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journal homepage: [www.elsevier.com/locate/iref](http://www.elsevier.com/locate/iref)Firm-asymmetry and strategic outsourcing<sup>☆</sup>Jiyun Cao<sup>a</sup>, Arijit Mukherjee<sup>b,c,d,e,\*</sup>, Uday Bhanu Sinha<sup>f</sup><sup>a</sup>The School of Economics, Nankai University and Collaborative Innovation Center for China Economy, Tianjin, China<sup>b</sup>Nottingham University Business School, UK<sup>c</sup>CESifo, Germany<sup>d</sup>INFER, Germany<sup>e</sup>GRU, City University of Hong Kong, Hong Kong<sup>f</sup>Department of Economics, Delhi School of Economics, New Delhi, India

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## ABSTRACT

In contrast to the conventional wisdom, we show that a final goods producer may outsource input production to an outside supplier even if the final goods producer possesses a superior input-production technology compared to the outside supplier. Such an outsourcing may reduce consumer surplus and social welfare. We also show that, in the presence of outsourcing, innovation by the firm doing outsourcing to reduce the cost of in-house input production and to reduce the input coefficient in the final goods production may have significantly different implications for the consumers and the society.

## 1. Introduction

Outsourcing occurs in several industries such as aviation, automobiles, computers and electronics. Among some well-known cases, consider the aircraft giant Boeing, which outsources products of over 34,000 components to different manufacturers for the production of 747 passenger aircraft. It is particularly interesting to note that Boeing signed agreements with a Japanese consortium<sup>1</sup> whose costs are just as high as or higher than Boeing. According to the agreements, Boeing would purchase from them the 767-X fuselage during the 1990s, and then wings, together with related research and development during the 2000s (Chen, 2011). In computer industry Sun purchases about 75% of components from other companies. It is also common that outsourcing activities sometimes take place in a manner where the arch rivals purchases from common suppliers. For example, in 2004, Shanghai Automotive Industry Corporation (SAIC) manufactured for Volkswagen and GM.<sup>2</sup> In the United States, more than 60% of auto parts suppliers make components for the big three car manufacturers, viz., GM, Chrysler and Ford (Alexandrov, 2010). Spirit AeroSystems Inc., the world's largest first-tier aero-structures manufacturer and the former Boeing Commercial Airplanes site that was divested from Boeing in 2005, is a supplier of fuselage sections for both Boeing and Airbus.<sup>3</sup>

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<sup>1</sup> It is composed of the three biggest industrial giants of Japan: Mitsubishi Heavy Industries, Kawasaki Heavy Industries LTD, and Fuji Heavy Industries (Chen, 2011).

<sup>2</sup> See: <https://hbr.org/2006/09/when-your-contract-manufacturer-becomes-your-competitor>.

<sup>3</sup> See: [https://en.wikipedia.org/wiki/Spirit\\_AeroSystems](https://en.wikipedia.org/wiki/Spirit_AeroSystems).

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Conventional wisdom suggests that the sourcing decision (i.e., producing in-house or purchasing from an outside supplier) may simply be a matter of choosing the least cost alternative by comparing internal production costs with the prices charged by the independent suppliers.<sup>4</sup> However, in today's world where strategic interactions among the final goods producers are evident, we show that a final goods producer may outsource input production to an outside supplier even if the final goods producer possesses a superior input-production technology compared to the outside supplier. The final goods producer with a superior input-production technology does this in order to get a strategic advantage in the final goods market.

We consider a situation where there are three firms. There is a final goods producer, which can produce both the final good and a critical input required to produce the final good. There is another final goods producer, which cannot produce the input but may purchase it from an outside input supplier that is technologically inferior compared to the final goods producer producing the input. We show in this framework that outsourcing by the final goods producer, which is most capable of producing the input, increases outside input supplier's input demand, which, in turn, increases the input price for both final goods producers. However, if the final goods producer with the input-production technology has a significantly superior technology to produce the final good compared to the final goods producer without the input-production technology, the burden of a higher input price is significantly more on the final goods producer without input-production technology compared to the other final goods producer, which increases the competitive advantage of the final goods producer with the input-production technology and creates the incentive for outsourcing. Although this type of strategic outsourcing to raise the rival's cost<sup>5</sup> is profitable for the final goods producer with the input-production technology, it may hurt the consumers and the society by increasing the input cost for the final goods producers. Thus, our paper, considering outsourcing in a closed economy, complements the literature showing a growing concern about the negative welfare effects of international outsourcing (Chen, Ishikawa, & Yu, 2004;; Marjit & Mukherjee, 2008;; Mukherjee & Tsai, 2010).

Our paper also contributes to the existing literature showing the effects of outsourcing on innovation (Marjit & Mukherjee, 2008;; Chen & Sen, 2010;; Beladi, Marjit, & Yang, 2012). Unlike the existing papers, which consider innovation to improve efficiency in final goods production, we consider and compare the welfare effects of innovation to improve efficiency in input production and final goods production. We show that the welfare effects of innovation for improving input production are significantly different to that of the final goods production. An increase in cost efficiency in input production will increase consumer surplus if it induces the final goods producer with the input-production technology to change its strategy from outsourcing to in-house input production. However, an increase in efficiency in final goods production may reduce consumer surplus if it induces the final goods producer with the input-production technology to change its strategy from in-house input production to outsourcing. While an increase in cost efficiency in input production will increase (may decrease) social welfare by inducing the final goods producer with the input-production technology to change its strategy from outsourcing to in-house input production, an increase in efficiency in final goods production may decrease (increase) social welfare by inducing the final goods producer with the input-production technology to change its strategy from in-house input production to outsourcing if its efficiency in processing input to the final good is (not) high enough to that of the final goods producer with no input-production technology.

There is a growing literature showing how outsourcing by a final good producer increases its competitiveness compared to the competitors by raising the input prices (Arya, Mittendorf, & Sappington, 2008;; Beladi & Mukherjee, 2012). However, unlike our paper, outsourcing occurs in those papers provided the independent input supplier possesses a better technology compared to the input producing final goods producer. Chen (2011) and Kabiraj and Sinha (2014, 2016) show the incentive for outsourcing by a final goods producer that has a better input-production technology than the independent input supplier. However, the reasons for outsourcing in those papers are different from ours. While entry-deterrence is the motive in Chen (2011), the benefit from technology transfer is the driving force for outsourcing in Kabiraj and Sinha (2014, 2016).<sup>6</sup> In contrast, the benefit from raising rival's cost is the main motive for outsourcing in our paper.

It may be worth noting that although we consider that the independent input supplier and the final goods producers are in the same country, outsourcing in our paper occurs even if the independent input supplier is from a different country. Thus, our paper also complements the literature on international outsourcing (Feenstra & Hanson, 1999; Glass & Saggi, 2001; Grossman & Helpman, 2002;; 2003;; Antràs & Helpman, 2004; Jones, 2005;; Marjit & Mukherjee, 2008). However, unlike these papers, raising rival's cost is the motive for outsourcing in our paper.

Our paper highlights the issue that the act of outsourcing raises some serious competitive concerns because of its negative impact on consumer surplus and social welfare. It shows the incentive for raising rival's cost in the starkest way despite having more efficient production method available in-house for input production. Thus, our analysis raises several important questions both for the policy makers and for future empirical analysis. Are there significant differences in input production technologies between an outsourcing firm and the input producers? Are the technological leaders having larger market shares choose outsourcing to throttle competition from technologically weak rivals? Most industries are abuzz with anti-competitive practices and the competition authorities typically believe that outsourcing activities are for minimizing the cost of production rather than raising rival's cost. In view of our finding, the competition authorities must consider the outsourcing activities more carefully and especially, where the technology leaders are engaged in outsourcing activities.

<sup>4</sup> The sourcing decision can be far more complex in reality. The literature reveals many strategic elements which may play a pivotal role in firms' sourcing decisions. For example, sourcing decision can be influenced by fears of supplier hold-up, concerns about leakage of proprietary information, the need to ensure timely and reliable supply of high-quality inputs, prospective gains from cultivating long term alliances with suppliers, strategic competitive considerations and anti-competitive purpose.

<sup>5</sup> One may refer to Salop and Scheffman (1987) and Mason (2002) for earlier work on raising rival's cost strategy.

<sup>6</sup> For other interesting papers on strategic outsourcing, see Shy and Stenbacka (2003) and Buehler and Haucap (2006).

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