between and within sovereign countries (within Canada (Helliwell, 1997), within the US (Wolf, 2000), between OECD countries (Wei, 1996) and between EU members (Head and Mayer, 2000)). These analyses all find rather large border effects, however declining over time, in line with increased trade liberalization.

I apply this method to determine whether Chinese economic reforms were successful or not in promoting domestic market integration.

Each province is considered an integrated economy within its boundaries while its frontiers hinder trade flow with the outside. The domestic integration of Chinese provinces is to be evaluated using the volume of intra-provincial trade flow as the reference. The approach makes sure that results are not influenced by the parallel evolution of international trade. The trade-diminishing effect of Chinese provincial borders is measured as the "excessive" trade volume observed within a province in relation to what would be expected from the model in absence of impediments to trade.2 The model is then modified to take into account the role of public versus private consumption in the provincial preference for local goods.

It appears that the trade-diminishing impact of provincial borders is not only high but also increasing over the 1990s (between 1992 and 1997), in the quasi totality of provinces and industries. This finding contrasts with results obtained on other

economies (Canada, USA, OECD, European Union). Despite the promotion of spatial integration by authorities, inter-provincial trade flow intensity inside China has declined between 1992 and 1997: locally produced goods supply a growing share of provincial consumption to the detriment of goods produced in the rest of the country.

Computed border effects are taken as proxies of impediments to inter-provincial trade. The study of their determinants confirms the relevance of applying the framework of endogenous protection to explain differences in levels of barriers to trade between Chinese provinces and between industries. On the demand side of trade protection, provincial unemployment rate and public sector size as well as industry-level fiscal contribution and labor intensity appear to be significant determining factors of the protection level against imports from other provinces. On the supply side of protection, the higher the provincial share of public consumption and financial autonomy, the greater the barriers on domestic trade. Findings emphasize that Chinese local governments, whose economic powers have expanded with decentralization, pursue a dual strategy of socio-economic instability minimization and tax revenues extraction.

This paper proceeds as follows: section 2 briefly describes Chinese market economic fragmentation and presents the actors of the decision-making process of domestic trade policy. Section 3 develops the empirical model used to measure provincial and industry-level border effects and its adaptation to take into account the impact of public sector size on the local bias of consumption. Data sources and variables construction method are then presented in section 4. Section 5 proceeds to the empirical estimation of provincial border effects in China. The determinants of these all-inclusive indicators of inter-provincial trade barriers are explored in section 6 in the light of the endogenous trade policy theory.

2 Political economy of domestic trade fragmentation in China

China's economy is characterized by its "cellular" structure due to its horizontal principle of economic management. It is traditionally based on a territorial or regional planning where local authorities govern most economic activities in one geographic region across different economic sectors. Chinese provinces are natural entities and even political regions in that they constitute socio-political entities. Their territories and residents are ruled by a specific power invested with increasing administrative and political functions since the decentralization process. The borders of the thirty-one Chinese provinces 3 delimit so many separate markets. The decentralization reforms initiated in 1980 reinforced China's de facto economic federalism as more regulatory responsibilities, ownership of firms, economic and financial powers were placed in the hands of provincial governments. Under the name of assistance to the local economy, local governments used their heightened administrative powers (in terms of trade, investment, budget and price fixation) to implement a multiform protection of workers and enterprises under their authority (Zhao and Zhang, 1999; Wong, 2003). Alright import bans, discriminatory product and health certification standards, tariffs and dumping charges, confiscations of profits earned on marketing foreign-provincial goods as well as subsidies to local commercial units for buying locally produced products aimed at curtailing competition with home-province products and sustaining employment and the survival of uncompetitive local enterprises (World Bank, 1994; Chinese Economic Studies, 1993; Development Research Center, 2003). Local authorities often justified their protectionist measures by their regional import substitution strategies. These provincial policies, just as those at the national level, intended to develop import-

replacing infant industries at home in the shelter of trade restrictions. Duplication of under-optimal enterprises, convergence of industrial production across different regions, wastefulness and territorial segmentation along provincial border logically arose (Young, 2000).

The rough data on domestic trade from provincial IO tables confirm that domestic trade is large but declining over the period 1992-1997. Average Chinese inter-provincial imports amount to 50 and 38 % of GDP respectively in 1992 and 1997. Inter-provincial trade makes up 80 and 66% of total trade in these years.

The value of inter-provincial trade in China increased between 1992 and 1997, yet at a lower rate than GDP, international trade or intra-provincial trade. Between 1992 and 1997, the share of imports from other provinces in total goods absorption 4 decreased. In 1992, average provincial absorption of goods was composed as follows: 27% of goods produced in other provinces, 68% of locally made products and 5% of international imports. In 1997, the importance of goods from the rest of the country in provincial absorption declined to 20% while the shares of locally produced goods and foreign goods rose to 72 and 8%, respectively.

In the analysis, specific attention is paid to the issue of potential trade diversion between national and international to make sure that findings of decreasing domestic market integration in China do not relate to the rapid growth of international trade. The decrease in inter-provincial trade intensity is consistent with the rapid international trade opening of Chinese provinces. However, the fact that it goes hand in hand with the rise of intra-provincial trade intensity raises doubts on effective domestic market integration. As mentioned earlier, the promotion by Chinese reforms of domestic openness alongside international openness was motivated by the search for dynamic and static gains resulting from increased competition, the diffusion of

technological progress and the determination of production according to comparative advantages. Pre-reform introverted development policies favored the development of inefficient and non-competitive local goods as production completely neglected principles of comparative advantages, economies of scale and specialization. International products are expected to substitute both for goods produced in other Chinese provinces (inter-provincial trade) and for locally produced goods (intra-provincial trade). There is no reason, in a context of domestic integration between Chinese provinces, for the substitution between international and national imports to be asymmetric depending on the inter-provincial or intra-provincial origin 5 of goods.

Findings of decreasing inter-provincial trade intensity beside rising intra-provincial trade intensity between 1992 and 1997 run counter to the logic of regional specialization according to comparative advantages and economies of scale. They support the claim of growing economic fragmentation in China.

The theory of endogenous trade policy is used to understand the logic of local authorities' protectionism. It contends that governments when deciding trade policies do not only pursue economic efficiency but also consider income distribution aspects. Trade protection is endogenously determined by the relationship between a demand (from private agents and interests groups) and a supply (from politicians and government).

Numerous empirical studies examine the political economy determinants of trade protection at the national level,6 some of which on developing economies like South Korea, Taiwan and Mexico. However, there are only a few applications of the endogenous trade theory to China (Branstetter and Feenstra, 2002 7; Chen and Feng, 2000 8; Bin, 2000). They focus exclusively on international trade.

This paper offers a first attempt to investigate the determinants of trade protection

adopted internally by Chinese provinces. The logic of above-cited studies can be taken up to apprehend provincial domestic trade protectionism. They all emphasize the importance of the objective of economic and political stability in the trade policy management. Economic reforms revealed that Chinese authorities are confronted to serious problems of over-employment and of low profitability in numerous enterprises especially state-owned ones. Due to soft budget constraint and historical management failures, almost half of public enterprises are running a deficit in 2000 (People's Daily, July 2000). These enterprises (*difang qiye*) often entertain close ties with the local government, which favors blackmailing practices and lobbying for more protection. We will verify that trade policy is used by provincial authorities as a tool to minimize threats of massive layoffs, bankruptcies and reduced competitiveness of local enterprises induced by liberalization and privatization processes (Bai et al., 2004; Kung, 1999). As such, protection is expected to be extended in priority to high employment and inefficient sectors. I further consider the importance of the fiscal revenue objective. It is conjectured, in coherence with results of previous studies on China's international trade policy, that local protectionism pursues a dual objective of fiscal revenue maximization and of social stability and economic equity preservation.

The ambition in this paper is to test the relevance of endogenous trade policy theory in the context of China's domestic market. The study aims at shedding light on the appropriate strategy for the central government to undertake in order to fight against local protectionism and to promote domestic market integration.

3 The border effect model

3.1 *Basic Model*

I follow the model proposed by Head and Mayer (2000) to measure trade integration between European countries.9 Their specification is now probably the cutting-edge implementation in that it develops the estimating equation from first principles and takes into account that prices of third nation goods can affect bilateral trade flows.

Head and Mayer (2000) adopt a monopolistic competition framework inspired by Krugman (1980) and derive a gravity equation from a utility function allowing for asymmetric consumer preferences.

Let c_{ijh} be the total consumption of good h from partner j by the representative agent in province i and a_{ij}, be the preference weight of its consumers for products imported from j. The CIF. value of imports of province i from partner j, m_{ij}, is obtained through the maximization of the following CES utility function under the budget constraint:

$$U_i = \left(\sum_{j=1}^{N} \sum_{h=1}^{n_j} (a_{ij} c_{ijh})^{\frac{\sigma-1}{\sigma}} \right)^{\frac{\sigma}{\sigma-1}} s.t.\ m_i = \sum_k m_{ik} = \sum_k c_{ik} p_{ik} \forall\ h \qquad (1)$$

with k covering all partners so that k=1, i, j,... N. We note σ the elasticity of substitution between any two varieties and p_{ik}, the delivery price of imports from k by i.

I specify a_{ij}, the preference weight of consumers in i for products imported from j 10 as composed by a systematic preference for home-produced goods (or aversion to outside goods noted DB_{ij}) and by a normally distributed error term, ϵ_{ij} : a_{ij}=exp(DB_{ij}+ϵ_{ij}). Let $DB_{ij} = 0$ when $i = j$ (intra-provincial trade) and let it be negative when $i \neq j$ (inter-provincial trade) so that $DB_{ij} = -\beta_i$. In this latter case,

consumers in province i prefer local goods to outside goods and feel an aversion β_i vis-à-vis products imported from the other side of the border.

I obtain the bilateral imports of i from j by summing imports for each variety, with n_j being the number of varieties in j:

$$m_{ij} = \frac{a_{ij}^{\sigma-1} n_j p_{ij}^{1-\sigma}}{\sum_k a_{ik}^{\sigma-1} n_k p_{ik}^{1-\sigma}} m_i. \tag{2}$$

A gravity equation is derived from this expression. In the model of monopolistic competition, the quantity of production (noted q) is identical for every firm. With v_j the production value in j, one obtains the equality $v_j = q p_j n_j$. We take into account the proportionality $n_j p_j = \frac{v_j}{q}$ between production v_j and the number of varieties n_j yielded by the Dixit-Stiglitz (1977) model to eliminate n_j and n_k terms from (2).

The price paid by consumers in province i for goods produced in partner j is defined as a multiplicative function of the production price in j, p_j, of the distance between the two partners d_{ij} and of trade (tariff and non-tariff) barriers applied by province i on its imports from j. Constant ad valorem barriers of u are assumed for all cross-border trade so that p_{ij}=$(1+u) d_{ij}^{\delta} p_j$.

Trade barriers u are supposed to be null inside provinces ($j = i$) but positive if $i \neq j$. One obtains:

$$m_{ij} = \frac{a_{ij}^{\sigma-1} v_j \left((1+u)\, d_{ij}^{\delta}\right)^{1-\sigma} p_j^{-\sigma}}{\sum_k a_{ik}^{\sigma-1} v_k \left((1+u)\, d_{ik}^{\delta}\right)^{1-\sigma} p_k^{-\sigma}} m_i \tag{3}$$

I follow Head and Mayer (2000) in adopting a relative specification to overcome estimation problems of the denominator. The authors transform the gravity relationship into relative terms with respect to intra-provincial trade flow m_{ii}. This procedure enables to eliminate the potential influence of third partners' characteristics. All as-

pects, which affect the level and evolution of trade with alternative partners, are thus controlled for.

Substituting for all the previously defined terms in the definition of m_{ij} and transforming the equation into logarithms leads to:

$$\ln \frac{m_{ij}}{m_{ii}} = \ln \frac{v_j}{v_i} - \delta(\sigma - 1) \ln \frac{d_{ij}}{d_{ii}} - \sigma \ln \frac{p_j}{p_i} - (\sigma - 1)[\beta_i + ln\,(1 + u)] + e_{ij} \qquad (4)$$

$$with \quad e_{ij} = (\sigma - 1)\,(\epsilon_{ij} - \epsilon_{ii})$$

The constant term in equation 4 is expected to be negative as it represents the deviation of observed inter-provincial trade flows from their predicted value in absence of barriers by the model, based on intra-provincial trade. It includes the effect of tariff and non-tariff barriers u as well as the impact of aversion to foreign goods β_i.

3.2 *Considering public consumption importance*

The basic equation can be enhanced through the definition of the local bias of consumption in the light of the endogenous trade policy theory. The supply of protection by a provincial government is assumed to depend on its interventionism in the economy captured through the share of public sector in the provincial consumption.

Equation 4 is easily modifiable to take into account the respective shares of the public and private sectors in the consumption and the specific values of their domestic bias. Let $\beta_i = \beta_i^{pub} * \alpha_i + \beta_i^{priv} * (1 - \alpha_i)$, with α_i the share of the public sector consumption in province i and β_i^{pub} and β_i^{priv} the aversion vis-à-vis outside products of public and private consumers respectively. Equation 5 follows:

$$\begin{aligned} \ln \frac{m_{ij}}{m_{ii}} &= \ln \frac{v_j}{v_i} - \delta(\sigma - 1) \ln \frac{d_{ij}}{d_{ii}} - \sigma \ln \frac{p_j}{p_i} - (\sigma - 1)\left[\alpha^i \beta^i_{pub}\right] \\ &\quad - (\sigma - 1)\left[\left(\alpha^i - 1\right)\beta^i_{priv} + ln\,(1 + u)\right] + e_{ij} \end{aligned} \qquad (5)$$

$$with \quad e_{ij} = (\sigma - 1)(\epsilon_{ij} - \epsilon_{ii}).$$

The constant term in equation 5 is purged from the impact of the public consumer's aversion towards outside goods. It now captures the aversion of the sole private consumers beside border-related trade barriers. We expect the estimate of the border effect based on equation 5 to be lower than that based on equation 4. This would reflect that greater preference for local goods is found in the public sector than in the private sector.

3.3 *Controlling for the evolution of international trade*

The model we use implicitly postulates the independence of the ratio between inter-provincial and intra-provincial trade flows with regard to characteristics of a third partner, that is, in our case, the rest of the world. The specification of Head and Mayer (2000) that transforms the gravity relationship into relative terms with respect to intra-provincial trade (equation 4) eliminates any potential influence of trade evolution with alternative international partners. As such, theoretically, the model is not influenced by substitution effects between international and national trade. It considers that producers do not choose from among the markets they sell to: they sell to whoever wants to buy. As such, the model relies on the assumption that there is continuity in provincial markets within China. If international trade liberalization occurs, substitution between international goods and national goods will follow in a symmetric way whatever the origin of the national goods (local or from other provinces). In absence of inter-provincial trade barriers, there is no reason that it results in trade reorientation between intra-provincial and inter-provincial sources.

The model we will estimate (equation 5) focuses on the ratio of inter-provincial trade

to intra-provincial trade, while controlling for the level and evolution of international integration through the transformation of our equation with respect to intra-provincial trade. All aspects of international trade have been cancelled out. In theory, greater engagement in international trade remains neutral in terms of the sharing out of remaining trade among suppliers from the province and from the rest of the country. The demand of Chinese consumers that is not satisfied by international products splits into local products and products from the rest of the country following the same proportion as before the liberalization.

However, this been said, it is true that the reality of China's trade integration in the world economy is quite complex. Specifically, China's engagement in international trade is characterized by strong dualism (Naughton, 1999). China's trade policy has accentuated the dichotomy of its economy: highly competitive sectors that are integrated into international production and trade networks in high-technology goods and that are dominated by foreign companies, coexist with traditional sectors that are falling steadily behind and that are dominated by Chinese firms (OECD, 2002; Lemoine and Ünal-Kesenci, 2002).

It can therefore be argued, in coherence with China's production dichotomy, that not all the production that takes place in China can be exported and conversely that a share of production is specifically aimed at being exported. Substitutability does not prevail between goods destined for exports and goods meant to be sold locally or on the national market. As such, it is crucial that the analysis, which focuses exclusively on the comparison of intra- and inter-provincial trade, excludes the products that are exported.

In our empirical estimations of equations 4 and 5 of the model, output terms v are defined as the output value of goods that are meant to be sold in the domestic market

only. The value of international exports is therefore deduced from that of gross output for each province and industry. This procedure aims at making sure that our findings on domestic market integration do not depend on the evolution of international trade of Chinese provinces. As a further test that estimated Chinese provinces' border effects are not inflated by their concomitant engagement in foreign trade, we will verify in section 6 that international trade is not a positive determinant of border effects size.

4 Data sources and variables construction

Most Chinese provinces produce square input-output tables for 1992 and 1997. A few of these tables are published in provincial statistical yearbooks. I obtained access to final-demand columns of these matrices from the input-output division in China's National Bureau of Statistics. They provide the decomposition of provincial output, international and domestic trade for 21 comparable industries of tradable goods in 1992 and 1997.11 Domestic trade flow, that is trade between each Chinese province and the rest of the country, were obtained for 25 provinces in 1992 and 24 provinces in 1997.12

As no data on bilateral trade flows between provinces are available,13 it is necessary to proceed to some adjustments to reconcile the model with the degree of aggregation of the available trade data.

Characteristics of the "rest of China"

We rely on the same method as Poncet (2003) to define the characteristics of the "rest of China". The "rest of China", denoted by roC, differs for each province considered and can be thought of as a distinct country whose production, V_{roC}, production price, p_{roC} and distance to province i, d_{i-roC}, can be generated on the basis of the char-

acteristics of the provinces that make it up. As such, its production V_{roC} corresponds to the sum of the productions v_j of its constituent provinces j: $V_{roC} = \sum_{j \neq i} v_j$.

To avoid a somewhat ad hoc way of aggregating provincial characteristics, expressions of the other characteristics of the "rest of China" are derived, on the ground that $m_{i-roC} = \sum_{j \neq i} m_{ij}$ with i and j being Chinese provinces, directly from the model (equation 3). As explained in detail in Poncet (2003), we deduce that the formula for the effective distance between each province i and the "rest of China", d_{i-roC}, is given by the production-weighted geometric mean $\prod_{j \neq i} d_{ij}^{v_{j*}}$ of bilateral distances d_{ij} between i and the other Chinese provinces j, with $v_{j*} = \frac{v_j}{V_{roC}}$, being the share of j in the output of the "rest of China".

For a given industry, the average production price inside the "rest of China", p_{roC}, equals the production-weighted geometric mean $\prod_{j \neq i} p_j^{v_{j*}}$ of production prices p_j in the provinces that form the "rest of China". Industry-level production prices are proxied by average wages in current Yuan extracted from provincial statistical yearbooks 14. Relying on comparable source of wages to proxy for production prices definitely is an improvement on traditional estimations. Gravity models with few exceptions completely overlook the influence of prices. When they do not, they usually rely on data on Consumer Price Index,15 which fail to provide information on the level of prices.

Intra-provincial characteristics

Intra-provincial industry-level trade flows, m_{ii}, are measured following Wei (1996)'s method, that is by subtracting the province's total exports (to domestic and foreign partners) from production for each industry.16

I moreover rely on a measure of intra-provincial distance that solves the various drawbacks of methods used so far in the literature. This measure has the advantage

not only of being derived directly from the model but also of taking into consideration the province-specific distribution of economic activities. Intra-provincial distance, d_{ii}, is computed consistently with the model without relying on arbitrary values of θ. It is the production-weighted geometric mean of bilateral distances between prefectures 17 that are indexed by l and m: $d_{ii} = \prod_{l \in i} d_{li}^{\frac{v_l}{v_i}}$ with $d_{li} = \prod_{m \in i} d_{lm}^{\frac{v_m}{v_i}}$.18 Bilateral distances between prefectures as well as those between provinces are measured on the basis of real distance by road in kilometers between their capital cities. They are computed following the shortest itinerary and the most rapid roads based on very detailed maps. This method helps to control for the fact that quality of transport infrastructure varies enormously across and within provinces.

5 Domestic border effects estimation

I apply the basic model of border effects (equation 4) to the Chinese context to estimate the level and evolution of its domestic market integration. Industry-level and province-level all-inclusive summaries of inter-provincial trade barriers are computed for 1992 and 1997.

Results are reported in table 1. Columns 1 and 4 to 8 correspond to a panel specification with industry-based fixed effects where a time dummy variable differentiates between the two years of our study, 1992 and 1997. The coefficient in front of the year dummy for 1997 corresponds to the variation of the average border effect between 1992 and 1997. A negative sign indicates an increase in our indicator of lower observed inter-provincial trade in relation to what would be expected in absence of impediments to trade. Columns 2 and 3 report the results obtained separately for 1992 and 1997 to make sure that the 1997 dummy in the column 1 is indeed capturing the evolution of

the border effect and not some instability that exists elsewhere in the model.

Columns 4 and 5 perform a robustness check in adopting the traditional subdivision of Chinese provinces into two categories: coastal and interior. This subdivision draws from the recognition of China's regional dualistic development structure and geographic, economic and administrative coastal-interior cleavages (Yang, 1991). The aim is to check the stability of the results across the two regional groups and to make sure that our results do not correspond to a regional phenomenon but rather apply to both interior and coastal regions.

While columns 1 to 6 impose a common coefficient on the various explanatory variables, column 7 allows for heterogeneity by industry. Column 8 goes further and introduces coefficients by year and industry. The last two columns (9 and 10) opt for a panel specification with fixed effects by couple of industry-year.19 The Huber/White/Sandwich estimator of variance is used to correct potential heteroskedasticity. The Davidson-MacKinnon test does not reject the null hypothesis of absence of endogeneity of the production term.20

Coefficients are quite consistent with their predicted values. The test of linear hypothesis does not reject that the coefficient on distance corresponds to the figure of -0.6 considered by Leamer (1997) as the normal elasticity of trade with respect to distance. The coefficient on relative production is close to its theoretical unitary value, though significantly different.

The good performance of the relative price variable can be underlined. Its coefficient, representing $-\sigma$, where σ is the substitution elasticity between varieties, is far superior to that obtained by studies based on the model of Head and Mayer (2000) on the EU. It is however lower than the theoretical prediction (between -5 and -10 according to different estimation methodologies). This econometric result can be ex-

plained by the fact that the analysis is centered on sub-units of a country. Production prices are labeled in the same currency, with no need of exchange rate conversion like in international studies.

The constant term in the model corresponds to the average border effect between provincial markets in China. The border effect between a province and the "rest of China" can be interpreted as the impeding-impact of the province's boundaries on its trade with all the other Chinese provinces taken as a whole. I quantify border effects following McCallum (1995) in using the ratio of imports from self to imports from others, holding other things equal. This consists in taking the exponential value of the estimated border effects. I will attach less importance to the interpretation of the measured impact of provincial borders on domestic trade than to the analysis of its evolution over time and of its inter-industry and inter-provincial variability.

The significant and negative coefficient on the year dummy variable of 1997 in columns 1 and 4 to 8 reflects that the average border effect (across provinces and industries) rose significantly between 1992 and 1997. The results obtained over the two sub-periods taken separately in columns 2 and 3 confirm that the 1992 and 1997 border effect estimates are indeed statistically difference (at the 1% confidence level) when the coefficients in the model are not constrained to be equal over the two periods.

Findings of fragmentation and growing protectionism apply to both interior and coastal provinces. Even though coefficients vary significantly between the two groups of provinces, we find evidence of increasing domestic trade barriers in both coastal and interior parts of China over the period of study. The comparison of columns 4 and 5 underlines that interior provinces suffer from higher fragmentation than coastal provinces. It should be noted that the province of Qinghai 21 appeared to drive downward the coefficient on distance in the sub-sample of interior provinces so as

to make it become insignificant. Column 6 therefore reports the results after this province is taken out of the sample. This adjustment allows the coefficients for the coastal and interior samples to converge. The non-significant coefficient on the relative price elasticity for the interior provinces may relate to the less appropriateness of proxying prices by wages in those provinces. Despite these divergences, substantial and worsening fragmentation nevertheless appears to be a national phenomenon (not only a regional one) as shown by the significant increase of the average border effect between 1992 and 1997 for both types of provinces.

Our results are robust to the introduction of specific responses of trade to traditional gravity forces (output, distance and price) by industry and industry cross year. The increase in trade impediments within China is even more significant when coefficients are allowed to vary by year and by industry (column 8). According to estimates reported in column 1, the average border effect increases from 24 [exp(3.16)] in 1992 to 31 [exp(3.16+0.26)] in 1997. Thus, after controlling for transport costs, production values and production prices, Chinese provinces turn out to consume around 24 times more locally produced goods than goods from the "rest of China" in 1992 against 31 times more in 1997, across industries.

Findings of rising internal trade barriers inside China are confirmed by results in the following columns 9 and 10 where the panel is estimated with fixed effects by industry and year. Although the specification does not allow to observe readily the 1992-1997 change in the border effect anymore, it is possible to compute the average border effect for each year. It is found to increase significantly between the two years of the study.

The border effect level can be made more explicit through its expression in tariff-equivalent. The estimate of the ad-valorem value of the border effect is computed as exponential of [border effect/$(\sigma - 1)$]-1. This computation requires an assumption

about the elasticity of substitution σ. Relying on $\sigma = 9$ 22 and on estimates of border effects from column 1, I find that the tariff-equivalent of crossing a border between a province and the rest of the country amounts to 48 and 53% in 1992 and 1997 respectively. These figures lie close to the value of 45% found for the European Union and the Canada-US border in the beginning of the 1990s (Head and Mayer, 2000; McCallum, 1996).

The trade impeding impact of provincial borders in China turns out to be closer to that of borders existing between independent sovereign countries than to that measured between sub-national regions inside individual countries. Studies on internal trade in the US and inside Canada find tariff-equivalents inferior to 15% (Wolf, 2000; Helliwell, 1997). Integration between different countries is slowed down by their nationalism, by the heterogeneity of their institutions, norms and legislations as well as by linguistic and cultural differences between them. These factors should not be at work or should have a lower impact on trade in a single unified country. Identical tariff-equivalents in China and in the EU during the 1990s correspond to a lower market integration achievement in China than in Europe and thus emphasize the fragmentation of Chinese economy.

It should however be acknowledged 23 in making comparisons with other regions, that the average population of China's provinces is larger than the populations of the EU nations, Canadian provinces or US states so that relative to these smaller economies, some of China's provinces may be able to achieve scale economies -particularly as income rise- within their boundaries.

More importantly, the rise of domestic border effects between 1992 and 1997 contrasts with results obtained for other trade zones. They all evidence decreasing internal trade barriers in coherence with their engagement in trade liberalization agreements. The increasing deviation between the observed inter-provincial trade flows inside China

and what would be expected in absence of trade barriers proves that Chinese authorities did not manage to promote domestic openness and crush economic structure fragmentation along the provincial limits. It supports the thesis of a move towards the disintegration of China's domestic market. Locally produced goods supply a growing share of the local consumption to the detriment of goods produced in the rest of the country. This evolution runs counter to the logic of regional specialization according to comparative advantages and economies of scale.

I proceed to check the pertinence of the analysis of domestic trade in China in terms of endogenous trade policies. Column 10 estimates equation 9 of the model after distinguishing between public and private consumption bias. I introduce public sector's share in total provincial consumption.24 The greater this share, the more protectionist the province should be. Public authorities and thus the state sector are expected to be more sensitive to the concept of local market protection. State-Owned Enterprises (SOE) are traditionally more inclined to give priority to a local supply against foreign imports and to follow discriminatory practices within the framework of investments, tenders or market allocation. The importance of the public sector consumption also proxies the magnitude of governmental interventionism in the provincial economy. Greater public sector consumption corresponds to a less advanced stage of state withdrawal. The observed negative sign on this variable underlines that public enterprises are more inclined to call for trade protectionism and to discriminate against imports of goods from the rest of the country. After the share of public sector consumption is introduced in the regression, the domestic bias included in the average border effect only captures that of the private sector. It logically turns out smaller. The decomposition between public and private consumption reduces the border from exp(3.24) (column 9) to exp(2.50) (column 10). These results confirm the negative impact of the

influence of the state in the economy on domestic market integration. Symmetrically, it proves how privatization and the withdrawal of the state may promote the reduction of impediments to inter-provincial trade.

The dissociation of yearly average border effects into industry-level and province-level yearly effects sheds light on the spatial and industry-based disparities of impediments to inter-provincial trade. It should improve our understanding of the observed move towards domestic disintegration in China. Yearly industry-level border effects correspond to the fixed effects of the panel regression (column 9). The yearly provincial border effects are retrieved by regressing the sum of the yearly global border effect and residual from the panel equation on the entire set of dummy variables for each province by year. The value of the coefficient specific to each province cross year is the specific border effect for a given province and a given year. P-values are deduced from standard errors of the regression.

Industry- and province-level border effects for 1992 and 1997 appear in table 2. The hierarchy of industry-level border effects appears to be quite logical. It is consistent not only with the literature on border effects determinants but also with China's specific context of industrial policies and distortions. General studies on the determinants of border effects emphasize that higher border effects are found for products, which are difficult or heavy to transport (Chen, 2004; Hummels, 2001). This aspect is coherent with the observation of weak market integration for industries of building materials and electricity and water.

The hierarchy of estimated border effects by industry is in line with evidence reported in China by the literature of policy and management decisions made at the local level that interfere with inter-provincial trade. Findings of high border effects for agriculture are not surprising. Various examples of attempts by local governments

to retain or protect low priced raw materials within their own locality in order to favor local manufacturers concern agricultural goods such as wool, silk, cotton, grain or tobacco (Watson et al., 1996; Chinese Economic Studies, 1993).

Results obtained for manufacturing activities also correspond very much with China's industrial policy features. Inter-provincial trade tensions and protectionist policies applied in priority to light low technology industrial goods subject to regional import substitution strategies and to massive over-capacity.

Naughton (2003) explains that, through the 1990s, local governments had very strong incentives to intervene in raw materials sectors to ease bottlenecks and in processing industries because it established a claim on scarce, cheap materials and provided a source of revenues. It is therefore logically that we find high and increasing border effects for coal and oil extraction as well as for building materials or metal products. The Eighth and Ninth Five-year Plans (1991-1995 and 1996-2000) focused on the development of pillar industries such as machinery, petroleum processing, raw chemical materials and construction industries to promote overall economic development (Lu, 2002). Local officials responded enthusiastically to these national expectations of industrial policy as they very much matched their economic interests. They took investments decisions that sharply increased the new capacity under construction. Naughton (2003) argues that the result has been something just short of disastrous, with massive over-capacity in a range of "pillar industries", especially building materials, metallurgy, petrochemistry and automobile industry.

Findings of high and increasing border effects for these industries tend to confirm the reliability of our approach. The four highest increases of industry-level border effects are found in wood products and furniture, food processing, non-metal minerals extraction (wood, salt, stone...) and metal products industries. These results are in

line with provincial strategies of import-substitution, maximal exploitation of their natural resources and on site transformation conducted by local authorities.

On the opposite, greater inter-provincial trade intensity is observed for goods which production is localized in a limited number of provinces, notably because of high technological content and capitalistic intensity (petroleum refining, metal smelting and electronic and telecommunications). Other provinces are bound to get their supplies from outside their borders for these goods.

The hierarchy of yearly provincial border effects also appears consistent with provinces features and profiles stated in various studies (Goodman and Segal, 1994, Yang, 1997 and Cheung, Chung and Lin, 1998) and in stories on trade tensions. Lowest border effects and thus higher economic integration with the rest of the territory are found for coastal provinces of Guangdong, Jiangsu and Hebei, Jilin province and for two municipalities (Shanghai and Tianjin). These two provincial-level cities are two important harbors and privileged exchange places (stock exchange in Shanghai). In China, the coastal dimension not only encompasses more developed transport infrastructure but also higher engagement in economic liberalization and restructuring. Our results confirm that more liberalized coastal provinces logically display lower impediments to trade.

Landlocked and depressed western provinces are characterized by greater impediments imposed on their imports from the rest of the nation: Qinghai, Yunnan, Shanxi and Ningxia provinces consume at least 40 times more local goods than goods imported from other provinces even after transport costs, wage and wealth differences (that is four times more than the coastal provinces mentioned above). These interior resources-rich provinces suffered greatly from distorted central policies (undervalued raw materials prices, preferential taxation for the coast, investment and reforms biased

in favor of coastal regions). They resorted to autarkical policies (import substitution and protectionism) to make up for the perceived unfairness and developed their own transformation industries in the shelter of trade restrictions.

Coastal province of Fujian as well as its neighbor Zhejiang also distinguish themselves by high impediments to domestic imports. These features can probably be explained by geographical and cultural factors. These mountainous provinces are bordered in the north and south respectively by the high chain of Wuyi Shan, so that Fujian is physically isolated from the rest of the country, all the more that until recently no railway line connected Fujian and neighboring Guangdong. Huge disparities divide these two provinces into a liberalized and high-growth coastal fringe and an autarkic and remote mountainous inside. Fujian and Zhejiang actively participated to trade conflicts on various goods such as the "silkworm cocoon war" and "grain war" that occurred at the end of the eighties (Chinese Economic Studies, 1994; Watson et al., 1996). They resorted to various protectionist measures to protect their home products from the competition of goods from their dynamic neighbors (Guangdong for Fujian and Shanghai for Zhejiang). Long (1994) moreover argues that the proximity with Taiwan has played against market integration with the rest of China. The long ban on ties with the enemy island induced poverty and tension in the neighboring Chinese provinces that tend to explain that they resorted as numerous interior provinces to protectionist measures. Furthermore, when trade was finally allowed between Fujian and Zhejiang and their natural partner Taiwan, it may have developed at the expense of exchanges with other provinces.

6 Determinants of domestic border effects

This section studies the causes of the lack of integration of Chinese domestic market. Determinants of inter-provincial and inter-industry heterogeneity of domestic trade barriers are successively investigated through the direct regression of yearly provincial and industry-level border effects estimated in the previous section. Provincial domestic protectionism is apprehended under the rubric of endogenous policy theory as detailed in section 2. A negative sign corresponds to a positive impact of the determinant on the protection level.

Column 1 of table 3 introduces the provincial rate of total budgetary expenses to GDP, the lagged rate of unemployment and the share of public sector in total consumption as explanatory variables of provincial border effects in 1992 and 1997.25 The Davidson-MacKinnon test does not reject the causality between provincial trade barriers and fiscal autonomy.26 This regression considers a factor of demand for protection (pressure from the unemployed) beside a supply factor (financial and economic autonomy of authorities). The importance of the public sector in provincial consumption can be perceived at the same time as a supply force -reflecting the interventionist strategy of the authorities- and as a demand variable -corresponding to the weight of the public sector in the local economy. I have already mentioned that SOE are the most endangered by the liberalization process due to their chronic over-employment, low or negative profits rates and lack of competitiveness. Provincial authorities are thus compelled to protect their activities if bankruptcy and layoffs are to be avoided. Moreover SOE's privileged direct links with local powers facilitate lobbying pressures and blackmailing practices for greater tariffs protection.

The rate of provincial total budgetary expenditures on GDP is held as an indicator

of financial autonomy and economic control of the provincial government and thus indicates its ability to intervene in the economy despite central directives. The lagged rate of unemployment constitutes another important motive for local governments to resort to protectionism. As China's economic reforms aimed at maximizing economic growth through marketization and privatization, massive layoffs ensued from increased competition. This new phenomenon represents a threat for local governments as it induces social unrest and loss of legitimacy. Trade protectionism may be considered as a way for provincial authorities to limit liberalization adjustments costs, reduce competition of more competitive outside products and curb unemployment growth.

Findings emphasize the positive link between greater provincial budgetary autonomy and higher barriers to inter-provincial trade. They confirm the argument put forward by many studies of Chinese economy that attributes the rise of local protectionism and local substitution policies to the economic reforms that assigned greater fiscal flows and economic control to regional governments (Zhao and Zhang, 1999; Wong, 2003; Chinese Economic Studies, 1993). Zhao and Zhang (1999) describe the impact of decentralization reforms in China in the following terms: "Fiscal decentralization has created conditions that encourage regionalism: disappearance of the traditional umbrella, unfairness to the poor regions, territorial segmentation and confrontation, central-local vertical confrontation, and failure of spatial programs of specialization and corporation".27

Empirical results moreover confirm the causality existing between past employment rate and current protection of local economy from outside competition behind trade barriers. The more a province suffered from massive layoffs, the more the authorities are prompt to provide protection to local activities.

Large adjustment costs (unemployment and bankruptcies of SOE), local activities

economic vulnerability as well as the intervention capacity of authorities through fiscal expenses and public consumption turn out to be major determinants of inter-province heterogeneity of barriers on domestic trade. These three factors explain 34% of inter-provincial border effects variability.

Column 3 of table 3 studies the causal structure of inter-industry heterogeneity of impediments to domestic trade in China. High labor intensity 28 and fiscal contribution of an industry 29 positively influence the level of protection it is granted from local authorities. Protection levels enjoyed by industries appear to be directly related to their intensity in terms of employment. A large number of workers by production unit secures more influence in the decision-making process of domestic trade policy for an industry. It also ensures a greater attention from authorities, whether their priority is to minimize short-run adjustment costs, limit social inequity or garner maximum political support to maintain political stability. Since the labor intensity variable corresponds to the inverse of labor productivity, results are consistent with the fact that authorities protect in priority low-productivity industries, which not only require more protection to survive increasing competition but also often lie under direct governmental control.

Additionally, governments tend to favor those industries that generate larger tax income. Chen and Feng (2000) evidence the same strategy in the context of international trade protection and stress that setting a higher tariff for an industry that is able to generate higher taxes is a "win-win game" for the authorities and the industry.

Domestic trade policy in China appears to be largely determined by two concerns of provincial authorities. The first concern stems from the governments' need to protect vulnerable and labor intensive enterprises (typically state-owned units). Higher domestic trade barriers are thus observed in provincial economies where the public sector plays a major role, where past unemployment rate is high and in sectors characterized

by high labor intensity and low productivity. This strategy is all the critical to avoid political unrest and social chaos that the province is already crippled by a high unemployment rate. The second concern has to do with fiscal revenues extraction. In a context of fiscal decentralization, local governments tend to protect in priority big taxpayers to maximize their intervention power (see Li, Qiu and Sun (2004, forthcoming) for a formal modeling of this argument).

As a final step, we test that findings of high and increasing provincial and industry-level border effects do not come from a trade diversion effect between international and national goods. An indicator of engagement in international trade is directly introduced in the estimations in order to make sure that the magnitude of the estimated border effects is not inflated by the parallel international opening.30 International openness is measured as the share of international imports in output in order to be consistent with the model that focuses is on consumption allocation between local goods and goods from the rest of the country.31

International openness does not contribute to the size of provincial border effects as underlined by the non-significant coefficient on the indicator of international trade liberalization in column 2. As far as the impact of international openness on industry-level border effect is concerned, the positive and significant sign emphasizes that the greater the international imports in a given industry, the lower the domestic protection it enjoys. The relationship therefore runs the opposite direction to the one that would indicate that industry-level border effects are inflated by international openness. Our results refute the argument that border effect estimates are a by-product of trade diversion between international and domestic trade. They nevertheless lead us to anticipate, given the rapid rate of privatization of China's SOE over the period 1997-present and increase in international engagement, that the border effects have diminished since the

period covered in this study.

7 Conclusion

This study applies the border effects method on a unique dataset of industry-level domestic trade flows between Chinese provinces to measure domestic market integration in China in 1992 and 1997. Border effects estimates underline the fragmentation of Chinese domestic economy and even the spread of local protectionism over the period. Rather than a single market, China appears as a collection of separate regional economies protected by barriers. We check that findings of decreasing domestic market integration are not influenced by the rapid growth of international trade of Chinese provinces.

Our results question China's future WTO compliance. International tariffs reduction does not secure free access to Chinese domestic market if provincial authorities maintain and even extend restrictions on inter-provincial trade.

The investigation of province-level and industry-level trade barriers confirms the relevance of applying the framework of endogenous protection to explain the level of impediments to trade between Chinese provinces. Empirical results emphasize that provinces' domestic trade protection pursues a dual objective of socio-economic stability preservation and fiscal revenues maximization.

Provincial barriers to domestic trade aim at minimizing the negative social, economic and political impacts of privatization and liberalization programs (layoffs, bankruptcies, declining profits...). Local protectionism thus occurs in the context of large economic autonomy of local authorities, high past unemployment rate, large public sector and high labor intensity industries.

The second objective concerns the extraction of tax revenues. Local authorities

that gained substantial economic powers from the decentralization process are inclined to protect those industries that generate large tax income.

As far as political implications are concerned, if economic reforms can favor the reduction of internal barriers through the reduction of the public sector and the search of productivity gains, their disrupting effects (layoffs, losses of inefficient SOE, declining profits) put in movement destabilizing forces that impede domestic trade integration. Chinese central government faces great challenges in order to comply with WTO rules and promote domestic market integration. It has to strike a balance between economic reforms and inherent adjustments costs and to limit local governments' economic interventionism.

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Notes

1 This directive corresponds to the State Council No. 303 Order entitled, "Stipulation of the State Council to Forbid Regional Blockade in Market Economic Activities".

2 Specifically, I refer to the proportion by which a province consumes more local goods than goods from the other provinces.

3 They include five autonomous regions *zizhiqu*, twenty-two provinces *sheng* and since 1997 four provincial-level municipalities *zhixiashi* (Shanghai, Tianjin, Beijing and Tchonqing located in Sichuan province).

4 Total absorption is defined as the sum of expenses on local goods, expenses on goods from the rest of the country and imports from international partners.

5 Actually, in case symmetry does not prevail, we argue that one may expect the substitution effect to be larger for local goods than for goods from the rest of the country as domestic integration should foster competition between domestic and local products, to the advantage of the firsts. This argument draws from the recognition that pre-reform introverted strategy prompted the development of a juxtaposition of autarkic provincial economies.

6 Baldwin (1984) and Rodrik (1995) provide excellent surveys of this literature.

7 This paper derives a model inspired from Grossman and Helpman (1994) and views the political process in China as trading off the social benefits of increased international opening against the loss incurred by state-owned enterprises. These authors treat Chinese provinces as distinct due to the limited economic integration between them and their trade policy autonomy.

8 This paper legitimates applying endogenous trade theory to Chinese economy despite the apparent lack of political competition among parties in the country. The authors set out three reasons to examine China's trade policy in the endogenous context although popular support does not seem to be needed to remain in or to gain political office. First, high-performance record strengthens government's legitimacy and trade policy is a tool used by provincial authorities to ensure good results in terms of growth and employment. Second, economic reforms create losers through massive layoffs, inflation and decreasing enterprises' profitability. Trade policy may help to limit the competition and

preserve political and social stability. Third, with the decentralization process, new actors (enterprises, industrial associations and local governments) have emerged and gained financial and political power. Lobbying activities mainly take place between enterprises and authorities by the means of persuasion, protest and bargaining. The negotiation strength of enterprises depends non only on their nature and status but also on their network (*guangxi*) with competent officials.

9 The model is described in greater detail in Head and Mayer (2002).

10 This consumer utilities specification allows heterogeneity in bilateral preferences and enables consumers to value products differently depending on their origin.

11 In 1997, a total of 40 industries are considered against 33 in 1992. This study concentrates on industries of tradable products and thus excludes service sectors.

12 IO tables are available for 28 provinces as data are missing for Tibet, Hainan and Tchongqing). Three provinces in 1992 (Anhui, Heilongjiang and Inner Mongolia) and four in 1997 (Anhui, Heilongjiang, Shandong and Guizhou) list only net outflows and are thus not useful for studying inter-provincial trade. Eleven provinces in 1992 and nine in 1997 separate inflows and outflows into domestic and foreign sectors. Domestic trade flows for the other provinces are deduced using industry-level provincial import and export data from the General Administration of Customs. These data match the data reported as international trade by provinces that separate international and domestic transactions in their IO tables. This finding gives some confidence in the method used as IO tables and customs data appear to use consistent methodology.

13 As a consequence, the model will not estimate the impact of provincial borders on trade flows between provinces that they separate but the effect of each province's boundaries on its trade with all other provinces.

14 These yearbooks provide wages for agriculture, extraction activities and industry.

15 The use of wages admittedly disregards issues of capital. However it could appear quite reasonable in the case of China as Chinese economic activities are predominantly labor intensive. Provinces should furthermore benefit from similar access to capital as credit allocation in China is made on a national basis by a small number of state owned banks.

16 The production that remains within the local boundaries (not exported) is at the same time equal

to imports "from itself " and exports "to itself ". Intra-provincial trade is thus to be calculated as: gross value of goods production minus international and domestic exports of goods for each industry.

17 In China, provinces are sub-divided into prefectures. Data on GDP of prefectures are taken from *Cities China 1949-1998* (1999).

18 Refer to Poncet (2003) for more details on the computing logic and hypotheses.

19 The Breusch Pagan test (Lagrange multiplier test) underlines the presence of specific industry-level effects that vary in time.

20 Output and trade are jointly determined in equilibrium (Harrigan, 1999). This could lead to a correlation between relative production and the error term. Lagged production and number of employees by industry and province are used as instruments. The test of over-identifying restrictions does not reject the validity of the choice of instruments.

21 This province stands out for its very small number of prefectures and its large surface area. These features therefore tend to inflate the province's measured internal distance, which consequently mechanically drives downward the coefficient in front of the relative distance.

22 Head and Ries (2001) find values of σ ranging between 7 and 11. Head and Mayer (2000) rely on $\sigma = 9$ and find a tariff-equivalent between 37 and 45% for European countries. Wei (1996) computes a tariff-equivalent of the border effect between OECD countries using $\sigma = 20$ because of the predominance of intra-industry trade in the trade flows of these countries. He finds a tariff-equivalent of 5%.

23 I thank an anonymous referee for suggesting me this point.

24 This variable only has a provincial dimension since information on public consumption with the double dimension province/industry does not exist. Data are extracted from the China Statistical yearbooks.

25 Budgetary and extra-budgetary expenses statistics are extracted from the New China 50 Year's Government Finance Statistics and the China Statistical Yearbooks. Unemployment and active population data are from the 1990 and 1995 population surveys.

26 Lagged value of the indicator of fiscal autonomy as well as provincial surface area and population density are used as instruments. Their validity is not rejected by the test of over-identifying

restrictions.

27 While the causal relation between the fiscal decentralization scheme and local protectionism is well recognized in the literature (Development Research Center, 2003), studies disagree on the specific effect of fiscal decentralization on global economic performance. Results of Zhao and Zhang (1999) on the negative impact of decentralization on economic growth are challenged by Lin and Liu (2000) and Chen, Hillman and Gu (2002) who show that fiscal decentralization made significant contribution to economic growth and better resource allocation.

28 Industry-level labor intensity is the number of workers per Yuan of production.

29 This variable is computed as net taxes on production of the considered industry divided by total net taxes through industries.

30 I am thankful to an anonymous referee for this suggestion.

31 The size rather than the change in international openness has been used due to data constraints. Industry-level international trade flows are taken from the IO tables which availability is limited to 1992 and 1997.

Dependent Variable: Ratio of inter-provincial to intra-provincial trade flow: $ln(\frac{m_{ij}}{m_{ii}})$										
Column	1	2	3	4	5	6	7	8	9	10
		Year 1992	Year 1997	Coast only	Interior only	Interior only Qinghai excluded				
Border Effect	-3.16***	-2.62***	-3.91***	-1.51***	-4.69***	3.89***	-2.93***	-2.37***	-3.24***	-2.50***
	(0.27)	(0.37)	(0.40)	(0.49)	(0.34)	(0.05)	(0.28)	(0.38)	(0.27)	(0.33)
Year 1997	-0.26**			-0.53***	-0.32**	-0.26**	-0.26**	-1.36**		
	(0.12)			(0.19)	(0.14)	(0.13)	(0.11)	(0.57)		
Rel. Production	0.83***	0.77***	0.89***	0.94***	0.86***	0.98***	by	by year &	0.83***	0.86***
	(0.03)	(0.05)	(0.05)	(0.06)	(0.04)	(0.05)	industry	industry	(0.03)	(0.03)
Rel. Distance	-0.51***	-0.64***	-0.39**	-1.34***	-0.11	-0.63***	by	by year &	-0.53***	-0.49***
	(0.13)	(0.18)	(0.19)	(0.26)	(0.14)	(0.15)	industry	industry	(0.13)	(0.13)
Rel. Price	-1.31***	-1.82***	-1.17***	-3.06***	1.80***	0.57	by	by year &	-1.40***	-1.61***
	(0.29)	(0.53)	(0.36)	(0.50)	(0.48)	(0.49)	industry	industry	(0.30)	(0.30)
% public sector consumption										-5.01***
										(1.26)
Fixed Effects by industry	yes	yes	yes	yes	yes	yes	yes	yes		
Fixed Effects by industry-year									yes	yes
Obs. Nb.	987	514	473	408	579	537	987	987	987	987
R squared	0.38	0.33	0.46	0.46	0.43	0.48	0.41	0.43	0.39	0.40
F-stat	157.13***	81.19***	129.91***	62.24***	103.53***	117.50***	11.35***	6***	207.09***	161.69***

Heteroskedastic consistent standard errors in parentheses,
with ***, ** and * denoting the significance at 1, 5 and 10% confidence level, respectively.

Table 1 measure of domestic border effects in china

by industry	border effects 1992	1997	by province	border effects 1992	1997
Electricity & hot water	-5.8***	-5.5***	**Coast:**		
Agriculture	-4.4***	-5.0***	Beijing	-3.0***	-3.5***
Building Materials	-4.0***	-4.3***	Tianjin	-2.5***	-3.0***
Metal products	-3.7***	-4.5***	Hebei	-1.7	-1.6
Paper and printing	-3.4***	-3.4***	Shanghai	-2.1*	-2.2**
Coal mining	-3.3***	-4.0***	Jiangsu	-1.1	-1.8
Oil extraction	-3.3***	-2.6***	Zhejiang	-3.5***	-4.6***
Sawmills and furniture	-3.2***	-4.0***	Fujian	-4.6***	-6.3***
Textile	-3.1***	-3.3***	Shandong	-3.2***	n.d.
Apparel	-3.0***	-3.1***	Guangdong	-2.0*	-1.8
Electric equip. & machinery	-3.0***	-3.1***	Guangxi	-3.0***	-2.7***
Instruments	-2.9***	-2.8***	Liaoning	-2.8***	-3.0***
Food manufacture	-2.8***	-3.6***	**Interior:**		
Non-ferrous mineral mining	-2.7***	-3.4***	Shanxi	-4.3***	-4.3***
Transport equip.	-2.7***	-3.0***	Jilin	-1.3	-2.4***
Machinery & equip.	-2.6***	-2.7***	Jiangxi	-3.2***	-2.9***
Chemicals	-2.5***	-3.0***	Henan	-2.8***	-3.3***
Metal ore mining	-2.3***	-3.0***	Hubei	-2.3***	-3.2***
Oil processing & Coking	-2.3***	-2.7***	Hunan	-2.6***	-3.1***
Metals smelting & pressing	-2.3***	-2.5***	I. Mongolia	n.d.	-3.5***
Electronic & telecom	-1.9***	-1.7***	Sichuan	-3.5***	-4.3***
			Guizhou	-3.8***	n.d.
			Yunnan	-4.1***	-3.4***
			Shaanxi	-3.0***	-3.0***
			Gansu	-3.6***	-3.6***
			Qinghai	-5.6***	-5.3***
			Ningxia	-3.8***	-4.0***
			Xinjiang	-3.7***	-3.5***

Heteroskedastic consistent standard errors in parentheses,
with ***, ** and * denoting the significance at 1, 5 and 10%confidence level.

Table 2 domestic border effects by importing province and industry

Dependent Variable: Border Effect province-year			Dependent Variable: Border Effect industry-year		
	1	2		3	4
Constant	-8.85***	-8.69***	Constant	-8.21***	-5.36***
	(1.43)	(1.68)		(1.39)	(1.27)
1997 dummy	0.31	0.37	1997 dummy	-0.68**	0.43
	(0.32)	(0.35)		(0.30)	(0.28)
Ln Fiscal Autonomy	-0.92**	-0.84**	Ln Labor	-0.45***	-0.29**
	(0.35)	(0.38)	Intensity	(0.14)	0.12
Ln Unemployment Rate	-0.89**	-0.93**	Ln Fiscal	-0.12*	-0.09**
	(0.38)	(0.35)	Contribution	(0.07)	(0.04)
Ln Importance of Public	-0.84**	-0.89**			
Consumption	(0.37)	(0.40)			
Ln Rate of International		0.07	Ln Rate of International		0.34***
Imports		(0.21)	Imports		(0.05)
Number of Observations	49	49		42	42
R squared	0.34	0.34		0.21	0.21

Heteroskedastic consistent standard errors in parentheses,
with ***, ** and * denoting significance at the 1, 5 and 10% confidence level.

Table 3 provincial and industry-level determinants of border effects