Chapter 18:
Wage Convergence in Mexico

André Varella Mollick and René Cabral

André V. Mollick, professor at the University of Texas–Pan American, discussed "Wage Convergence in Mexico." He explained that he had been working with René Cabral from the EGADE Business School to analyze the increase in capital and labor mobility in Mexico as a result of NAFTA, in order to quantify NAFTA's effects on Mexican wages. In addition, they had tried to determine if the increased economic integration between Mexico and the United States led to quicker wage convergence at the regional level. The authors found that greater integration with the United States has not just led to growth of output in Mexico, but also has changed the supply of labor across regions as well as the regional distribution of Mexican wages. Their analysis indicate that states closer to the U.S-Mexican border experienced quicker wage convergence than non-border states and that migration appears to be an important force in this convergence.

Mollick noted that this study builds on work by Robertson (2000) on wage convergence. Using data from 1987–97, Robertson looked at how local wages in Mexico responded to U.S. wages, and found that after wage shocks, wages in Mexican border cities converged to U.S. wages more frequently than wages did in Mexico's interior. Additionally, within the Mexican border regions, cities that had higher capital and migration flows experienced larger wage shocks and more rapid wage convergence to U.S. wages than other Mexican border cities. Robertson suggested that "of forces that could integrate labor markets—goods flows, capital movements, and migration—migration may be the dominant mechanism."[31] Mollick added that the authors also sought quantitative evidence that this is the case and found a small but statistically significant effect.

In describing their approach, Mollick referred to his and Cabral's previous work in this area, especially Mollick and Cabral (2015), but also Cabral, Mollick, and Faria (2010) for wages and Cabral and Mollick (2012) for output. In these studies, the authors analyzed real wages and looked at partitions according to migration rates and foreign direct investment (FDI) by states. In doing so, they found some effects on real wages. Yet Cabral, Mollick, and Faria (2010) did not include years of education, which may have been an issue in the specification of their models.

[31] Robertson (2000), p. 743.

In his presentation, Mollick focused on Mexico post-NAFTA, beginning in 1995. He noted that after the initial shock with the 6 percent contraction of GDP and the high inflation rate, there were no further negative shocks in this period, as there were in 1982, 1987, and 1994. He then compared the economic importance of flows of people and capital, showing how he and Cabral had employed dynamic panels to estimate wage equations, emphasizing reverse causation from not only the fundamentals to wages, but also from wages to the fundamentals**,** such as education and productivity.

The data used for the estimations below come from Mollick and Cabral (2015), who examined state-level series for Mexico and calculated labor productivity (GDP per capita), population growth and migration flows, FDI, and real wages. The real exchange rate is available at the national level. They used real GDP per capita in 1993 prices in Mexican pesos; real social security wages rather than minimum wages in Mexico, which vary by state; and maquiladora wages, although data for these are sometimes lacking at the state level. Average years of schooling were obtained from Mexico's Ministry of Education. The migration rate is the difference between outflows and inflows of people over the total population—a positive number signifies a net outflow of people from the state. The data indicate a difference between border and non-border states. Real wages are highest in the federal district, as is per capita output. Nonetheless, some border states have higher real wages than average. FDI is also higher in the federal district, at 9 percent of GDP, and is followed by two border states, Baja California and Nuevo León.

Following Chiquiar (2008), Mollick and Cabral (2015) merged border states with other northern states, dividing the country into two regions—Border-North and South-Center. Mollick and Cabral look at real wage equations for all 32 states relative to a panel of the non-border states (25 states plus the Federal District, therefore excluding the six states that border on the United States), since a panel of the six border states with the United States would have had only a limited number of observations.

As descriptive statistics, Mollick and Cabral (2015) compared the values of the panel of six border states versus the panel of non-border states from 1997 to 2006. Looking at an average daily wage of 34 pesos at 1993 prices, they observe a 10 percent variation in wages in border states compared to non-border states, from 36.53 pesos to 33.33 pesos. Schooling also varies, with border states having an average of 8.47 years, compared to 7.43 years in non-border states, a 14 percent variation. Labor productivity is also higher in border states compared to non-border states. The FDI-GDP ratio is approximately three times higher in border states, and the annual population growth rate is higher in border states, at 1.8 percent compared to 1.2 percent. Following Mollick and Cabral (2015), the authors used two fundamentals for the empirical estimations below: years of schooling and GDP per capita, which both correlate highly with real wages. A more educated and productive workforce would be expected to earn higher wages.

Testing for Wage Convergence

To look at convergence, Mollick and Cabral (2015) initially tested for absolute convergence—i.e., wages as a function of state-specific effects and lagged wages. They employed two basic models for (conditional) wage convergence: years of education and real output per capita (labor productivity), though these are not used together. The shift factors are shocks to labor demand (FDI to capture foreign capital inflows) and shocks to the labor supply (state migration flows or population growth). They controlled for the competitiveness of the Mexican peso by using the real exchange rate, following Verhoogen (2008) and Robertson (2003).

The authors estimate the following two equations for conditional convergence below:

$$w_{it} = \mu_i + \gamma_1 w_{it-1} + \gamma_2 EDU_{it} + \sum \beta_j x_{it}^j + v_{it} \qquad (1)$$

$$w_{it} = \mu_i + \gamma_1 w_{it-1} + \gamma_2 \left(\frac{Y}{L}\right)_{it} + \sum \beta_j x_{it}^j + v_{it} \qquad (2),$$

where i is from 1 to k states and x_{it} is the group of m shift or control variables. The first equation has years of education as the fundamental and the second has labor productivity, as used by Mollick and Cabral (2015) for four panels of Mexican states. The endogenous explanatory variables are instrumented with suitable lags of their own (the authors use 2 and 3 lags).

The data used in the estimation were for 32 Mexican states over 10 years consisting of 260 observations for non-border states and a total of 320 observations for the panel of all states. There is also an endogeneity problem. With the model using years of education, for example, education will affect wages but wages will also affect education. Wages may also have an impact on migration flows, because an increase in wages may lead to a population inflow into a state. The same applies to capital flows as well. As argued by Mollick and Cabral (2015), system-generalized methods of moments (SGMM) estimators are better suited to deal with these reverse-causation patterns in the data.

The results of schooling show very significant education effects that are higher for all states. The observed coefficient is 0.330 (or 0.403 with three lags). Without border states, this drops to 0.194 (or 0.211 with three lags). Contrary to what might have been expected based on results from previous work that shows wages increase with an increase in FDI, there were no FDI effects on wages. The migration coefficients were only significant for international migration across the full sample (0.021 or 0.023).

The results of the productivity equation show significant productivity effects that are higher for all states (0.038 or 0.055). These figures are lower without border states (0.025 and 0.044). As before, there is no

FDI effect on wages. The migration effects are always statistically significant for international migration (0.023 or 0.022), similar to those effects without border states (0.024 or 0.022).

For the education model, the implied λ's (speed of adjustment to the steady state) tend to be higher with all states, with similar results from the labor productivity model. The rate of convergence in this model varies from 26 to 30 percent per year, dropping to 17 or 18 percent per year without border states. Results from the labor productivity model show rates of convergence of 9 to 11 percent per year, dropping to 8 or 10 percent without border states.

With population growth rates (instead of migration flows) and education, the results show that the estimated lagging wage is between 0.56 and 0.68, which is respectable but not very high. Convergence rates across all states are between 44 and 59 percent, which would indicate that within two years there could be convergence for all states. In terms of shocks, the FDI-to-GDP ratio has no effect, but the population growth rate has a negative effect that is not very strong. Here, however, while the sign of the effect is correct, there is only significance in one instance.

At the close of his presentation, Mollick stated that the results suggest that during the post-NAFTA Mexican experience, states closer to the U.S.-Mexico border have converged more rapidly toward the steady state. These convergence results are stronger for the education model than the labor productivity model. Finally, with respect to Robertson's conjecture that migration forces seem to be the main force behind the adjustment in the model with labor productivity, Mollick and Cabral found statistically significant support for this claim, although with small effects, with some stronger results for the labor productivity model. It appears that FDI flows have no impact on real wages in any of the models studied.

Further work along these lines should consider additional data in order to increase the size of the panel of Mexican states sharing a border with the United States and allow for factors such as the reduction in migration from Mexico to the United States observed after the global financial crisis. If a longer time span is available, a more direct approach with panels of border versus non-border states should shed light on the results reported in this study.

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