



Foreign versus domestic outsourcing: Firm-level evidence on the role of technology

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ABSTRACT

The decision about where to outsource varies across firms and industries. General machinery heavily depends on domestic subcontractors, while outsourcing overseas is prevalent in apparel. Based on firm-level data explicitly distinguishing foreign outsourcing from domestic outsourcing in all manufacturing industries, this paper finds that firms tend to prefer domestic outsourcing to foreign outsourcing when they are R&D-intensive. This finding is consistent with incomplete contracting models, since technologically complex products are likely to require high-quality contracting environment and assembler–supplier proximity. This paper also finds that firms connected with computer networks are actively outsourcing.

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1. Introduction

Outsourcing is increasing its importance in a wide range of firms and industries. While many assemblers have long been outsourcing to subcontractors in proximate locations, outsourcing across borders has been facilitated by information technology development and trade liberalization in recent years. Outsourcing to low-wage countries appears particularly prevalent in firms producing apparel and other labor-intensive goods, as in Nike, the company outsourcing most of its manufacturing tasks across borders. On the other hand, assemblers of technologically complex products tend to depend heavily on domestic suppliers. For example, Toyota employs the just-in-time procurement of customized auto parts from nearby suppliers. The relationship between technology and foreign outsourcing is worth investigating.

The firm's decision about where to outsource has recently been formalized by the incomplete contract theory. For example, in the model by Grossman and Helpman (2005), the production is supposed to require a customized input manufactured by an independent supplier with a relation-specific investment, governed by an incomplete contract. A final assembler searches for a partner supplier close to its input requirement, either in the technologically and legally advanced home country North or in the low-wage foreign country South.

Their model predicts that a firm tends to choose domestic outsourcing (DO) rather than foreign outsourcing (FO) when the firm's product is more technologically complex. The factors behind this choice can be listed as follows. First, customizing inputs is likely to be especially costly for Southern suppliers, many of whom are not equipped with computer-aided design (CAD). Second, these complex products tend to require high-quality legal system for verification/contracting. Third, the assembler-supplier proximity is often critical in customizing complex products. Finally, input markets for these technologically advanced products tend to be thicker in North. Many other recent theoretical models of incomplete contracting are also in line with this prediction (e.g. Acemoglu, Anrès, Helpman, 2006; Anrès, 2005; Anrès & Helpman, 2006; Feenstra & Spencer, 2005).

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Table 1
Comparison of averages and shares

	<i>FO and DO</i>	<i>FO only</i>	<i>DO only</i>	<i>No Out</i>
(1) Share (% in total number of firms)	2.48	0.20	46.52	50.81
(2) Average Firm Size (in sales) (relative to <i>No Out</i>)	20.99	6.93	2.57	1
(3) Firms active in R&D (% within each group)	46.16	28.21	22.22	9.97
(4) Average R&D–sales ratio (%)	2.49	2.59	2.37	3.48
(5) Average capital–labor ratio (relative to <i>No Out</i>)	1.15	1.15	0.98	1
(6) Firms connected with Computer networks (%)	52.13	33.76	31.33	13.61
(7) Firms operating Affiliates overseas (%)	26.22	27.35	3.99	1.26

Notes: All 118,300 firms are included. The rows (3), (6), and (7) display the percentage within each group.

By using firm-level data, this paper empirically examines how technology is related with the firm's choice between FO versus DO. The current paper uses unique and direct data on outsourcing, where contracts with foreign suppliers are explicitly distinguished from those with domestic suppliers. The data set covers 118,300 firms in all manufacturing industries in Japan without any firm-size threshold. A wide range of corporate variables are also included, such as sales, employment, capital, R&D expenditure, foreign affiliates, and computer network connection.

To preview the principal results, firms tend to outsource within the home country rather than across borders when they are R&D-intensive. This paper first uses the multinomial logit model on the firm's outsourcing location choice, but confirms the robustness of the results by the Heckman's two-step estimation procedure with the yen value ratio of outsourced tasks. Descriptive statistics derived from firm-level data are generally consistent with the regression results, and also reveal notable inter-industry variations.

The rest of this paper is organized as follows. Section 2 briefly describes the data set. Section 3 summarizes descriptive statistics. Section 4 explains empirical specifications and reports firm-level estimation results. Section 5 concludes.

2. Data description

All the data used for this paper are derived from *The Basic Survey of Commercial and Manufacturing Structure and Activity* (Sho-Kogyo Jittai Kihon Chosa in Japanese).¹ The survey covers 118,300 firms in all manufacturing industries without any firm-size threshold.² This sample size is remarkably large, matched almost only by the U.S. *Census of Manufactures*. Hence, we can interpret this survey as a relatively precise representation of all manufacturing in Japan. The survey includes a wide range of variables, such as sales, employment, capital, R&D expenditure, the computer network connection, and foreign affiliates. This survey was conducted only once at 1998.

The limited availability of micro-data has prevented previous empirical studies from investigating the location choice in outsourcing.³ As a unique and direct measure of FO, the survey collects data on the yen values of manufacturing or processing tasks contracted out (*gaichu* in Japanese) to suppliers located in foreign countries, explicitly distinguished from those contracted out to firms located in Japan. While the survey contains no other information on subcontractors, this definition of FO successfully excludes intermediates purchased at marketplace, which inevitably contaminate FO measures dependent on intermediate import data.

3. Descriptive statistics

This section summarizes descriptive statistics derived from the firm-level data. Firms are grouped by their involvement in outsourcing or by industry.

3.1. Comparison of averages

Table 1 disaggregates all the surveyed 118,300 firms into the following four disjoint groups: (1) *FO and DO* (firms with foreign and domestic outsourcing both strictly positive), (2) *FO only* (firms with positive foreign outsourcing but no domestic outsourcing), (3) *DO only* (firms with positive domestic outsourcing but no foreign outsourcing), and (4) *No Out* (firms outsourcing no production at all).

Several contrasts in Table 1 are noteworthy. As shown in the row (1), only around 3% of the surveyed firms are outsourcing production across borders, while nearly half are outsourcing within the home country. On the other hand, around half of the firms

¹ Any researcher can access to the same original firm-level data files by obtaining individual official permission from the government in advance, though confidential micro data cannot be publicly disclosed.

² Commercial industries are also surveyed, but this paper focuses on manufacturing because the outsourcing captured in this survey is on production-related tasks, as will be explained later.

³ Few studies have distinguished outsourcing locations at the firm/plant level. As a rare example, Görg and Hanley (2003) include the ratio of imported inputs over total inputs in the productivity regression for electronics plants in Ireland, yet the choice of location is not examined. Based on the same data as this paper, Tomiura (2007) compares productivity across firms involved in export, FO, and FDI, but does not consider DO or R&D.

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