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The Effect of Mexican Workforce Migration on the Mexican *Maquiladora* Labor Market

The Mexican *maquiladora* is a major source of growth in the Mexican economy.[1] Consequently, the *maquiladora* industry influences the country's shifting migration patterns, as *maquiladoras* spread out from their traditional enclave in the north and workers gravitate to *maquiladora* centers in search of better employment opportunities. This paper measures two forces that act as determinants of the wages and employment of skilled and unskilled workers in Mexican *maquiladoras:* Mexican interstate labor migration and international return labor migration.[2] We examine the impacts of these two forces for a low-value-added sector of the Mexican *maquiladora* industry, which should be particularly sensitive to wage changes. We then speculate on the ability of Mexican workers to withstand competition from lower-wage Chinese workers.

New migration patterns developed in Mexico in the 1990s. Urban-to-urban migration supplanted the earlier phenomenon of rural-to-urban migration, a process the National Population Council (CONAPO) termed the new geography of migration. In addition, industrialized centers developed in the central and southern states as the *maquiladoras* shifted from their historic northern geographic locations. For example, from 1990 to 2000, *maquiladora*

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1. *Maquiladoras,* or in-bond manufacturing assembly plants, are part of free enterprise zones established in the 1960s. The special tax status of the industry requires U.S. firms in Mexico to report to the Mexican government on output, expenses, and inputs. These zones allow duty-free importation of raw materials and payment of export duties only on the value added in production.

2. We do not attempt to measure the nonpecuniary effects of migration, such as disruption of family life, stress on children living without one or both parents, and the loss of community support for migrants.

textile employment grew by 145 percent in the border regions, compared with 918 percent in the nonborder regions. Consequently, the border region's share of textile employment fell from 49 percent in 1990 to 17 percent in 2000.[3]

The majority of *maquiladora* employees are interstate migrants. Fernández-Kelly finds that 70 percent of the *maquiladora* workers in her sample are so classified.[4] In a similar study, Young and Fort report on interviews of 1,246 women in the labor force in Ciudad Juarez, Mexico.[5] Of these, 46 percent were employed in the *maquiladoras,* 26 percent in commerce, 20 percent in services, and 8 percent in a variety of other industrial sectors. The authors conclude that the *maquiladora* workers were more likely to have migrated to Ciudad Juarez than were the women working in other industries (72 percent versus 43 percent). Of the *maquiladora* workers, 82 percent were interstate migrants, almost double the 45 percent share of non-*maquiladora* workers.

A study of migration patterns and their impact on the wages and employment of *maquiladora* workers is timely, given that numerous U.S. firms have left Mexico in the last few years and relocated to China. This exit is commonly attributed to relatively higher wages in Mexico vis-à-vis China.[6] However, interstate migration in pursuit of employment in manufacturing assembly plants can either reduce or increase the market wage for unskilled and skilled workers, depending on a number of factors. Immigration should shift labor supply. If immigration occurs without an increase in the turnover rate, the labor supply will shift right as a result of the increase of workers in a given skill category. This causes the equilibrium wage to fall. Immigration could shift the labor supply to the left, however, if immigrants exhibit high turnover rates. Two patterns of employment that have been traced to internal migration in Mexico may increase turnover and hence employers' costs. First, *maquiladoras* absorb workers in transit to the United States. Second, they employ young, inexperienced females and males from rural areas. Therefore, the assembly plant's labor pool is largely composed of individuals with a high tendency to switch jobs, migrate to the United States, or, in the case of women, exit the labor market for childbearing. Picou and Peluchon estimate that the annual turnover rate in the *maquiladoras* routinely exceeds 100 percent.[7] Sargent argues that high turnover not only imposes significant personnel costs, but also inhibits the

3. See U.S. General Accounting Office (2003).
4. Fernández-Kelly (1983).
5. Young and Fort (1994).
6. However, in a pooled regression using the 1990 and 2000 Mexican census, we find that log wages in the *maquiladora* industry decreased over the decade in real 2000 pesos.
7. Picou and Peluchon (1995).

installation of sophisticated manufacturing facilities that demand substantial worker training.[8] Higher turnover rates will shift the labor supply curve to the left, and the equilibrium wage will rise.

Borjas, Freeman, and Katz, as well as Card, address the issue of how an influx of immigrants can lead to an outflow of natives.[9] In theory, if the native labor supply curve is upward sloping or perfectly inelastic, then an influx of immigrants would decrease the supply of native workers. In Mexico, native workers, particularly unskilled workers, may respond to inflows of immigrants by seeking employment in the informal sector. In addition, many native workers may migrate permanently to the United States, depleting their numbers in Mexico.

Immigration could shift labor demand to the right, which would increase the equilibrium wage. This shift could reflect an increase in productivity from more skilled migrants or an increase in demand for goods produced by the migrants. Migrants may be more skilled than natives or may have innate abilities not captured by educational attainment or work experience, if workers prone to migrate are among the most able, motivated, or productive workers in the population. Mexican workers who do not emigrate to the United States, but instead migrate internally, may be positively selected. In this case, an influx of migrants into another Mexican state could increase wages if firms seek out migrant workers, on average, more than native workers. This would change the mix of workers employed in an industry, such that the industry would largely be composed of more productive migrants.[10]

While our focus is on the impact of Mexican migration on the Mexican *maquiladora* industry, the literature on the impact of Mexican immigration on the wages of U.S. workers guides our analysis. Considerable disagreement exists regarding the impact of Mexican migration on the wages of native workers in the U.S. labor market. In a natural experiment involving the *Marielitos,* Card estimates the impact of immigration on the Miami labor market.[11] He finds that a 7 percent increase in the workforce raised the wages of black and other workers (except Cubans), presumably as the result of a demand shift offsetting a supply shift. Card later argues that while migration shifts the supply curve for the migrants' labor type outward, migration of new workers into a region also shifts the demand curve for many goods and services and their labor type

8. Sargent (1997).

9. Borjas, Freeman, and Katz (1991); Card (1990).

10. This prediction is consistent with the evidence found by Fernández-Kelly (1983) and Young and Fort (1994).

11. Card (1990). *Marielito* is a term applied to the Cuban refugees who fled to the United States from the Cuban port of Mariel in 1980.

outward.[12] In addition, native workers are less likely to be affected if the skill set of immigrants differs from that of natives. A widely cited review article by Friedberg and Hunt concludes that the effect of immigration on the labor market outcomes of natives is small.[13] In contrast, Borjas concludes that immigration causes a substantial reduction in the wages of native-born unskilled workers: a 10 percent increase in the supply of immigrant workers reduces wages of skilled native workers by 3–4 percent and by as much as 8 percent for all workers.[14]

A more recent strand of literature studies the impact of Mexican emigration on wages in Mexico. The first to examine this subject, Mishra gauges this impact using the 1970–2000 Mexican and U.S. censuses.[15] She concludes that emigration from Mexico to the United States had a statistically significant and positive effect on Mexican wages and increased wage inequality in Mexico.

Hanson considers the regional impact of emigration on wages in Mexico for high- and low-migration states.[16] He finds that the distribution of male earnings in high-migration states shifted to the right relative to that in low-migration states. In the 1990s, average hourly earnings in high-migration states rose relative to that in low-migration states by 6–9 percent. However, because he assumes Mexican labor is immobile across Mexican regions, region-specific labor supply shocks would not affect regional earning differentials in his model.

Mollick and Wvalle-Vázquez examine the impact of variations in U.S. real output and of real Chinese wages on the demand for Mexican *maquiladora* workers.[17] They find that growth in U.S. real output has a relatively strong impact on *maquiladora* employment, but that the effect on employment of higher real wages in Mexico relative to China is small and statistically insignificant. However, they do not distinguish skilled from unskilled workers, and they use aggregated *maquiladora* data.

In this paper, we replace data aggregated across production sectors with disaggregated data for the textile *maquiladora* sector. Panel data at the state level are available for this sector from 1998 to 2001, allowing us to estimate labor demand functions for skilled and unskilled workers using fixed effects. Since our data are at the state (rather than plant) level, to obtain enough observations our analysis is necessarily limited to the low-value-added textile *maquiladora*

12. See Roger Lowenstein, "Immigration Equation," *New York Times,* July 9, 2006.
13. Friedberg and Hunt (1995).
14. Borjas (2003).
15. Mishra (2007).
16. Hanson (2005).
17. Mollick and Wvalle-Vázquez (2006).

division that is prevalent throughout Mexico. We assume that *maquiladora* firms are short-run cost minimizers subject to exogenously determined output constraints (driven almost exclusively by U.S. demand), exogenously determined prices for skilled and unskilled labor, and a set of demand curve shifters (namely, quantities of materials inputs and time). We then compute state-level own-price and cross-price elasticities of demand for both types of workers. High own-price and cross-price elasticities would bode well for the Mexican *maquiladora* industry in terms of remaining competitive with Chinese producers. Using the 2000 Mexican census, we estimate the impact of changes in interstate migration and international return migration rates on wages. Finally, we combine these migration rates with our estimated labor demand elasticities to determine the ultimate impact of migration on each type of wages and employment in this *maquiladora* sector.

The remainder of this paper is organized as follows. In the next section, we present a cost minimization model of the *maquiladora,* from which we obtain input demand functions for skilled and unskilled workers and derive the own-price and cross-price elasticities of demand. We also describe our methodology for estimating the impact of migration on wages. The subsequent section describes the firm-level production data and the demographic data that are used jointly to determine the impact of changes in immigration on wages and employment. We then present our empirical results, while our conclusions follow in the final section.

The Model

The objectives of our econometric models are threefold. First, we wish to estimate demand functions for skilled and unskilled labor in the textile *maquiladora* sector, computing the impact of changes in wages on employment by skill type. Second, we wish to estimate wage equations for interstate migrants and returning international migrants for skilled and unskilled workers and to estimate wage changes for each type of worker that have resulted from actual migration levels. Third, we wish to apply these wage changes to our estimated demand functions for each labor type to determine the effect of migration-induced wage changes on employment in this *maquiladora* sector.

Cost Minimization by the Firm

We assume that the *maquiladora* meets exogenously determined production goals subject to exogenously determined input prices. We find that *maquiladoras* account for only a small proportion of production in each state, so *maquiladoras* are reasonably assumed to be price takers in the labor market. Defining variable costs as $C_f = \Sigma_n p_{nf} x_{nf}$, we obtain the restricted cost function, C_f, for *maquiladora* firms aggregated to the level of state f as

$$(1) \qquad C_f\left(y_f, \frac{\mathbf{p}_f}{b_f}; \mathbf{z}\right) = \min_{b_f \mathbf{x}_f}\left[\left(\frac{\mathbf{p}_f}{b_f}\right)\left(b_f \mathbf{x}_f\right) \middle| f\left(\mathbf{x}_f; \mathbf{z}_f\right) = y_f\right],$$

where $\mathbf{p}_f = (p_{1f}, \ldots, p_{Nf})$ is a vector of N ($n = 1, \ldots, N$) input prices, $\mathbf{x}_f = (x_{1f}, \ldots, x_{Nf})$ is a vector of N input quantities, y_f is output, $\mathbf{z}_f$ is a vector of quasi-fixed inputs (such as materials inputs) that can shift the cost function, and b_f is a state-specific parameter (since we are using aggregate *maquiladora* production data at the state level).

The first-order conditions corresponding to equation 1 are given by

$$(2) \qquad y_f = f\left(\mathbf{x}_f; \mathbf{z}_f\right)$$

and

$$(3) \qquad p_{nf} = \frac{\phi \partial f\left(\mathbf{x}_f; \mathbf{z}_f\right)}{\partial x_{nf}}, \quad n = 1, \ldots, N,$$

where ϕ is the Lagrange multiplier. Applying Shephard's Lemma to equation 1, we obtain the input demand functions for factor *n:*

$$(4) \qquad \frac{\partial C_f}{\partial p_{nf}} = x_{nf}\left(p_{1f}, \ldots, p_{Nf}, y_f; \mathbf{z}_f\right), \forall n.$$

The Translog Cost Function and Labor Demand Equations

Assuming the availability of panel data (T time series observations on F states), we define factor cost shares as $s_{nft} = \partial \ln C_{ft} / \partial \ln p_{nft}$, where $t = 1, \ldots, T$ and $f = 1, \ldots, F$. A fixed effects approach leads to stochastic cost and share equations with the general form

$$(5) \qquad C_{ft} = \frac{1}{b_f} C\left(p_{1ft}, \ldots, p_{Nft}, y_{ft}; \mathbf{z}_{ft}\right) \exp\left(v_{ft}\right)$$

and

$$(6) \qquad \frac{\partial \ln C_{ft}}{\partial \ln p_{nft}} = s\left(p_{1ft}, \ldots, p_{Nft}, y_{ft}; \mathbf{z}_{ft}\right) + \omega_{nft}, \forall n,$$

where v_{ft} and ω_{nft} are two-sided random error terms. In equation 5, we interpret b_f as a state-specific dummy variable that controls for unobserved time-invariant heterogeneity (such as distance to the border). By specifying an appropriate functional form for the cost function, we derive an estimable expression for variable cost and for cost shares given in equations 5 and 6. We employ the translog functional form, which provides a convenient second-order approximation to an arbitrary, continuously twice-differentiable restricted cost function. The translog approximation to the cost function in equation 1 is

$$(7) \quad \ln C_{ft} = \gamma_0 - \ln b_f + \gamma_y \ln y_{ft} + \frac{1}{2}\gamma_{yy}\left(\ln y_{ft}\right)^2 + \sum_n \gamma_n \ln p_{nft}$$
$$+ \frac{1}{2}\sum_n \sum_f \gamma_{nl} \ln p_{nft} \ln p_{lft} + \sum_r \gamma_r \ln z_{rft} + \frac{1}{2}\sum_r \sum_n \gamma_{rn} \ln z_{rft} \ln z_{sft}$$
$$+ \sum_r \gamma_{ry} \ln z_{rft} \ln y_{ft} + \sum_n y_{ny} \ln y_{ft} \ln p_{nft} + \sum_r \sum_n \gamma_{rs} \ln z_{rt} \ln p_{nft}$$
$$+ \gamma_t t + \gamma_{tt} t^2 + v_{ft},$$

where $\gamma_{nl} = \gamma_{ln}$, for all n and l, $n \neq l$, and $t = 1, \ldots, T$. The share equations corresponding to equation 7 are

$$(8) \quad s_{nft} = \frac{\partial \ln C_{ft}}{\partial \ln p_{nft}} = \gamma_n + \sum_l \gamma_{nl} \ln p_{lft} + \sum_r \gamma_{rn} \ln z_{rft} + \gamma_{ny} \ln y_{ft} + \omega_{nft}, \forall n.$$

While we could have adopted an error-components approach by moving $-\ln b_f$ to the error term, the fixed effects specification avoids the strong assumptions required by this random-effects approach. These include distributional assumptions for both components of the error term, as well as the unlikely assumption that both components of the error are uncorrelated with the explanatory variables in equation 7. With the fixed effects approach, by contrast, we require no distributional assumptions and assume only that the v_{ft} and ω_{nft} terms are uncorrelated with the regressors.

Given these assumptions, and with output held constant, C_{ft} is linearly homogeneous in prices. This implies the following restrictions on the cost function parameters:

(9) $$\sum_n \gamma_n = 1;$$

(10) $$\sum_n \gamma_{ny} = 0;$$

(11) $$\sum_n \gamma_{nz} = 0, \forall z;$$

(12) $$\sum_n \gamma_{nl} = \sum_n \sum_l \gamma_{nl} = 0.$$

Since the cost shares sum to one, we estimate $N - 1$ share equations (to avoid linear dependency). We estimate our cost system using nonlinear least squares, so the results are invariant to the share equation dropped.

After estimation, we obtain own-price and cross-price elasticities of demand, holding output and the prices of other inputs constant, as

(13) $$\eta_{nn} = \frac{\left(\gamma_{nn} + s_n^2 - s_n\right)}{s_n}, \forall n,$$

and

(14) $$\eta_{ln} = \frac{\left(\gamma_{ln} + s_l s_n\right)}{s_1}, \forall l, n; l \neq n.$$

For these elasticities, the first subscript represents a quantity and the second a price.

The Impact of Migration on Wages and Employment

In this section we develop our methodology for estimating the impact of migration on wages. Table 1 illustrates some of the differences in the characteristics of natives and immigrants. Immigrants, on average, are more educated, earn higher incomes, and are more likely to be married than natives. This is

TABLE 1. Average Characteristics of Natives and Immigrants, by Skill Type[a]

	Natives			*Interstate immigrants*			*Returning international immigrants*		
Variable	*All*	*Unskilled*	*Skilled*	*All*	*Unskilled*	*Skilled*	*All*	*Unskilled*	*Skilled*
Experience	16.4008	16.2240	16.9593	14.3017	14.5562	13.7637	17.0238	17.3576	8.567
Indigenous	0.0475	0.0576	0.0157	0.0376	0.0483	0.0151	0.0201	0.0194	0.0223
Log income	7.6026	7.3858	8.2873	7.8178	7.5009	8.4878	7.8736	7.580	8.7731
Male	0.8397	0.8552	0.7908	0.8294	0.8317	0.8246	0.9229	0.9343	0.8880
Married	0.5692	0.5215	0.7196	0.6068	0.5428	0.7420	0.6733	0.6204	0.8358
Schooling	7.5266	6.4102	11.0527	8.6052	6.7576	12.5108	7.9596	6.6520	11.9701
Skilled	0.2405	. . .	. . .	0.3123	. . .	. . .	0.2549	. . .	. . .

Source: 2000 Mexican census.

. . . = Not applicable.

a. See table 2 for a definition of the variables.

consistent with Chiquiar and Hanson, who conclude that there is positive selection of migrants.[18]

We first estimate a log wage equation using data from the 2000 Mexican census for all workers in the manufacturing sector. Although we have no way of knowing whether they are employed in *maquiladoras,* we assume that workers in each sector are part of one relatively homogeneous labor market. For an individual m in state j, with skill category i (equal to u for unskilled and s for skilled), each equation has the following form:

$$w_{mji} = \beta_0 + d_j + \beta_1 \text{PINM}_{ji} + \beta_2 \text{PRINT}_{ji} + \beta_3 \mathbf{X}_m + e_{mji}, \tag{15}$$

where w_{mji} is the log of the hourly wage, PINM_{ji} is the ratio of interstate migrants to the sum of all immigrants and all native workers (that is, the total stock of workers) for the individual worker's skill type in his or her state of residence, PRINT_{ji} is the ratio of returning international migrants to the sum of all immigrants plus all native workers for the individual worker's skill type in his or her state of residence, d_j is a dummy indicating state of residence, and $\mathbf{X}_m$ is a vector comprising sociodemographic variables (see table 2 for variables and definitions). Finally, e_{mji} is a random error term. We define PINM_{ji} and PRINT_{ji} as measures to reflect the aggregate supply conditions for the individual's labor skill type.

Since immigrants may be drawn to states where the relative demand for labor is increasing, we treat PINM_{ji} and PRINT_{ji} as endogenous and compute a two-stage least squares estimator using two instruments based on networking effects, which should be exogenous but highly correlated with the endogenous variables. For skill type i, the instrument for PINM_{ji} is based on

$$z_{kji}^{I} = \left(\frac{c_{kji,1990}}{c_{ki,1990}}\right)\left(\frac{c_{ki,1995-2000}}{c_{ji,2000}}\right), \tag{16}$$

where $c_{kji,1990}$ is the number of people who were born in state k and living in state j in 1990, $c_{ki,1990}$ is the number of people who were born in state k and were migrants living in another Mexican state in 1990, $c_{ki,1995–2000}$ is the number of migrants from state k living in another Mexican state from 1995 to 2000, and $c_{ji,2000}$ is the total number of workers in state j in 2000. The first term in parentheses measures the 1990 historical probability of an interstate migrant from state k living in state j, while the second term in parentheses measures

18. Chiquiar and Hanson (2005).

TABLE 2. Definition of Variables

Variable	*Definition*
Experience	Work experience (worker's age minus fifteen years)
Experience squared	Work experience squared
Indigenous	Dummy equal to 1 if indigenous and 0 otherwise
$\text{INM}_{ij,t}$	Number of interstate immigrant workers
PINM_{ij}	Total interstate immigrant workers in skill class *i* of worker *m* divided by total workforce for skill type *i* of worker *m* in state *j*
Log income	Log of income in pesos
Male	Dummy equal to 1 if male and 0 otherwise
Married	Dummy equal to 1 if married and 0 otherwise
Native	Dummy equal to 1 if native and 0 otherwise
$\text{RINT}_{ij,t}$	Number of returning international migrant workers
PRINT_{ij}	Total returning international migrant workers in skill class *i* of worker *m* divided by total workforce for skill type *i* of worker *m* in state *j*
Schooling	Number of years of schooling
Skilled	Dummy equal to 1 if skilled and 0 otherwise
Urban	Dummy equal to 1 if worker lives in urban area and 0 otherwise

the change from 1995 to 2000 in the total migration from state *k* to any state relative to the work force in state *j*. The product of these two terms yields an exogenous measure of the expected amount of migration from state *k* to state *j* from 1995 to 2000 relative to the workforce in state *j*.

The instrument for PRINT_{ji} is based on

$$z_{kji}^{R} = \left(\frac{c_{kji,1990}}{c_{ki,1990}}\right)\left(\frac{r_{ki,1995-2000}}{c_{ji,2000}}\right), \tag{17}$$

where $r_{ki,1995-2000}$ is the number of returning international migrants born in state *k* migrating from the United States to any state in Mexico from 1995 to 2000. The product of the two terms in parentheses yields an exogenous measure of the expected amount of international return migration from state *k* to the United States and back to state *j* from 1995 to 2000 relative to the workforce in state *j*.

The final step in computing our networking-effects instruments is to sum z_{ki}^{I} and z_{ki}^{R} over all *K* states except for the receiving state *j* to obtain

$$z_{ji}^{I} = \sum_{\substack{k=1 \\ k\neq j}}^{K} z_{ki}^{I}, \forall j, \tag{18}$$

and

(19)
$$z_{ji}^{R} = \sum_{\substack{k=1 \\ k \neq j}}^{K} z_{ki}^{R}, \forall j.$$

Card uses a similar instrument.[19]

Given these instruments, our next step is to estimate the log wage equation 15 using two-stage least squares. We then compute the wage elasticities, $\tau_{\text{INM},sj}$ and $\tau_{\text{RINT},uj}$, for skilled and unskilled workers, respectively, for each state and each immigrant class. We then use the Mexican census data for 1990 and 2000 to compute the percentage change in the supply of interstate migrants by skill category as $\Delta_{\text{INM},sj}$ and $\Delta_{\text{INM},uj}$:

(20)
$$\Delta_{\text{INM},sj} = \frac{\text{INM}_{sj,2000} - \text{INM}_{sj,1990}}{0.5\left(N_{sj,1990} + N_{sj,2000}\right) + \text{INM}_{sj,1990}}, \forall j,$$

and

(21)
$$\Delta_{\text{INM},uj} = \frac{\text{INM}_{uj,2000} - \text{INM}_{uj,1990}}{0.5\left(N_{uj,1990} + N_{uj,2000}\right) + \text{INM}_{uj,1990}}, \forall j,$$

where $N_{ij,t}$ is the native workforce with skill level i in state j, at time t, and $\text{INM}_{ij,t}$ is the actual level of interstate immigrant workers with skill level i in state j, at time t. Similarly, we use the percentage change from 1990 to 2000 in the supply of returning international migrants by skill category,

(22)
$$\Delta_{\text{RINT},sj} = \frac{\text{RINT}_{sj,2000} - \text{RINT}_{sj,1990}}{0.5\left(N_{sj,1990} + N_{sj,2000}\right) + \text{RINT}_{sj,1990}}, \forall j,$$

and

(23)
$$\Delta_{\text{RINT},uj} = \frac{\text{RINT}_{uj,2000} - \text{RINT}_{uj,1990}}{0.5\left(N_{uj,1990} + N_{uj,2000}\right) + \text{RINT}_{uj,1990}}, \forall j,$$

19. Card (2001). We wish to thank a referee for suggesting these instruments.

where RINT_{ij} is the actual level of international return migration with skill level i in state j, at time t. Since the native workforce in many states has changed dramatically over time, we follow Borjas in averaging the 1990 and 2000 levels and treating the preexisting immigrant population as part of the native stock in the denominator.[20]

For each state, we next carry out the following sequential calculations. First, we multiply each $\Delta_{\text{INM},ij}$ and $\Delta_{\text{RINT},ij}$ by the computed wage elasticity (τ) for the corresponding skill and immigrant type to yield the implied percentage change in wages for each skill level and migratory type. We then multiply each percentage change in wages by the corresponding elasticity of demand for each skill type (η), obtained from equations 13 and 14, to produce estimates of changes in the share of *maquiladora* employment resulting from changes in labor supply within each migrant category. The percentage change in wages stemming from the observed change in interstate migration is

(24) $$\Delta \log w_{\text{INM},sj} = \tau_{\text{INM},sj}\Delta_{\text{INM},sj}, \forall j,$$

and

(25) $$\Delta \log w_{\text{INM},uj} = \tau_{\text{INM},uj}\Delta_{\text{INM},uj}, \forall j.$$

The percentage change in wages stemming from the observed percentage change in international return immigration is

(26) $$\Delta \log w_{\text{RINT},sj} = \tau_{\text{RINT},sj}\Delta_{\text{RINT},sj}, \forall j,$$

and

(27) $$\Delta \log w_{\text{RINT},uj} = \tau_{\text{RINT},uj}\Delta_{\text{RINT},uj}, \forall j.$$

Letting the variables L_s and L_u denote the quantity of skilled and unskilled labor, respectively, for interstate migration, the percentage change in employment is

(28) $$\Delta \log L_{\text{INM},sj} = \eta_{ss,j}\Delta \log w_{\text{INM},sj} + \eta_{su,j}\Delta \log w_{\text{INM},uj}, \forall j,$$

and

(29) $$\Delta \log L_{\text{INM},uj} = \eta_{uu,j}\Delta \log w_{\text{INM},uj} + \eta_{us,j}\Delta \log w_{\text{INM},sj}, \forall j.$$

20. Borjas (2003).

For international return migration, the percentage change in employment is

$$\Delta \log L_{\text{RINT},sj} = \eta_{ss,j} \Delta \log w_{\text{RINT},sj} + \eta_{su,j} \Delta \log w_{\text{RINT},uj}, \forall j, \tag{30}$$

and

$$\Delta \log L_{\text{RINT},uj} = \eta_{uu,j} \Delta \log w_{\text{RINT},uj} + \eta_{us,j} \Delta \log w_{\text{RINT},sj}, \forall j. \tag{31}$$

The Data

The *maquiladora* production data are drawn from the *maquiladora* yearbook published by the National Institute of Statistics, Geography, and Information (INEGI).[21] The yearbook identifies six major *maquiladora* sectors: food, beverage, and tobacco; textiles, clothing, and leather; wood and wood products; chemicals and by-products of petroleum, rubber, and plastics; social and personal services; and metal products, machinery, and equipment. Our empirical analysis uses aggregated state-level data on the textiles, clothing, and leather sector (which we refer to simply as textiles). This sector includes operations in twenty Mexican states.[22] The yearbook provides data on production, value added, materials, and the quantity and earnings of skilled and unskilled workers. Production is defined as the sum of value added and material costs. Material costs are defined as the value of both domestic and imported primary materials, packaging, and other costs incurred in the processing stage.[23] Data on production, value added, materials expenses, and earnings were adjusted to the base year 2001 by the national consumer price index provided by the Bank of Mexico.[24]

Figure 1 shows average value added in all sectors for each of the twenty Mexican states in our sample. Perhaps surprisingly, the states with relatively high value added in textile production are Chiapas and Colima. Chiapas' population has relatively low levels of human capital and relatively high levels

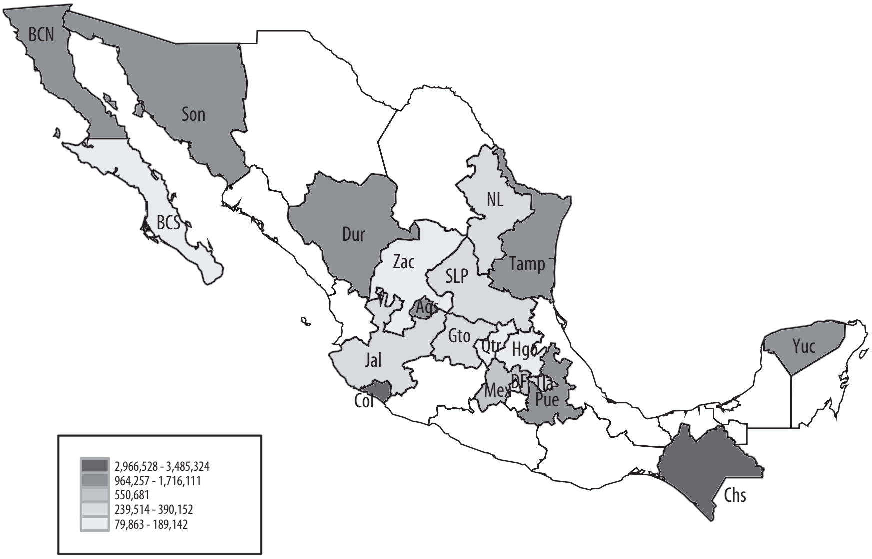
21. INEGI (2005).

22. The twenty states with textile production are Aguascalientes (Ags), Baja California Norte (BCN), Baja California Sur (BCS), Chiapas (Chs), Colima (Col), Durango (Dur), Federal District (DF), Guanajuato (Gto), Hidalgo (Hgo), Jalisco (Jal), México (Mex), Nuevo León (NL), Puebla (Pue), Querétaro (Qtr), San Luis Potosí (SLP), Sonora (Son), Tamaulipas (Tamp), Tlaxcala (Tla), Yucatán (Yuc), and Zacatecas (Zac).

23. According to INEGI (2005), 3.0 percent of material costs were generated in Mexico in May 2004 and 3.4 percent a year later.

24. The national consumer price index is available online at the Bank of Mexico website (www.banxico.org.mx). Since we were not provided with data on capital, we must assume separability with respect to this input.

FIGURE 1. Average Value Added in the *Maquiladora* Industry, 1998–2001[a]
Constant 2001 dollars



a. States in white are not included in our sample. The abbreviations are as follows: Aguascalientes (Ags), Baja California Norte (BCN), Baja California Sur (BCS), Chiapas (Chs), Colima (Col), Durango (Dur), Federal District (DF), Guanajuato (Gto), Hidalgo (Hgo), Jalisco (Jal), México (Mex), Nuevo León (NL), Puebla (Pue), Querétaro (Qtr), San Luis Potosi (SLP), Sonora (Son), Tamaulipas (Tamp), Tlaxcala (Tla), Yucatán (Yuc), and Zacatecas (Zac).

of indigenous people. Colima is a relatively small state in central Mexico with a significant amount of production in the textile industry. Both states have low migration rates. Given the growing presence of the *maquiladora* industry in these poorer states, we would expect to see increased rural-to-urban and urban-to-urban intrastate and interstate migration over time.

Labor employed in the *maquiladora* industry is sorted into two types of workers: skilled workers, defined empirically as workers involved in the administrative process, and unskilled workers, defined as workers directly involved in the production process.[25] An ideal classification of labor would be by skill type, education, experience, and occupation; however, the data available to us are disaggregated only into wages paid for quantities of unskilled and skilled labor employed. In all states for which data are available, a large proportion of wage payments goes to skilled workers, even though the textile industry predominantly employs unskilled workers.

25. INEGI (2005) terms the two categories *obreros* and *personal administrativo.*

Studies carried out for the United States commonly exclude women from the sample in an attempt to reduce measurement error, given that female labor force participation is relatively low for earlier cross-sections employed in most industries.[26] In Mexico, the ratio of female to male employees has decreased in the *maquiladoras,* as men have increased their presence in this once female-dominated industry and as women have attained increased labor opportunities in other sectors.[27] Since women make up a significant proportion of the labor force in this industry, we do not exclude them from our sample.

The demographic data used to gauge the impact of interstate and return migration on wages in each state are taken from the 2000 Mexican census. The sample covers 105,291 workers employed in any of six manufacturing sectors, including textiles, in the twenty relevant states. The census identifies only the manufacturing sector within which the worker is employed, not whether the employer is a *maquiladora.* We assume that all manufacturing workers within these states serve as substitutes in any *maquiladora* industry. Workers are classified as skilled or unskilled by occupational classification within the manufacturing sectors according to the 1990 and 2000 Mexican censuses, which classify manufacturing workers into two categories: *obreros/peones* and *jefes. Obreros/peones* refers to laborers involved in the production process, while *jefes* refers to workers involved in administration. The classification of workers is the same as that in INEGI's yearbook, although the categories are given somewhat different names in the two publications. Hence, it is accurate to make inferences from the Mexican census and use them in conjunction with labor demand estimates obtained using our *maquiladora* data.

An issue that arises in analyzing the impact of immigration is determining which workers are substitutes—that is, which workers compete in the same labor market. For the United States, immigrants and natives can be viewed as imperfect substitutes in certain occupations, given that immigrants, on average, have less human capital and do not speak English as well as natives. Friedberg and Hunt examine labor market changes associated with the exodus of 600,000 Russian Jews to Israel; they find that immigrants compete more with one another than with natives.[28] In Mexico, we have two possibilities. One is to treat interstate migrants, returning international immigrants, and natives as perfect substitutes in the *maquiladora* labor market, since they speak the

26. Borjas (2003).

27. See MacLachlan and Aguilar (1998) for background information on changes in the structure of the labor force of this industry.

28. Friedberg and Hunt (1995).

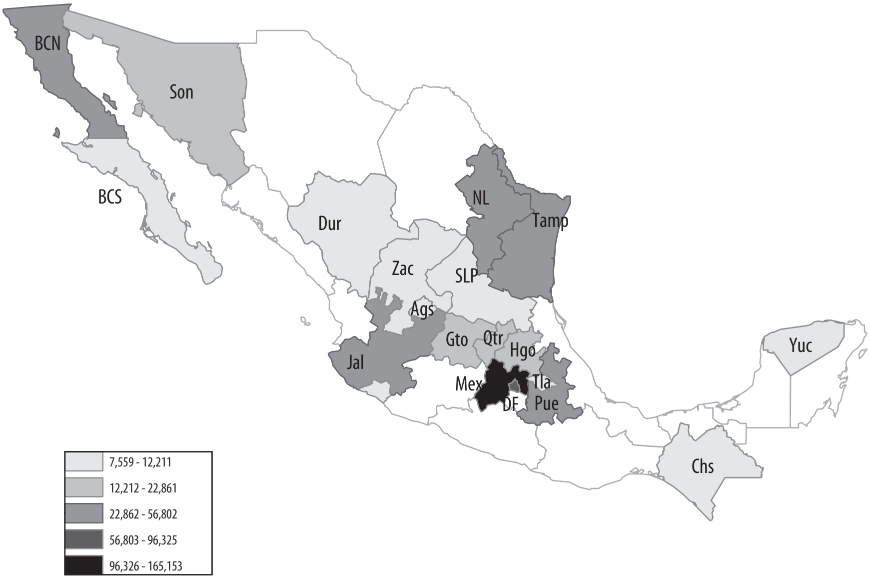
same language and have roughly the same skill set. In this case, all workers can be viewed and treated as a single factor of production. The second possibility is to treat immigrants differently from natives, since immigrants may have different motivations and proficiencies than natives. Also, returning international migrants may have accumulated human capital in the United States that is highly rewarded in the manufacturing industry in Mexico. We think that the second scenario is probably more consistent with how immigration affects Mexico's labor market. We thus assume that natives and immigrants are imperfect substitutes, and we treat them as unique categories. Based on these assumptions, we treat workers employed in the other five divisions of the manufacturing industry as perfect substitutes for workers in the textile sector, in order to capture as many substitutes as possible for these workers.[29]

The sample is restricted to individuals aged sixteen to sixty-four who participated in the labor force. The inclusion of individuals as young as sixteen is not unreasonable for a developing country such as Mexico, especially since the *maquiladora* industry attracts young workers with relatively little work experience. Monthly earnings are drawn from the subsample of persons who were employed in the year of the survey, were not students, and reported positive monthly earnings. A person is defined to be an interstate migrant if he or she resided in a different Mexican state in 1995 than in 2000. Figure 2 shows the average interstate migration for the twenty Mexican states in our sample. If the person resided abroad in 1995, returned to Mexico, and was interviewed in the 2000 Mexican census, then that person is regarded as a returning international migrant. If a person resided in the same state in 2000 as in 1995, that person is regarded as a native worker.

Based on the 2000 Mexican census, table 3 presents the percentage of interstate and returning international migrants relative to the total population for skilled and unskilled workers for the twenty Mexican states with textile *maquiladora* production. The percentage of migrants relative to the total workforce is greater for interstate migrants than for returning international migrants by approximately an order of magnitude. The average percentage for skilled interstate migrants is typically larger than that for unskilled interstate migrants. Some of the highest percentages for skilled interstate migrants are found in Baja California Norte, Baja California Sur, and Zacatecas. Few differences in mobility exist, however, between skilled and unskilled returning

29. The difficulty of capturing the true pool of workers in the manufacturing labor market is exacerbated by unreliable unemployment measures in Mexico. The sample only includes employed workers, so it does not capture the potential number of workers in a given occupation.

FIGURE 2. Average Interstate Immigration in Mexico, 1998–2001[a]
Number of migrants



a. States in white are not included in our sample. See figure 1 for a list of abbreviations.

international workers. In comparison, the United States is also characterized by high labor mobility, with about three percent of the population moving across state lines in any given year and almost 10 percent of the population changing states over a five-year period.[30] Movements in labor among some Mexican states are clearly greater than this.

Empirical Results

We estimate the translog cost and share equations for skilled labor in equations 7 and 8, with respective R^2 values of 0.99 and 0.25 for the textile sector. Own-price and cross-price elasticities of demand for skilled and unskilled workers are computed for the textile sector using equations 13 and 14. They are reported in table 4, where η_{ss} represents the own-price elasticity of demand for skilled labor with respect to skilled wages and η_{uu} represents the own-price

30. Borjas (1996).

TABLE 3. Percent Interstate Migration and International Return Migration Relative to Total Population, by State[a]

	Percent skilled workers		Percent unskilled workers	
State	*INM*	*RINT*	*INM*	*RINT*
Aguascalientes	5.6572	0.6656	3.1983	1.4215
Baja California Norte	14.1364	1.4091	18.7765	1.5142
Baja California Sur	19.1257	0.0000	18.5455	0.3636
Chiapas	9.7938	2.0619	7.4180	0.9986
Colima	7.2607	0.0000	1.6403	0.1789
Durango	6.4961	0.7874	2.8670	1.3761
Federal District	4.6318	0.2342	6.4410	0.1245
Guanajuato	10.8922	0.3476	5.8011	0.6215
Hidalgo	4.9143	0.6095	3.1470	1.4563
Jalisco	8.8141	0.2648	6.5397	0.0853
México	6.6315	0.9797	2.5263	1.0307
Nuevo León	5.7133	0.7350	6.1596	0.3911
Puebla	7.0558	0.5131	4.1677	0.6364
Querétaro	10.3139	0.2242	4.3222	0.5894
San Luis Potosí	5.9361	0.4566	2.2357	0.9384
Sonora	6.7455	0.6954	4.5483	0.6901
Tamaulipas	10.3995	0.7638	8.4194	0.3226
Tlaxcala	8.5515	0.3490	5.2230	0.1205
Yucatán	4.1966	0.5995	1.6156	0.1393
Zacatecas	12.2857	0.5714	3.0315	2.0599
Average	7.5500	0.5727	5.0126	0.5944

a. RINT and INM refer to returning international migrants and interstate migrants, respectively.

elasticity of labor demand for unskilled workers with respect to unskilled wages. Both estimates indicate that labor demand curves for skilled and unskilled workers are downward sloping.[31] The own-price elasticities indicate that the demand for skilled labor, with an average own-price elasticity ranging from about –0.34 to –0.49, is more wage elastic than that for unskilled labor, with an own-price elasticity ranging from about –0.04 to –0.10.[32] Firms thus exhibit a greater relative responsiveness to changes in the wages of skilled workers than to changes in the wages of unskilled workers. Fajnzylber and Maloney obtain similar findings for Chile, Mexico, and Colombia.[33] They estimate elasticities ranging from –0.20 to –0.80; our estimates typically fall within this range. The estimates of η_{su} and η_{us}, which are the cross-price elasticities of demand, indicate that skilled workers are at higher risk of replacement

31. This is consistent with Borjas (2003).
32. Borjas (1996) finds short-run elasticities in the range of –0.4 to –0.5 for the United States.
33. Fajnzylber and Maloney (2001).

TABLE 4. Textile Sector: Estimated Price Elasticities of Factor Demand, by State[a]

State	η_{ss}	η_{uu}	η_{su}	η_{us}
Aguascalientes	–0.3619	–0.0471	0.3619	0.0471
Baja California Norte	–0.4291	–0.0636	0.4291	0.0636
Baja California Sur	–0.4388	–0.0695	0.4388	0.0695
Chiapas	–0.4701	–0.0831	0.4701	0.0831
Colima	–0.4534	–0.0738	0.4534	0.0738
Durango	–0.3351	–0.0399	0.3351	0.0399
Federal District	–0.4653	–0.0812	0.4653	0.0812
Guanajuato	–0.4151	–0.0590	0.4151	0.0590
Hidalgo	–0.4678	–0.0814	0.4678	0.0814
Jalisco	–0.4768	–0.0884	0.4768	0.0884
México	–0.4211	–0.0604	0.4211	0.0604
Nuevo León	–0.4940	–0.1004	0.4940	0.1004
Puebla	–0.3939	–0.0525	0.3939	0.0525
Querétaro	–0.4802	–0.0897	0.4802	0.0897
San Luis Potosí	–0.4945	–0.1017	0.4945	0.1017
Sonora	–0.4550	–0.0753	0.4550	0.0753
Tamaulipas	–0.4600	–0.0776	0.4600	0.0776
Tlaxcala	–0.4439	–0.0698	0.4439	0.0698
Yucatán	–0.4049	–0.0554	0.4049	0.0554
Zacatecas	–0.4905	–0.0975	0.4905	0.0975

a. Price elasticities, where the first subscript refers to quantity and the second to price; *s* and *u* refer to skilled and unskilled, respectively.

by unskilled workers than conversely. Firms may be able to reduce costs by training unskilled workers to replace skilled workers. They may also be able to easily substitute away from skilled workers into more capital-intensive processes requiring fewer skilled workers in production.

In the second step, we estimate equation 15 using two-stage least squares to determine the impact of interstate migration and international return migration on the wages of skilled and unskilled workers in any of the states with *maquiladoras* in the textile sector. To assess the strength of our instruments, we regress each endogenous variable on the full set of instruments (that is, the networking-effects instruments plus the other exogenous variables in the model). We obtain *F* statistics equal to 33,795 and 30,261 for the regressions of INM and RINT, respectively, on the full set of instruments. The corresponding R^2 values are 0.90 and 0.89. The *F* statistics are clearly in excess of the rule-of-thumb value of ten, which allows us to conclude with confidence that the instruments employed are sufficiently strongly correlated with the endogenous variables.

Table 5 reports the results for ordinary least squares (OLS) and two-stage least squares (2SLS). The 2SLS results indicate the impact of using the networking-effects instruments, where we allow for heteroskedasticity of

TABLE 5. Textile Sector: Estimated Log Wage, 2000 Mexican Census[a]

	OLS		*2SLS*	
Variable	*Estimated coefficient*	*Estimated standard error*	*Estimated coefficient*	*Estimated standard error*
Constant	6.1349*	0.0136	6.1457*	0.0151
INM	1.1900*	0.1830	–3.9031*	1.2640
RINT	0.0688*	0.0110	0.5337*	0.1189
Urban	0.0966*	0.0042	0.1148*	0.0061
Schooling	0.0573*	0.0007	0.0584*	0.0007
Male	0.2224*	0.0046	0.2139*	0.0052
Indigenous	–0.0617*	0.0097	–0.0608*	0.0099
Experience	0.0236*	0.0005	0.0236*	0.0006
Experience squared	–0.0003*	0.0000	–0.0004*	0.0000
Married	0.0880*	0.0042	0.0915*	0.0043
Skilled	0.5510*	0.0058	0.6530*	0.0258
Aguascalientes	0.2715*	0.0191	–0.1427	0.1086
Baja California Norte	0.4887*	0.0353	0.5370*	0.0567
Baja California Sur	0.6359*	0.0497	1.4102*	0.1966
Colima	0.2549*	0.0264	0.0355	0.0703
Durango	0.2043*	0.0211	–0.2318*	0.1144
Federal District	0.2523*	0.0132	0.4138*	0.0425
Guanajuato	0.2993*	0.0159	–0.0475	0.0908
Hidalgo	0.0811*	0.0166	0.1128*	0.0228
Jalisco	0.3431*	0.0176	–0.1075	0.1172
México	0.2340*	0.0135	0.4840*	0.0634
Nuevo León	0.4299*	0.0144	0.4254*	0.0190
Puebla	0.1542*	0.0138	0.0628*	0.0302
Querétaro	0.3401*	0.0174	0.3723*	0.0222
San Luis Potosí	0.0735*	0.0164	–0.2213*	0.0774
Sonora	0.3510*	0.0157	0.2387*	0.0361
Tamaulipas	0.3023*	0.0193	0.4782*	0.0487
Tlaxcala	0.1223*	0.0151	0.3053*	0.0475
Yucatán	0.0708*	0.0135	0.0306	0.0170
Zacatecas	0.1599*	0.0256	–0.5439*	0.1846

* Statistically significant at the 5 percent level using a two-tailed test.
a. See table 2 for a definition of the variables.

unknown form by employing the Newey-West covariance matrix estimator.[34] The estimated R^2 value of the log wage regression is 0.49 for the OLS regression and 0.43 for the 2SLS regression using the textile sector data.[35]

The positive estimated coefficient on PRINT_{ji} is consistent with Card and with Friedberg and Hunt, who suggest that the migration-induced demand shift

34. See Newey and West (1987).
35. Since RINT is very small, we rescale it by multiplying by 100 to avoid roundoff error. This has no impact on any of the other results that we report.

can outweigh the supply shift.[36] However, the negative coefficient on PINM_{ji} is consistent with Borjas.[37] The use of instruments changes the sign of this variable from that obtained using OLS, whose findings suggest that migration causes an increase in supply that outweighs any rightward shift in demand. The estimated coefficients of the rest of our explanatory variables are consistent with our maintained hypotheses. For example, the human resource literature finds evidence of male wage premiums. We find gender-based and racial-based wage premiums in the textile sector. Women earn approximately 21 percent less than men, on average, while indigenous textile workers earn about 6 percent less than nonindigenous workers. We also find a wage premium for an additional year of education (approximately 6 percent) and for marriage (about 9 percent). Another result consistent with the literature is that the effect on wages of an additional year of experience increases at a decreasing rate. Furthermore, the partial effect of the dummy variable for skilled workers indicates a skilled-worker wage premium of 65 percent for workers employed in the textile sector.

We also compute the average elasticities of wages with respect to each type of migration. We find that the average elasticity of wages with respect to interstate migration is –0.22, while the average elasticity with respect to international return migration is 0.31. The coefficients on all but five state dummy variables were statistically significant at the 5 percent level with a two-tailed test, indicating that individuals living in a state other than Chiapas (the omitted dummy category) receive higher wages than workers in Chiapas.[38] The dummy for Zacatecas is significant at the 10 percent level using a two-tailed test.

Table 6 provides the actual percent change in migration from 1990 to 2000 by skill type and source of migration, computed from the Mexican census for these two years. Skilled workers have registered substantial interstate immigration into the states of Baja California Norte, Baja California Sur, Hidalgo, Tamaulipas, and Zacatecas, while Baja California Sur and Hidalgo have been the most important destinations for unskilled workers. Considerable interstate emigration of unskilled workers has occurred from Baja California Norte. International return migration has been relatively small in comparison.

As described earlier, we use these estimates of migratory percentage changes, by immigration and skill type, in conjunction with the estimated log wage equation elasticities with respect to immigration type to estimate the impact of

36. Card (1990); Friedberg and Hunt (1995).
37. Borjas (2003).
38. Chiapas is one of the poorest states in Mexico.

TABLE 6. Percent Change in Immigration from 1990 to 2000[a]

State	*RINT-U*	*RINT-S*	*INM-U*	*INM-S*
Aguascalientes	1.26	0.63	−1.79	−3.40
Baja California Norte	0.79	1.69	−7.55	7.51
Baja California Sur	0.25	0.80	8.72	15.81
Chiapas	−0.06	0.00	1.13	1.38
Colima	0.76	2.84	2.14	1.90
Durango	1.03	1.07	−0.45	−0.59
Federal District	0.06	0.02	−0.45	0.41
Guanajuato	0.75	1.09	0.52	1.03
Hidalgo	0.95	0.47	6.18	6.92
Jalisco	1.34	0.59	0.01	0.67
México	0.03	0.21	−2.11	−3.29
Nuevo León	0.33	0.40	0.12	2.72
Puebla	0.92	0.42	4.14	2.52
Querétaro	0.71	0.14	0.54	−0.37
San Luis Potosí	1.00	−0.15	0.09	−0.85
Sonora	0.65	0.52	0.72	0.40
Tamaulipas	0.32	1.50	2.03	7.82
Tlaxcala	0.12	0.54	5.66	2.92
Yucatán	0.21	0.78	0.97	0.74
Zacatecas	2.26	0.00	2.61	9.60
Weighted average	0.62	0.98	0.83	1.86

a. RINT and INM refer to returning international migrants and interstate migrants, respectively, while *U* and *S* refer to unskilled and skilled workers, respectively.

immigration on wages. We then average these estimates by skill type. Table 7 shows the estimated percentage changes in wages caused by immigration for the textile sector. The weighted average effect of migration on wages is typically small and positive for international return migration. However, most states experienced a reduction in wages as a result of interstate migration. The most notable reductions occurred in Baja California Sur, where the wages of skilled and unskilled workers fell approximately 12 percent and 6 percent, respectively, and in Baja California Norte, where skilled workers saw a 4 percent decline. Wages declined from 3.0 to 4.6 percent in Hidalgo, Tamaulipas, and Zacatecas. These results for skilled interstate migrants are reasonably close to those of Borjas, who estimates for the United States that a 10 percent increase in the labor supply of immigrants reduced the wages of skilled native workers by 3 to 4 percent and by as much as 8 percent for all native workers.[39]

Table 8 shows the extent to which these estimated percentage changes in wages translate into estimated percentage changes in employment in the

39. Borjas (2003).

TABLE 7. Textile Sector: Estimated Percent Change in Wage as a Result of Immigration[a]

State	*RINT–U*	*RINT–S*	*INM–U*	*INM–S*
Aguascalientes	0.96*	0.22*	0.22*	0.75*
Baja California Norte	0.64*	1.27*	5.54*	–4.14*
Baja California Sur	0.05*	0.00*	–6.31*	–11.80*
Chiapas	–0.01*	0.00*	–0.07*	–0.39*
Colima	0.40*	3.12*	–0.62*	–0.73*
Durango	0.76*	0.45*	0.05*	0.15*
Federal District	0.00*	0.00*	0.11*	–0.07*
Guanajuato	0.42*	0.57*	–0.05*	–0.27*
Hidalgo	0.31*	0.09*	–1.40*	–2.94*
Jalisco	1.04*	0.19*	0.00*	–0.13*
México	0.00*	0.03*	0.54*	1.13*
Nuevo León	0.07*	0.16*	–0.03*	–0.61*
Puebla	0.31*	0.11*	–0.67*	–0.69*
Querétaro	0.22*	0.02*	–0.09*	0.15*
San Luis Potosí	0.50*	–0.04*	–0.01*	0.20*
Sonora	0.24*	0.19*	–0.13*	–0.11*
Tamaulipas	0.06*	0.61*	–0.67*	–3.18*
Tlaxcala	0.01*	0.10*	–1.15*	–0.97*
Yucatán	0.02*	0.25*	–0.06*	–0.12*
Zacatecas	2.49*	0.00*	–0.31*	–4.60*
Weighted average	0.36	0.72	0.03	–0.82

* Statistically significant at the 5 percent level using a two-tailed *t* test.

a. RINT and INM refer to returning international migrants and interstate migrants, respectively, while *U* and *S* refer to unskilled and skilled workers, respectively.

maquiladora textile sector. The weighted average effects of migration on employment are very small for all but skilled interstate migrants. The largest positive effect is about 4 percent in Baja California Norte, with an approximate 2 percent increase in Baja California Sur and Zacatecas. In Tamaulipas, the increase is approximately 1 percent.

Finally, we use the delta method to compute the significance of the entries in tables 7 and 8, since they are functions of previously estimated parameters as well as data.[40] All the entries in table 7 are significant at the 5 percent level using a two-tailed *t* test. The estimated standard errors are equal to those provided in table 5. To compute the significance of the entries in table 8, we must take the estimated percent changes in wages from table 7 as given (that is, not random variables), since we have not estimated their covariances together with those of the labor demand equation parameters. Although the results in table 8

40. See the TSP Reference Manual, version 5.0, for details on the delta method calculations.

TABLE 8. Textile Sector: Estimated Percent Change in Employment as a Result of Immigration[a]

State	*RINT–U*	*RINT–S*	*INM–U*	*INM–S*
Aguascalientes	−0.0290*	0.2524	0.0209	−0.1818*
	(0.0049)	(0.1808)	(0.0164)	(0.0424)
Baja California Norte	0.0444	−0.2827*	−0.6763*	4.3090*
	(0.0287)	(0.0914)	(0.0934)	(0.7947)
Baja California Sur	−0.0035*	0.0217*	−0.4046	2.4885*
	(0.0001)	(0.0068)	(0.2672)	(0.8792)
Chiapas	0.0004*	−0.0027*	−0.0236*	0.1446*
	(0.0001)	(0.0009)	(0.0090)	(0.0102)
Colima	0.2208*	−1.2713*	−0.0086	0.0493
	(0.0714)	(0.0533)	(0.0167)	(0.0817)
Durango	−0.0125	0.1077	0.0041	−0.0349*
	(0.0098)	(0.1412)	(0.0034)	(0.0095)
Federal District	−0.0001	0.0007	−0.0125*	0.0816*
	(0.0002)	(0.0007)	(0.0017)	(0.0166)
Guanajuato	0.0094	−0.0657	−0.0130*	0.0908*
	(0.0128)	(0.0646)	(0.0060)	(0.0080)
Hidalgo	−0.0128*	0.0930	−0.0870	0.6309*
	(0.0020)	(0.0505)	(0.0653)	(0.2251)
Jalisco	−0.0698*	0.3998*	−0.0104*	0.0596*
	(0.0045)	(0.1369)	(0.0030)	(0.0003)
México	0.0022*	−0.0131*	0.0467	−0.2755*
	(0.0008)	(0.0003)	(0.0259)	(0.0724)
Nuevo León	0.0089*	−0.0436*	−0.0582*	0.2855*
	(0.0038)	(0.0080)	(0.0143)	(0.0034)
Puebla	−0.0111*	0.0805	−0.0012	0.0083
	(0.0026)	(0.0499)	(0.0155)	(0.1079)
Querétaro	−0.0221*	0.1035*	0.0257*	−0.1203*
	(0.0005)	(0.0248)	(0.0036)	(0.0102)
San Luis Potosí	−0.0464*	0.2557*	0.0177*	−0.0978*
	(0.0010)	(0.0634)	(0.0046)	(0.0011)
Sonora	−0.0034	0.0208	0.0016	−0.0098
	(0.0045)	(0.0334)	(0.0025)	(0.0178)
Tamaulipas	0.0440*	−0.2578*	−0.1989*	1.1651*
	(0.0140)	(0.0075)	(0.0725)	(0.0891)
Tlaxcala	0.0056*	−0.0392*	0.0110	−0.0764
	(0.0023)	(0.0013)	(0.0218)	(0.1788)
Yucatán	0.0119*	−0.0916*	−0.0031	0.0237*
	(0.0056)	(0.0027)	(0.0028)	(0.0104)
Zacatecas	−0.2268*	1.2016*	−0.3915*	2.0743*
	(0.0001)	(0.3051)	(0.1066)	(0.0379)
Weighted average	0.03	−0.17	−0.06	0.39

* Statistically significant at the 5 percent level using a two-tailed *t* test.

a. RINT and INM refer to returning international migrants and interstate migrants, respectively, while *U* and *S* refer to unskilled and skilled workers, respectively. Estimated standard errors are in parentheses.

are less precise than our other findings, the vast majority of the estimates are significant.

Conclusion

Although a number of researchers examine the impact of immigration on wages and employment in the United States, few studies for Mexico focus on the effects of interstate migration and international return migration. This paper sets out to fill this gap. By modeling firm productivity and employment in conjunction with an analysis of the impact of migration on wages, we avoid the shortcomings of the U.S. studies by Borjas, Card, and Mishra, all of whom use census-level data without linking wage changes to the type of employer.[41]

Two basic conclusions emerge from this study. First, our estimates of worker demand functions indicate substantial sensitivity to changes in price. While the demand functions of skilled and unskilled *maquiladora* workers slope downward, skilled workers face a higher own-price elasticity of demand and a higher cross-price elasticity of demand than do unskilled workers. Second, inflows of skilled interstate migrants into the textile manufacturing labor market from 1998 to 2001 generated substantial reductions in wages for Baja California Sur and to a lesser extent for Zacatecas, Baja California Norte, Tamaulipas, and Hidalgo. Wages were also reduced in most Mexican states by the influx of interstate unskilled migrants, but to a much lower degree. Consequently, modest increases in the employment of skilled interstate migrant labor are found in Baja California Norte and, to a lesser extent, Baja California Sur, Zacatecas, and Tamaulipas. The large amounts of interstate migration in Mexico have thus produced modest wage reductions, potentially helping to stem any further flight of *maquiladora* production to China.

41. Borjas (2003); Card (1990); Mishra (2007).