

Outsourcing and Input Volatility

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1 Summary and Motivation

The 2010 EPRN project “Firm Flexibility and Export Potential,” is already in working paper format, was invited for presentation at several professional meetings such as the European Trade Study Group in Lausanne (2010) and the Southern Economic Association in Atlanta(2010), and is currently under review at a top 10 Economics journal. This fast turn around was possible due the generous funding of the project that allowed the authors to purchase valuable data, collaborate in the United States as well as in Denmark, and buy out months of teaching in order to focus on the research. Nguyen and Schaur are grateful for this support and thank EPRN for the opportunity to apply for additional funding to develop this research along a new dimension. We propose to examine the impact of outsourcing volatility on Danish firms and the Danish economy.

Last year’s project delivered two important policy implications. First, exporting firms exhibited a significant amount of flexibility by substituting sales across multiple destinations. For the Danish export counsel, this result can provide valuable advice for new exporters. Second, the project found that exporting stabilizes local output markets. This result is surprising, but shows that international transactions can stabilize the local economy. This time we propose to take on outsourcing through the imports of intermediate inputs. It is an increasingly important part of the Danish Economy, and especially the labor market. Outsourcing is responsible for the loss of up to 50,000 Danish jobs, according to Jørgen Mads Clausen, the chairman of Danfoss (Bloch 2005).

Volatility in the outsourcing channel is important, as it directly transmits foreign production shocks to Danish industries. We may find the same diversification impact of international input sourcing as we did for the output markets as the availability of foreign inputs may smooth fluctuation on local input markets. Whether sourcing of inputs from international markets improves the stability of local markets or increases the volatility is ultimately an empirical question that we propose to answer with the help of the funding outline in this proposal.

Current models of outsourcing (Feenstra and Hanson, 1999, Grossman and Rossi-Hansberg, 2008) focus on the cost cutting motivation for outsourcing; firms import their intermediate goods when it is cheaper to do so. These models assume a perfectly competitive intermediate goods market with no uncertainty. These models miss an important trade off. While outsourcing gives domestic firms access to cheap intermediate inputs, these international sourcing relationships often come with increases in volatility. Sources of foreign volatility include production shocks, variation in the quality of the inputs and supply chain disruptions. Firms that source inputs from overseas reduce the cost of their intermediate inputs, but take larger risks. Importers likely channel these risks to the domestic economy. Evaluating the significance of these transmission channel is important to structure policy for local goods and factor markets. Yet at the

firm level, most of the evidence for these channels is anecdotal. We propose to apply modern econometric techniques to compare firms that source from the domestic market with firms that source from the foreign market to identify the impact of outsourcing on the Danish firm's input and output volatility, as well as to the overall volatility of the Danish labor and output markets.

Per Stig Møller (2010), the former udenrigsminister, suggest that increased outsourcing and globalization in the upcoming years will provide both new opportunities as well as increased competition for Danish companies. The net benefit or costs of outsourcing is still a new topic in international trade, and this project will look at a new channel through which outsourcing effects the Danish economy.

2 Background and Research Contributions

The rapid growth in actual trade in intermediate goods has been matched by the rapid growth in the literature following it (Hummels et al. 2001, Bergoing, et. al. 2004). The theoretical literature has focused on the cost-savings benefits of outsourcing (Feenstra and Hanson, 1999 and Grossman and Rossi-Hansberg 2008). In these models, final-goods producing firms can purchase their inputs from domestic and foreign intermediate-goods manufacturers. Since intermediate-goods are sold on a perfectly competitive market, the final-goods firms gain wholly from increases in outsourcing opportunities. Since the domestic firm is thought to always benefit from outsourcing, the empirical literature has focused on the effects of outsourcing on the local labor market. These labor market effects include average wages (Amiti and Davis, 2008), average employment rates (Biscourp and Kramarz, 2007), and relative skilled/unskilled wages and employment (Feenstra and Hanson, 1997, 1999, Hsieh and Woo 2005).

A contemporary study is examining the effect of outsourcing on the Danish labor market. Hummels, Jørgensen, Munch and Xiang (2010) use a Danish worker-firm matched dataset to look how outsourcing affects Danish workers. They find that an increase in outsourcing at the firm level raises skilled labor wages by 8.5 percent while reducing wages by 7.3 percent for unskilled workers. This project will complement Hummels, Jørgensen, Munch and Xiang's work. Instead of identifying the impact of outsourcing on levels, we examine the impact on the volatility. While higher average wages are welcome, their benefits may be tempered by more frequent lay offs and hiring swings.

Although there are many papers that look at outsourcing, few papers have looked at the effect of outsourcing on the input and output volatilities. One notable exception is a working paper by Bergin, Feenstra, and Hanson (2010). They document the volatilities of outsourcing industries in Mexico and the US. Employment levels in Mexican outsourcing industries fluctuate twice as much as in their US counterparts. This difference is driven by the entry and exit of Mexican plants within the industry. The advantage of the Danish dataset is that we can examine this at the firm level; we can see whether firms that outsource hire and fire workers at a significantly different rate than firms that do not outsource.

In order to achieve our goals, we model outsourcing the firm level, following the

heterogeneous firm models of Melitz (2003) and Melitz and Ottaviano (2008) but incorporating multiple inputs, as in Feenstra and Hanson (1999), and volatile prices, as in Mills (1984, 1986) and Mills and Schumann (1985). Firms employ intermediate inputs to produce final goods. Firms face volatile prices in both domestic and foreign intermediate input markets. The model will highlight the trade off between hiring cheap intermediate inputs at high volatility from international markets versus stability at higher prices on the domestic input markets.

3 Research questions and Empirical Strategy

The detailed firm level data is applied to examine the role of outsourcing on the volatility of firm inputs and output. Specifically, we answer the following questions.

1. Do Danish firms that import intermediate goods increase or decrease their input volatilities? That is, do firms use outsourcing to stabilize their supply chains, or does outsourcing destabilize a firms' supply chains?
2. Does the change in input volatility due to outsourcing propagate to the firm's outputs?
3. Do Danish firms that import intermediate goods exhibit higher or lower employment volatility?
4. Does the proportion of outsourcing firms in an industry lead to an increase or decrease in the industry's overall employment volatility?

4 Data

We have access to several Danish firm registers from which we compile our dataset. The Account Statistics register contains firm-level observations of capital stock, input costs and energy consumption. The FIDA database in Statistics Denmark contains information on the size and value added of each firm, as well as the industry in which it belongs. The "industriens salg af varer" register contains sales records for all Danish firms with at least 10 employees. The Danish External Trade Statistics (Udenrigshandelsstatistikken) records the detailed product classification of each shipment, the value and weight (in kilos) of the shipment, the month of the shipment, the destination or origin country, and the identity of the Danish firm engaging in the trade.

5 Project participants and their experience

The two researchers have previously worked on the 2010 EPRN project "Firm Flexibility and Export Potential." Georg Schaur's work in international trade has been to examine the effects of demand volatilities on trade flows (see attached CV). This was done mainly at the industry level, and with this project, can now be done at the firm level.

Daniel Nguyen's main body of work has been in studying exporting with heterogeneous firms, both theoretically and empirically (see attached CV). His previous work has been with Danish firm-level register data. Thus, this pair of researchers has the necessary prerequisites to perform original research as outlined in this proposal. Both authors have either published or have manuscripts invited for resubmission at the top journal in international economics.

6 Time plan and projected outcome

The scheduled duration of the project is $1\frac{1}{2}$ years starting January 2011. The aim of the project is to identify the channels illustrated above and to examine their magnitude. This will inform policy decisions that relate to international integration and the stability of local markets. We aim to publish this work in a top economics journal.

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