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# Productivity effects on Mexican manufacturing employment<sup>☆</sup>

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### ABSTRACT

We examine the effects of labor productivity and total factor productivity (TFP) on employment across 25 Mexican manufacturing industries from 1984 to 2000. Employing panel data methods, several interesting findings emerge. First, we observe a strong and positive impact of NAFTA on employment. Second, productivity exerts a procyclical, positive effect on employment but this effect becomes smaller after NAFTA. Third, partitions of our sample according to capital-labor intensity suggest that industries which are less capital-intensive were affected negatively on impact by NAFTA but that productivity impacted employment positively after NAFTA. In contrast, more capital-intensive industries display these results in reverse.

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## 1. Introduction

Under standard approaches to the demand for labor with its marginal product (and the wage rate) on the vertical axis against the amount of labor ( $L$ ) on the horizontal axis, an increase in productivity

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or in capital stock (if complement to labor) leads to a shift outward of the labor demand curve (see Abel, Bernanke, & Croushore, 2008, Chapter 3). If we assume that the labor supply curve is perfectly elastic, a shift upwards in labor demand will lead to higher employment without change in wages. Studies examining labor productivity in Mexico have indeed concluded that “the disappointing wage performance has occurred despite the fact that Mexican worker’s productivity has increased since NAFTA took effect.” Polaski (2004, p. 9).

While a relatively elastic supply of workers into manufacturing is plausible in Mexico, an important empirical question remains: can we trust simple labor productivity measures? Or should we resort to a more general productivity formulation in which the “Solow residual” is accounted for when the industry employs workers and capital stock? In the latter, the productivity term can be associated with the differences between output and inputs in what is known as total factor productivity (TFP). The precise treatment of Mexican productivity (whether by labor productivity or TFP) becomes especially important with the increasingly greater degree of openness of the Mexican economy that supposedly enhanced productivity: first with GATT membership in the mid-1980s and then with NAFTA in 1994.

This paper examines whether productivity increases or decreases employment, taking a special look at Mexico’s second wave of trade liberalization in the mid-1990s. The relation between productivity and employment has long been explored in relation to industrial countries, especially for the US economy. There is in particular an established literature employing vector autoregressions (VAR) methods to capture whether innovations in productivity lead to increases or decreases in employment with mixed results for U.S. manufacturing. Galí (1999), for instance, documents negative effects and Chang and Hong (2006) argue otherwise based on the aggregation of 458 four-digit U.S. manufacturing industries for the period 1958–1996. They show that technological improvements lead to increases in employment in most U.S. industries.

Having in mind the potential effects of globalization in an increasingly open economy like Mexico, it seems natural to investigate how factors such as trade integration, capital mobility and outsourcing might affect Mexico’s productivity and how productivity can impinge on overall employment. Several studies have examined the evolution of Mexico’s productivity. Iscan (1998), for instance, examines the trade liberalization policies adopted by Mexico after 1986 and their positive effects on productivity. Comparing the performance of Chile and Mexico during the 1980s, Bergoing, Kehoe, Kehoe, and Soto (2001) report a steady decline in Mexico’s aggregate TFP during the 1980s and first part of the 1990s. Similar evidence for aggregate productivity is observed by Loayza, Fajnzylber, and Calderon (2004) and Lederman, Maloney, & Serven (2005). Likewise, studying Mexico’s manufacturing industry, Montes-Rojas and Santamaría (2007) report a positive rate of labor productivity and a negative, null or slightly positive TFP evolution during the post-NAFTA era, depending on the methodology employed.

Recent years have seen a significant increase in the number of studies that examine the effects of international technology diffusion on productivity.<sup>2</sup> This literature proposes that the exposure of developing economies to trade and foreign capital flows has accelerated technology transfers from developed to developing countries. While these studies consistently show that technological spillovers have enhanced productivity in developing economies, little is known about the effect of productivity movements on employment levels.

To the best of our knowledge, there are no studies examining the impact of TFP changes on the Mexican labor market.<sup>3</sup> This paper revisits this issue under a panel data framework as an alternative to the VAR approach, in which TFP innovations (shocks) affect employment or hours worked. Contrary to the VAR methodology whose focus was on series averaging, we exploit efficiently the variability of

<sup>2</sup> For surveys of this literature comprising developed and developing countries see, for instance, Saggi (2002) and Keller (2004). Savvides and Zachariadis (2005) and Ciruelos and Wang (2005) present evidence of technology diffusion for panels of developing countries, while Iscan (1998), Thangavelu and Owyiong (2003) and Fernandes (2007) present country specific evidence for Mexico, Singapore and Colombia, respectively. International technology diffusion is relevant for developed economies as well, as shown by the literature initiated by Coe and Helpman (1995), and Coe et al. (1997), among others.

<sup>3</sup> Related literature sheds light on this issue from different angles. For a cross-section of countries, Hall and Jones (1999) show that more open policies increase income per capita for a wide range of countries. Using plant level data for Colombia, Eslava, Haltiwanger, Kugler, and Kugler (2004) find that market reforms are associated with rising overall productivity that is primarily driven by reallocation away from low- and towards high-productivity businesses.

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