

IDE Research Bulletin

Research project summary based on papers for academic journals
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Production Patterns of Heterogeneous Multinational Firms: Theory and Empirics

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March 2019

IDE-JETRO

Overview

The primary purpose of this research project was to analyze how the three types of strategy to have access to foreign market, i.e., (1) exporting commodities produced in the home country where the headquarters of the firm is located, (2) producing commodities at affiliate plants built in a foreign country for local sales by horizontal FDI, and (3) producing commodities at affiliate plants built in a foreign country for exports to the third countries, are chosen in a certain economic environment by firms that are heterogeneous with respect to productivity level. To achieve this objective, a numerical simulation model was planned to be developed in order to manage the complexity of the subject of our investigation, and empirically tested to examine its validity. We started with trying to introduce firm heterogeneity a la Melitz (2003) into the extended knowledge-capital model, which was an extension of the model originally developed by Markusen (1997) and fully utilized as a workhorse during our past research projects. However, we eventually found that there is a problem with the affinity between firm heterogeneity and the knowledge-capital model. Thus, we changed our policy to extend another theoretical model presented by Helpman, Melitz, and Yeaple (2004), which managed to introduce horizontal FDI in the trade model with heterogeneous firms developed by Melitz (2003), instead of introducing firm heterogeneity in a FDI-related model. Then, we faced second problem that it is not easy to calibrate parameter values from a real dataset within the designated range assumed by the base theory. While Oyamada held seminars on this issue in several international conferences and discussed with many specialists in several international conferences, a useful solution has not yet been found at this moment. Considering the fact that there still are many unclear points left in the behavioral characteristics of the Melitz-type model, we finally decided to dig down deeply into the basic trade model with monopolistic competition to know better the analytical tool. On the other hand, we performed empirical examinations on the extended knowledge-capital model again, since we found very good data for testing that enable us independently correspond to every mode of FDI.

1. Behavioral Characteristics of MRIO-Based Global AGE Models with Variable Elasticity of Substitution between Varieties

Based on an intuition that an additional variety reduces the distance between varieties

filling the gaps in existing varieties, this study explored the behavioral characteristics of an applied general equilibrium model based on multi-regional input-output data with the Melitz-type heterogeneous and Krugman-type homogeneous firms that operate under monopolistic competition. Choosing the case of unilateral import liberalization of Chinese manufactured products by the US for example, simulation experiments with the three-region, three-sector model of global trade, which endogenizes the substitution elasticity as an increasing function of the total number of varieties that are available for each economic agent on the demand side, revealed the following results.

1. Introducing agent-specific items that enable finer adjustments in a model with the assumption that sourcing is independently done by agent may work more favorable to a country that liberalize imports compared to a third country that are not directly involved in trade liberalization when the Melitz-type trade specification is assumed.
2. Since smoother adjustment will be enabled by variable substitution elasticity, the efficiency-enhancing effect of international trade may bring significantly large welfare gains to all countries in the global economy in an environment with less distortion achieved by removal of tariffs so that even third countries excluded from trade liberalization can recover welfare losses to positive gains.
3. Inter-sector and international spillovers of the effects of smoother resource relocations through intermediate transactions among countries/regions amplify the efficiency-enhancing effect in the Melitz-type model to be a sufficiently large level for third countries to improve welfare.
4. In this study, the manufacturing sector, which differentiates outputs under monopolistic competition, plays an important role as the key agent that effectively transmits the efficiency-enhancing effect of smoother substitution to the global economy. Implementing an economic policy targeting this agent may work efficiently.
5. While economic agents pursue variety increase no matter how much the price appreciates in the environment with strong preference for variety, agents just pursue cheaper commodities in more efficient circumstance when the influence of the total number of varieties to the substitution elasticity intensifies.

2. Estimation of an Extended Knowledge-Capital Model Utilizing Value-Added Content of Exports

The purpose of this study is to examine the statistical significance of the extended knowledge-capital model developed by in Oyamada (2019). This study tries to provide more comprehensive analysis expanding our previous attempt presented in Uchida and Oyamada (2017). While the home country of foreign affiliates was limited to Japan with 22 host countries with respect to 12 manufacturing sector from 1995 to 2006 previously, we removed the limitation to increase home countries to 43 with 43 host countries with respect to 19 manufacturing sectors. In addition, information on value-added components in gross exports by source, which is calculated with the World Input-Output Table (released 2016) applying the technique introduced in Koopman, Wang, and Wei (2014), is utilized in this study to deal with every mode of foreign direct investment (FDI). The estimation results show that each FDI strategy largely depends on the trade costs while the size of GDP is not significantly related to FDI activities. In addition, the amount of value-added exports would decrease in the case that MNEs are established in developing countries.