



# Structural change and economic growth with relation-specific investment<sup>☆</sup>



Tsutomu Harada<sup>\*</sup>

Graduate School of Business Administration, Kobe University, 2-1 Rokkodai, Nada, Kobe 657-8501, Japan

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## ABSTRACT

This article develops an inter-sectoral endogenous innovation model that is able to account for changing productive relations among sectors and examines how the relation-specific investment affects the evolution of industry structure. It is shown that in the steady state, the economy gets stuck in the “growth trap” where the economy still achieves positive growth, but at the lowest level. The most efficient remedies for the growth trap are to facilitate relation-specific investment among sectors and to decrease the degree of specialization in the economy. Thus, the relation-specific investment is indeed instrumental in improving economic efficiency in the face of the growth trap. These remedies could be implemented by subsidies on relation-specific groups and permanent R&D taxes.

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## 1. Introduction

All factors of production are heterogeneous. The heterogeneity which matters is not physical heterogeneity, but heterogeneity in use. The process of economic development and growth involves grouping and regrouping of various factors of production, and as an economy proceeds on the path of economic progress, increasing specialization and complexity in the use of the factors of production result. The process of increasing specialization and concomitant grouping and regrouping of factors of production

needs to be modeled in order to elucidate their economic consequences.

However, most of the related work on economic development and growth typically assumes the homogeneity of factors of production and production functions. As a result, although increasing specialization could emerge in these models such as the product variety model in the endogenous growth literature (see e.g., Grossman and Helpman, 1991), its effect appears only through symmetry, leading to no heterogeneity in use among sectors and firms in the economy.

This article models the evolution of industry structure incorporating the heterogeneity in use of factors of production and endogenously changing productive relations over time. Moreover, the model in this article allows for relation-specific investment among sectors in the economy, forming relation-specific groups. Relation-specific investment has been extensively studied by transaction cost economics (Williamson, 1985, 1996) and incomplete contract literature (Grossman and Hart, 1986; Hart and Moore, 1990).

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<sup>\*</sup> Tel.: +81 78 803 6914; fax: +81 78 803 6977.

E-mail address: [harada@people.kobe-u.ac.jp](mailto:harada@people.kobe-u.ac.jp)

However, its economic implications have been examined only at the micro level. How do increasing specialization and changing productive relations affect the formation of relation-specific groups? What are the economic consequences of these relation-specific groups? These research questions constitute the main motivation of this article.

It is shown that in the steady state, the economy gets stuck in the “growth trap” where the economy still achieves positive growth, but at the lowest level. The most efficient remedy for the growth trap is to facilitate relation-specific investment among sectors and to decrease the degree of specialization in the economy. Thus, the relation-specific investment is indeed instrumental in improving economic efficiency in the face of the growth trap.

These remedies could be implemented by subsidies on relation-specific groups and permanent R&D taxes. Therefore, it is the mixture of subsidies on relation-specific groups and permanent R&D taxes that enable the economy to escape from the growth trap and improve both social welfare and economic growth.

The rest of the article is organized as follows. Section 2 reviews related literature and describes the main motivation of this article. Section 3 develops the basic model of an inter-sectoral growth economy and Section 4 examines the effect of relation-specific investment. Section 5 characterizes the evolution of industry structure and Section 6 presents our conclusion.

## 2. Related literature

Before looking at the model used in this article in any detail, let us first review the related literature on inter-sectoral economic growth, structural changes, and relation-specific groups. In this way, we can clearly describe the motivation of this article and its empirical background.

First of all, this article is primarily concerned with inter-sectoral economic growth that accompanies changing structural relations. On the one hand, while some multi-sector endogenous growth models explore multiplier effects associated with inter-sectoral relations (Rodríguez-Clare, 1996; Ciccone, 2002; Jones, 2011), they do not account for changes in the inter-sectoral relations. On the other hand, input-output literature focuses more on the asymmetric nature of inter-sectoral relations represented by input-output tables. However, even if more general production technologies are adopted over the Leontief type (see e.g., ten Raa and Mohnen, 1994; Rose and Casler, 1996; Liew, 2000), they do not incorporate the dynamics of inter-sectoral relations at all.

One exception to this neglect of changing productive relations is found in Harada (2015) where an inter-sectoral growth model is presented with structural changes induced by R&D. This article builds upon Harada (2015) and extends the model to incorporate relation-specific groups within an industry structure. We believe this extension is critical to understanding the process of economic change because relation-specific groups, or “business groups”, are a prominent feature of the industrial organization of many emerging economies, including Brazil, Chile, Hong Kong,

India, Indonesia, Malaysia, Pakistan, South Africa, South Korea, and Taiwan (Ghemawat and Khanna, 1998).

Some empirical studies on business groups suggest that business group membership positively affects firm profitability and productivity (see e.g., Keister, 1998). Although such evidence does not directly show the positive effect of business groups on economic growth, given that many East Asian countries such as Japan, Korea, Hong Kong, Indonesia, Malaysia, and China can be characterized by the presence of business groups and high economic growth, at least historically, it can be inferred that business groups do have some positive effects on economic development and growth.

Business groups can be defined in a variety of ways. For example, Granovetter (1995) defines business groups as “collections of firms bound together in some formal and/or informal ways, characterized by an ‘intermediate’ level of binding”, excluding, “on the one hand, a set of firms bound merely by short-term strategic alliances and, on the other, a set of firms legally consolidated into a single one” (p. 95). This definition clearly implies that business groups include many forms of inter-firm relations, ranging from formal arms-length legal contracts to relational contracts grounded in family, ethnicity, society, religion and region.

Among the various business groups, we are specifically interested in the Japanese *keiretsu*. The term *keiretsu* has been applied to a variety of Japanese inter-firm ties. In general, *keiretsu* is defined as a cluster of independently managed firms maintaining close and stable economic ties, cemented by a governance mechanism such as a presidents’ club, partial cross-ownership, and interlocking directorates (Grabowiecki, 2006). Calder (1993) argues that *keiretsu* groups “have been a key element in Japan’s rapid industrial development and transformation since the 1950s” (p. 142).

As an economic analysis of *keiretsu*, Qiu and Spencer (2002), inspired by the user-supplier relationship in the Japanese automobile industry, model *keiretsu* as an institution facilitating relation-specific investment and draw implications for various policies aimed at opening the Japanese market for intermediate goods such as auto-parts. They show that a VIE (voluntary import expansion) reduces relation-specific investment, raising the *keiretsu* cost of production. This in turn leads to a reduction in Japanese auto output and hence to a reduction in the total Japanese demand for parts. Thus, although the US share of the Japanese parts’ market would rise due to the import of a greater range of parts, it is possible that the total value of US parts exported to Japan would fall.

Ahmadjian and Oxley (2006) analyzed a more detailed institutional mechanism of *keiretsu*: the extensive use of partial equity stakes in suppliers by Japanese automobile assemblers. That is, auto assemblers hold partial equity stakes in their suppliers in situations where the suppliers are likely to be most vulnerable to assembler opportunism. They showed that on average, Japanese automobile assemblers hold shares in 20% of the suppliers in their sample, and one third of the equity ties involve stakes of less than 5%. In addition, Deyer (2009) mentioned that Toyota owns roughly 28% of the shares of its top ten major supplier partners. With partial equity stakes, automobile assemblers outsource customized, relation-specific auto parts, from

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