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The effects of offshoring on the elasticity of labor demand

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ABSTRACT

In this paper, I use detailed plant-level data to analyze the relationship between offshoring and labor demand elasticities in the U.S. manufacturing sector during the 1972–2001 period. The results suggest that conditional demand elasticities for production workers are positively associated with increased exposure to offshoring both in the short-run and in the long-run. This relationship holds both for the unbalanced panel of plants and, for plants which continue their operations throughout the sample period. Controlling for skill biased technical change does not alter the magnitude or the significance of the estimated positive relationship between offshoring and labor demand elasticities.

1. Introduction

During the past few decades, the U.S. economy has become much more integrated into the world economy through increased openness to international trade and as a source and host of capital flows. At the same time, many countries have abandoned policies that restrict foreign investment and have started offering better infrastructure and tax incentives aimed at encouraging foreign capital inflows. Together with improvements in technology that decreased transportation and monitoring costs significantly, this era is characterized by increased global production and vertical specialization of countries. However, during this period mobility of goods and capital has remained significantly higher than that of labor (Rodrik, 1997). Understanding the implications of these new aspects of globalization on labor markets is important and has policy implications concerning a large portion of the U.S. population and the rest of the world. In this paper I contribute towards this understanding of globalization by investigating the effect of offshoring on conditional labor demand elasticities using confidential plant-level data for the U.S. manufacturing sector.

Much of the previous research on labor market effects of international trade focuses on the change in the skill premium observed in the U.S. and other developed nations.[1] Most of these studies have focused on trade with developing countries as predicted by the Heckscher-Ohlin model and the Stolper-Samuelson theorem. Most have found that trade in final goods explains only a small portion of increased wage inequality. Although the debate still continues, many economists see skill biased technical change and offshoring (trade in intermediate inputs) as the two main factors contributing to the rise in observed wage gap, mainly because other potential explanations such as trade in final goods, immigration and the decline of unions fail to explain the extent of the wage gap.

Rodrik (1997) identifies labor demand elasticities as an equally important channel through which an increase in international trade can affect labor markets. He argues that greater product market competition, due to a decline in trade protection and the entry of less developed nations into the manufacturing sector, should make labor demand more elastic. The increased possibility of substituting foreign labor for domestic through offshoring is also likely to flatten the labor demand curve. Importantly, offshoring could impact labor markets even though its share is small in most industries. An increase in the threat of offshoring could increase labor demand elasticities, even if actual levels of offshoring do not change.

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[1] See Gaston and Trefler (1994), Berman et al. (1994), Autor et al. (1998) among others. Harrison and Hanson (1999), Feenstra and Hanson (2001), Goldberg and Pavcnik (2004, 2007), Harrison and McMillan (2007) provide comprehensive surveys of the literature on trade and wages. Related literature examines the impact of capital flows on skill upgrading; see Feenstra and Hanson (1997), Blonigen and Slaughter (2001).

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Increased labor demand elasticities have important labor market consequences, and it is important to understand the significance of this channel. First, an increase in labor demand elasticity alters the incidence of non-wage labor costs, such as payroll taxes or improved working conditions. Increased responsiveness of employers to wage changes increases workers' share of such costs. Second, higher elasticities result in greater instability in the labor market. If labor demand is more elastic, shocks to labor demand caused by changes in labor productivity will lead to higher volatility of employment and wages. Third, higher elasticities lead to a decline in the bargaining power of labor, weakening unions and decreasing labor's share of industry rents (Rodrik, 1997). The decline of unionism (Card, 2001), and the increase in within-group volatility in labor market conditions (Gottschalk and Moffitt, 1994) in recent decades are well documented for the U.S. economy. Recent studies also document an increase in income risk (Krishna and Senses, 2009) and a reduction in the scope for risk-sharing arrangements between workers and firms (Bertrand, 2004) especially in industries with higher exposure to foreign competition. These findings are consistent with the idea that labor demand elasticities have increased as the U.S. economy has become more integrated with the rest of the world.

The literature on the impact of international trade on labor demand elasticities has mainly focused on developing countries during trade liberalization periods.[2] Slaughter (2001) is the first to test the relationship between openness and labor demand elasticities for a country that increasingly engages in offshoring activity. He estimates labor demand elasticities for eight manufacturing sectors in the U.S. from 1961 through 1991, using industry-level data. His estimation results suggest that the demand for production labor has become more elastic in this period, but the contribution of openness to change in these elasticities is unclear. More recently, Hijzen and Swaim (2008) document a substantial increase in elasticity of labor demand over the past two decades using industry-level data for a large number of OECD countries. They find that offshoring is associated with a more elastic demand in the cross section.[3]

In this paper I use disaggregated data at the plant-level to analyze the link between offshoring and labor demand elasticities in the U.S. manufacturing sector during the 1972–2001 period. I begin by estimating conditional labor demand elasticities for production workers in each industry for every year.[4] These elasticities are derived from cost share equations both in the short-run when capital is treated as a quasi-fixed input, and in the long-run when all factors of production are assumed to be variable. The next step of the analysis focuses on the relationship between industry-level, time varying estimates of elasticities and various measures of exposure to offshoring. I evaluate the importance of this relationship both for the short run and long run elasticities, controlling for technological change, in addition to year and industry fixed effects.

The use of plant-level data in the estimation of labor demand elasticities has various advantages over using data at the industry-level. First, it allows me to control for plant-level heterogeneity and to estimate these labor demand elasticities at the industry-level. Second, the identifying assumption of perfectly elastic labor supplies is more appropriate at the disaggregated level of the plant (Hamermesh, 1986a,b). Third, plant-level data allow me to distinguish between within-plant changes in labor demand elasticities and changes due to plant entry and exit.

The results suggest that conditional demand elasticities for production workers both in the short-run and in the long-run are positively associated with increased exposure to offshoring. This relationship holds both for the unbalanced panel of plants and, for plants which continue their operations throughout the sample period. Controlling for skill biased technical change does not alter the magnitude or the significance of the estimated positive relationship between offshoring and labor demand elasticities. Evidence on the link between skill biased technical change and labor demand elasticities is mixed at best.

This paper is organized as follows. The next section introduces the empirical specifications for estimating labor demand elasticities and provides summary statistics for these estimates. Section 3 describes the analysis examining the relationship between offshoring and labor demand elasticities and presents the estimation results. Section 4 concludes.

2. Own price elasticity of demand for production labor

The first step of the analysis is to estimate labor demand elasticities for each industry and year. In estimating conditional labor demand elasticities, I follow previous work on the relative importance of trade and technology on rising income inequality and use a translog framework.[5] This flexible functional form is preferable in this context, as it places no *a priori* restrictions on substitutability between inputs, as do CES, Cobb-Douglas or Leontief, and contains these simpler forms as special cases.

2.1. Translog specification: capital is quasi-fixed

I begin by deriving the cost share equations from a short-run cost function with quasi-fixed inputs. In this part of the analysis, as in Berman, Bound and Griliches (1994) and Feenstra and Hanson (1999), I assume that the level of capital (K) is fixed. This choice is primarily due to lack of data on rental prices of capital at the disaggregated level of the firm (or the industry). These conditional demand elasticities derived from the short-run cost function, reflect the responsiveness of the demand for production workers to changes in own wages when firms are constrained in their choice of capital levels.

The translog cost function is a second order approximation to an arbitrary cost function and takes the following form:

$$\log C = \alpha_0 + \sum_f \alpha_f \ln w_f + \sum_k \beta_k \ln x_k + \frac{1}{2}\sum_f \sum_f \gamma_{ff'} \ln w_f \ln w_{f'} + \frac{1}{2}\sum_f \sum_k \delta_{km} \ln x_k \ln x_m + \sum_f \sum_k \phi_{fk} \ln w_f \ln x_k + \gamma_t t + \frac{1}{2}\gamma_{tt} t^2 + \sum_f \gamma_{tf} t \ln w_f + \sum_k \gamma_{tk} t \ln x_k \quad (1)$$

where w_f denotes prices of variable inputs and x_k denotes quantities of output and fixed inputs.

The coefficients on t represent technological change.

[2] Krishna et al. (2001) are the first to examine this relationship using panel data at the firm level for Turkey. Fajnzylber and Maloney (2000) estimate dynamic labor demand equations using establishment level panel data from Chile, Mexico and Colombia. They test for structural breaks in the labor demand equations across time, during a period in which all of these countries experienced changes in their trade policies. Hasan et al. (2007) implement a similar analysis for India using industry level data. They find positive effects of trade liberalization on labor demand elasticities, especially in states with more flexible labor regulations.

[3] Interestingly, Hijzen and Swaim (2008) find this relationship between average offshoring and labor demand elasticities to be weaker in countries with stricter employment protection legislation, consistent with Hasan et al. (2007).

[4] In this paper I only focus on conditional labor demand elasticities since the increased possibility of outsourcing mainly affects labor demand elasticities through the substitution effect (see Lommerud et al. (2008), for an exception under specific assumptions). However, it should be noted that increased product market competition faced by domestic firms (due to reduced trade protection in the U.S., the decline in transportation costs and entry of developing countries into the world trade market) will also make labor demand more elastic through the scale effect. Using plant-level data Levinsohn (1993) and Harrison (1994) find support for the idea that intensified trade competition curtails domestic market power. While neither of these studies focuses directly on labor demand elasticities, the resulting increase in the elasticity of final good demand should make the derived labor demand curve even flatter over time.

[5] See for example, Berman, Bound and Griliches (1994), Feenstra and Hanson (1999) and Canals (2006).