CEPII
CENTRE
D'ÉTUDES PROSPECTIVES
ET D'INFORMATIONS
INTERNATIONALES

No 2009 – 34
December

DOCUMENT DE TRAVAIL

Export Sophistication and Economic Performance: evidence from Chinese provinces

Joachim Jarreau
Sandra Poncet

TABLE OF CONTENTS

EXPORT SOPHISTICATION AND ECONOMIC PERFORMANCE: EVIDENCE FROM CHINESE PROVINCES

NON-TECHNICAL SUMMARY

In this paper, we use disaggregated data on China's trade over the period 1997-2007 to examine the recent upgrading of China's exports and its consequences on the country's economic performance. To quantify this upgrading, we use a measure of export sophistication initially proposed by Hausmann, Hwang and Rodrik (2007), which infers the average productivity level of a country's exports, from observed world trade flows. Using the distinction made in the data between firm ownership types, as well as between assembly trade and ordinary trade activities, we are able to identify the contributions of each to the total upgrading of exports. We find, in line with recent studies on the topic, that the upgrading of exports is mainly attributable to the assembly trade sector, and to non-domestic firms. However, domestic firms, which mainly operate in the ordinary trade sector, have also experienced a significant increase, in level, of their exports' sophistication.

Next, we test the impact of this rise in sophistication on the economic performance of China's provinces. This measure serves as a proxy for a country's or region's capacity to specialize in the production and export of sophisticated goods. According to Hausmann, Hwang and Rodrik (2007), countries or regions that engage in the cost discovery process of developing more sophisticated goods should be able to grasp greater gains from trade, beyond those associated to traditional comparative-advantage induced specialization. Our study thus provides a test of this theory, with the advantage that, by comparing the economic performance of China's provinces, we are able to mitigate issues of omitted variables associated to different legal and institutional systems, likely to arise in cross-country studies.

Our results indicate that the sophistication of exports positively influences the export and growth performance of provinces, after controlling for fundamental determinants of this performance. We find that the benefits from export upgrading are restricted to the sector of ordinary trade, in which the main part of the value chain is being produced in China. We also find that the export structure of foreign entities has no direct impact on economic performance, but that it has an indirect one, through its positive influence on the sophistication of domestic entities, suggesting the presence of spillovers. Our results are robust to the use of internal instruments (GMM), necessary in order to address the endogeneity issue arising from the inclusion of lagged performance in our specification. In the final part, we investigate whether the gains from specialization in sophisticated exports is conditional on other features of provinces. We find evidence that these gains are more important in provinces more outward oriented, that is to say more opened to trade and Foreign Direct Investment (FDI); and in those enjoying better access to foreign markets. We also find evidence of increasing returns to export sophistication. Taken together, these results tend to point to the likelihood of a future widening of spatial economic disparities across China.

ABSTRACT

We consider the effect of export sophistication on economic performance using regional variations within a single country (China) over the period 1997-2007. We confirm Hausmann, Hwang and Rodrik (2007)'s prediction that regions that engage in the cost discovery process of developing sophisticated

goods grasp greater gains from globalization and grow faster. We find that these gains are limited to to export activities undertaken by domestic entities. Direct gains do not appear to derive from foreign entities typically engaged in processing trade even though they are the main contributors to the global upgrading of China's exports. Our findings globally suggest that the expected gains from exporting higher productivity goods are not unconditional, they are greater for provinces already blessed by high incomes, better market centrality and higher trade performance and Foreign Direct Investment attractiveness. These features consistent with evidence of increasing returns to sophistication are unfortunately likely to contribute further to the current widening of spatial economic disparities across China.

JEL Classification: F1, O1, R1.

Keywords: Export sophistication, economic growth, outward orientation, China.

SOPHISTICATION À L'EXPORTATION ET PERFORMANCE ÉCONOMIQUE: APPLICATION AUX PROVINCES CHINOISES

RÉSUME NON TECHNIQUE

Dans cet article, nous utilisons des données détaillées de commerce extérieur de la Chine sur la période 1997-2007, pour étudier la montée en gamme des exportations chinoises et ses conséquences sur les performances à l'exportation et la croissance. Pour quantifier cette montée en gamme, nous utilisons la mesure de la sophistication des exportations proposée par Hausmann, Hwang et Rodrik (2007) ; cette mesure utilise les flux de commerce mondial et les niveaux de PIB par tête des pays exportateurs pour inférer le niveau de productivité moyen associé à la structure des exportations d'un pays. La distinction entre commerce d'assemblage et ordinaire ainsi qu'entre les différents types de propriété des firmes nous permet d'identifier les contributions respectives de chaque secteur à la montée en gamme. Nous trouvons, en accord avec d'autres études récentes, que les contributions les plus importantes viennent du secteur d'assemblage et des firmes non domestiques (étrangères ou en joint ventures) majoritaires dans ce secteur. Cependant, les firmes domestiques, présentes en majorité dans le secteur ordinaire, ont vu la sophistication de leurs exportations augmenter significativement sur la période.

Ensuite, nous testons, au niveau des différentes provinces chinoises, l'impact de cette montée en sophistication sur la performance économique. Selon Hausmann, Hwang et Rodrik (2007), la production et l'exportation de biens plus sophistiqués doit permettre des gains à l'échange plus importants, au-delà de ceux prédits par la théorie classique du commerce basée sur l'avantage comparatif. Notre étude fournit un test de cette prédiction en présentant l'avantage, du fait qu'elle se situe au niveau régional, d'éviter les biais inhérents aux différences institutionnelles qui interviennent dans les comparaisons entre pays. Nos résultats indiquent que la sophistication des exportations influence positivement la performance à l'exportation et la croissance des provinces. Cependant, les bénéfices de la montée en gamme sont limités au secteur ordinaire, pour lequel l'essentiel de la chaîne de valeur est produite en Chine (et non importée). La modification de la structure des exportations des firmes étrangères n'a, elle, pas d'impact direct sur la croissance, mais seulement un impact indirect, à travers l'influence positive exercée sur la sophistication des firmes domestiques.

Dans la dernière partie, nous examinons dans quelle mesure les gains de la sophistication sont conditionnels à d'autres caractéristiques des provinces. Il apparaît que ces gains sont plus importants dans les provinces plus ouvertes au commerce et aux investissements étrangers, ainsi que dans celles bénéficiant d'un meilleur accès aux marchés extérieurs. Nous trouvons également que les rendements de la sophistication sont croissants. Au vu de l'ensemble de ces résultats, une aggravation des disparités économiques régionales en Chine apparaît probable.

RÉSUMÉ COURT

Nous considérons l'impact de la sophistication des exportations sur la performance économique des provinces chinoises sur la période 1997-2007. Nos résultats sont en accord avec la prédiction de Hausmann, Hwang et Rodrik (2007), selon laquelle les régions qui s'engagent dans le processus de développement de la production de biens plus sophistiqués, engrangent des gains au commerce plus

importants, et croissent plus rapidement. Nos résultats indiquent que ces gains résultent des activités des entreprises domestiques. Le développement d'activités plus sophistiquées dans les secteurs d'assemblage pour l'exportation, ou parmi les firmes non domestiques, n'a pas le même impact sur la performance des provinces malgré leur contribution forte à la montée en gamme des exportations chinoises. Finalement, nos résultats indiquent que les gains de spécialisation dans les produits sophistiqués ne sont pas inconditionnels : ils sont plus importants pour les provinces à plus haut revenu, pour les plus centrales ou pour celles qui présentent les plus hauts taux d'ouverture ou attirent le plus d'IDE. Ces caractéristiques sont compatibles avec l'hypothèse de rendements croissants de la sophistication des exportations ; ils pointent plutôt vers une aggravation future des disparités économiques régionales en Chine.

Classification JEL : F1, O1, R1.

Mots clés : Investissements directs étrangers, externalités, sophistication, Chine.

EXPORT SOPHISTICATION AND ECONOMIC PERFORMANCE: EVIDENCE FROM CHINESE PROVINCES[1]

Joachim Jarreau*
Sandra Poncet†

1. INTRODUCTION

Since the early nineties, China has been integrating into world trade at an astounding pace. Chinese exports have more than quintupled between 1992 and 2007, faster than the growth rate of the economy. This has radically transformed the functioning of China's economy, going from an isolated position with exports representing less than 10% of GDP in 1980 to a highly integrated one, with an export ratio of more than 37% in 2007. This process has been accompanied by a not less impressive diversification of China's trade, as its manufactured exports pervaded all sectors of world trade, from low-technology textile to high-tech electronics and computers.

This success of China's trade integration has elicited several debates among economists. Much of the attention has focused on the upgrading of China's exports: economists (but also world consumers) have noticed since the mid-nineties the impressive broad range of China's export products and in particular the ability of Chinese producers to export capital and skill-intensive products, high-technology products, and in general products that are usually thought to belong to the area of specialization of more developed countries. The success on world markets of Chinese firms in the sectors of ITs, mobile phones and electronics, such as Lenovo and Founder, TCL, Skyworth, have been symptomatic of this evolution. Rodrik (2006) observes that China is an outlier in terms of the overall sophistication of its exports. The sophistication index of Hausmann, Hwang and Rodrik (2007) based on the "income level of a country's exports" underlines that China's export bundle is similar to that of a country with an income per-capita level three times higher than China. Relying on a different indicator, Schott (2007) also finds that China's export bundle increasingly overlaps with that of the world's most developed economies and that this overlap cannot be explained completely by its factor endowments.[2]

Two related debates have emerged about this exceptional performance. The first one concerns the veracity of this upgrading. The second deals with the contribution of this upgrading to explain China's recent growth. This paper relies on very detailed trade data for 30 provinces within China over the period 1997-2007 to empirically investigate these two related issues.

On the first issue, several authors have argued that the apparent upgrading of China's exports is misleading: it would only be attributable to foreign producers operating in the assembly

[1]We thank Akiko Suwa-Eisenmann for helpful advice.
*Paris School of Economics and CEPII, 9 rue Georges Pitard, 75015 Paris. (joachim.jarreau@gmail.fr)
†Paris School of Economics and CEPII, 9 rue Georges Pitard, 75015 Paris. (sandra.poncet@univ-paris1.fr).
[2]Refer also to Fontagné, Gaulier and Zignago (2007).

trade sector, that is, the production of high-technology goods using domestic labor-intensive processes and imported inputs (Lemoine and Unal-Kesenci, 2006; Amiti and Freund, 2008; Lardy, 2005). According to Chinese customs data, in 2007, 54% of Chinese exports correspond to processing trade. This share rises to 85% for high technology exports. Foreign entities dominate these processing trade activities : in 2007, 82% of processing trade exports is made by foreign firms. This figure reaches 91% for high tech processing trade exports. The fact that the final assembling of these goods takes place in China is simply the result of higher fragmentability of production processes and of production sharing, and should not be interpreted as a higher domestic capability to manage technology. Identifying the right diagnosis is crucial to properly anticipate the future evolution of China's economy, notably its capacity to evolve from "the world's factory, churning out massive quantities of laboriously produced goods" to a "global center of innovation, joining the ranks of developed countries and the emerging East Asian centers of technological creativity" (Naughton, 2007).

The second and related issue is whether reshaping the production structure beyond the boundaries set by factor endowments (physical capital, human capital and natural resources) provides some benefits. According to the standard trade theory focusing on comparative advantages the answer is clearly no. An important theoretical literature pertaining to endogenous growth has however proposed models[3] going beyond the traditional framework of perfect competition to show that production structure is an important contributor to economic performance,[4] thus that developing countries could gain from importing and adopting technology from more advanced economies. These models focus on the process of learning and adoption of new technologies as a costly process. In this framework, patterns of comparative advantage across countries will depend not only on their respective endowments, but also on the national policies encouraging technological learning and technology import. Some empirical validation of these theories has been recently provided by Hausmann, Hwang and Rodrik (2007). Based on cross-country panel regressions, they show that countries that acquire the capability to export a basket of products of higher sophistication (given their initial factor endowments) will gain more from trade and achieve higher growth rates. They hence argue that "what a country exports matters".

The two issues of the reality of sophistication increase and of its growth enhancing effect are especially connected in the context of China. China has adopted, starting in the early 1980s, a policy of opening to foreign investment, precisely in the hope that technological capabilities and management practices would spill over to domestic producers and enable the country to increase its export sophistication and performance and sustain high growth rates.

This paper relies on provincial trade data differentiating between domestic and non domestic trading units and between processing trade and ordinary trade to contribute to the literature in three different ways.

First, we precisely estimate the upgrading of China's exports by disentangling between in-

[3]These endogenous growth models are based on increasing returns to scale or some type of externalities (Fujita, Krugman and Venables, 1999; Banerjee and Munshi, 2004).

[4]Refer among others to Stokey (1988), Young (1991), Aghion and Howitt (1998) and Hausmann, Hwang and Rodrik (2007).

digenous sophistication and foreign sophistication based on processing trade. We find that the recent upgrading of China's trade has also concerned domestic producers operating in the ordinary trade sector. The per capita income level associated to exports by domestic entities has increased by 34.7% between 1997 and 2007 to reach 12500$, similar to that of Lithuania, a country three times richer in PPP per capita terms than China. It remains however lower than that of non domestic entities that has risen by 41.6% over the period to reach 14550$, similar to the income level associated to the export bundle of Italy, a country five times times richer in PPP per capita terms than China. The decomposition of China's export sophistication growth highlights that an overwhelming share (85%) can be attributed to non-domestic entities, in line with previous findings of the key role of processing trade in export upgrading (Lemoine and Unal-Kesenci, 2006; Amiti and Freund, 2008). Wang and Wu (2008) relying on city-level data show that processing trade and foreign investment are conducive to the export of more sophisticated varieties within a given product category.

Second, we estimate the relationship between export sophistication and economic performance in China. We confirm Hausmann, Hwang and Rodrik (2007)'s prediction that regions that engage in the cost discovery process of developing more sophisticated goods grasp greater gains from globalization and grow faster. An important question in the Chinese context is whether these growth enhancing effects depend on the origin (domestic or foreign) of this cost discovery process. This has profound implications on the capacity of a region to jumpstart development by relying on Foreign Direct Investment (FDI) attraction and processing trade instead of indigenous R&D promotion. We find that these gains are limited to activities undertaken by domestic entities. No growth enhancing gains are found to derive from foreign entities, which are typically engaged in processing trade. This contrasts sharply with the fact that the increase in the level of sophistication of foreign entities is the main contributor to the global upgrading of China's exports.

Third, we investigate whether the relationship between export sophistication and income per capita holds equally in all contexts. Our findings globally suggest that the expected gains from exporting more sophisticated goods are not unconditional. The effect of export sophistication on economic performance is greater for provinces already blessed by high incomes, better market centrality and higher trade performance and FDI attractiveness. These features, consistent with evidence of increasing returns to sophistication are unfortunately likely to contribute further to the current widening of spatial economic disparities across China.

The rest of this article is organized as follows. In Section 2, we present our measure of export sophistication and the dataset used and we describe the recent evolution of China's export sophistication. Section 3 illustrates our baseline specification and estimation methodology. Section 4 presents our main empirical results and explores the heterogeneity of the relationship between export sophistication and economic performance. Section 5 concludes.

2. EVOLUTION OF CHINA'S TRADE STRUCTURE

2.1. Measuring export sophistication

We rely on Hausmann, Hwang and Rodrik (2007)'s measure of the "productivity of a country's export basket", obtained by comparing it with the income level of countries with similar export structures. This measure assumes that each good k that a country can potentially produce and export has an intrinsic level of productivity associated to it, $Prody_k$ that is the weighted average of the income levels of this good k 's exporters, where the weights correspond to the revealed comparative advantage of each country j in good k:[5]

$$Prody_k = \sum_j \frac{x_{jk}/X_j}{\sum_j (x_{jk}/X_j)} Y_j, \tag{1}$$

where x_{jk} is the value of exports of good k by country j, X_j is the total value of country j's exports and Y_j is the per capita level of income of country j, measured as the real GDP in PPP, per capita. The bigger share a given good k weighs in the exports of rich countries, the more 'sophisticated' it will be.

The sophistication level associated with a country j's export bundle, noted $EXPY_j$, is the overall level of productivity of its export basket. It is the weighted sum of the productivity levels associated to each exported good k, $Prody_k$, with the weights being the share of each good in the country's total exports.

$$EXPY_j = \sum_k \frac{x_{jk}}{X_j} Prody_k \tag{2}$$

The purpose of this measure is not to determine directly the intrinsic features that make a product sophisticated, e.g. the technology embedded in it, the levels of specialized skills required to produce it, R&D investments, etc.; but rather to infer, from observed patterns of trade, which products require a high level of development to export.[6]

As a robustness test, we will rely on an alternative indicator of sophistication based on Lall (2000)'s classification of products[7] by technological level: the share of high-technology manufactures in total exports. We hold this share as a more precise indicator of high technology

[5] The numerator of the weight, x_{jk}/X_j, is the value-share of the commodity in the country j's overall export basket while the denominator of the weight, $\sum_j (x_{jk}/X_j)$, aggregates the value-shares across all countries exporting the good.

[6] Hence, it captures a mix of the sources of competitiveness of high-wage countries, which include technology, in a broad sense: not only product/process innovation, but also the capabilities needed to handle technologies efficiently, value chain organization, infrastructure (for example ICTs). Since it potentially reflects other features of high-income countries' exports, such as differentiation, low fragmentability, availability of specific natural resources, trade distortions caused by barriers and subsidies, one should bear in mind that this measure is an amalgam of all these factors, more than a specific technology, or skill-intensity measure (Lall, Weiss and Zhang, 2006).

[7] Contrary to Hausmann, Hwang and Rodrik (2007)'s $Prod_y$ index, Lall (2000)'s classification of products is time-invariant.

since it is focused on the top of the quality/technology spectrum. Also it is strictly related to technology contrary to EXPY, which cannot be held as strictly measuring technology as it possibly takes into account other aspects which make a given product likely to be exported by advanced, technology-rich countries. We will show that our results are confirmed.

2.2. Data

A preliminary exercise is to investigate how China's export sophistication compares with that of countries of similar per capita income level. We draw the relationship between country level sophistication and PPP-adjusted per capita GDP. Figure 1 is drawn for 2007 decomposing China's sophistication level into its domestic and non domestic components.

We compute the product level sophistication index, $Prody_k$, for each year between 1997 and 2007 from the BACI world trade dataset.[8] This dataset, which is constructed using COMTRADE original data, proposes bilateral trade flows at the 6-digit product (Gaulier and Zignago, 2008).[9] We construct yearly sophistication measures for international partners and for Chinese provinces[10] based on Equation 2.

Our main source for this study is the Chinese customs data, which report province level exports and imports by 6-digit product over the period 1997-2007. Its unique feature is that it allows to differentiate between domestic and non domestic trading units[11] and between processing trade and ordinary trade. Processing trade includes all trade flows by firms operating in the assembly sector, that is, importing inputs to process them in China and re-export the finished products (these producers benefit from a preferential tax regime on imported inputs). Ordinary trade relates to normal exports.[12]

2.3. Evidence on China's export sophistication

2.3.1. International comparison

We find a similar pattern as in Rodrik (2006): there is a very strong correlation (between 0.79 and 0.86 depending on the year) between these two variables in our sample of around 170 countries. Rich (poor) countries export products that tend to be exported by other rich (poor) countries. China is an 'outlier' in this relationship both when we look at the product bundle exported by domestic and exported by non domestic firms. In 2007, the export bundle of domestic firms has a level of sophistication (12500$) similar to that of Lithuania, a country

[8] World countries real GDP per capita in PPP are taken from the World Development Indicators database (World Bank).

[9] The Chinese customs data was converted into the 1992 Harmonized system (HS) classification before being merged with the BACI data that uses the 1992 classification for all years.

[10] Chinese provinces' real GDP per capita come from the China Statistical Yearbook. Refer to Appendix 1 for precise definitions of all variables.

[11] Non-domestic firms include fully-foreign firms as well as "joint ventures" regrouping several contractual forms, including equity and non-equity joint ventures, and joint cooperatives.

[12] The data also refers to a third ("Others") category that groups other flows such as aid, border trade and consignment.

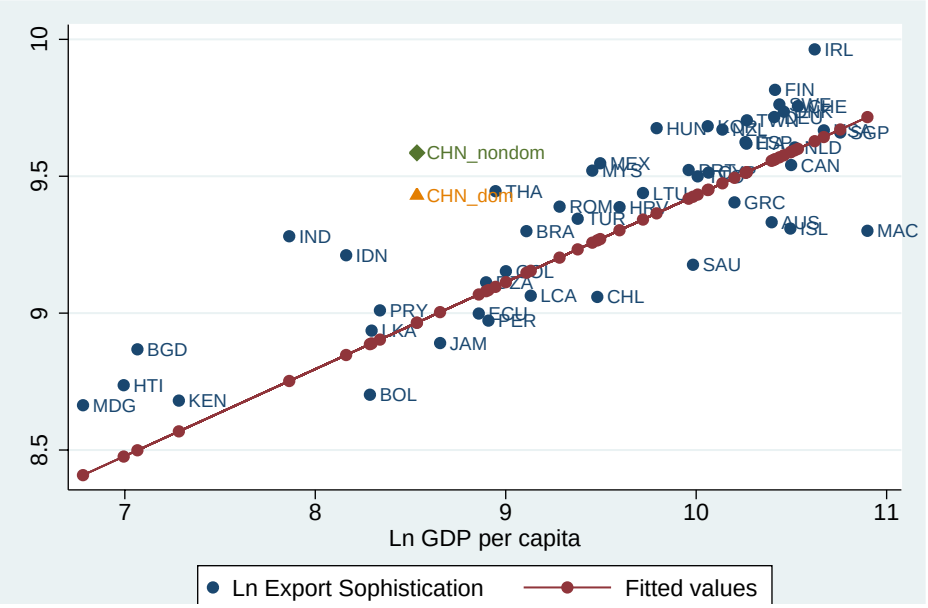

Figure 1 – Relationship between per-capita PPP GDP and EXPY (in logs), 2007. Source: Authors' computations based on BACI and WDI.

three times richer than China in PPP per capita terms. That of non domestic firms is higher at 14550$, similar to that of Italy, a country five times richer than China in PPP per capita terms.

2.3.2. China's upgrading: domestic versus non-domestic

When we look of the evolution of China's sophistication over time distinguishing between domestic and foreign entities, we observe that the recent upgrading of China's exports is not confined to foreign entities typically operating in processing trade but has also concerned domestic producers. Figure 2 displays a steep increase in the sophistication level of exports for both types of exporters. The income level associated to exports by domestic entities has increased by 34.7% between 1997 and 2007. Over the same period that of non domestic entities has however risen faster, by 41.6%. The level of sophistication for domestic entities is systematically lower than that of non-domestic exporters, certainly reflecting their different involvement in assembly trade (Lemoine and Unal-Kesenci, 2006; Amiti and Freund, 2008). In 2007, 78% of non-domestic firms exports correspond to processing trade activities, compared to 23% for domestic firms exports. In 2007, an overwhelming share of China's processing trade exports (82%) emanate from non-domestic firms. Over the period (1997-2007), the gap between domestic and non domestic export sophistication has thus doubled from 1025$ to 2090$. When decomposing the growth in global sophistication, we find that 85% of it can be attributed to non-domestic entities.

A similar and even clearer message is delivered when relying on alternative measures of export sophistication. Figure 3 uses the share in exports of products defined as High-Tech in Lall (2000)'s classification.

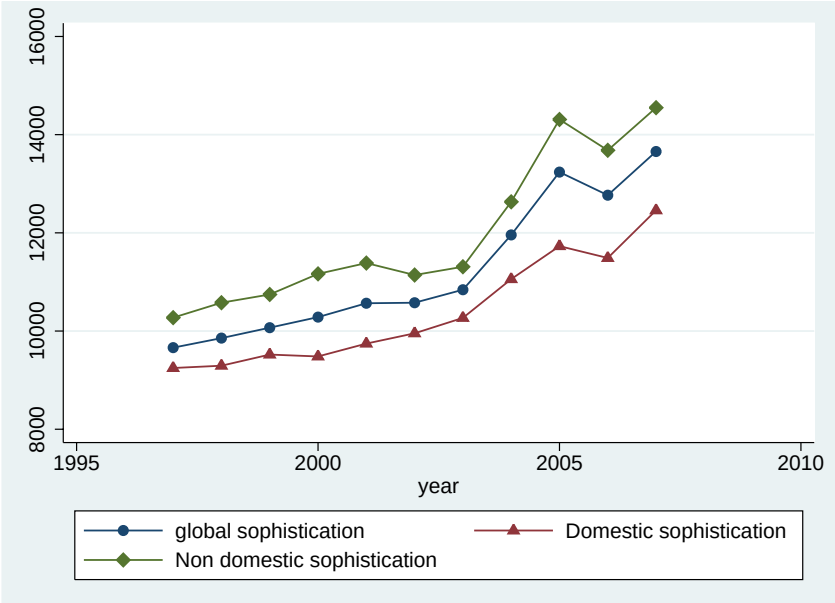

Figure 2 – China's export Sophistication: evolution according to firm type. Source: Authors' computations based on Chinese customs, BACI and WDI.

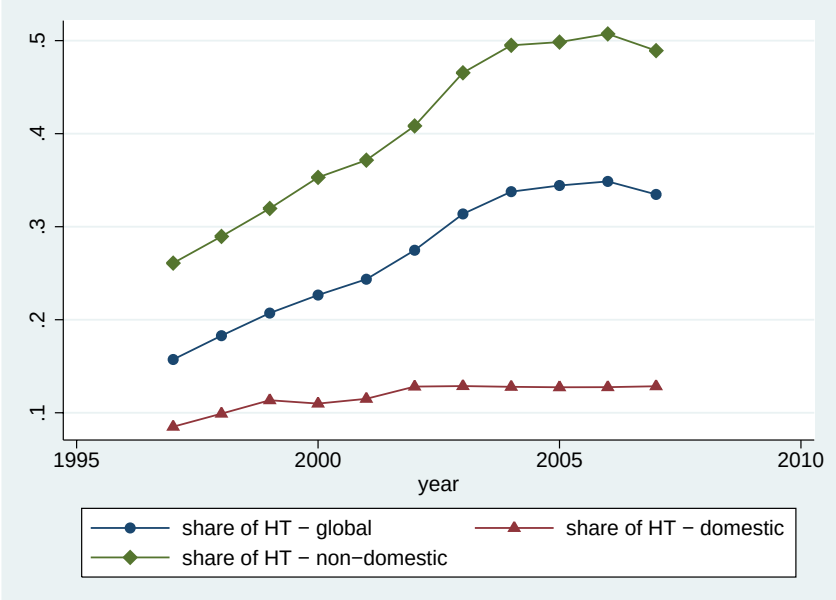

Figure 3 – China's export share of High Tech goods: evolution according to firm type. Source: Authors' computations based on Chinese customs and BACI.

2.3.3. *Provincial heterogeneity*

We move on to look at the pattern of export sophistication across provinces in China. Chinese provinces are known to exhibit important disparities in industrial structure and in overall development; their export sophistication level is also likely to vary. One important question is whether the observed widening in economic performance is imputable to differences in export upgrading.

Figure 4 shows the relationship between real income per capita (in constant 2000 dollars) and export sophistication across provinces in 2007. It is positive but appears weaker than for the cross-country sample (Figure 1). The correlation varies between 0.32 and 0.68 depending on the year between these two variables in our sample of 30 provinces. We observe important disparities in terms of sophistication, with overall, the provinces where specific policies of liberalization and of openness to trade and foreign investment were put in place exhibiting some of the highest levels of export sophistication (Guangdong, Shanghai, Jiangsu and Tianjin).

Interestingly, when looking in Figure 5 at the relationship between real income per capita and export sophistication average yearly growth rates over the period 1997-2007, we identify a much stronger correlation suggesting that the link between sophistication and growth does not simply reflect differences in terms of geography or institutions (likely to be invariant or to increase at a similar pace across China).

In the following sections of the paper, we go further into this issue in order to verify that the observed relationship between sophistication and economic performance is truly a causal one.

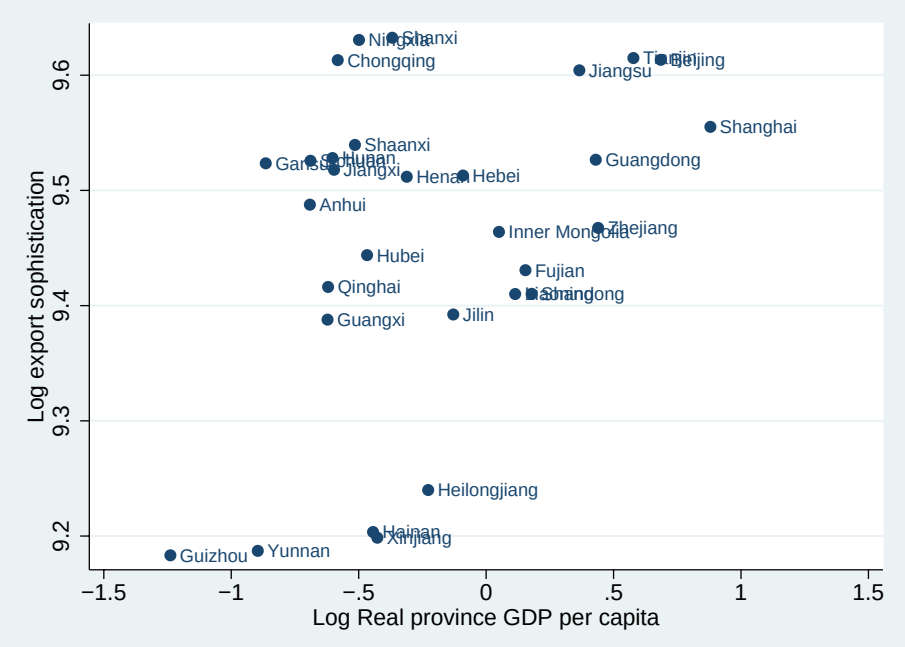

Figure 4 – Export sophistication and real GDP per capita across China's provinces, 2007. Source: Authors' computations based on Chinese customs and China Statistical Yearbooks.

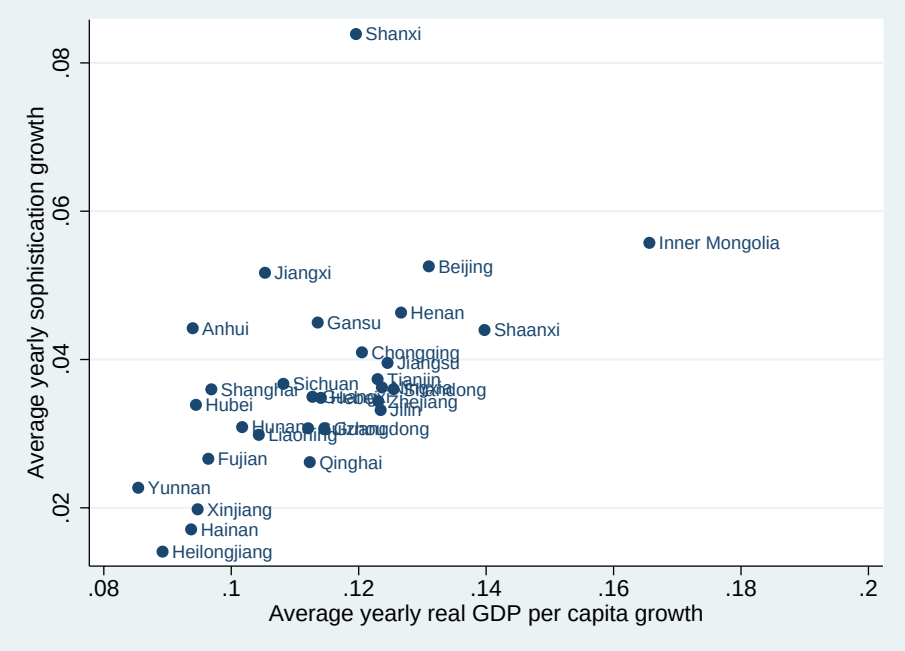

Figure 5 – Yearly growth of export sophistication and real GDP per capita, 1997-2007. Source: Authors' computations based on Chinese customs and China Statistical Yearbooks.

3. ECONOMETRIC METHODOLOGY AND BASELINE SPECIFICATION

In this section, we first present our baseline growth equation, and discuss the conditioning information set that we use. We then describe our econometric methodology.

3.1. Baseline specification

We use a cross-province time-series panel of data to estimate the relationship between sophistication and economic performance. We aim at testing Hausmann, Hwang and Rodrik (2007)'s prediction that regions that engage in the cost discovery process of developing more sophisticated goods grasp greater gains from globalization and have a faster economic growth. We investigate whether Chinese provinces with higher export sophistication grow faster and export more.[13] Our baseline regression, which we initially estimate using a within-groups estimator, takes the following form:

$$Y_{i,t} = \alpha + \beta Sophistication_{i,t-1} + \gamma CONTROL_{i,t} + \eta_i + \mu_t + \epsilon_{i,t} \quad (3)$$

where i indexes our 30 provinces, and t, time. Y denotes economic performance proxied successively by real GDP per capita and export-to-GDP ratio. Sophistication represents our indicator presented in Section 2. To make up for the potential endogeneity problems, we lag our sophistication indicator one year. We will furthermore verify, relying on instrumental variables,

[13] We rely on annual growth rate to maximize the number of observations. Our results were robust to using two-year averages. The results based on the two-year averages are not reported for brevity, but are available on request.

that our results are not biased by simulataneity or circularity issues. Our estimations cover 10 years from 1998 to 2007. CONTROL is defined according to the augmented Solow model as proposed by Mankiw et al. (1992). The logarithm of lagged economic performance is included to control for convergence. We also introduce the share of population with more than primary schooling as a proxy for human capital (Education) and the fixed investment over GDP ratio (Investment rate) as a proxy for physical capital accumulation. We further introduce the following four additional policy variables that have been identified in the empirical growth literature as being correlated with growth performance across countries (Barro, 1991; Easterly et al., 1997) and by Démurger (2001) and Boyreau-Debray (2003) in the Chinese context: trade as a share of GDP or FDI over GDP as a proxy for engagement in the internationalization process(Outward orientation), the share of state entities in total investment (State entities) as an indicator of low progress in reform, the share of government expenditure for science and technology promotion over GDP (Research expenses) to account for the investment in Research and Development, and the kilometers of railways and roads per capita (Infrastructure density) as an indicator of intra-provincial market integration.[14] Finally, provincial fixed effects and time fixed effects are denoted by η_i and μ_t respectively, and ϵ_{it} is an idiosyncratic error term.

3.2. Econometric methodology

Equation 3 is estimated using a within-groups estimator, which controls for province-specific heterogeneity. We further introduce year fixed effects to capture the unobserved effects of economy-wide changes over time. We also cluster standard errors at the province level.

The sense of the causality between export sophistication and economic performance is not clearly determined even after export sophistication is lagged one year, confronting us to a reverse causality and a simultaneity issue. Moreover, since the lagged dependent variable is introduced among the regressors, together with the provincial fixed effects, this estimator is biased (downward)[15] and inconsistent even if ϵ_{it} is not serially correlated, as the lagged dependent variable is correlated with the error term. We thus need to control for the endogeneity arising both from the dynamic specification of the equation and from reverse causation or omitted variables.

We follow two alternative strategies. First we rely on internal instruments, using the Generalized-Method-of-Moments (GMM) system panel estimator, proposed by Arellano and Bond (1991) and Blundell and Bond (1998), which combines in a system the first-differenced equation with the same equation expressed in levels using appropriate lags of the right-hand side variables expressed in level and first difference as instruments. The instruments for the regression in differences are the right-hand side variables expressed in level lagged twice or more, while the instruments for the equation in levels are lagged differences of the corresponding variables.[16].

[14] See Appendix 1 for precise definitions and data sources of all variables.

[15] This bias is generally referred to as the Nickell (1981) bias. Nickell (1981) derives a formula for this bias (when there are no exogenous regressors), showing that it approaches 0 as the sample size tends to infinity. The within-groups estimator is thus likely to perform well only when the time dimension of the panel is large.

[16] As discussed in Bond et al. (2001), Berg and Krueger (2004), and Hauk and Wacziarg (2004), the system-GMM is indeed the most suitable way to address the problems of estimating growth regressions.

Consistency of the GMM estimates depends on the validity of the instruments. We test for the validity of our instruments by using two tests suggested by Arellano and Bond (1991): the test for overidentifying restrictions and the test for second-order serial correlation of the residuals (AR(2)). The AR(2) test is asymptotically distributed as a standard normal law under the null of no second-order serial correlation, and provides a further check on the specification of the model and on the legitimacy of variables dated t-2 as instruments. Overidentifying restrictions will be tested based both on the Sargan test and the Hansen test. While the former may not be robust, it is not weakened by many instruments. In contrast, the Hansen test is robust but can be weakened by many instruments. Both tests are asymptotically distributed as a chi-square with degrees of freedom equal to the number of instruments less the number of parameters, under the null of instrument validity.

We will further check the robustness of our results and specifically investigate the potential endogeneity issue related to our variable of interest, export sophistication, relying on external instruments in line with the literature on spillovers from foreign to domestic firms. The reliability of this method lies on the identification of instruments that are correlated with economic performance but uncorrelated with the error term, i.e. with the unobserved component of GDP per capita. Our estimations will suggest that once the export sophistication level of domestic firms is controlled for, the export sophistication level of foreign firms does not significantly affect the economic performance of a province, hence this latter variable would be a suitable instrument. We will argue that high foreign technology can benefit domestic firms in line with the empirical evidence of FDI spillovers (Javorcik, 2004; Aitken et al., 1997; Görg and Greenaway, 2004). Through various tests on our two-stage least squares (2SLS) estimation, we will verify that foreign sophistication is a valid instrument for the domestic sophistication.

Both instrumental procedures will provide us with coherent findings. The appropriateness of the instrumental variables in both cases will give credence to the conclusion that the estimated link between sophistication and economic performance is not due to simultaneity bias or insufficient control for other determinants of growth in our fixed effects estimations.

4. REGRESSION RESULTS

4.1. Export sophistication impact on economic growth

Let us first focus on GDP growth as a proxy for economic performance and rely on real income per capita GDP as our dependent variable. Results are reported in Table 1. Columns (1) and (2) report our benchmark growth regression before Columns (3) and (4) add our variable of interest, province-level export sophistication.

The variables in the conditioning information set have the expected signs. Lagged GDP per capita attracts a positive and significant coefficient. The value inferior to one indicates a process of convergence. Our proxy for human and physical capital accumulation (education and investment rate) generally attract a positive and significant coefficient. Among our policy indicators, our proxy for the degree of outward orientation (trade share of GDP) has a positive impact on economic growth while the share of state entities in total investment enters with the

expected negative sign. The two other control variables (research expenses and infrastructure density) do not enter significantly.

Export sophistication enters with a positive and significant coefficient. It is useful to interpret the magnitude of the estimated coefficient based on the results of Column (4). Holding other factors constant, a 15% increase in export sophistication (corresponding to a one-standard deviation over mean increase) raises income per capita by about 1.5% on average. This impact appears much greater (almost five times greater) than what Hausmann, Hwang and Rodrik (2007) estimate based on a cross-country panel data set over the period 1962-2000. It is however rather close to their results when the sample is restricted to low-middle income countries to which China belongs. Also the 1.5% growth in income per capita should be put in the context of China's rapid growth. The average per capita income growth rate is 10% over the period.

Columns (5) and (6) verify that our results are not driven by the specific features of some specific provinces. In Column (5) we test whether the "municipality" provinces are outliers by dropping the observations for the four "super cities" of our sample (Beijing, Tianjin, Shanghai and Chongqing). The sample size drops from 300 to 260 but leaves our results almost unchanged. We conclude that these cities do not drive the results and thus keep them in the following regressions. In Column (6) we check that our results do not derive from the two most outward-oriented provinces. Half of China's exports indeed originate from the two coastal provinces of Guangdong and Jiangsu (31 and 17% of China's exports in 2006). Again, while our sample size drops from 300 to 280, our results are virtually unaffected.

In Column (7) we check that our results are robust to the use of first differences instead of provincial fixed effects. Theoretically, first differences is an alternative to the use of provincial fixed effects. It gives similar estimates but implies loosing the first time period for each cross section (see Wooldridge, 2002). In Column (7) we have 9 years (1999-2007) for each province instead of 10 years as in the other columns but obtain virtually unchanged results.

The last three columns of Table 1 verify that the significant and positive contribution of export sophistication on economic performance truly pertains to the domestic ability of provinces to upgrade the sophistication of their goods and not simply to a strategy of processing trade. The issue is to which extent the measured export sophistication does not simply reflect the sophistication level of previously imported inputs.

We proceed in two steps. In Column (8) we introduce the sophistication level of imports[17] in parallel to the sophistication level of exports.

The lack of significance of import sophistication and the maintained significance of export sophistication suggest that what matters for economic growth is truly the sophistication of the export basket and that the sophistication of the import basket provides no additional explanatory power. In Columns (9) and (10) we verify that we obtain similar findings using the share of high tech products in trade instead of the sophistication level. Our results tend to confirm that

[17]It is computed in a similar manner as for exports using import shares. The sophistication level associated with a province j's import bundle (over all goods k) is obtained as $\sum_k \frac{Import_j^k}{\sum_k Import_j^k} Prody_k$

findings of a significant impact of export sophistication on economic growth do not simply reflect processing trade of previously imported inputs. In China, the economic performance is thus directly connected to the cost discovery process of developing higher sophistication by domestic firms despite its limited contribution to the country's global sophistication growth.

4.2. Endogeneity issues

As explained above, our estimations may be biased both due to the introduction of the lagged dependent variable among the regressors, together with the provincial fixed effects and to endogeneity problems on other explanatory variables. We tackle these issues in Table 2 using both internal instruments (GMM) and external instruments (2SLS). Both strategies will indicate that the exogeneity of our sophistication indicator cannot be rejected.

The consistency of the GMM estimates (Columns (2), (4) and (6)) will be checked based on the two tests suggested by Arellano and Bond (1991) and reported at the bottom of the Table. The test for second-order serial correlation of the residuals (AR(2)) indicates that the orthogonality conditions cannot be rejected at the one percent level, thus that the error term is not serially correlated. The Hansen and Sargan tests for overidentifying restrictions both do not reject the null hypothesis that our instruments are appropriate.

The comparison of Columns (1) with fixed effects and (2) with GMM allows us to identify that the use of the GMM estimators confirm the positive impact of export sophistication on economic growth. The main difference pertains to the upward revision of the coefficient on the initial GDP per capita that indicates the effective correction of the correlation between the lagged dependent variable and the error term.[18] While the coefficient on export sophistication obtained with the GMM estimator appears smaller, it is not significantly different from the one obtained based on fixed effects. This suggests that our indicator does not suffer from endogeneity problems. The strong link between export sophistication and growth does not appear to be driven by simultaneity bias.

The next three columns of Table 2 address the endogeneity of our variable of interest more precisely and develop an instrumentation strategy based on external instruments for our indicator of export sophistication. Based on fixed effects and GMM estimators, respectively, Columns (3) and (4) investigate the relative importance of domestic and non domestic export sophistication. The two non-overlapping indicators are computed using the Hausmann, Hwang and Rodrik (2007) procedure (described in Section 2.1) on export flows of domestic and foreign firms separately. Results in both columns indicate that once the export sophistication level of domestic firms is controlled for, the export sophistication level of foreign firms does not significantly affect the economic performance of a province. The absence of a direct effect of the sophistication of the foreign firms export basket on economic growth once that of domestic firms is taken into account suggests a possible instrumentation strategy based on the hypothesis of sophistication spillovers from foreign to domestic firms. Several channels are put forward theoretically to explain that foreign firms can benefit innovation activity of domestic firms. A

[18] As evidenced by Nickell (1981), the fixed effects estimator that takes into account the unobserved location-specific effects produces a downward bias on the lagged dependent variable.

first channel corresponds to reverse engineering: local firms can learn about the products and technologies brought in by foreign investors. A second channel is via skilled labor turnovers whereby local firms obtain the technological know-how of foreign-investment-related firms by "stealing" their skilled workers. A third spillover channel corresponds to a demonstration effect on local R&D activity. The mere presence of foreign products can stimulate domestic firms to innovate and develop new products and processes. A final spillover channel emphasized by Javorcik (2004) is through supplier–customer relationships. Foreign firms may provide technological know-how transfer or staff training to their local suppliers in order to enhance their innovation capability. Several studies provide empirical support for these FDI spillover effects (Blomstrom and Kokko, 1999). In the specific context of China, Hu and Jefferson (2001) find that inward FDI has a positive effect on the introduction of new products while Cheung and Lin (2004) measure a positive effect of FDI on the number of domestic patent applications in China. They find that the spillover effect is the strongest for minor innovation, suggesting a "demonstration effect" of FDI.

Column (5) reports the results of our two stage instrumentation strategy. The first stage corresponds to the regression of the domestic export sophistication on the contemporaneous and lagged foreign export sophistication as well as the other explanatory variables of income performance considered in Equation 3. Several tests suggest the validity of these instruments. Both variables enter positively and significantly in the first stage regression. Coefficients of 0.13 (significant at the 1% confidence level) and 0.08 (significant at the 10% confidence level) are estimated respectively on the two instruments. The first stage is characterized by a partial R^2 of 10% and a F-test of excluded instruments is F(2,29)=13.51. These findings confirm the hypothesis of positive spillovers running from foreign to domestic firms in terms of export sophistication. Two additional tests help to verify the validity of our instruments: the Hansen test of overidentifying restrictions and the weak identification test. The insignificance of the Hansen test of overidentifying restrictions (2.3, Chi-sq(1) P-val=0.13) indicates that the orthogonality of the instruments to the error term cannot be rejected, suggesting that our instruments are appropriate. Moreover, we obtain a Kleibergen-Paap Wald F-stat of 13.5 above the informal threshold of 10 suggested by Staiger and Stock (1997) to assess the validity of instruments. Overall, these tests suggest that the second stage estimates (reported in Column (5)) are reliable, i.e. that domestic export sophistication is a positive and significant determinant of economic growth. The high p-value (0.61) obtained on the Davidson-MacKinnon test of exogeneity indicates that there is no significant difference between the export sophistication estimates obtained with and without instrumentation. This result confirms previous evidence that the positive relationship between export sophistication and growth is not biased by endogeneity problems.

Our findings so far suggest that the positive effect of export sophistication on growth reflects the direct positive impact of the sophistication of the export basket demonstrated by domestic firms (and not foreign firms) on growth. The first stage results of the IV regression nevertheless suggests that while China's policy of opening to foreign investment did not bring direct growth enhancing effects, some benefits were realized as technological capabilities spilled over to domestic producers.

A remaining issue to be investigated is whether the impact pertains to ordinary trade export or processing trade. This is the focus of the last column of Table 2. The GMM estimator is applied to a specification that decomposes the export sophistication into its ordinary trade (OT) and processing (PCS) trade components. The two non-overlapping indicators simultaneously enter with a positive sign but only ordinary trade sophistication is significant (at the 5% confidence level). This confirms the results obtained in the last three columns of Table 1. The significant impact of export sophistication on economic growth mainly corresponds to the positive effect of technological capabilities demonstrated by domestic firms. Direct gains do not appear to derive from processing trade activities despite their higher level of sophistication and their important contribution to the global upgrading of China's exports.

4.3. Export sophistication impact on export performance

We now turn to our second proxy of economic performance, the export rate. Rodrik (2006) suggest that China's capacity to export a bundle of goods much similar to that exported by countries three times richer in per capita terms has been the key to its successful export growth. We thus expect that within China, provinces with higher export sophistication gain more from trade and thus export more. We estimate Equation 3 relying on the export to GDP ratio as our dependent variable. Results are reported in Table 3. Outward orientation is proxied by the ratio of FDI over GDP. The first eight columns run estimations similar to the first eight columns of Table 1. Columns (1) and (2) display the benchmark export performance regressions before introducing our indicators of export sophistication in Columns (3) and (4).

While the explanatory power of the regressions appears high (the within R^2 is above 75%), it is mostly due to the lagged dependent variable. The initial export to GDP rate attracts a significant and positive (but lower than 1) coefficient. The two proxies for human and physical capital accumulation fail to enter significantly. Among our control variables, most are not significant.[19] The only exception is the proxy for infrastructure density that enters with a positive and highly significant coefficient.

Our variable of interest, export sophistication enters with a positive and significant coefficient. Results in our preferred specification (Column (4)) suggest that holding other factors constant, a 15% increase in export sophistication (corresponding to a one-standard deviation over mean increase) raises export rate by about 6% on average. Since the average export-to-GDP rate in China is 20%, this impact is clearly economically significant. It proves robust to the two checks run in Columns (5) and (6), i.e. the exclusion of the four "super cities" and of the two most outward oriented coastal provinces of Guangdong and Jiangsu, respectively. Our results also remain when first differences estimators are used instead of provincial fixed effects (Column (7)).

Our results sofar are in line with Hausmann, Hwang and Rodrik (2007) that predicts that regions that engage in the cost discovery process of developing more sophisticated goods perform better both in terms of exports and income. An important question in the Chinese context is again the origin of this cost discovery process. It is crucial to determine whether it matters that it is

[19]The standard errors for non significant variables are not reported for the sake of space saving.

undertaken by domestic entities and whether the discovery can be imported notably through FDI or trade processing.

Estimates obtained above on the impact of export sophistication on economic growth (columns 8 to 10 of Table 1 and Table 2) already suggest that sophistication induced economic performance in China does not simply reflect a strategy of technology acquisition through the processing of previously imported inputs and the attraction of foreign entities. We indeed observed that what matters for economic performance are sophistication efforts undertaken by domestic firms for trade.

We verify these results looking at trade performance in the last three columns of Table 3. In Column (8), we introduce the sophistication level of imports in parallel to the sophistication level of exports. In coherence with results obtained on GDP per capita, import sophistication does not enter significantly, suggesting that the positive impact of the sophistication of the export basket does not simply reflect the importance of assembly trade. Columns (9) and (10) decompose sophistication between its domestic and foreign components and between its ordinary trade and processing trade components respectively. The measured lack of significance of the foreign and processing trade sophistication, once the domestic or ordinary export sophistication is controlled for, further confirms the importance of indigenous cost discovery process of developing more sophisticated goods for trade and economic performance. Those gains are limited to activities undertaken by domestic entities despite their limited contribution to the global sophistication growth. Technology acquisition from the processing of previously imported inputs and the attraction of foreign entities seems to be beneficial to growth only to the extent that they are fully taken over by domestic firms.

4.4. The heterogeneous influence of sophistication

One novel contribution of this paper is to investigate the possibility that the relationship between the development of sophisticated goods and economic performance depends on the locations' characteristics. It is likely that the contribution of export sophistication to economic performance disparities in China is not only rooted in the heterogeneity of export sophistication across provinces but also in the heterogenous impact of sophistication on income and trade growth depending on the provinces characteristics.

Heterogeneity in the estimated impact of export sophistication on growth across countries has been highlighted by Hausmann, Hwang and Rodrik (2007). They find that export sophistication does not work the same way for all countries. Regressions estimated separately for four different country groups distinguished by income levels (high-income OECD countries, middle-income countries, lower middle-income countries and low income countries) show that export sophistication has a greater impact on growth performance among middle-income countries (to which China belongs) than among countries at either end of the income spectrum. Potential explanations for such a result are numerous including considerable measurement error in the lowest-income sub-sample and limited variability in sophistication in rich countries. It is also difficult to disentangle between alternative families of conditioning factors (geography, institutions or integration) because of the issue of endogeneity. Observed differences in terms of

institutions or integration may reflect differences in other uncontrolled variables.

One advantage of exploiting regional variations within a single country (China) is that we mitigate the typical issue of omitted variables as the legal system, other institutions and internationalization process change at a common pace across the regions. Heterogenous results between sub-groups can more easily be linked to specific differences with less fear of this result being contaminated by unobserved endogenous differences. This section investigates the specific role of centrality and outward orientation as necessary preconditions for a growth enhancing effect of export sophistication. The intuition is that the discovery of high productivity goods is more likely to generate cost-discovery externalities and information spillovers (favoring growth) in a favorable context characterized by accessible foreign markets and voluntary outward orientation.

Provinces with a greater outward orientation and better accessibility to markets should benefit from a greater return for their sophistication improvement and thus a larger growth enhancing effect.

A related issue is whether the growth benefits from sophistication are increasing with the extent of sophistication and the level of income, thus displaying a pattern of increasing returns. Since the key is that the development of high productivity products generates information spillovers for emulators (Hausmann and Rodrik, 2003), we could anticipate that the pay off of discovery activities increases with the extent of past achievements.

Column (1) in Table 4 introduces the squared value of export sophistication in our preferred specification (Column (4) of Table 1). The squared sophistication enters with a significant and positive coefficient, attesting to the presence of increasing returns to sophistication. However, the coefficient on overall sophistication turns negative. This raises the possibility that the sophistication can have a negative effect on economic growth for some provinces. We compute the threshold above which the effect becomes positive. We get a sophistication value of 8,200 dollars. Only 5% of our observations are below this threshold and all provinces move beyond this threshold during the period of investigation. We thus conclude that overall there are increasing returns to sophistication on economic growth.

The following columns investigate possible explanations for this pattern. Our preferred regression is estimated separately for two sub-groups of provinces distinguished by income level (Columns (2) and (3)), market accessibility (Columns (4) to (6)) and outward orientation (Columns (7) to (12)) respectively. The sub-groups are split based on the median value.[20]

Columns (2) and (3) investigate the heterogeneity according to the GDP per capita level. Results indicate that a 1% increase in export sophistication has a significantly greater impact on income growth in richer provinces (0.4 compared to 0.05 percentage points), which seems consistent with the increasing returns result. The following four columns look at market accessibility as a conditioning factor of sophistication's impact on growth. We rely on two alternative measures of market accessibility. The first one, called "centrality", has been developed by Head and Mayer (2006) as an exogenous source of spatial variations in access to world demand. It

[20]Provinces belong to a given sub-group throughout the period.

is the sum of the inverted distances of a location to the center of every inhabited 1° by 1° cell in the world population grid. The second one, called "market access", is a distance weighted average of partners' real demand first offered by Redding and Venables (2004). We compute yearly indicators of market access for each province following a two-step procedure detailed in De Sousa and Poncet (2009). Results in Columns (4) to (5) suggest that centrality is a significant source of heterogeneity in the growth enhancing effect of developing more sophisticated goods. Export sophistication only appears to be growth enhancing in provinces with above median centrality, it is however non significant for provinces with below median centrality.

Columns (6) to (7) display coherent results: the growth-enhancing effect of sophistication is significantly higher for provinces with good market access. A similar message is obtained from regressions estimated separately for two sub-groups of provinces distinguished by outward orientation. We rely on three alternative and complementary indicators of provincial trade openness: export to GDP, FDI over GDP and export density. FDI over GDP is a proxy for the openness to foreign investment. Export to GDP and export density help to distinguish between two important dimensions of trade performance: the intensive and the extensive margin of trade respectively (refer to Melitz (2007) and Chaney (2008)). Export density is computed as the number of used product lines (that is, of SH8 products for which a non-zero export flow is observed) over the total number of existing product lines (observed in Chinese exports of the same year). This indicator varies from 3.2 to 93% in our sample. The median value using for the split of our sample is 48%.

Results based on all three indicators of outward orientation deliver a similar message: international openness increases the gains from sophistication. We find a significantly higher impact of export sophistication on economic growth for outward looking provinces than for others.

Our findings globally suggest that the expected gains from developing higher productivity goods are not unconditional: they significantly depend on the context and notably on preliminary favorable conditions. Consistently with previous evidence of increasing returns to sophistication, the effect of export sophistication on economic performance appears to be greater for provinces already blessed by high incomes, better market centrality and higher trade performance and FDI attractiveness. These results suggest the further widening of spatial income disparities across China.

5. CONCLUSION

In this article, we rely on regional variations within a single country (China), to investigate whether export sophistication is growth enhancing. Our study thus provides a test of the literature relating to production structure and economic performance, with the advantage of that, by comparing the economic performance of China's provinces, we are able to mitigate issues of omitted variables associated to different legal and institutional systems, likely to arise in cross-country studies. We verify Hausmann, Hwang and Rodrik (2007)'s prediction that regions that engage in the cost discovery process of developing more sophisticated goods grasp greater gains from globalization and have a faster economic growth.

We find that these gains are limited to activities undertaken by domestic entities. Economic performance is thus directly connected to the cost discovery process of developing higher sophistication by domestic firms despite its limited contribution to the global sophistication growth. Direct gains do not appear to derive from foreign entities typically engaged in processing trade even though China's policy of opening to foreign investment is beneficial through two indirect channels: through technology spillovers from foreign to domestic firms and through a leverage effect on the elasticity of domestic sophistication on economic growth. Indeed, when investigating potential conditionality in the relationship between export sophistication and growth, we find that the growth enhancing effect of sophistication is greater for provinces already blessed by high incomes, better market centrality and higher trade performance and FDI attractiveness.

Table 1 – Growth regression: Explained variable: Log Real GDP per capita

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	All provinces				no outliers		1st-diff	export vs import		
Initial income	0.594^a	0.613^a	0.589^a	0.607^a	0.888^a	0.615^a	0.017	0.607^a	0.590^a	0.611^a
	(0.201)	(0.185)	(0.198)	(0.182)	(0.042)	(0.186)	(0.125)	(0.185)	(0.200)	(0.185)
Investment rate	0.113^b	0.118^b	0.107^b	0.113^b	0.065^a	0.124^b	0.208^a	0.113^b	0.120^b	0.127^b
	(0.052)	(0.054)	(0.051)	(0.053)	(0.021)	(0.054)	(0.058)	(0.054)	(0.052)	(0.055)
Education	0.455	0.476	0.589^b	0.601^b	0.291^c	0.624^b	-0.018	0.601^b	0.421	0.432
	(0.302)	(0.282)	(0.282)	(0.267)	(0.147)	(0.291)	(0.226)	(0.268)	(0.293)	(0.270)
Outward orientation	0.035	0.042	0.043^c	0.050^b	0.030^b	0.057^b	0.117^a	0.051^c	0.041	0.050^c
	(0.024)	(0.026)	(0.022)	(0.024)	(0.014)	(0.026)	(0.031)	(0.025)	(0.025)	(0.029)
Research expenses		0.015		0.012	-0.006	0.011	0.001	0.012		0.014
		(0.019)		(0.019)	(0.010)	(0.019)	(0.018)	(0.018)		(0.018)
State entities		-0.020		-0.017	-0.006	-0.022	0.006	-0.016		-0.009
		(0.044)		(0.042)	(0.026)	(0.044)	(0.048)	(0.044)		(0.045)
Infrastructure density		-0.038		-0.038	-0.024	-0.044	-0.014	-0.038		-0.039
		(0.025)		(0.024)	(0.014)	(0.026)	(0.017)	(0.024)		(0.026)
Export sophistication			0.122^b	0.118^b	0.077^a	0.120^b	0.107^c	0.118^b		
			(0.051)	(0.050)	(0.020)	(0.052)	(0.053)	(0.048)		
Import sophistication								0.001		
								(0.035)		
Share of HT exports									0.022^c	0.023^c
									(0.013)	(0.013)
Share of HT imports									-0.001	-0.003
									(0.010)	(0.010)
Observations	300	300	300	300	260	280	270	300	300	300
R^2	0.970	0.970	0.970	0.970	0.992	0.970	0.164	0.970	0.970	0.970
Province FE and year FE	yes	yes	yes	yes	yes	yes	n.a.	yes	yes	yes

The sample used in estimation consists of 30 provinces between 1997 and 2007. Clustered (at the province level) standard errors are reported in parentheses. ^{a}, ^{b} and ^{c} indicate significance at the 1%, 5% and 10% confidence level. Column 5 reports the results without the four province level cities (Beijing, Tianjin, Shanghai and Chongqing). Column 6 reports the results without the two most outward oriented provinces of Guangdong and Jiangsu. Column 7 reports the results in first difference. All indicators (except education) are in logs. See Appendix 1 for precise definitions of all variables. All proxies of trade sophistication and HT shares are lagged by one year.

Table 2 – Growth regression- IV: Explained variable: Log Real GDP per capita

	1	2	3	4	5	6
	FE	GMM	FE	GMM	IV	GMM
	Benchmark		domestic vs non domestic			OT vs PCS
Initial income	0.607^a	0.930^a	0.608^a	0.956^a	0.602^a	0.954^a
	(0.182)	(0.042)	(0.182)	(0.030)	(0.169)	(0.029)
Investment rate	0.113^b	0.068^b	0.108^c	-0.029	0.106^b	-0.026
	(0.053)	(0.031)	(0.053)	(0.044)	(0.052)	(0.043)
Education	0.601^b	0.347^c	0.618^b	0.168^b	0. 591^b	0.165^b
	(0.267)	(0.186)	(0.262)	(0.078)	(0.244)	(0.079)
Outward orientation	0.050^b	0.017	0.052^b	0.011	0.046^b	0.012
	(0.024)	(0.015)	(0.025)	(0.012)	(0.023)	(0.013)
Export sophistication	0.118^b	0.047^c				
	(0.050)	(0.027)				
Research expenses	0.012	0.011^c	0.013	0.015^a	0.021	0.016^a
	(0.019)	(0.006)	(0.019)	(0.005)	(0.019)	(0.005)
State entities	-0.017	-0.053^b	-0.019	-0.031^b	-0.020	-0.034^b
	(0.042)	(0.021)	(0.043)	(0.013)	(0.040)	(0.013)
Infrastructure density	-0.038	-0.011	-0.039	-0.010	-0.043^c	-0.010
	(0.024)	(0.010)	(0.025)	(0.006)	(0.025)	(0.007)
Domestic export sophistication			0.108^c	0.055^b	0.188^c	
			(0.062)	(0.027)	(0.111)	
Non-domestic export sophistication			0.016	0.023		
			(0.023)	(0.019)		
Domestic OT sophistication						0.060^b
						(0.028)
Domestic PCS sophistication						0.006
						(0.012)
AR(2) z		1.25		1.16		1.15
Pr > z		0.213		0.246		0.251
Overid. restrictions test						
Sargan χ^2		233.69		228.06		229.03
Hansen χ^2		16.15		12.20		12.82
Davidson-MacKinnon						
Exogeneity test F(1,252)					0.26	
P-value					0.61	
Observations	300 observations					
Fixed effects	Province and year					
R^2	0.970		0.970		0.970	

The sample used in estimation consists of 30 provinces between 1997 and 2007. Clustered (at the province level) standard errors are reported in parentheses. ^{a}, ^{b} and ^{c} indicate significance at the 1%, 5% and 10% confidence level. All indicators (except education) are in logs. Proxies of trade sophistication are lagged by one year in fixed effects regressions. See Appendix 1 for precise definitions of all variables. In columns 1 and 3 sophistication indicators are not instrumented but are lagged by one year. Columns 2, 4 and 6 report the results relying on the GMM system estimator. The validity of this procedure is not rejected based on the non significance of the autocorrelation of errors and the non significance of the Hansen and Sargan tests of overidentifying restrictions. Column 5 reports the results relying on instrumental variables. Domestic export sophistication is instrumented by the contemporary and the lagged non-domestic export sophistication. The validity of these instruments is not rejected. Both variables enter positively and significantly in the first stage regression for which the partial R^2 is 10% and the F-test of excluded instruments is F(2,29)=13.51. The Hansen test of overidentifying restrictions is not rejected (2.3, Chi-sq(1) P-val=0.13). The Kleibergen-Paap rk Wald F-stat is 13.5. The Davidson-MacKinnon test of exogeneity is not rejected (F(1,252)=0.059, p-value=0.81).

Table 3 – Growth regression: Explained variable: Log Export over GDP ratio

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	All provinces				no outliers		1st-diff	type of sophistication		
Initial export rate	0.674^a	0.643^a	0.709^a	0.684^a	0.732^a	0.679^a	-0.113^c	0.684^a	0.688^a	0.689^a
	(0.065)	(0.067)	(0.063)	(0.062)	(0.058)	(0.064)	(0.063)	(0.061)	(0.063)	(0.064)
Investment rate	-0.061	-0.077	-0.080	-0.094	-0.099	-0.095	-0.089	-0.098	-0.101	-0.086
Education	-0.638	-0.638	-0.196	-0.219	-0.268	-0.151	0.828	-0.223	-0.260	-0.289
Outward orientation	0.041	0.036	0.044	0.039	0.033	0.038	0.035	0.042	0.032	0.034
Research expenses		0.008		-0.004	0.045	0.003	-0.014	-0.004	0.001	-0.017
State entities		0.028		0.043	0.030	0.034	-0.189^b	0.038	0.046	0.010
		(0.071)		(0.073)	(0.072)	(0.076)	(0.085)	(0.073)	(0.077)	(0.067)
Infrastructure density		0.134^b		0.127^b	0.084	0.128^b	0.010	0.119^b	0.131^b	0.103^c
		(0.056)		(0.054)	(0.063)	(0.057)	(0.053)	(0.052)	(0.052)	(0.051)
Export sophistication			0.422^b	0.416^b	0.499^a	0.417^b	0.572^a	0.426^b		
			(0.180)	(0.177)	(0.175)	(0.183)	(0.194)	(0.185)		
Import sophistication								-0.061		
								(0.098)		
Domestic export sophistication									0.498^b	
									(0.243)	
Non-domestic export sophistication									-0.068	
									(0.115)	
Ordinary trade export sophistication										0.628^a
										(0.153)
Processing export sophistication										0.030
										(0.057)
Observations	300	300	300	300	260	280	270	300	300	300
R^2	0.759	0.763	0.767	0.771	0.794	0.768	0.102	0.772	0.773	0.786
Province FE and year FE	yes	yes	yes	yes	yes	yes	n.a.	yes	yes	yes

The sample used in estimation consists of 30 provinces between 1997 and 2007. Clustered (at the province level) standard errors are reported in parentheses. ^{a}, ^{b} and ^{c} indicate significance at the 1%, 5% and 10% confidence level. Column 5 reports the results without the four province level cities (Beijing, Tianjin, Shanghai and Chongqing). Column 6 reports the results without the two most outward oriented provinces of Guangdong and Jiangsu. Column 7 reports the results in first difference. All indicators (except education) are in logs. See Appendix 1 for precise definitions of all variables. All proxies of trade sophistication are lagged by one year.

Table 4 – Growth regression: Explained variable: Log Real GDP per capita

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
	Squared	GDP per capita		centrality		MA		X/GDP		FDI/GDP		X density	
	term	high	low	high	low	high	low	high	low	high	low	high	low
Initial	0.562^a	0.462^b	0.871^a	0.901^a	0.419^a	0.412^b	0.940^a	0.402^b	0.928^a	0.439^b	0.931^a	0.435^b	0.878^a
income	(0.195)	(0.180)	(0.053)	(0.073)	(0.140)	(0.147)	(0.050)	(0.155)	(0.052)	(0.172)	(0.048)	(0.182)	(0.066)
Inv. rate	0.132^b	0.160^b	0.043	0.046^b	0.148^b	0.100	0.067^b	0.065	0.065^b	0.106	0.079^a	0.069	0.069^b
	(0.059)	(0.072)	(0.027)	(0.021)	(0.054)	(0.087)	(0.025)	(0.068)	(0.023)	(0.074)	(0.024)	(0.070)	(0.024)
Educ.	0.702^b	1.159	0.287^c	0.199	1.295^c	1.298	0.287^c	0.948	0.227	1.470^c	0.304^b	1.189^c	0.240^c
	(0.301)	(0.751)	(0.134)	(0.179)	(0.697)	(0.754)	(0.147)	(0.616)	(0.132)	(0.704)	(0.131)	(0.563)	(0.130)
Outward	0.037^c	0.075^b	0.023	0.033	0.106^b	0.090^b	0.036	0.088^b	0.042	0.075^c	0.041^c	0.018	0.031^c
orientation	(0.020)	(0.033)	(0.019)	(0.023)	(0.045)	(0.039)	(0.022)	(0.033)	(0.025)	(0.038)	(0.023)	(0.049)	(0.018)
X soph.	-8.380^c	0.390^b	0.059^c	0.070^c	0.129	0.271^c	0.069^b	0.204^c	0.049	0.279^b	0.063^b	0.300^c	0.063^b
	(4.633)	(0.146)	(0.032)	(0.033)	(0.100)	(0.147)	(0.026)	(0.100)	(0.033)	(0.124)	(0.026)	(0.145)	(0.027)
X soph.^{2}	0.465^c												
	(0.254)												
Research	0.009	-0.010	-0.001	0.010	0.028	-0.001	0.004	0.004	0.008	-0.004	0.007	0.065^c	-0.010
expenses	(0.016)	(0.020)	(0.015)	(0.012)	(0.031)	(0.035)	(0.011)	(0.026)	(0.012)	(0.042)	(0.008)	(0.032)	(0.017)
State	-0.005	0.017	-0.029	-0.041	0.058	0.005	-0.061^b	-0.050	-0.023	0.022	-0.060^b	0.001	-0.047^b
entities	(0.040)	(0.069)	(0.028)	(0.038)	(0.097)	(0.074)	(0.027)	(0.065)	(0.031)	(0.070)	(0.026)	(0.070)	(0.019)
Infrastr.	-0.031	-0.061	-0.026	-0.045^b	-0.056^c	-0.040	-0.036^b	-0.065	-0.035^c	-0.045	-0.038^b	-0.055	-0.033^c
density	(0.023)	(0.037)	(0.018)	(0.019)	(0.031)	(0.036)	(0.016)	(0.040)	(0.018)	(0.035)	(0.015)	(0.050)	(0.017)
Obs. Nb.	300	150	150	150	150	150	150	150	150	150	150	150	150
R^2	0.972	0.959	0.993	0.992	0.957	0.956	0.993	0.955	0.993	0.956	0.993	0.955	0.993
FE	Province fixed effects & year fixed effects												

The sample used in estimation consists of subsets of 30 provinces between 1997 and 2007. Clustered (at the province level) standard errors are reported in parentheses. ^{a}, ^{b} and ^{c} indicate significance at the 1%, 5% and 10% confidence level. All indicators (except education) are in logs. See Appendix 1 for precise definitions of all variables. All proxies of trade sophistication are lagged by one year.

6. APPENDIX: DEFINITION OF THE VARIABLES AND STATISTICAL SOURCES

Data on provincial level income and export rate as well as data on our control variables are taken from annual issues of the China Statistical Yearbook (CSY). This Appendix provides the exact definition for each indicator used as explained or explanatory variables in our regressions. All our variables are measured at the province level.

Explained variables GDP per capita: logarithm of real GDP per capita (deflation based on annual CPI) Export rate: export value over GDP

Explanatory variables Sophistication variable: Measures of the sophistication level of exports and imports are computed based on Equation 2 relying on trade flows from the China Customs.

Control variables: Education: Share of population with more than primary schooling State entities: Share of state entities in total investment in fixed assets GOV: Government expenditure over GDP Openness ratio: ratio of exports plus imports to GDP Research expenses over GDP: ratio of government expenditure for science and technology promotion over GDP Infrastructure density: length of railways and roads (in kilometers) divided by population

FDI/GDP: ratio of foreign direct investment inflows to GDP. FDI inflows are defined as the investments inside China by foreign enterprises and economic organizations or individuals (including overseas Chinese, compatriots from Hong Kong, Macao and Taiwan, and Chinese enterprises registered abroad), following the relevant policies and laws of China for the establishment of ventures exclusively with foreign own investment, Sino-foreign joint-ventures, and cooperative enterprises, or for co-operative exploration of resources with enterprises or economic organizations in China. It includes the re-investment by foreign entrepreneurs of profits gained from investment, as well as the funds that enterprises borrow from abroad in the total investment of projects, which are approved by the relevant department of the government.

List of provinces and municipalities: Beijing, Tianjin, Hebei, Shanxi, Inner Mongolia, Liaoning, Jilin, Heilongjiang, Shanghai, Jiangsu, Zhejiang, Anhui, Fujian, Jiangxi, Shandong, Henan, Hubei, Hunan, Guangdong, Guangxi, Hainan, Guizhou, Yunnan, Shaanxi, Gansu, Qinghai, Ningxia, Xinjiang, Sichuan, Chongqing.

7. REFERENCES

Aghion P., and P. Howitt, 1998, Endogenous Growth Theory, Cambridge, MA, MIT Press.

Aitken B. J., G. Hanson and A. Harrison, 1997, 'Spillovers, foreign investment and export behavior', *Journal of International Economics*, 43, 103-132.

Arellano M. and S. Bond, 1991, 'Some tests of specification for panel data: Monte Carlo evidence and an application to employment equations', *Review of Economic Studies*, 58, 277–297.

Amiti M. and C. Freund, 2008,'An Anatomy of China's Export Growth', NBER Policy Research working paper 4628.

Banerjee A. and K. Munshi, 2004, 'How Efficiently is Capital Allocated? Evidence from the Knitted Garment Industry in Tirupur' *Review of Economic Studies*, 71(1), 19-42.

Barro R., 1991, 'Economic growth in a cross-section of countries', *Quarterly Journal of Economics*, 56, 407–443.

Berg A. and A. Krueger, 2003, 'Trade, growth and poverty: a selective survey'. IMF Working Paper No. 03/30.

Blundell R. and S. Bond, 1998, 'Initial conditions and moment restrictions in dynamic panel data models', *Journal of Econometrics*, 87, 115-143.

Blomstrom, M., and A. Kokko, 1998, 'Multinational corporations and spillovers', *Journal of Economic Surveys*, 12(3), 247– 278.

Bond S., C. Bowsher and F. Windsmeijer, 2001, 'Criterion-based inference for GMM in autoregressive panel data models', *Economics Letters*, 73, 379-388.

Boyreau-Debray G., 2003, 'Financial intermediation and growth: Chinese style'. World Bank Policy Research Working Paper No. 3027.

Chaney T., 2008, 'Distorted gravity: the intensive and extensive margins of international trade', *American Economic Review*, 98 (4), 1701-1721.

Cheung, K.-Y, and P. Lin, 2004, 'Spillover effects of FDI on innovation in China: evidence from the provincial data", *China Economic Review* 15 (1), 25–44.

Dean J., K. C. Fung and Z. Wang, 2007, 'Measuring Vertical Specialization in Chinese trade', US International Trade Commision working paper.

Démurger S., 2001, 'Infrastructure Development and Economic Growth: an Explanation for Regional Disparities in China?', *Journal of Comparative Economics* 29, 95-117.

De Sousa J. and S. Poncet, 2009, 'How are wages set in Beijing?', mimeo.

Easterly W., N. Loayza and P. Montiel, 1997, 'Has Latin America's post reform growth been disappointing?' *Journal of International Economics*, 43, 287–311.

Fontagné L., G. Gaulier and So. Zignago, 2007, 'Specialization across varieties and North-South competition' *Economic Policy*, 23 (53), 51-91.

Fujita M., P. Krugman and A. J. Venables, 1999, The Spatial Economy: Cities, Regions, and International Trade, Cambridge, MA, MIT Press.

Gaulier G. and S. Zignago, 2008, 'BACI: A World Database of International Trade at the Product level, 1995-2004 version' , CEPII working paper.

Görg H. and D. Greenaway, 2004, 'Much Ado About Nothing? Do Domestic Firms Really Benefit from Foreign Direct Investment?', World Bank Research Observer, 19, 2, 171–97.

Hausmann R., J. Hwang and D. Rodrik, 2007, 'What You Export Matters', *Journal of Economic Growth*, 12, 1-25.

Hausmann R. and D. Rodrik, 2003, 'Economic Development as Self Discovery', *Journal of Development Economics*, 72 (2), 603-633.

Head K. and T. Mayer, 2006, 'Regional Wage and Employment Responses to Market Potential in the EU', *Regional Science and Urban Economics* 36 (5), 573-594.

Hering L. and S. Poncet, 2009, 'The Impact of Economic Geography on Wages: disentangling the Channels of Influence', *China Economic Review*, 20, 1-14.

Hu, A., and G. Jefferson, 2001, 'FDI, technological innovation, and spillover: Evidence from

large and medium size Chinese enterprises', mimeo. Brandeis University: Waltham, MA.

Javorcik S. B., 2004, 'Does Foreign Direct Investment Increase the Productivity of Domestic Firms? In Search of Spillovers through Backward Linkages', American Economic Review, 94, 3, 605–27.

Lardy N., 2005, 'China: the great new economic challenge', chapter in F. Bergsten, (Ed), The United States and the World Economy: Foreign Policy for the next decade. Washington D.C. Institute for International Economics.

Lall S., 2000, 'The Technological Structure and Performance of Developing Country Manufactured Exports, 1985-1998', *Oxford Development Studies*, 28, 3.

Lall S., J. Weiss and J. Zhang, 2006, 'The "Sophistication" of exports: a new trade measure', *World Development*, 34 (2), 222-237.

Lemoine F. and D. Unal-Kesenci, 2004, Assembly Trade and Technology Transfer: the case of China', *World Development*, 32, 5, 829-850.

Melitz M. J., 2003, 'The impact of Trade on Intra-industry reallocations and aggregate industry productivity', *Econometric*, 71 (6), 1695-1725.

Naughton B. 2007, *The Chinese Economy: Transitions and Growth*. Cambridge, MA: MIT Press.

Nickell S., 1981, 'Biases in Dynamic Models with Fixed Effects', *Econometrica*, 49, 6, 1417–26.

Redding S. and A. J. Venables, 2004, 'Economic Geography and International Inequality', *Journal of International Economics* 62 (1), 53-82.

Rodrik D., 2006, 'What is so special about China's Exports?', *China & World Economy*, 14 (5), 1-19.

Schott P., 2007, 'The Relative Sophistication of Chinese Exports', *Economic Policy*, 23 (53), 5-49.

Stokey N., 1988, 'Learning-by-Doing and the Introduction of New Goods', *Journal of Political Economy*, 96, 701-717.

Wang Z. and S.-J. Wei, 2008, 'What accounts for the rising sophistication of China's exports', NBER Working paper 13771.

Young A., 1991, 'Learning by Doing and the Dynamic Effects of International Trade', *Quarterly Journal of Economics*, 106, 369-405.

LIST OF WORKING PAPERS RELEASED BY CEPII

An Exhaustive list is available on the website: \\www.cepii.fr.
To receive an alert, please contact Sylvie Hurion (sylvie.hurion@cepii.fr).

No	*Tittle*	*Authors*
2009-33	Assessing the Sustainability of Credit Growth: The Case of Central and Eastern European Countries	V. Coudert & C. Pouvelle
2009-32	How do different exporters react to exchange rate changes? Theory, empirics and aggregate implications	N. Berman, P. Martin & Thierry Mayer
2009-31	Spillovers from Multinationals to Heterogeneous Domestic Firms: Evidence from Hungary	G. Békés, J. Kleinert & F. Toubal
2009-30	Ethnic Networks, Information, and International Trade: Revisiting the Evidence	G. J. Felbermayr, B. Jung & F. Toubal
2009-29	Financial Constraints in China: Firm-level Evidence	S. Poncet, W. Steingress & H. Vandenbussche
2009-28	The Crisis: Policy Lessons and Policy Challenges	A. Bénassy-Quéré, B. Coeuré, P. Jacquet &J. Pisani-Ferry
2009-27	Commerce et flux financiers internationaux : MIRAGE-D	A. Lemelin
2009-26	Oil Prices, Geography and Endogenous Regionalism	D. Mirza & H. Zitouna
2009-25	EU15 Trade with Emerging Economies and Rentier States: Leveraging Geography	G. Gaulier, F. Lemoine & D. Ünal
2009-24	Market Potential and Development	T. Mayer
2009-23	Immigration, Income and Productivity of Host Countries: A Channel Accounting Approach	A. Mariya & A. Tritah
2009-22	A Picture of Tariff Protection Across the World in 2004 MAcMap-HS6, Version 2	H. Boumellassa, D. Laborde Debucquet & C. Mitaritonna
2009-21	Spatial Price Discrimination in International Markets	J. Martin
2009-20	Is Russia Sick with the Dutch Disease	V. Dobrynskaya & E. Turkisch
2009-19	Économies d'agglomération à l'exportation et difficulté d'accès aux marchés	P. Koenig, F. Mayneris & S. Poncet

No	*Tittle*	*Authors*
2009-18	Local Export Spillovers in France	P. Koenig, F. Mayneris & S. Poncet
2009-17	Currency Misalignments and Growth: A New Look using Nonlinear Panel Data Methods,	S. Béreau, A. López Villavicencio & V. Mignon
2009-16	Trade Impact of European Measures on GMOs Condemned by the WTO Panel	A. C. Disdier & L. Fontagné
2009-15	Economic Crisis and Global Supply Chains	A. Bénassy-Quéré, Y. Decreux, L. Fontagné & D. Khoudour-Casteras
2009-14	Quality Sorting and Trade: Firm-level Evidence for French Wine	M. Crozet, K. Head & T. Mayer
2009-13	New Evidence on the Effectiveness of Europe's Fiscal Restrictions	M. Poplawski Ribeiro
2009-12	Remittances, Capital Flows and Financial Development during the Mass Migration Period, 1870-1913	R. Esteves & D. Khoudour-Castéras
2009-11	Evolution of EU and its Member States'Competitiveness in International Trade	L. Curran & S. Zignago
2009-10	Exchange-Rate Misalignments in Duopoly: The Case of Airbus and Boeing	A. Bénassy-Quéré, L. Fontagné & H. Raff
2009-09	Market Positioning of Varieties in World Trade: Is Latin America Losing out on Asia?	N. Mulder, R. Paillacar & S. Zignago
2009-08	The Dollar in the Turmoil	A Bénassy-Quéré, S. Béreau & V. Mignon
2009-07	Term of Trade Shocks in a Monetary Union: An Application to West-Africa	L. Batté, A. Bénassy-Quéré, B. Carton & G. Dufrénot
2009-06	Macroeconomic Consequences of Global Endogenous Migration: A General Equilibrium Analysis	V. Borgy, X. Chojnicki, G. Le Garrec & C. Schwellnus
2009-05	Équivalence entre taxation et permis d'émission échangeables	P. Villa
2009-04	The Trade-Growth Nexus in the Developing Countries: a Quantile Regression Approach	G. Dufrénot, V. Mignon & C. Tsangarides
2009-03	Price Convergence in the European Union: within Firms or Composition of Firms?	I. Méjean & C. Schwellnus
2009-02	Productivité du travail : les divergences entre pays développés sont-elles durables ?	C. Bosquet & M. Fouquin

No	*Tittle*	*Authors*
2009-01	From Various Degrees of Trade to Various Degrees of Financial Integration: What Do Interest Rates Have to Say	A. Bachellerie, J. Héricourt & V. Mignon
2008-32	Do Terms of Trade Drive Real Exchange Rates? Comparing Oil and Commodity Currencies	V. Coudert, C. Couharde & V. Mignon
2008-31	Vietnam's Accession to the WTO: Ex-Post Evaluation in a Dynamic Perspective	H. Boumellassa & H. Valin
2008-30	Structural Gravity Equations with Intensive and Extensive Margins	M. Crozet & P. Koenig
2008-29	Trade Prices and the Euro	J. Martin & I. Méjean
2008-28	Commerce international et transports : tendances du passé et prospective 2020	C. Gouel, N. Kousnetzoff & H. Salman
2008-27	The Erosion of Colonial Trade Linkages after Independence	T. Mayer, K. Head & J. Ries
2008-26	Plus grandes, plus fortes, plus loin… Performances relatives des firmes exportatrices françaises	M. Crozet, I. Méjean & S. Zignago
2008-25	A General Equilibrium Evaluation of the Sustainability of the New Pension Reforms in Italy	R. Magnani
2008-24	The Location of Japanese MNC Affiliates: Agglomeration, Spillovers and Firm Heterogeneity	T. Inui, T. Matsuura & S. Poncet
2008-23	Non Linear Adjustment of the Real Exchange Rate Towards its Equilibrium Values	S. Béreau, A. Lopez Villavicencio & V. Mignon
2008-22	Demographic Uncertainty in Europe – Implications on Macro Economic Trends and Pension Reforms – An Investigation with the INGENUE2 Model	M. Aglietta & V. Borgy
2008-21	The Euro Effects on the Firm and Product-Level Trade Margins: Evidence from France	A. Berthou & L. Fontagné
2008-20	The Impact of Economic Geography on Wages: Disentangling the Channels of Influence	L. Hering & S. Poncet
2008-19	Do Corporate Taxes Reduce Productivity and Investment at the Firm Level? Cross-Country Evidence from the Amadeus Dataset	J. Arnold & C. Schwellnus
2008-18	Choosing Sensitive Agricultural Products in Trade Negotiations	S. Jean, D. Laborde & W. Martin
2008-17	Government Consumption Volatility and Country Size	D. Furceri & M. Poplawski Ribeiro

No	*Tittle*	*Authors*
2008-16	Inherited or Earned? Performance of Foreign Banks in Central and Eastern Europe	O. Havrylchyk & E. Jurzyk
2008-15	The Effect of Foreign Bank Entry on the Cost of Credit in Transition Economies. Which Borrowers Benefit most?	H. Degryse, O. Havrylchyk, E. Jurzyk & S. Kozak
2008-14	Contagion in the Credit Default Swap Market: the Case of the GM and Ford Crisis in 2005.	V. Coudert & M. Gex
2008-13	Exporting to Insecure Markets: A Firm-Level Analysis	M. Crozet, P. Koenig & V. Rebeyrol
2008-12	Social Competition and Firms' Location Choices	V. Delbecque, I. Méjean & L. Patureau
2008-11	Border Effects of Brazilian States	M. Daumal & S. Zignago
2008-10	International Trade Price Indices	G. Gaulier, J. Martin, I. Méjean & S. Zignago
2008-09	Base de données CHELEM – Commerce international du CEPII	A. de Saint Vaulry
2008-08	The Brain Drain between Knowledge Based Economies: the European Human Capital Outflows to the US	A. Tritah
2008-07	Currency Misalignments and Exchange Rate Regimes in Emerging and Developing Countries	V. Coudert& C. Couharde
2008-06	The Euro and the Intensive and Extensive Margins of Trade: Evidence from French Firm Level Data	A. Berthou & L. Fontagné
2008-05	On the Influence of Oil Prices on Economic Activity and other Macroeconomic and Financial Variables	F. Lescaroux& V. Mignon
2008-04	An Impact Study of the EU-ACP Economic Partnership Agreements (EPAs) in the Six ACP Regions	L. Fontagné, D. Laborde & C. Mitaritonna
2008-03	The Brave New World of Cross-Regionalism	A. Tovias
2008-02	Equilibrium Exchange Rates: a Guidebook for the Euro-Dollar Rate	A. Bénassy-Quéré, S. Béreau & V. Mignon
2008-01	How Robust are Estimated Equilibrium Exchange Rates? A Panel BEER Approach	A. Bénassy-Quéré, S. Béreau & V. Mignon

Organisme public d'étude et de recherche en économie internationale, le CEPII est placé auprès du Centre d'Analyse Stratégique. Son programme de travail est fixé par un conseil composé de responsables de l'administration et de personnalités issues des entreprises, des organisations syndicales et de l'Université.

Les *documents de travail* du CEPII mettent à disposition du public professionnel des travaux effectués au CEPII, dans leur phase d'élaboration et de discussion avant publication définitive. Les *documents de travail* sont publiés sous la responsabilité de la direction du CEPII et n'engagent ni le conseil du Centre, ni le Centre d'Analyse Stratégique. Les opinions qui y sont exprimées sont celles des auteurs.

Les *documents de travail* du CEPII sont disponibles sur le site : http//www.cepii.fr.

CEPII
9, RUE GEORGES PITARD, 75740 PARIS CEDEX 15
SYLVIE HURION – PUBLICATIONS
TÉL : 01 53 68 55 14 - FAX : 01 53 68 55 04
sylvie.hurion@cepii.fr

ISSN : 1293-2574