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# Essays on External Conditions and Wage-Setting Within Firms: Dissertation Summary

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Almost 50 years ago, John Dunlop (1957) noted that wages vary extensively among firms for workers in narrowly defined occupations in particular geographic regions. Dunlop suggested that a variety of factors—product market conditions and social norms among them—might play a role in wage-setting, in addition to the supply and demand for different types of labor. Careful work with micro-data, in both developed and developing countries, has since provided further evidence for Dunlop's observation. Some industries pay more than others across occupational categories, controlling for the observed characteristics of workers.<sup>1</sup> More recent studies using matched employer-employee data have found a similar result for individual firms (Abowd, Kramarz, and Margolis 1999). Another persistent empirical regularity is that large firms pay more than small ones, even within narrowly defined industries and regions.<sup>2</sup>

Despite these studies and an outpouring of work, both theoretical and empirical, on what might broadly be referred to as employment relationships, we still can say little with confidence about the causal role of factors beyond labor supply and demand in wage-setting. Studies have documented correlations between high wages and high productivity (Cappelli and Chauvin 1991; Levine 1992; Wadhvani and Wall 1991), advanced technology (Krueger 1993; Doms, Dunne, and Troske 1997), and positive employee attitudes (Akerlof, Rose, and Yellen 1988; Levine 1993a; Lincoln and Kalleberg 1990), but such correlations are consistent with a variety of causal mechanisms. To estimate a causal effect, we need both to find a source of exogenous variation in a variable that we believe affects wage-setting and to isolate a control group against which the affected firms or workplaces can be compared, in a dataset large enough to permit statistical inference.

The two chapters of this dissertation pursue a common approach to this problem: to find a source of credibly exogenous changes in market conditions external to a set of workplaces and to examine the influence of those changes on wage-setting within the set of workplaces. In Chapter 2, the workplaces are plants in the Mexican manufacturing sector and the exogenous variation is generated by the shock to product market conditions brought about by the peso crisis of late 1994. In Chapter 3, the workplaces are distribution terminals of a large, unionized U.S. trucking firm, and the exogenous variation is generated by fluctuations in the rate of unemployment

and wage levels for comparable workers in the local labor markets outside of each terminal.

## Chapter 2: Trade, Quality Upgrading, and Wage Inequality in the Mexican Manufacturing Sector

After a brief introductory chapter, the argument is presented in three sections. Section 2.1 investigates the response of the Mexican manufacturing sector to the exchange rate shock through a case study of one particularly important plant, the Volkswagen plant in Puebla, Mexico. The devaluation of the peso, together with the contraction of the domestic economy that followed, led the plant to expand exports and cut domestic production. Because cars sold in the United States were largely high-quality models—the Jetta, the Golf, and later the New Beetle—and cars sold on the domestic market were mainly a lower-quality model—the original Beetle—the increase in the share of exports resulted in an increase in the average quality of car produced. This shift in turn appears to have entailed changes in average wages for both blue-collar and white-collar employees, since the more automated and technologically sophisticated production process for the higher-quality models requires more highly skilled workers across occupational categories.

Section 2.2 presents a new theoretical model that spells out why we might expect the change in product market conditions brought about by an exchange rate shock to have an impact on wage decisions within firms. In the model, firms are heterogeneous in an underlying productivity parameter that can be interpreted as technical know-how or entrepreneurial ability, and goods are differentiated in quality. In a developing country like Mexico, only the most productive firms within each industry enter the export market, and they produce a better-quality good for export than for the domestic market in order to appeal to richer developed-country consumers. Producing high-quality goods in turn requires paying high wages to both white-collar and blue-collar employees, but especially to white-collar employees. An increase in the incentive to export leads to *differential quality upgrading* within industries: initially more-productive firms increase exports and shift toward greater production of higher-quality goods; initially less-productive firms remain solely in the domestic market and undertake no such upgrading. This process leads initially more-productive firms to raise wages across occupational categories, to raise the relative wage of white-collar workers, and to increase capital intensity relative to initially less-productive firms within the same industry.

Section 2.3 tests the causal implications of the model using a newly constructed panel dataset on Mexican manufacturing plants. I find robust evidence that during

the years of the crisis (1993–1997) initially more-productive plants increased both white-collar and blue-collar wages, increased the relative wage of white-collar workers, and increased the capital-labor ratio to a greater extent than initially less-productive plants. Using an auxiliary dataset, I also find that over the 1994–1998 period initially more-productive plants were more likely to acquire ISO 9000 certification, an international production standard commonly associated with high product quality. As a further test, I reestimate the same model on periods before and after the peso crisis during which a currency devaluation did not intervene. I find essentially no evidence of quality upgrading in the 1989–1993 or the 1997–2001 periods. The only years in which I find similar (but weaker) results are 1986–1989, a period itself characterized by a significant depreciation of the peso. The empirical results thus provide strong support for the argument that changes in product market conditions—in particular, in the relative demand for goods of different quality—can have an important impact on wage-setting.

In formalizing the mechanism of differential quality upgrading, the model draws on four elements from the existing theoretical literature. The first element is monopolistic competition with heterogeneous producers, in the spirit of Melitz's (2003) extension of the seminal papers by Krugman (1979, 1980). The second element is a micro-founded form of differentiation in product quality, drawn from Anderson, de Palma, and Thisse's (1992) extension of the discrete-choice theory of McFadden (1978, 1981). The third element is an asymmetry in consumer demand between two countries, called North and South. In particular, consumers in North are assumed to be richer and hence more willing to pay for quality than consumers in South, an idea that dates back at least to Linder (1961). The fourth element is an O-ring production function from Kremer (1993) and Kremer and Maskin (1996) in which the production of high-quality goods requires highly skilled workers across occupational categories and is more sensitive to the skill of white-collar workers than to that of blue-collar workers. The main contribution of the model is to synthesize these previously separate ideas and to arrive at a new mechanism through which trade-related shocks may affect outcomes at the plant level: shifts in the within-plant product mix among goods of different qualities destined for different markets.

The empirical part of the chapter is related to a growing empirical literature on international trade and the behavior of individual plants. Studies in this literature have tended to find little evidence of within-plant changes in behavior in response to exposure to international markets. An emerging consensus in the literature on trade and productivity is that trade raises aggregate productivity by shifting production toward more-productive plants rather than by improving productivity within plants

(Clerides, Lach, and Tybout 1998; Bernard and Jensen 1999). Studies that have examined the effects of industry-level changes in trade policy on plant-level changes in wage and employment decisions have found what many observers have described as puzzlingly small effects—in some cases despite large changes in tariffs or other trade policy measures.<sup>3</sup> In contrast, this chapter finds robust effects of a shock to the incentive to export on within-plant behavior. The strength of the results may be due to two advantages of using an exchange rate shock, rather than changes in trade policy, as the source of exogenous variation. First, unlike most changes in trade policy, the shock was largely unexpected. Second, the shock was big. The peso lost approximately half of its value in a matter of days at the end of 1994, a change that dwarfs average tariff changes under NAFTA.<sup>4</sup> The challenge in making use of an exchange-rate shock is to identify a source of variation in its impact at the plant level. A main empirical contribution of this chapter is to show how to use the interaction of the exchange-rate shock and preexisting heterogeneity within industries to identify the heterogeneous effects of the shock at the plant level.

The chapter argues that differential quality upgrading within industries may be part of the answer to an important puzzle in the literature on trade and wages in developing countries: why has trade liberalization in many developing countries, including Mexico, been accompanied by rising wage inequality? The simplest Hecksher-Ohlin model of international trade predicts precisely the opposite effect: a developing country like Mexico, when integrating with a rich country like the United States, should specialize in activities intensive in unskilled labor, thereby raising the demand for unskilled labor and *reducing* wage inequality. More sophisticated Hecksher-Ohlin-type models can explain rising inequality in a country like Mexico, but only if production shifts toward skill-intensive sectors. In fact, employment growth in Mexico has been fastest in the least skill-intensive and capital-intensive industries, consistent with the simplest Hecksher-Ohlin model. The apparent inability of Hecksher-Ohlin-type theories to explain rising wage inequality has led many observers to conclude that it must be due to factors unrelated to trade, for instance to skill-biased technical change. Differential quality upgrading represents an alternative mechanism through which trade may raise wage inequality in developing countries, and presents an example of how understanding the role of product market conditions in wage-setting may shed light on issues of more general policy relevance.

### Chapter 3: Fairness and Freight-Handlers

Chapter 3 draws on evidence from an internal attitude survey of freight-handlers in a large, unionized U.S.

trucking firm to investigate the role of external labor market conditions as a reference point for employee fairness judgments.<sup>5</sup> We have data from 29 geographically dispersed freight-handling terminals, compiled yearly over the period 1996–2000. The key element of the research design is that wages at each terminal are determined in collective bargaining at a national and regional level, and local managers have no discretion to vary wage rates in response to local labor market conditions. As a result, economic shocks in the local area generate exogenous variation in the attractiveness of the wage paid by the firm relative to employees' options in the outside labor market. We relate this variation in the relative wage to employees' perceptions of the fairness of their wage and to their performance, as measured by the rate of disciplinary dismissals.

After an introduction (Section 3.0) and a description of the institutional characteristics of the firm and the dataset (Section 3.1), Section 3.2 presents the indicators of outside labor market conditions. The first indicator is the local unemployment rate. The second indicator is a measure of the wage in the outside labor market for workers with similar observable characteristics from the Current Population Survey (CPS), calculated in two different ways. Sections 3.3, 3.4, and 3.5 present the empirical results. The strongest results are for the effect of external labor market conditions on employee perceptions of wage fairness. The results indicate a robust, statistically and economically significant association between the rate of unemployment in the local labor market and the extent to which employees consider their wage to be fair, which we argue can be given a causal interpretation. We find an analogous effect of the wages of similar workers in the outside labor market on fairness perceptions. These results stand in contrast to studies based on surveys of managers (Bewley 1999, 2002; Levine 1993b), which suggest that many managers do not consider external conditions to be important determinants of their employees' wage-fairness judgments.

The results provide modest support for the reduced-form proposition that an increase in the local unemployment rate improves employee performance, as measured by the rate of disciplinary dismissals, when controlling for terminal fixed effects. Although the estimates are not robust in the strictest specification, they constitute stronger evidence for the central claim of efficiency-wage theories than perhaps the most convincing previous study, Cappelli and Chauvin (1991), which is based on cross-sectional variation across workplaces. In order for the local unemployment rate and the outside wage to be valid instruments for fairness perceptions, it must be the case that they affect employee performance only through their effect on employee fairness perceptions. Under this assumption, the results

also provide modest support for the hypothesis that improvements in wage-fairness perceptions generate improvements in employee performance.

Because local managers have no discretion to adjust wages, the chapter presents no direct evidence on wage-setting behavior, but it does present evidence about why we might expect managers to take local labor market conditions—beyond their effect on supply and demand for labor—into account if they did have such discretion. The chapter also suggests by extension that fairness concerns may be important for aggregate labor market phenomena such as unemployment and the adjustment of wages and employment levels to aggregate shocks.

### Notes

1. See Krueger and Summers (1986) and Katz and Summers (1989) for the United States, Moll (1993) for similar results in a developing country context.
2. See Brown and Medoff (1989) for the United States, Schaffner (1998) and Velenchik (1997) for developing countries.
3. See Levinsohn (1999), Currie and Harrison (1997), and Harrison and Hanson (1999).
4. This is especially important if we are interested in shocks to the incentive to export to a rich country. Tariff reductions by developed countries are typically small, in part because their tariffs tend already to be low.
5. This chapter is based on a joint work with Stephen V. Burks and Jeffrey P. Carpenter.

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