様　式　Ｃ－１９、Ｆ－１９－１、Ｚ－１９　（共通）

科学研究費助成事業　　研究成果報告書

令和　４ 年　 ６ 月 １６ 日現在

機関番号：３４３１０
研究種目：基盤研究(C)（一般）
研究期間：2019～2021
課題番号：１９Ｋ０１６３８

研究課題名（和文）A Study of the Implications of Innovation Location Patterns for Economic Growth and National Welfare

研究課題名（英文）A Study of the Implications of Innovation Location Patterns for Economic Growth and National Welfare

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交付決定額（研究期間全体）：（直接経費）　　3,000,000円

研究成果の概要（和文）：この研究プロジェクトの目的は、国際間における経済統合が進展する中、企業が研究開発活動の最適な立地を選択する方法について理論的な考察を与え、結果として生じる研究開発の立地模様が関連する国々に利益をもたらすか害を及ぼすかを評価することである。特に労働雇用と生産性成長に与える影響に重点を置き、国の厚生を改善させるような政策の役割を特定することを目的にした。

主に、以下の課題を分析した。先ず、イノベーション部門におきるオフショアリングが生産性成長を加速する可能性に関して証明した。次に、労働市場に起きる摩擦と組合交渉力、そして人口の高齢化が産業の立地と経済成長に与える影響について、新しい結果を導き出した。

研究成果の学術的意義や社会的意義
経済政策の一つの目的は地方経済を再生することである。その一方で、都市圏に産業が集積されると経済成長が加速することもよく知られている。本研究では、産業の立地模様に与える影響を通して、経済政策が複数の地域にもたらす効果を考える。その結果、より的確な経済政策を実行することが可能になる。

研究成果の概要（英文）：The purpose of this research project was to theoretically study how firms select optimal geographic locations for their research and development (R&D) activities across an increasingly integrated world economy, and to appraise whether the resulting R&D locations patterns benefit or hurt the associated home and host countries, with a specific emphasis on the consequences for employment and productivity growth, and with an aim to identify the roles of policy in improving national welfare.

The research project successfully analyzed the following issues: (i) the relationship between innovation offshoring and productivity growth; (ii) how labor market frictions affect industry location patterns, unemployment rates, and economic growth; (iii) the effects of import competition on regional industry location and economic growth; (iv) the effects of demographic transition on industry location and economic growth; (v) the effect of union power on industry location patterns and economic growth.

研究分野：経済理論の応用分析

キーワード：Industry Location　R&D Offshoring　Employment　Productivity Growth　International Trade

１．研究開始当初の背景

(1) In an increasingly integrated world economy, characterized by dramatic reductions in communication and transport costs, national borders are less of a constraint when firms select the best geographic locations for their production and innovation activities. While research has shown that the resulting international shifts in production location patterns have important consequences for trade and employment patterns, economic growth and national welfare, the implications of changes in the geographic location of research and development (R&D) are less well understood.

(2) The importance of studying innovation locations patterns is highlighted, however, by the significant rise in R&D offshoring from advanced to emerging economies over the last decade, as evidenced by the growing U.S. trade deficits in R&D services with China and India (average annual growth of 22% and 17% between 2006 and 2015). Identifying two of the key factors in the firm-level R&D location decision as access to technical knowledge and the availability of low-cost skilled labor, the business literature has suggested that the surge in R&D offshoring activity has partly been driven by the large supply of engineers and scientists available in emerging economies.

(3) Although initial empirical evidence has suggested that R&D offshoring has a positive effect on economic performance, the relationship has not been formally derived within in a theoretical growth framework. To that end, the current research project has aimed to contribute to the literature with the development and application of an endogenous market structure and endogenous growth framework that helps to unravel the channels through which R&D offshoring affects innovation performance and productivity growth.

(4) There is a well-developed international trade literature investigating how economic integration affects unemployment using a search-based labor-market frictions approach. In addition, recent empirical evidence has suggested the existence of institutional spillovers through which domestic labor market policy potentially influences the labor market outcomes of trade partners. The international trade literature has generally not considered the implications of institution spillovers for innovation-based economic growth when firms are free to shift innovation and production across national borders.

(5) Regional economic policy tends, however, to emphasize both employment and innovation-based growth hand in hand. At the same time, regional economic policy also tends to support the existence of geographic clusters of innovation and production activity. Given the close link between policies designed to promote jobs and growth, the research project has aimed to contribute to the literature by shedding light on how the shifts in production and innovation location patterns resulting from adjustments in labor market policies affect both national

employment levels and fully endogenous productivity growth through institutional spillovers.

２．研究の目的

(1) The key aim of the research project has been to theoretically investigate how firms select the optimal geography locations for their R&D activities across an increasingly integrated world economy, and to appraise whether the resulting R&D offshoring patterns benefit or hurt the associated home and host countries, with a specific emphasis on the consequences for employment and productivity growth, and the identification of potential roles for economic policy in improving national welfare.

(2) The project outline included three objectives. The first was to extend the endogenous market structure and endogenous growth framework to study the relationship between innovation offshoring and productivity growth in model where skill differentiated workers choose between low-skilled and high-skilled employment. The second objective was to develop a theoretical framework in which firms potentially split the innovation process vertically into intermediate tasks and then shift each task to its lowest cost location, allowing for a study of the mechanisms through which the offshoring of innovation-based tasks affects employment patterns, market entry, and productivity growth. The third objective was to introduce an endogenous market structure and endogenous growth framework with labor market frictions and study the mechanisms through which international shifts in firm-level location patterns for production and innovation generate institutional spillovers between national labor markets, with an emphasis on understanding the implications for national employment levels and productivity growth.

３．研究の方法

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

(2) All of the results of the research project build on a theoretical framework that was previously developed by the project members. The framework 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 exhibit a positive relationship between an economy's size and its rate of economic growth. The framework includes two industries. The first

produces a homogeneous good. The second produces a heterogenous goods with many distinct product varieties. The firms producing heterogenous product varieties also invest in in-house process innovation with the objective of raising productivity and lowering production costs. Importantly, technical knowledge is assumed to accumulate within the production technologies of firms, generating knowledge spillovers whereby current improvements in production technologies reduce the future cost of investment in process innovation, as the stock technical knowledge increases. This mechanism leads to perpetual economic growth. 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 diminish as the distance between production and innovation activities increases. Firms therefore benefit from locating their innovation activities in regions where a large share of production occurs, as knowledge spillovers into innovation will be higher and investment costs will be lower. A key assumption of the framework is perfect capital mobility, which allows firms to shift production and innovation activities independently to their lowest cost locations. Trade costs between regions and imperfect knowledge diffusion then ensure that locations with larger markets host greater shares of innovation and production activity.

４．研究成果

(1) The first result of the research project was to refine a theoretical framework that allows for an investigation of the implications of innovation offshoring for productivity growth in a two-country framework that features a tension between access to technical knowledge and low-cost high-skilled labor in the firm-level decision regarding where to location innovation. The project members conclude that industry and innovation tend to concentrate in the asset-wealthy country when trade costs are relatively high. A positive relationship between innovation costs and industry concentration then ensures that improved international knowledge diffusion coincides with an increase in net offshoring flows in innovation from the asset-wealthy country to the asset-poor country, and potentially with a faster rate of productivity growth.

(2) The second result was to refine a two-country model of international trade that enables a study of how labor market frictions affect industry location patterns, unemployment rates, and productivity growth. The project members demonstrate that when the larger country offers subsidies to labor search costs or reduces unemployment benefits, the domestic unemployment rate falls, causing greater industry concentration and faster productivity growth, but higher unemployment for the smaller country. When similar labor market policies are implemented in the smaller country, however, the resulting fall in domestic unemployment leads to lower industry concentration and slower productivity growth, while lowering unemployment in the larger country.

(3) The third result was a study of how import competition affects the regional concentration of industry location in a small open economy with two regions. In this version

of the theoretical framework, industry concentration is linked with firm-level investment in process innovation through an import competition effect that is increasing in the market share of imported goods and the productivity differential of domestic firms with the rest of the world. The project members show that increased import competition, through a larger number of imported goods or a faster international rate of productivity growth, leads to greater regional industry concentration by reducing domestic market entry and decreasing the relative productivity of domestic firms.

(4) The fourth result involved an extension of the theoretical framework to consider asymmetric tariffs rates in a two-country model. The project members demonstrate that a country's initial share of industry determines how changes in the country's tariff rate affects the rate of productivity growth. On the one hand, if the country has a smaller share of industry, increasing the tariff rate reduces the geographic concentration of industry, and decreases the rate of productivity growth. On the other hand, if the country has a larger share of industry, increasing the tariff rate raises the geographic concentration of industry, and increases the rate of productivity growth.

(5) The fifth result was an investigation of how increasing longevity and declining birth rates affect market entry and productivity growth in a two-country model. The project members demonstrated that population aging reduces a country's labor supply, share of industry, and relative productivity. If the smaller country of the two countries experiences population aging, knowledge spillovers improve and the rate of productivity growth rises, as the level of market entry falls. Alternatively, population aging in the larger country weakens knowledge spillovers and lowers the rate of productivity growth, but has an ambiguous effect on market entry. A quantitative analysis of the theoretical framework based on population data for the United States and Western Europe was used to study the welfare effects of demographic transition.

(6) The sixth result was an examination of how unionization affects economic growth through its impact on industry concentration in a two-country model. The project members show that stronger bargaining power in the relatively large country increases the rate of output growth when labor unions are employment-oriented but decreases the rate of growth when unions are wage-oriented. The model was calibrated using labor market data for the United States and the United Kingdom in order to complete a study of the effects of falling union bargaining power on industry location patterns, output growth, and national welfare.

５．主な発表論文等

〔雑誌論文〕　計7件（うち査読付論文　2件／うち国際共著　0件／うちオープンアクセス　0件）

１．著者名 Davis, Colin, Ken-ichi Hashimoto, and Ken Tabata	４．巻 1154
２．論文標題 Unionization, Industry Concentration, and Economic Growth	５．発行年 2022年
３．雑誌名 Discussion Paper No. 1154, Institute of Social and Economic Research, Osaka University	６．最初と最後の頁 1-25
掲載論文のDOI（デジタルオブジェクト識別子） なし	査読の有無 無
オープンアクセス オープンアクセスではない、又はオープンアクセスが困難	国際共著 －

１．著者名 Davis, Colin, Ken-ichi Hashimoto and Ken Tabata	４．巻 71
２．論文標題 Demographic Structure, Knowledge Diffusion, and Endogenous Productivity Growth	５．発行年 2022年
３．雑誌名 Journal of Macroeconomics	６．最初と最後の頁 1-17
掲載論文のDOI（デジタルオブジェクト識別子） 10.1016/j.jmacro.2021.103396	査読の有無 有
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１．著者名 Davis, Colin and Ken-ichi Hashimoto	４．巻 29
２．論文標題 Import Competition and Industry Location in a Small-Country Model of Productivity Growthport	５．発行年 2021年
３．雑誌名 Review of International Economics	６．最初と最後の頁 1046-1064
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２．論文標題 Tariffs, Agglomeration, and Endogenous Growth	５．発行年 2021年
３．雑誌名 The Kokumin-Keizai Zasshi (Journal of Economics & Business Administration)	６．最初と最後の頁 61-74
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1．著者名 Davis, Colin, Ken-ichi Hashimoto, and Ken Tabata	4．巻 1113
2．論文標題 Demographic Structure, Knowledge Diffusion, and Endogenous Productivity Growth	5．発行年 2020年
3．雑誌名 Discussion Paper No. 1113, Institute of Social and Economic Research, Osaka University	6．最初と最後の頁 1-43
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1．著者名 Davis, Colin and Ken-ichi Hashimoto	4．巻 1055
2．論文標題 Innovation Offshoring with Fully Endogenous Productivity Growth	5．発行年 2019年
3．雑誌名 Discussion Paper No. 1055, Institute of Social and Economic Research, Osaka University	6．最初と最後の頁 1-40
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1．著者名 Davis, Colin and Ken-ichi Hashimoto	4．巻 1052
2．論文標題 Productivity Growth, Industry Location Patterns and Labor Market Frictions	5．発行年 2019年
3．雑誌名 Discussion Paper No. 1052, Institute of Social and Economic Research, Osaka University	6．最初と最後の頁 1-33
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〔学会発表〕　計5件（うち招待講演　0件／うち国際学会　1件）

1．発表者名 Colin Davis
2．発表標題 Endogenous Productivity Growth, Industry Location Patterns, and Labor Market Frictions
3．学会等名 Asian Pacific Trade Seminars, Tokyo University（国際学会）
4．発表年 2019年

１．発表者名
Ken-ichi Hashimoto

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４．発表年
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Ken-ichi Hashimoto

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３．学会等名
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３．学会等名
日本経済学会 2019年度 春季大会

４．発表年
2019年

〔図書〕　計0件

〔産業財産権〕

〔その他〕

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６．研究組織

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７．科研費を使用して開催した国際研究集会

〔国際研究集会〕　計0件

８．本研究に関連して実施した国際共同研究の実施状況

共同研究相手国	相手方研究機関