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研究課題名(和文) Industry Concentration, Fully Endogenous Productivity Growth, and Economic Development

研究課題名(英文) Industry Concentration, Fully Endogenous Productivity Growth, and Economic Development

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研究成果の概要(和文)：本プロジェクトの目的は、産業活動の地理的な集積が企業の研究開発投資による生産性成長と国の経済発展に及ぼす影響を理論的に考究することである。企業の生産活動とイノベーション活動の立地調整を通して、経済統合の進展が、企業の市場参入や生産性成長に与える影響を、また各国の経済厚生への効果を分析できるモデルの構築に成功した。具体的には以下2つの課題を分析した。先ず、国の間に生じる租税格差が産業の立地をどのように変化させるか、そして市場参入および生産性成長、国の厚生が受ける影響について、新しい結果を出した。次に、製造部門とイノベーション部門におけるオフショアリングが生産性成長を加速する可能性を証明した。

研究成果の概要(英文)：This research project set out to theoretically investigate how the geographic concentration of industrial activity affects the prospects for economic development through productivity growth driven by firm-level investment in process innovation. The project successfully created a framework for analyzing how improved economic integration affects market entry, productivity growth, and national welfare through adjustments in the location patterns of production and innovation activity.

The framework was used to study two issues. First, we derived new results on how international corporate tax differentials affect industry location patterns with interesting implications for market entry, productivity growth, and national welfare levels. Second, we were able to demonstrate the potential benefits of manufacturing and innovation offshoring on productivity growth. In a new extension, we are now studying the relationships between industry location patterns, unemployment, and productivity growth.

研究分野：経済理論の応用分析

キーワード：経済成長

### 1. 研究開始当初の背景

(1) For many years economists have been concerned with how industry is geographically organized at the local, regional, and international levels, and the relationship that arises between the location patterns of industry and the patterns of trade in goods and services. In addition, a strong interest has developed in trying to understand the effects that patterns of industry location and trade have on economic growth. To this end, a large theoretical literature has evolved to consider the mechanisms through which industry location, international trade, and foreign direct investment affect innovation-based economic growth through firm-level investment in research and development.

(2) The theoretical literature has often been found to be at odds with empirical evidence, however, in that the structure of mainstream theory has led to the prediction of a positive relationship between an economy's size, usually measured by population, and its rate of economic growth, within the majority of the theoretical models studying the relationships between industry location, patterns of trade, and economic growth. The empirical evidence consistently finds that there is no positive relationship between an economy's size and its rate of growth, indicating that the theoretical literature that studies the relationships between spatial patterns of industry, international trade, and economic growth needs revising.

(3) The current research project aimed to contribute to the literature with the development and application of a theoretical framework that corrects for the positive bias of an economy's size on the pace of economic growth.

### 2. 研究の目的

(1) The key aim of this research project was to theoretically investigate how the geographic concentration of industrial activity affects the prospects of a country for economic development through accelerated productivity growth, within an international economy that features increasing levels of economic integration between countries, while correcting for the positive bias of the size of an economy on the speed of economic growth.

(2) The project outline included three main objectives. The first was to construct a theoretical framework that would allow for a study of the effects of industry concentration on productivity growth driven by firm-level investment in process innovation. The second objective was to use the framework to investigate how greater regional integration affects the growth prospects of developing countries. The third objective was to extend the framework to consider whether small open countries develop faster when their industrial activities are more or less heavily concentrated in one geographic region.

### 3. 研究の方法

(1) This research project derived its results using a theoretical approach that combined the mathematical modeling techniques of three distinct subfields within the economics literature: the new international trade literature, the new economic geography literature, and the endogenous economic growth literature. The various modeling approaches of these literatures were combined with the goal of developing a mathematical framework that could be used to derive theoretical results for the questions addressed by the research project. The results were also tested using numerical simulations of the mathematical models with parameter values drawn from appropriate empirical studies in the literature.

### 4. 研究成果

(1) The first key result of the research project was the creation of a theoretical framework that allows for a study of how the geographic concentration of industry affects productivity growth that is not biased by a scale effect; that is, the framework does not predict a positive relationship between an economy's size and its rate of productivity growth. The theoretical framework considers two countries that employ labor as the sole economic resource, and that participate in international trade in two goods, a homogenous good and a heterogeneous good with many distinct product varieties. The firms producing heterogeneous goods also invest in process innovation with the aim of lowering production costs. Importantly, technical knowledge is assumed to accumulate within the production technology of firms generating knowledge spillovers whereby improvements in

production technologies help firms to reduce their future costs of investment in process innovation as technical knowledge increases. These knowledge spillovers are intrinsically linked with the geographic distributions of industry and innovation through the localized nature of knowledge spillovers; the strength of knowledge spillovers tends to decrease as the distance between production and innovation activities increase. Firms therefore benefit from locating their innovation activities in regions where a large amount of production occurs, as knowledge spillovers into innovation will be greater and investment costs will be lower. With perfect capital mobility, firms shift production and innovation independently to the lowest cost countries, and international trade costs and imperfect knowledge diffusion result in the larger of the two countries tending to host greater shares of both production and innovation activity.

(2) The framework introduced above was used to investigate how the monopoly power of firms affects the relationship between economic integration and productivity growth that is not biased by a scale effect. International trade costs and imperfect knowledge diffusion lead to the partial concentration of production and the full concentration of innovation in the larger of the two countries. Then, improved economic integration between the two countries, resulting from either a decrease in trade costs or an increase in knowledge diffusion, results in a rise in the concentration of industry in the larger country. When monopoly power is strong, the number of firms producing distinct product varieties decreases, but the pace of productivity growth increases. In this case both countries benefit from greater economic integration. With weak monopoly power, however, the number of firms increases while the rate of productivity growth falls. As such, each country may benefit from or be hurt by improved economic integration.

(3) The theoretical framework was extended to consider how national corporate tax policy affects productivity growth through adjustments in geographic patterns of industry. In this extension, the existence of trade costs and imperfect knowledge spillovers between countries, ensures that production concentrates

partially and innovation concentrates fully in the country with the lowest corporate tax rate and the largest after-tax market. Investigating the relationships between national tax policy, productivity growth, and market entry, the theoretical results suggest that the effects of changes in the international corporate tax rate differential depend on the initial levels of tax rates. Focusing on the tax policy of the country with the relatively low tax rate, a decrease in the tax rate always accelerates productivity growth, but has a negative effect on the number of firms if the initial tax rate is high and a positive effect on the number of firms if the initial tax rate is low. Given these results for productivity growth and market entry, the research finds that decreases in the national corporate tax rate benefit the low-tax rate country, but may benefit or hurt the high-tax rate country.

(4) A second extension of the theoretical framework studies the relationships between national labor market frictions, unemployment rates and the rate of productivity growth. Again, international trade costs and imperfect knowledge diffusion cause the partial concentration of production and the full concentration of innovation in the country with the larger market size as measured by population. Focusing on national labor market policies, the research considers how unemployment benefits and subsidies to firm-level employee search costs affect productivity growth through adjustments in national unemployment rates, national shares of industry, and knowledge spillovers from production to innovation. The results suggest that when the large country offers subsidies to search costs or reduces unemployment benefits in the domestic labor market, the resulting decrease in the unemployment rate causes an increase in the concentration of industry and accelerates productivity growth as the level of knowledge spillovers rises. If similar domestic labor market policies are implemented in the small country, however, productivity growth is dampened as the unemployment rate decreases leading to lower industry concentration and a fall in knowledge spillovers.

(5) The third extension of the framework considers the implications of innovation

offshoring for innovation-based economic growth. Central to the framework is an occupational choice, through which skill-differentiated workers select either low-skilled employment in production or high-skilled employment in innovation. The research then examines the tension arising between access to technical knowledge and low-cost high-skilled labor in the innovation location decision for firm. Characterizing countries according to their levels of asset wealth, the results suggest that industry and innovation tend to concentrate in the asset-wealthy country when trade costs are relatively high. In addition, a positive relationship between innovation costs and industry concentration ensures that improved international knowledge diffusion coincides with an increase in net offshoring flows in innovation from the asset-wealthy to the asset-poor country, and faster productivity growth.

(6) Over the duration of the project, separate but related research was also completed. The research developed an economic growth model in which product cycles arise endogenously from investment in incremental and breakthrough innovations. Incumbent firms invest in incremental technology improvements with the aim of reducing production costs. Market entrants develop breakthrough product designs in order to capture the market from vintage product lines. The competing objectives of the two types of innovation generate product cycles within an environment of creative destruction, as new products displace old and are then manufactured using production technologies that are continuously refined. Investigating the relationship between innovation incentives and the average length of product cycles, the research characterized three stable patterns of product evolution: incremental innovation alone, breakthrough innovation alone, and product cycles with both types of innovation. Numerical examples suggest that when the market exhibits stable product cycles, subsidies to either type of innovation raise the rate of economic growth and improve welfare.

#### 5. 主な発表論文等

(研究代表者、研究分担者及び連携研究者には下線)

[雑誌論文] (計 4 件)

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## 6. 研究組織

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