FDI Liberalization and Export Sophistication: Evidence from China

Lu Yi, Li Yunong, and Zhu Lianming

Abstract—In this paper, we empirically investigate whether FDI liberalization affects export sophistication. China's accession to WTO in Dec, 2001 and a (immediately) subsequent FDI policy reform provide a window of opportunity for difference-in-difference (DID) identification. The estimation shows that FDI liberalization leads to a 1.0% to 1.5% increase for the level sophistication of export structure at industry level. The result passes a number of robustness checks on identification assumptions. In addition, our result also suggests that the increase comes from a higher share of export by foreign firms, an upgrade of joint ventures and domestic firms. In terms of trade regime, ordinary trade receives more significant upgrade as a result of FDI liberalization. Our study contributes to the literature by understanding FDI liberalization at industry level in China and its effect on China's export sophistication.

Keywords—FDI, Export Sophistication

I. INTRODUCTION

One economy's output can be upgraded through a few ways. First, the economy may, for example, shift its production to the more advanced electronics industry from textile industry. Second, for the same one product, the economy may produce better quality output. Thirdly, one industry may produce more sophisticated products. The cross-industry upgrading is associated with the more traditional product and resource reallocation across industries. Within-product upgrade, it is closely related to some recent papers that study product quality. [1], [2]

In this paper we study on Chinese export upgrade within one industry. As a low-income country in the late 1990s and early 2000s, the sophistication of Chinese export is unusually high and rises rapidly. [3] FDI, among others, may be significant associated with such observation in China. [4]

China's accession to WTO in Dec 2001 and a subsequent FDI regulation reform give us an opportunity to employ the difference-in-difference (DID) estimation to study the effect of FDI liberalization on within-industry export upgrading.

Our paper relates to several strands of the literature. Firstly, it contributes to the empirical studies on China's accession to WTO and its effects on the Chinese economy. Chinese exports to the rest of the world jumps after 2001 and at the same time the domestic market experienced large inflow of imports as well as FDI. The accession to WTO has brought changes to many aspects of the Chinese economy. Han et al., (2012) find that the WTO accession of China is associated with higher within-region wage inequality by raising the education premium. Lu and Yu (2013) shows that the liberalization of domestic markets for imports reduces the dispersion of firm markups and thus is pro-competitive. The various effect of export or import growth have been studied in a number of papers using DID estimation. Specifically they employ the heterogeneity in export growth due to intern geography or the heterogeneity in import tariff reductions across industries after China's accession to WTO in 2001. Although FDI policy reform was announced publicly back into Jan, 2002, to our best knowledge, there is few paper in the literature which identifies the liberalized industries and perform a DID estimation. An important empirical contribution of us is to find the liberalized industries due to China's WTO accession by carefully reading the official documents and thus we are able to employ a DID estimation to study its effect on with-industry export upgrading in this paper.

Secondly, our paper contributes to the body of works on Chinese export sophistication. Rodrik (2006) and Schott (2008) both find that China, as a low income country, is special as its export is unusually sophisticated. Rodrik (2006) suggests consumer electronics sector played an important role for this observation while Schott (2008) suggests China produces low-quality products and thus it may not directly compete with products from developed economies. Xu (2010) finds that China is much less an outlier in the cross-country comparison of the export sophistication if within-product quality and China's significant regional inequality are considered. Yao (2009) suggests China may not be special if its unique processing trade regime, the uneven distribution of its export across regions and the limitation of HS codes in terms of identifying differentiated products are taken into account. Wang et al., (2010) summarize the rising export sophistication of China from 1996 to 2005. FDI is found conductive to product quality, measured as unit price, but not to play a major role in explaining cross-city differences in the export sophistication.

Thirdly, our paper contributes to the literature on FDI promotion policy's effect on export upgrading. Xu and Lu (2009) find that an industry's level of export sophistication in China is positively related its share of wholly owned enterprises from OECD countries. Harding and Javorcik (2012) employ...
industry-level FDI promotion policy across countries and find a positive effect of FDI on unit value of exports in developing countries but find no indication that FDI increases the similarity of export structure of developing countries and developed countries. Our paper finds that FDI liberalization leads to within-industry export structure upgrade.

This paper is structured as follows. Section II describe data on Chinese FDI and export, and empirical strategy. Section III presents the empirical findings and Section IV concludes.

II. EMPIRICAL STRATEGY

A. Data on FDI regulation

In 1997 Chinese government published a Foreign Direct Investment Industrial Guidance Catalog. An industry or a product can have a status as Encouraged, Restricted, or Prohibited in this document while an industry or a product which doesn’t appear is Permitted. Following China’s accession to WTO in Dec, 2001 Chinese government published a new version of Foreign Direct Investment Industrial Guidance Catalog in Jan 2002 and the former document is abolished. This new document has similar categorization of industries or products. As part of China’s promised liberalization process under WTO accession, this new document changes a few industries' status for FDI. An industry is defined as "Unchanged" if it has the same status in official documents of 1997 and 2002, "Encouraged" if it has an improved status in the new document than the former one, "Discouraged" if it has a worse status in the new document or "Mixed" if some of its products' status improves and others' status drops.

![TABLE I FOREIGN DIRECT INVESTMENT TO CHINA](image)

Overall, this FDI reform associated with China WTO accession make more industries encouraged to FDI. In this paper, we basically use these more liberalized industries as treatment group and the unchanged industries as the control group to gauge the effect of FDI liberalization on within industry export upgrading. Industries with "Discourage" or "Mix" status are excluded in this paper.

B. Data on Chinese export

We mainly use UN Comtrade data for our baseline result and robust check. UN Comtrade data we use in this paper covers all Chinese export and reports total export value aggregated at HS 6-digit product level for the period from 1998 to 2006. China Customs data records every export transaction in China from 2000 to 2006 and it has more detailed information such as the name, ownership, and address of the exporting firm, the transaction type, destination country, unit value and others. It is used to study export share of FIEs, and upgrading for different ownership type and trade regimes.

We aggregate export value at HS 6-digit level. Each HS 6-digit product's "income component" is from Rodrik (2006) and is matched to a CIC 4-digit industry according the concordance table. In addition, China’s Industrial Enterprise Census data is used to compute control variables at industry level.

C. Measure of Export Sophistication

We use the product sophistication measures from Rodrik (2006) which associates each HS 6-digit product \( i \) with an income level \( PRODY_k \). The industry-level export sophistication is a share-weighted average of \( PRODY_k \). In particular,

\[
EXPY_i = \sum_k s_k PRODY_k,
\]

where \( EXPY_i \) is the export sophistication of a 4-digit Chinese industry \( i \) and \( s_k \) is the export share of product \( k \) which belongs to industry \( i \). Xu and Lu (2009) uses a similar measure as \( EXPY_i \) using US imports of Chinese goods. Within an industry, \( PRODY_k \) differs across products and an increase of \( EXPY_i \) means on average \( s_k \) increases for products with higher \( PRODY_k \) in this industry. Such an increase can be interpreted as within-industry export upgrading.

The export similar index (Schott, 2008) at 4-digit Chinese industry is computed and used for robustness check.

D. Empirical Specification

Our baseline specification

\[
y_u = \alpha + \beta_1 Encourage_i \times Post2002_i + X_{it} \gamma + \delta_t + \lambda_y + \epsilon_u,
\]

where \( y_u \) is the measure of the industry-level export sophistication (in log); \( Encourage_i \) is 1 if industry \( i \) is liberalized in the FDI policy reform, and 0 otherwise; \( Post2002_i \) is an indicator which takes a value of 1 if it is a year after 2001, and 0 otherwise; \( \delta_t \) and \( \lambda_y \) are the industry and year fixed effects, capturing all time-invariant differences across industries and all yearly shocks common to all industries; \( \epsilon_u \) is the error term. The standard errors are clustered at CIC 4-digit industry level.

III. EMPIRICAL FINDINGS

A. Graphical Exposition

The time trends of dependent variable of treatment and control groups is a simple and direct method to visually illustrate the effect of treatment. We plot such time trends in Fig. 1 and Fig. 2 using UN Comtrade data and Customs data. It is.

2 The product sophistication is downloaded from \url{http://www.cepii.fr/anglaisgraph/bdd/sophistication/Data_sophistication_PRODY_1997.xls}. and it is time-invariant. We also use another source of product sophistication as one robustness check.
clear that the export of liberalized industries (treatment group) on average become more sophisticated from 2002 onwards while we observe the export sophistication time trend for unchanged industries (control group) is much flatter throughout the whole period regardless of which data set we use. This observation gives a first-sight impression that FDI liberalization leads to an upgrade for the within-industry export sophistication.

C. Robustness Checks

In Table, we provide a set of robust check. Year and industry fixed effects and the set of \( X_i \) in Column 3 of Table is included in all columns.

B. Baseline Results

In Table we present the our baseline results. Column 1 regress industry level export sophistication on \( encourage \times Post2002 \), and Column 2 adds year and industry fixed effects. Column 3 further include a set of control variables \( X_i \) and Column 4 further controls industry-specific time trend. The significance of \( encourage \times Post2002 \), is robust in all specifications while its magnitude of the coefficient is sensitive to the specification. The more robust specifications, in Column 3 and Column 5, implies that the FDI liberalization leads to 1% to 1.5% increase in export sophistication.

D. Ownership Type and Trade Regime

If export upgrading is entirely the result of larger export share by FIEs as a result of FDI liberalization policy, then it may not be quite conductive to domestic and general upgrading of the economy.

Indeed, we find that the liberalized industries does observe an increase of export share by FIEs as presented in Fig. 3. Wang et al., (2010) find similar pattern and document that foreign firms export product of higher sophistication.
We use the more detailed China Customs data to study the effects of FDI liberalization for different ownership types and trade regimes. In Column 1-4 in Table V, we employ our baseline specification for different ownership types. The evidence suggests that joint venture and domestic in liberalized industries upgrades positively. This implies that there is potentially spillover effects from export by FIEs.

One additional concern of the baseline result is that it may be driven by an export upgrading of the processing traders, which may be FIEs, in the liberalized industries. If this is the case, the estimated effect of FDI regulation reform in the baseline may be misleadingly high as such processing traders are likely to employ sophisticated foreign input. In Column 4 and 5, we separately do the estimation for ordinary trade and processing trade. Ordinary export in liberalized industries tends to upgrade by a magnitude similar to that in the baseline result due to FDI policy reform while almost no effect is observed for processing traders in liberalized industry.

IV. Conclusion

We contribute to the literature by identifying the industries become more liberalized to FDI after China’s WTO accession and in this paper we study the effect of FDI liberalization on within-industry export upgrading. We find that such liberalization leads to a 1% to 1.5 % increase in export sophistication and this result is robust to a battery of tests. While foreign export share increases in liberalized industries, there is evidence that such FDI regulation reform does lead domestic firms and ordinary firms to upgrade their export.

REFERENCES