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# 6    When the Minimum Wage Really Bites: The Effect of the U.S.-Level Minimum on Puerto Rico

Alida J. Castillo-Freeman and Richard B. Freeman

Since the passage of the Fair Labor Standards Act in 1938, Puerto Rico has been subject to minimum wage regulations. For many years, industry boards set separate minima by industry and occupation that were markedly below the U.S. federal minimum wage. In 1974, the U.S. Congress, supported by the Puerto Rican government, initiated a policy to raise the level and coverage of federally mandated minimum wages on the island to U.S. standards. By 1983, the minimum wage in Puerto Rico reached the $3.35 per hour rate then prevailing in the United States, and coverage matched the U.S. rate of 60 percent or more of the work force. With hourly earnings on the island just two-thirds of mainland hourly earnings, the result was an extraordinarily high ratio of the minimum wage to average pay—producing a minimum wage with genuine economic bite.

To what extent has the U.S.-level minimum reduced employment in Puerto Rico? How important has migration been in adjusting to the minimum wage–induced loss of jobs? Has the minimum contributed to the migration of less-educated and less-skilled Puerto Ricans to the United States (Ramos, in this volume)?

This paper seeks to answer these questions using diverse bodies of data on employment and earnings in Puerto Rico and on the employment and earnings of Puerto Rican migrants in the United States. It reports the following findings. (1) The U.S.-level minimum altered the distribution of earnings in

Puerto Rico to an extraordinary extent, creating marked spikes that dominate the earnings distribution. (2) Imposing the U.S.-level minimum reduced total island employment by 8–10 percent compared to the level that would have prevailed had the minimum been the same proportion of average wages as in the United States. In addition, it reallocated labor across industries, greatly reducing jobs in low-wage sectors that had to raise minima substantially to reach federal levels. (3) Migrants from Puerto Rico to the United States are drawn largely from persons jobless on the island, with characteristics that make them liable to have been disemployed by the minimum wage. As the Puerto Rican minimum rose toward U.S. levels, the education of migrants fell below that of nonmigrants. (4) Migration was critical in allowing Puerto Rico to institute U.S.-level minimum wages and played a major role in the long-term growth of real earnings in Puerto Rico by reducing the labor supply and raising the average qualifications of workers on the island.

We present the evidence for these claims in four stages. First, we describe the minimum wage system in Puerto Rico and show that it altered the island's distribution of earnings. Second, we estimate the employment consequences of the minimum using time-series and cross-industry data. Third, we examine the volume and characteristics of migrants to the United States as the island moved toward the federal minimum. Finally, we consider the consequences of migration for the minimum wage system and outcomes in the Puerto Rican labor market.

## 6.1 The Minimum Wage in Puerto Rico

The 1938 Fair Labor Standards Act (FLSA) established minimum wages in Puerto Rico as it did in the United States proper. At first, the law applied the mainland minimum rate ($0.35) to Puerto Rico, but Congress soon recognized that this would devastate the island's economy and passed a separate amendment that established committees in some forty industries to set separate industry and occupational minima "that would not substantially curtail employment" while also not giving Puerto Rico "an unfair competitive advantage over mainland competitors" (U.S. Department of Commerce 1979, 2:633–42). From 1940 until 1974, amendments to the FLSA expanded coverage on the island but maintained the industry-committee mode of setting minima. With the 1974 and 1977 Amendments to the FLSA, however, Congress introduced a new policy, increasing coverage and enacting automatic increases in Puerto Rican minima to bring them to the U.S. level. The 1977 Amendment required industries with minima at U.S. levels to follow the scheduled mainland increases and those whose minima were below U.S. levels to increase wages by $0.30 per year until they reached the federal minimum. By 1983, Puerto Rico had effectively reached the mainland minimum.

Table 6.1 records levels of the minimum wage and coverage on the island and, for purposes of comparison, in the United States, in each year that Con-

**Table 6.1**  **Minimum Wage, Minimum/Hourly Earnings in Manufacturing, and Coverage**

| | Puerto Rico | | | | United States | | | |
|---|---|---|---|---|---|---|---|---|
| Year | Min. ($) (1) | Min./Mfg. (2) | Cov. (3) | (Min./Mfg.) × Cov. (4) | Min. ($) (5) | Min./Mfg. (6) | Cov. (7) | (Min./Mfg.) × Cov. (8) |
| 1950 | .20 | .47 | .29 | .14 | .75 | .52 | .36 | .19 |
| 1956 | .45 | .70 | .29 | .20 | 1.00 | .51 | .38 | .19 |
| 1961 | .61 | .62 | .29 | .18 | 1.15 | .50 | .43 | .22 |
| 1963 | .72 | .64 | .29 | .19 | 1.25 | .51 | .44 | .22 |
| 1967 | .97 | .70 | .44 | .31 | 1.40 | .50 | .55 | .28 |
| 1968 | 1.10 | .71 | .44 | .31 | 1.60 | .53 | .54 | .29 |
| 1974 | 1.68 | .72 | .47 | .34 | 2.00 | .45 | .62 | .28 |
| 1975 | 1.87 | .73 | .66 | .48 | 2.10 | .44 | .60 | .26 |
| 1976 | 2.03 | .73 | .64 | .47 | 2.30 | .44 | .60 | .26 |
| 1978 | 2.51 | .75 | .64 | .48 | 2.65 | .43 | .62 | .27 |
| 1979 | 2.77 | .75 | .64 | .48 | 2.90 | .43 | .63 | .27 |
| 1980 | 3.00 | .75 | .64 | .48 | 3.10 | .43 | .63 | .27 |
| 1981 | 3.26 | .74 | .64 | .47 | 3.35 | .42 | .63 | .26 |
| 1987 | 3.35 | .63 | .64 | .40 | 3.35 | .34 | .64 | .22 |

*Sources:* Puerto Rico: minimum calculated from U.S. Department of Labor's "Minimum Wage Industry Studies"; average hourly earnings in manufacturing from the *Yearbook of Labour Statistics;* coverage based on unpublished estimates from the U.S. Department of Labor, Employment Standards Administration. United States: minimum wages from the 1990 *Statistical Abstract of the United States,* table 675; manufacturing earnings from the 1990 *Economic Report of the President;* coverage is estimated from Welch (1978) by multiplying by ratio of nonagricultural private employees to total employment.

*Note:* Cov = number of covered nonsupervisory employees divided by civilian employment.

gress changed the law and in 1987. As there was no single minimum in Puerto Rico until the 1980s, the pre-1983 "average minimum" for the island in column 1 is the employment-weighted average of forty-four separate industry minima (based in some cases on averages of occupational minima within industry, as described in Castillo [1983]). Column 2 gives the ratio of the average minimum to average hourly earnings in manufacturing; it shows that industry boards set rates on the order of 60–70 percent of average manufacturing earnings through 1974. Column 3 presents estimates of the ratio of the number of workers covered by the minimum to civilian employment. Because agriculture, government, and much of the trade and service sector were not covered by the law, however, only 29 percent of the island work force was subject to the minimum from the 1950s though 1967, compared to much higher proportions of the U.S. work force. As a result, until 1967 the ratio of the coverage-weighted minimum to average earnings—a crude measure of the overall strength of the minimum wage—was *lower* in Puerto Rico than in the United States (col. 4 vs. col. 8). Hence, the effect of the minimum on the aggregate Puerto Rican labor market was modest. Not until 1975 did the

coverage-weighted minimum on the island markedly exceed the U.S. level, after which it remained 80 percent or so higher through 1987.

### 6.1.1    Effect of the Minimum on Wages

An effective minimum wage should produce spikes in the distribution of earnings in the area of the minimum, allowing the analyst to infer the level of the minimum from the shape of the distribution. Our investigation of three data sets of earnings shows such a pattern for the island, with remarkable spikes at the relevant minima in each distribution, implying that the minimum wage law is a major determinant of actual wages paid.

The first data set consists of wage distributions for workers in covered industries obtained by the Bureau of Labor Statistics U.S. Department of Labor ("Minimum Wage Industry Studies") as part of its assessment of separate industry minima through the early 1970s. We examined distributions for dozens of industries and found that, in all low-wage industries, an extraordinary proportion of workers was paid the industry minimum, with modal pay changing with changes in the minimum. For example, in 1964, the hourly minimum was $0.83 in shoes and related products, and 41 percent of workers received exactly $0.83; in 1968, when the industry minimum had increased to $1.17, 84 percent were paid $1.17. Similarly, in 1964, when the hourly minimum in the women's and children's underwear industry was $0.96, 49 percent of workers received $0.96, whereas in 1972, when the industry minimum was $1.45, 41 percent received that wage. In rubber products, 46 percent were paid the $0.98 minimum in 1963 and 36 percent the $1.32 minimum in 1969. Comparable distributions for industries in the United States show no such bunching of wages around the minimum except for such sectors as sawmills in the south in the early years of the minimum wage law.

Second, an examination of earnings from the 1980 Census of Population for Puerto Rico reveals spikes at pay levels where differing industry minima covered workers during the period of transition to the U.S. minimum. The Census asked individuals to report annual earnings, weeks worked, and usual hours worked per week in the preceding year; we used these data to calculate hourly pay by dividing annual earnings by weeks worked times hours worked per week.[1] In contrast to the Department of Labor's surveys, the Census encompasses the entire island, is obtained from individuals who have no incentive to report wages at the minimum, and covers the period when federal regulation rather than industry boards set the minima. Figure 6.1a displays the distribution of 1979 hourly pay for full-time workers in Puerto Rico from the Census files. Since not all industries had reached the federal minimum in

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1. One disadvantage of the Census data is that they have not been cleaned for errors due to miscoding etc., as is typically done with CPS data. We deleted observations when weeks worked was less than twenty, when hours worked last week was less than ten or equal to ninety-nine, and when wage was less than $0.50 per hour.

1979, the law cannot be expected to create a single spike in the earnings distribution. In 1979, approximately 50 percent of covered workers were at the U.S. minimum of $2.90, 13 percent were covered by a minimum within $0.10 of that value, and 25 percent were covered by the industry minimum in the $2.50–$2.60 range. An effective minimum would thus produce one spike at $2.90 and a smaller one around $2.50–$2.60. The figure shows such a pattern.

A third source of data on the Puerto Rican earnings distribution is usual hourly earnings ( = usual weekly earnings/usual hours worked) from the Current Population Survey (CPS) in Puerto Rico. The CPS provides earnings information in the 1980s, when the Puerto Rican minimum reached the U.S. level throughout the island. The CPS usual weekly earnings and hours information is closer to wage rates than the census figures for annual earnings and hours/weeks worked and thus should be subject to smaller measurement error than the Census data. We estimated the distribution of hourly earnings for Puerto Rico using CPS files for 1983 and 1988. The distributions for both years show the dominance of the U.S. minimum on the island's pattern of earnings. Figure 6.1*b* displays the distribution of hourly earnings from the CPS for 1983. It reveals a spike around the $3.35 U.S. minimum: 25 percent of the workers were paid between $3.30 and $3.40 in that year. The change in the shape of the earnings distribution from one centered on $2.50–$2.60 and $2.90 in 1979 to one centered on $3.35 in 1983 indicates that imposition of the U.S. minimum on Puerto Rico altered the distribution of pay on the island. Figure 6.1*c* gives the comparable distribution for 1988, at which time the U.S. minimum had been in effect for roughly five years. The spike in the $3.30–$3.40 range is as pronounced as in 1983, with 28 percent paid in this range, the vast majority at exactly $3.35. That the $3.35 minimum continued to be the modal rate of pay despite five years of rising nominal average wages is striking evidence that the minimum did indeed constrain island wage setting.

As a final test of how the minimum affected earnings in Puerto Rico, we regressed the log of average hourly earnings economy-wide and in manufacturing on the log of the minimum wage from 1951 to 1987, controlling for a general time trend, real GNP in Puerto Rico, and the GNP deflator in Puerto Rico. We used three related statistical specifications: ordinary least squares, a first-order autoregressive structure, and least squares with earnings lagged one year as an additional regressor. The minimum obtained a positive significant coefficient in each regression (table 6.2) with elasticities in the range of 0.2–0.4. The below-unit elasticities are consistent with the evidence in figure 6.1 that the minimum affects the shape of the earnings distribution by increasing wages at the lower end rather than by producing general wage inflation.

In sum, imposition of the U.S.-level minimum wage in Puerto Rico altered hourly earnings on the island in ways that make Puerto Rico an excellent institutional setting for assessing the effects of the minimum on the job market. Does the minimum have the "economic bite" on employment in Puerto

**A. 1979**



Wage

**B. 1983**
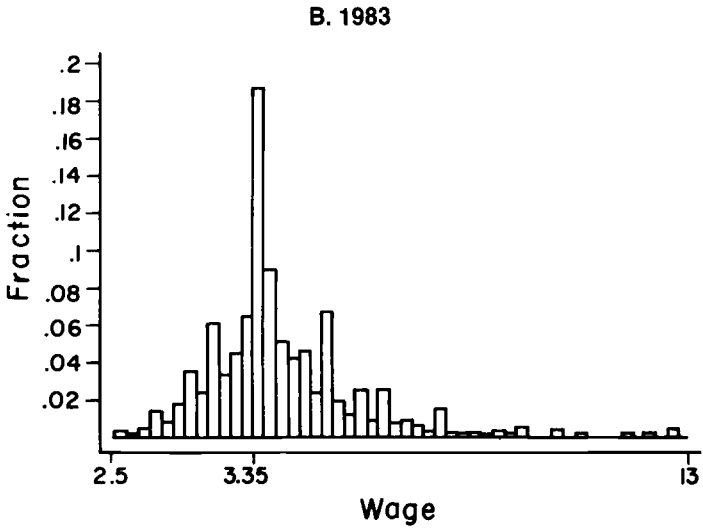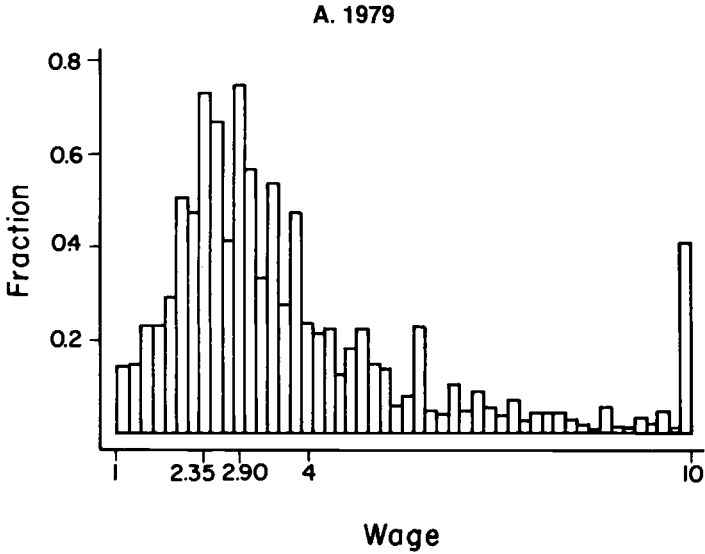


Wage

Rico that textbook discussions of wage-fixing laws lead one to expect? Has the minimum wage affected migrant flows as well?

## 6.2   Employment Effects of the Minimum Wage

To determine the employment effects of the minimum, we performed two related analyses. First, we used time-series data to estimate the effect of the minimum on the employment-population rate and unemployment rate on the
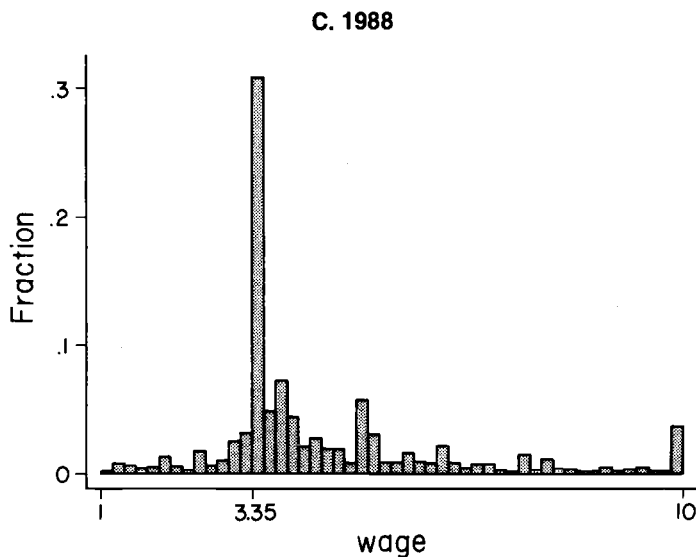
**C. 1988**



**Fig. 6.1 Distribution of hourly earnings in Puerto Rico**

*Source: a,* 1980 Puerto Rican Census. *b,* 1983 Puerto Rican CPS. *c,* June 1988 Puerto Rican CPS.

*Note:* The Census data are based on annual earnings. We deleted observations when weeks worked was less than twenty, when hours worked last week was less than ten or equal to ninety-nine, and when the wage was less than $0.50 per hour.

**Table 6.2 . The Effect of the Minimum Wage on Average Earnings in Puerto Rico, 1951–87**

|  | Average Earnings | | | Average Manufacturing Earnings | | |
|---|---|---|---|---|---|---|
|  | (1) | (2) | (3) | (4) | (5) | (6) |
| Constant | − 4.34 | − 3.69 | − 2.10 | − .26 | − .42 | − .21 |
| Log min. | .32 | .27 | .19 | .37 | .21 | .20 |
|  | (.04) | (.05) | (.04) | (.05) | (.07) | (.04) |
| Trend | .01 | .03 | − .00 | .04 | .05 | − .00 |
|  | (.01) | (.01) | (.01) | (.01) | (.02) | (.01) |
| Log PR def. | .39 | .45 | .15 | .19 | .06 | .09 |
|  | (.12) | (.11) | (.09) | (.16) | (.29) | (.09) |
| Log PR GNP | .57 | .02 | .30 | .01 | − .03 | .05 |
|  | (.07) | (.03) | (.07) | (.20) | (.16) | (.06) |
| Lagged earnings |  |  |  |  |  | .72 |
|  |  |  |  |  |  | (.09) |
| $R^2$ | .999 | .999 | .999 | .998 | .999 | .999 |
| SE | .028 | .025 | .020 | .037 | .028 | .022 |
| AR(1) | . . . | .61 | . . . | . . . | .81 | . . . |
|  |  | (.16) |  |  | (.14) |  |

*Source:* Estimated by the authors from data in app. A.

*Note:* Standard errors are given in parentheses.

island. Our time-series regressions are based on models analogous to those in U.S. minimum wage studies (see Brown, Gilroy, and Kohen 1982) in which the key independent variable is an average of the ratio of the minimum to average earnings times coverage among industries. Second, exploiting the fact that industries in Puerto Rico had different minima for many years and reached the U.S. level at different times, we estimated a cross-sectional time-series model linking industry employment to industry minima.

Table 6.3 presents the results of our time-series analysis for the period 1951–87. As employment and population data for Puerto Rico are given in calendar year and fiscal year terms and are periodically revised on the basis of the latest Census of Population, we present estimates using two related employment and population series. In columns 1–2, our dependent variable is based on calendar year employment and population data for persons aged 16 and over adjusted to the 1980 Census for 1963–87 and fiscal year data for persons aged 14 and over for earlier years.[2] In columns 3–4, our dependent variable uses a consistent fiscal year series for persons aged 14 and over, also adjusted to the 1980 census benchmark. In columns 5–6, the dependent variable is the ln of the unemployment rate. For the minimum, we use two related measures. The first is a "Kaitz" employment-weighted average of each sector's minimum/average hourly earnings multiplied by its coverage:

$$\Sigma a_i(m_i/w_i)c_i,$$

where $a_i$ is industry $i$'s share of island employment; $m_i$ is the minimum in industry $i$, $w_i$ is the average hourly earnings in industry $i$, and $c_i$ is the coverage in industry $i$. The second measure is the ratio of the average minimum $(m)$ to average·hourly earnings $(w)$ in the economy multiplied by an economy-wide coverage figure obtained from a different source than the industry coverage figures (see app. A).[3] In all cases, the regressions are in ln form and include Puerto Rican and U.S. GNPs (in ln constant dollars) and a linear trend. Because ordinary least squares regressions showed considerable serial correlation, the calculations are based on an AR(1) model (OLS estimates yielded larger coefficients on the minimum, so our results are the more conservative ones).[4]

The regressions show that, however specified, the minimum had a significant effect on the employment-population rate, with estimated short-run elasticities that range from 0.15 (cols. 1 and 3) to 0.10 (col. 4). These elasticities

2. There is only a modest effect of changing from the age 14 and over to the age 16 and over data (see U.S. Department of Commerce 1979, 2:600, table 16).

3. Because the minimum wage alters average earnings in Puerto Rico, however, we also estimated a model in which the GDP deflator for Puerto Rico replaces average earnings as the deflator in the minimum variable. Our results are similar but weaker than those in the table.

4. The OLS specification yielded coefficients (standard errors) for the minimum wage variables in the columns in the table of $-.24$ (.05), $-.19$ (.04), $-.18$ (.05), and $-.14$ (.04) on the employment-population regressions and of .29 (.26) and .27 (.20) on the unemployment rate.

**Table 6.3**        **Regression Coefficients (standard errors) for the Effect of the Minimum Wage (and other factors) on Employment-Population and Unemployment Rates in Puerto Rico, 1951–87**

| | Employment Rate | | | | Unemployment Rate | |
|---|---|---|---|---|---|---|
| | Measure A | | Measure B | | | |
| | (1) | (2) | (3) | (4) | (5) | (6) |
| Minimum: | | | | | | |
| Kaitz | −.15 | | −.15 | | .27 | .21 |
| | (.07) | | (.07) | | (.20) | (.14) |
| (Min./Avg.) × comp. | | −.11 | | −.10 | | |
| | | (.05) | | (.05) | | |
| Puerto Rican GNP | .25 | .27 | .04 | .05 | −.84 | −.87 |
| | (.11) | (.11) | (.10) | (.10) | (.57) | (.57) |
| U.S. GNP | .38 | .37 | .62 | −.67 | −1.21 | −1.17 |
| | (.22) | (.22) | (.25) | (.25) | (.71) | (.70) |
| Trend | −.024 | −.024 | −.024 | .025 | .081 | .080 |
| | (.006) | (.006) | (.006) | (.006) | (.022) | (.023) |
| Constant | −5.51 | −5.54 | −5.70 | | 12.56 | 12.52 |
| AR(1) | .65 | .64 | .43 | .40 | .85 | .86 |
| | (.15) | (.16) | (.19) | (.19) | (.12) | (.11) |
| $R^2$ | .92 | .92 | .91 | .92 | .89 | .90 |
| SE | .027 | .027 | .029 | .029 | .083 | .084 |

*Source:* Estimated using data in app. A. Employment rate: measure A uses the PREPOP series, measure B the PREPOPF series.

are of comparable magnitude to those found on the effects of the minimum on teenage employment in the United States prior to the 1980s (Brown 1988; Brown, Gilroy, and Kohen 1982) but with lower standard errors, presumably because in Puerto Rico a much greater proportion of the work force is affected by the minimum, giving us the equivalent of a larger data set from which to draw statistical inferences. In addition to the calculations in table 6.3, we did several other analyses of the time-series data to check on the robustness of our findings. In one set of calculations, we added additional lagged dependent variables: the coefficients on the minimum wage variable were similar in magnitude and significance to those in the table, and the coefficients on the lagged dependent variable were on the order of 1/2. If we interpret the lagged coefficients in a partial adjustment context, the responses of employment are roughly twice those in table 6.3.[5] In another set of calculations, we estimated ARIMA models of different orders. The results were comparable to those in

5. Because of the lagged term, we estimated regressions for 1952–87. Our coefficients (standard errors) on the minimum wage variable and the lagged dependent variable for the models in table 6.3 are −.17 (.06) and .45 (.19); −.13 (.04) and .48 (.17); −.12 (.05) and .49 (.17); −.09 (.04) and .50 (.16); .30 (.13) and .65 (.16); and .41 (.19) and .41 (.19).

table 6.3, indicating that the finding of a substantial minimum wage effect is robust to the precise model used to analyze the data. Rather than giving all our specifications, we present the time-series data in appendix A, which readers can manipulate as they desire.[6]

The short-run elasticities of employment to the minimum in table 6.3, while modest in magnitude, suggest that Puerto Rico experienced massive job losses as a result of the application of the U.S. minimum to the island. This is because the minimum is so high relative to average earnings in Puerto Rico. In 1987, for example, the coverage-weighted minimum/manufacturing earnings in table 6.1 were 0.63 ln points higher in Puerto Rico than in the United States, and a Kaitz index of the minimum for Puerto Rico comparable to the U.S. Kaitz index was 0.64 ln points higher in Puerto Rico than in the United States.[7] A 0.64 ln difference in the minimum implies that, even with relatively modest elasticities, island employment would have been 9 percent higher in 1987 than if the minimum was at the same level relative to pay as in the United States. For the period 1973–87, our analysis suggests that the increased minimum in Puerto Rico reduced the employment-population ratio by roughly 0.02 points, accounting for over one-third of the 0.052 point actual drop.[8]

Turning to the unemployment results in table 6.3, economic theory has no prediction about the effects of the minimum wage on unemployment rates. Some workers displaced by the minimum may leave the work force (in the case of Puerto Rico, they may leave the island), while others may be attracted to the labor force by the higher pay—and our regressions show correspondingly weaker effects on unemployment rates than on employment-population rates. Still, given the magnitude of the minimum in Puerto Rico, the point estimates imply that the minimum raised the unemployment rate substantially. A 0.63 ln point increase in the Kaitz measure of the minimum, for example,

6. In one analysis, we entered the ln of the minimum, coverage, and average earnings separately and obtained the following coefficients (standard errors): $-.12$ (.09) on ln minimum; $-.10$ (.07) on ln coverage; and $-.10$ (.20) on ln average earnings. That the ln minimum and ln coverage have similar coefficients supports the restriction of entering them together in the equation. The insignificant coefficient on average earnings suggests that it plays little role in the results. In another analysis, we estimated the effects of the minimum for the period prior to imposition of the U.S. minimum, 1951–73, and the period when island minima began moving toward the federal level, from 1974 to 1987. The result was a large significant coefficient in the latter period but an insignificant coefficient in the former.

7. The U.S. Kaitz index relates to nonagricultural private wage and salary employment, whereas our measure for Puerto Rico was based on total employment. Accordingly, we estimated a Kaitz index for Puerto Rico based solely on private nonagricultural wage and salary workers in Puerto Rico.

8. Specifically, we multiply the 0.64 difference in the Kaitz minimum wage variable by the 0.15 coefficient in col. 1 and get a 0.096 ln point reduction in the employment-population rate. With a 1987 employment-population rate in Puerto Rico of 0.369, this produces a 0.406 employment-population rate, for a 10 percent increase in employment. Similarly, the $-0.11$ coefficient in col. 2 yields an estimated reduction in the employment rate of 0.07 ln points, for a 7 percent increase in employment.

would have raised the rate of unemployment by 3 percentage points, according to the coefficient in column 5.

Note finally that, *if* workers displaced by the minimum were more likely than other workers to migrate to the United States, the table 6.3 employment and unemployment effects understate the full effect of the minimum in displacing labor. This is because they are based solely on the population in Puerto Rico rather than on the larger number of persons who would have been on the island and unemployed absent the migration option.

### 6.2.1 Cross-Industry/Time-Series Analyses

The existence of separate minima by industry in Puerto Rico from the 1950s through 1983, and the corresponding differential increase of industry minima to the U.S. rate, offers an alternative to the standard time-series mode of estimating the effect of minimum wages on employment. It allows us to assess the effects of the minimum wage by contrasting changes in employment among industries as their minima moved toward the federal level. For this analysis, we created a cross-industry time-series data set for Puerto Rico from 1956 to 1987 by matching employment and earnings data for forty-two industries that cover the entire economy, save agriculture and government,[9] with minimum wages from the industry reports of the U.S. Department of Labor ("Minimum Wage Industry Studies") and with industry coverage from the U.S. Department of Commerce (1979, table 1, 2:634). With forty-two industries and thirty-one years (we excluded 1982 as there was no Survey of Manufacturing conducted in Puerto Rico in that year), we have a sample of 1,302 observations that provides a stronger test of the hypothesis that the minimum affected employment than thirty-one time-series observations.

We use the pooled cross-industry/time-series data set to estimate the effect of minimum wages on employment in an analysis of covariance framework:

$$(1) \qquad \ln \text{EMP}_{it} = a + b \ln(c_{it} \times m_{it}/w_{it}) + T_t + \text{IND}_i + u_{it},$$

where $T_t$ is a vector of year dummy variables to control for cyclical or trend factors that influence employment, and $\text{IND}_i$ is an industry dummy variable to control for the scale of employment in an industry, and $u_{it}$ is the error term.

The pooled cross-industry/time-series analysis differs from the time-series analysis in several ways beyond sample size. It allows us to enter separate year and industry dummies and thus isolate the within-industry within-year variation in variables that is generally more difficult to explain than pure time-series variation. It also permits us to separate our analysis between the period when minima were set by the industry councils and the period when the Congress mandated changes in the minimum and thus to test for the potentially

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9. We use data for thirty-seven detailed manufacturing industries from the Puerto Rican Survey of Manufacturing and for five one-digit nonmanufacturing industries from the Departamento del Trabajo y Recursos Humanos.

greater employment effects under the latter regime. With output terms ex-
cluded from the equation, moreover, the minimum will capture changes in
employment due to minimum wage–induced changes in industry output as
well as those due to minimum wage–induced changes in employment with
output (level of demand) fixed. And by focusing on employment by industry,
the analysis captures the movement of workers from industries with large in-
creases in minimum wages to those with small increases as well as from em-
ployment to nonemployment. The latter two considerations suggest that em-
ployment effects from the cross-industry analysis will exceed those from the
aggregate time-series analysis.

Table 6.4 presents the regression coefficients and standard errors on the
minimum wage variables from our industry analysis for the entire period and
for the subperiods 1956–73 and 1974–87. The estimates strongly confirm the
proposition that minimum wage substantially affected employment in Puerto
Rico. In column 1, the minimum/average times coverage variable obtains a
negative significant coefficient of 0.54, more than four times its standard er-
ror. The estimates in columns 2 and 3 show that the effect of the minimum
occurs entirely in the period after the 1974 Amendment imposed increases in
minima toward the U.S. federal level. The elasticity of employment to the
minimum is −0.91 after 1974, compared to an estimated 0.20 elasticity be-
fore 1974. This suggests that the industry councils took seriously the mandate
to set minima so that they "would not substantially curtail employment,"
whereas the congressionally mandated changes were, of course, exogenous to
the economic conditions on the island.

Underlying the sizable minimum wage effects in table 6.4 is a substantial

| Table 6.4 | Regression Coefficients (standard errors) for the Effect of the Minimum Wage and Other Variables on Ln Employment-Population, 1951–87, and on Ln Employment by Industry, 1956–87 | | |
|---|---|---|---|
| | Cross Industry | | |
| | 1956–87 (1) | 1956–73 (2) | 1974–87 (3) |
| Minimum | −.54 (.13) | .20 (.12) | −.91 (.24) |
| Industry dummies | 41 | 41 | 41 |
| Year dummies | 30 | 17 | 12 |
| Sample size | 1,302 | 756 | 546 |
| $R^2$ | .87 | .95 | .95 |

Source: Estimated by authors from a data set available on disk from the NBER. The detailed
industry data for Puerto Rico are obtained from the U.S. Department of Labor's "Minimum Wage
Industry Studies" and the Departamento del Trabajo's "Seria historica del empleo, despempleo y
grupo trabajador in Puerto Rico."

Note: Minimum is the multiplicand of coverage for industry times minimum/hourly earnings in
industry. Figures exclude 1982 owing to the absence of the Puerto Rican Survey of Manufactur-
ing. The regressions cover forty-two industries, with agriculture and government excluded.

reallocation of Puerto Rican workers from low-wage industries that increased their minima greatly to reach U.S. standards to high-wage industries that required only modestly higher minima to reach the federal level. In industries at the U.S. minimum in 1973, employment grew by 1 percent from 1974 to 1983. In industries whose minimum was within $0.10 of the U.S. minimum in 1973, employment increased by 2 percent over the same period. But in industries whose 1973 minimum was more than $0.10 below the U.S. minimum and that therefore had to raise minima substantially to reach the U.S. level, employment dropped by 32 percent from 1974 to 1983! These calculations indicate that the U.S.-level minimum reallocated employment on the island as well as reducing the total employment-population rate. They show that a major reason for the higher elasticities of employment to the minimum in table 6.4 than in table 6.3 is the movement of workers across industries.

## 6.3    The Minimum Wage and Migration

Since Puerto Ricans face no legal restrictions migrating to the United States, migration depends on the incentives facing individuals, including those that result from the minimum wage. Changes in the minimum can affect both the volume and the composition of migration. Economic analysis has no clear prediction about how the volume of migration might respond to higher minimum wages. Workers will be more likely to migrate if they are disemployed by the minimum than if they hold jobs at below-minimum wages, but workers whose earnings are increased by the minimum will be less likely to migrate. The net effect of the minimum on the size of the migrant flow will depend on the number of workers in the two groups and their response to the minimum wage–induced change in their conditions.[10] Economics does, however, predict how the minimum will affect the composition of migrants. Since employers are likely to lay off or forgo hiring the least skilled workers when wages rise, the minimum should induce greater migration of the less skilled.

### 6.3.1    Volume of Migration

Puerto Rican migration to the United States has been immense. In 1980, one-third of 20–64-year-old persons born in Puerto Rico resided in the United States (Ramos, in this volume, table 2.1). Although there are no administrative statistics on migration from Puerto Rico, data from the U.S. and Puerto Rican Censuses of Population and CPSs and passenger travel records show sizable changes in the volume of migration over time. In the 1950s, massive

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10. If, in accord with our estimates in sec. 6.2, the elasticity of demand to the minimum is below one, expected earnings of *all* workers will be higher under the minimum. This does not, however, imply that the minimum reduces migrant flows. for workers who suffer the loss of jobs but do not gain the benefits of higher wages may respond more to their condition than those who obtain modest gains in wages. Moreover, the elasticity is based on total employment, including workers whose skills make the minimum irrelevant to them.

migration from Puerto Rico more than doubled the share of the Puerto Rico born living in the United States (see table 6.5). For the next two decades, migration rates fell, seemingly stabilizing the share of the Puerto Rico born on the mainland, only to surge once more in the 1980s. Figure 6.2 graphs the only available measure of annual migrant flows—net passengers journeying from the island—relative to the population on Puerto Rico, revealing further fluctuation in flows from year to year. From 1951 to 1987, migration averaged 0.9 percent of the island population, with a standard deviation of 0.9. In the 1950s, 1.9 percent of the island population left annually; in the 1960s, 0.5 percent; in the 1970s, 0.3 percent; and in the 1980s, 1.0 percent.

To see if the swing in migration is related to the minimum wage, we regressed the ratio of net migrants to the Puerto Rican population (MIG) on the Kaitz measure of the minimum, economic conditions in the United States and Puerto Rico, and the proportion of the Puerto Rico born living in the United States in the previous year (PRUS), using various measures of economic conditions and specifications. In nearly all cases, the minimum variable had a statistically insignificant effect on the volume of migration. For example, controlling for GNP in Puerto Rico and the United States, we obtained

$$\text{MIG} = -.14 + .07 \log \text{USGNP} - .05 \log \text{PRGNP} + .005 \log \text{MIN} - .17 \text{ PRUS}$$
$$\quad\quad\quad\quad (.02) \quad\quad\quad\quad (.02) \quad\quad\quad\quad (.01) \quad\quad\quad\quad (.05)$$

$R^2 = .57$ (standard errors in parentheses).

Here, the coefficient on the minimum wage implies that the 0.64 ln point lower minimum that would make it comparable to the minimum on the mainland relative to average earnings would reduce migration by 0.3 percent of the population, but the standard error is too high to place any confidence in this estimate. One interpretation of the high standard error is that the emigration-

**Table 6.5     Migration from Puerto Rico, 1950–87**

|  | Puerto Rico, Total Population (1,000s) (1) | Puerto Ricans Living in U.S. (1,000s) (2) | % Puerto Ricans in U.S. (2)/ (1 + 2) (3) |
|---|---|---|---|
| 1950 | 2,203 | 226 | .093 |
| 1960 | 2,339 | 617 | .209 |
| 1970 | 2,659 | 810 | .233 |
| 1980 | 2,889 | 931 | .244 |
| 1987 | 3,294 | 1,155 | .260 |

*Sources:* "Puerto Ricans in the U.S." (1950, 1960, 1970); "Characteristics of the Population: Puerto Rico" (1950, 1960, 1970, 1980); "General Social and Economic Characteristics" (1980, table 167); Junta de Planificacion, "Informe economico al gobernador," various eds.; Centro de Estudios de Puertoriquenos (1979, table 9, p. 187).

*Note:* The number of Puerto Ricans living in the United States in 1987 is estimated by summing annual net passenger flows from 1981 to 1987 and adding half the 1980 flow. The flows are from Falcon (1990).
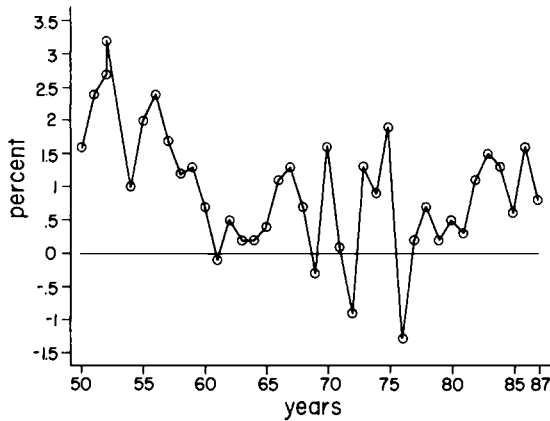
**Fig. 6.2    Percentage of Puerto Ricans who migrated to the United States**

inducing effect of the minimum through disemploying workers and the emigration-reducing effect of the minimum through raising wages roughly balance out. Another interpretation is that the minimum has a nonnegligible effect on migration that cannot be reliably detected in the fluctuating time-series data. While econometric manipulations that smooth the data might yield better estimates of the effect of the minimum,[11] we believe that there is no convincing story about the volume of migration in the time series and turn instead to micro survey data on how the minimum may have influenced the characteristics of migrants.

### 6.3.2    Premigration Employment Experience of Migrants

Economic analysis predicts that workers displaced by the minimum should be more likely to leave the island than others and, given the higher capital/labor ratios in the United States, should have greater success finding jobs in the United States than in Puerto Rico. Consistent with this, Puerto Rican male and female migrants have much higher employment-population rates than Puerto Rican residents with the same years of schooling (cols. 1–2 of table 6.6). However, because these data do not tell us how migrants fared when they were in Puerto Rico, they leave open the possibility that migrants actually came largely from the ranks of the employed. To determine the employment experience of migrants prior to emigration, we turned to the 1982–83 "Encuesta de migracion" of the Junta de Planificacion de Puerto Rico (1984). The *encuesta* asked migrants at the international airport their employment status during the previous three months. Because migrants are younger than typ-

11. Santiago (1990) estimates a complex model with monthly flows that suggests that the minimum raised migration, but he has no other control variables, and his raw correlations give the opposite result. We interpret this as indicating the difficulty of making inferences from these data.

**Table 6.6**          **Percentage Employed of Puerto Rico-born Men and Women, by Year of Schooling and Migrant Status, 1980 and 1983**

| | Males | | | |
| | 1980 | | 1983 | |
| Years of Schooling | In Puerto Rico | In U.S. | In Puerto Rico (adjusted for age) | Migrants to U.S. 3 Months before Migration |
|---|---|---|---|---|
| ≤ 6 | 39 | 64 | 32 | 30 |
| 7–9 | 49 | 68 | 40 | 33 |
| 10–11 | 55 | 72 | 52 | 36 |
| 12 | 67 | 81 | 60 | 38 |
| 13–15 | 77 | 84 | 71 | 48 |
| 16 + | 87 | 85 | 79 | 50 |
| All | 57 | 71 | 55 | 38 |
| | Females | | | |
| ≤ 6 | 10 | 22 | 7 | 5 |
| 7–9 | 17 | 26 | 14 | 11 |
| 10–11 | 21 | 31 | 13 | 5 |
| 12 | 38 | 46 | 34 | 21 |
| 13–15 | 55 | 56 | 46 | 32 |
| 16 + | 72 | 67 | 67 | 55 |
| All | 28 | 33 | 29 | 20 |

*Sources:* 1980, tabulated from the Public Use Files of the U.S. and Puerto Rico Censuses. 1983, tabulated from the Puerto Rican CPS. 1983 migrants, tabulated from the Junta de Planificacion de Puerto Rico (October 1984), tables 12, 14, and A7.

*Note:* The 1983 rates are weighted by the age distribution of migrants from the Junta de Planificacion de Puerto Rico (October 1984), using table A-5 for weights. The same age weights were used for both sexes.

ical island residents, we contrasted migrant employment rates with a weighted average of age-specific employment rates of residents, using the age distribution of migrants as weights. Further, to avoid problems due to changes in island employment over time or between surveys and Censuses,[12] we contrasted these rates with 1983 employment rates from the Puerto Rican CPS.

The results of these comparisons show that the percentage of migrants employed is markedly below the percentage of island residents employed in the same education-sex group (cols. 3 and 4 of table 6.6). In the aggregate, 38 percent of male migrants were employed, compared to 55 percent of male residents. Given the numbers of residents and migrants, this implies that approximately 4.4 percent of employed males and 7.5 percent of jobless males

12. The U.S. Department of Commerce (1979, 2:601) noted substantial differences between Census and CPS estimates of unemployment rates. The revisions in annual employment and population estimates after the 1980 Census benchmark was introduced also imply inconsistencies between the two sources.

migrated. Among women, the pattern is weaker, presumably because women are "tied movers" (Mincer 1976): 20 percent of migrants worked, compared to 29 percent of residents, giving rates of migration of 2.6 percent for the employed and 3.7 percent for the not employed.[13] The *encuesta* also asked why individuals were migrating. Consistent with the notion that lack of work induced considerable migration, the vast majority of migrants exclusive of military personnel and students said that they were migrating to work (33 percent) or to search for work (47 percent) (Junta de Planificacion 1984, table A-18). Less-educated and younger persons were especially likely to be moving to search for work.

### 6.3.3    Years of Schooling of Migrants

Ramos (in this volume) has shown that male Puerto Rican migrants to the United States had fewer years of schooling than similarly aged nonmigrants in 1980, which he attributes to the higher payoff to education in Puerto Rico. Since the minimum will disproportionately reduce the employment of less-educated workers, this pattern is also consistent with the minimum wage influencing the characteristics of migrants. To try to identify a separate minimum wage effect, we compared the education of migrants to that of residents in Puerto Rico in earlier Censuses. If migrants had less schooling than nonmigrants in periods when the minimum was weak, we would be loathe to ascribe much of the 1980 census pattern to the minimum wage. By contrast, evidence that the migrant-nonmigrant schooling gap developed when the minimum increased would lend support to the hypothesis that the minimum influenced the educational composition of migrants.

Published Census data on the median years of schooling of Puerto Rican migrants and of residents on the island aged 25 years and older in 1950, 1960, and 1970[14] showed the *opposite* pattern of relative attainment to that for 1980. In 1950, when relatively few Puerto Ricans had migrated to the United States, migrants had 7.7 years of school completed, compared to 3.7 years for persons on the island. In 1960, migrants completed 7.9 years of schooling, nonmigrants 4.6 years. In 1970, migrants had 8.4 years and nonmigrants 6.9 years completed—a smaller but still substantial gap that implies that as late as 1970 the bulk of Puerto Rican migrants were more educated than nonmigrants. Not until the 1980 Census do migrants have less education than non-

13. The *encuesta* estimated that there were 59,000 male and 37,000 female migrants aged 16–64 in 1983. The Puerto Rican CPS suggests that there were approximately 501,000 employed men and 479,000 not employed men on the island aged 16–64. There were 294,000 employed women and 806,000 not employed women. We used these data to estimate the rate of migration of employed and not employed men and women from Puerto Rico, unadjusted for the age of migrants.

14. The figures for the Puerto Rico born living in the United States are taken from the special Census volume on "Puerto Ricans Living in the U.S." in 1950, 1960, and 1970. The figures for residents in Puerto Rico come from the Puerto Rico volumes of the Census. The Census canceled the 1980 volume on Puerto Ricans in the United States.

migrants, consistent with the contention that movement toward the U.S. in the 1970s altered the selectivity of migration.

To explore the 1970–80 change in migrant-nonmigrant education differences further, we estimated equations for years of schooling from the Public Use Files of the 1970 and 1980[15] U.S. and Puerto Rican Censuses and the June 1988 U.S. and Puerto Rican CPSs. Building on Ramos's analysis of the 1980 Census, we pooled the records of 16–64-year-old persons born in Puerto Rico and residing in the United States with those of Puerto Ricans living in Puerto Rico. We regressed years of school completed on dummy variables for age (to control for the upward trend in schooling), migrant status, and (in 1970 and 1980) a "recent migrant" dummy that takes the value of one if the person migrated to the United States in the preceding five years.

The estimated coefficients and standard errors on the migrant dummy variables are given in table 6.7. The coefficient in the 1980 regression for males corroborates Ramos's finding that migrant men had fewer years of schooling than resident of Puerto Rico. The coefficient in the 1988 regression is smaller but still negative. By contrast, the coefficient in the 1970 regressions for males show migrants having fewer years of schooling than island residents. The regressions for females tell a similar story: migrants had less education than nonmigrants in 1980 and 1988 but more education than nonmigrants in 1970. In 1980 and 1988, moreover, migrant-nonmigrant educational differentials were greater for women than for men, possibly because the minimum affects the employment of female workers more than that of male workers owing to the lower wages of women.

The regressions that distinguish between recent and earlier migrants tell a more complex story. The estimated coefficients on recent migrants are negative in the 1970 Census as well as in the 1980 Census and are absolutely larger in the 1970 Census as well. This implies that 1965–70 migrants were disproportionately drawn from less-educated Puerto Ricans, whereas those who came earlier were drawn from the more educated. If the 1965–70 migration of the less educated was due to the minimum wage, we would expect a sharp rise in the minimum in 1965–70. Table 6.1 above shows such a rise in the coverage-weighted minimum in Puerto Rico due to the 1965 Amendment to the Fair Labor Standards Act. While this does not prove that the increased migration of the less educated in 1965–70 is due to the minimum, it is consistent with the minimum wage contributing to the change.

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15. For Puerto Ricans in the United States in 1970, we used the 1/100 sample of the U.S. Census; for Puerto Ricans in Puerto Rico in 1970, the 1/100 sample of the Puerto Rican Census was used; for Puerto Ricans in the United States in 1980, we used a sample derived by combining the 1/100 sample with the 5/100 sample from selected states with many Puerto Ricans. The sample represents 90 percent of the total Puerto Rico born population in the United States. For details, see Ramos (in this volume). The sample of Puerto Ricans residing in Puerto Rico is extracted from the 5/100 Census for Puerto Rico. We included all out-of-school persons not in the military in the age bracket 16–64.

**Table 6.7**        **Estimated Coefficients (standard errors) for Differences in Years of Schooling Completed by Puerto Rican Migrants to the United States and Puerto Ricans on the Island, 1970–88**

|  | Males | | | | |
|---|---|---|---|---|---|
|  | 1988/86 | 1980 | 1970 | 1980 | 1970 |
| Migrants | − .35 | − .53 | .18 |  |  |
|  | (.25) | (.05) | (.10) |  |  |
| Recent migrants |  |  |  | − .34 | − .66 |
|  |  |  |  | (.14) | (.24) |
| Earlier migrants |  |  |  | − .55 | .32 |
|  |  |  |  | (.05) | (.10) |
| Dummies for age | 9 | 9 | 9 | 9 | 9 |
| $R^2$ | .06 | .07 | .08 | .07 | .08 |
| $N$ | 5,442 | 56,809 | 18,850 | 55,809 | 18,850 |
|  | Females | | | | |
| Migrants | − .76 | − .70 | .23 |  |  |
|  | (.20) | (.04) | (.09) |  |  |
| Recent migrants |  |  |  | − .65 | .57 |
|  |  |  |  | .05 | (.22) |
| Earlier migrants |  |  |  | − .70 | .37 |
|  |  |  |  | (.12) | (.09) |
| Dummies for age | 9 | 9 | 9 | 9 | 9 |
| $R^2$ | .13 | .15 | .12 | .15 | .12 |
| $N$ | 6,451 | 63,561 | 20,921 | 63,561 | 20,921 |

*Sources:* 1970 and 1980 tabulated from the Public Use Files of the U.S. and Puerto Rican Censuses. 1988 tabulated from the June 1988 Puerto Rican CPS, with migrants from June 1988 and 1986 from the U.S. CPS.

We examined the changed selectivity of migrants by education between the 1970 and the 1980 Censuses in one additional way. We used the two Censuses to calculate the average years of schooling of the Puerto Rico born in Puerto Rico and in the United States in specified "pseudocohorts"—persons aged $y$ years in 1970 and $y + 10$ years in 1980. Figure 6.3 displays the results of this analysis in terms of the *change* in years of schooling completed by pseudocohorts on the island and in the United States. It shows greater increases in years completed for cohorts in Puerto Rico than for cohorts in the United States, implying a substantial sorting of the Puerto Rico born in a given cohort, with the less educated moving to the United States and the more educated returning to Puerto Rico. This is what one would expect if the movement toward the U.S.-level minimum in the 1970s made it more difficult for the less educated to find work on the island.

An alternative explanation of why migrants had less schooling than nonmigrants in the 1980s but not in the 1970s is that the rewards to education
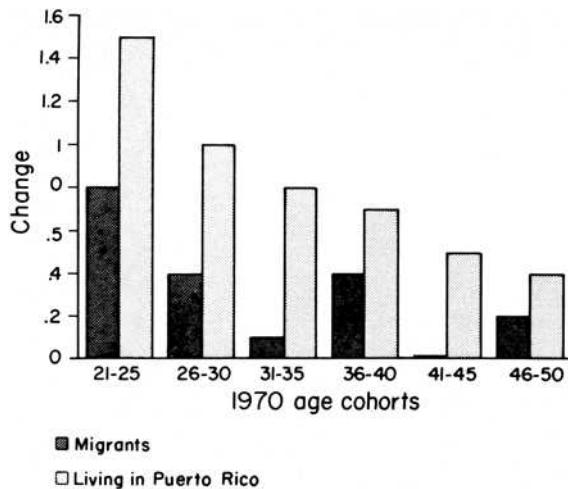
**Fig. 6.3   Change in mean years of schooling completed by cohort and residence, Puerto Rico–born men, 1970–80**

increased from 1970 to 1980 in Puerto Rico relative to the United States. We examined this possibility for male workers by estimating log earnings equations for men in Puerto Rico and for migrants to the United States in 1970 and 1980 for both annual and hourly earnings.[16] Our model included years of potential work experience dummy variables and a linear years of schooling term (all the regressions are in app. B). For Puerto Rico–born men in the United States, the regressions for *weekly* earnings gave a coefficient on schooling of 0.048 in 1970 and 0.036 in 1980, for a 0.012 drop in the effect of schooling on earnings. By contrast, the regressions for Puerto Ricans on the island gave a coefficient on schooling of 0.071 in 1970 and 0.077 in 1980, for a 0.006 rise in the effect of schooling on earnings. These results suggest that changes in the returns to schooling contributed to the changed educational selectivity of migrants in the decade and thus buttress Ramos's story. The regressions for *yearly* earnings showed a 0.010 fall in the effect of schooling on the earnings of migrants, compared to a 0.018 rise in the effect of schooling on the island. Since yearly and weekly earnings differ by weeks worked, the implication is that the effect of schooling on weeks worked increased by just 0.002 among migrants but by 0.012 among island residents. This is consistent with the notion that the minimum wage altered the selectivity of migrants by reducing the employment of the less educated more than of the educated. Thus, there is evidence that both joblessness due to the increased minimum wage and edu-

16. The 1970 Censuses did not ask for usual hours worked, so our analysis is based on information on hours worked last week. In addition, the Public Use tapes present time-worked data in categories rather than in actual values; we used category midpoints in our analysis.

cational pay differentials contributed to the greater immigration of the less educated to the United States in the 1970s.

### 6.3.4   Migration, Education, and Language

Another way to examine how the minimum wage might affect migration is to contrast the likelihood of migration among workers more or less likely to be affected by the minimum. We have done this using education as an indicator of being affected by the minimum. For six education groups, we used 1980 Puerto Rican Census data to estimate the proportion of workers likely to be affected by the minimum had they resided in Puerto Rico; we also used pooled U.S. and Puerto Rican 1980 Census data to estimate the proportion of the Puerto Rico born residing in the United States.

There is no easy way to assess the proportion of workers affected by the minimum (PMIN). The distribution of earnings from the 1980 Puerto Rican Census shows the proportion earning the minimum or less, but not the number of persons who lost their jobs or who migrated as a result of the minimum, and thus understates the proportion affected by the minimum. The understatement will, moreover, be greater for groups whose employment is most reduced and/or who migrate in large numbers, biasing the estimates against finding a minimum wage effect on those outcomes. Still, as the Census earnings distribution offers the only direct indicator of PMIN, we used it to compute the proportions of Puerto Ricans in different education groups with earnings at or below the $2.90 U.S. minimum. Column 1 of table 6.8 shows that these proportions decline with education steeply after high school.[17]

To estimate the proportion of the Puerto Rico born who were migrants in our six education groups, we regressed a zero-one variable for U.S. residence on dummy variables for years of schooling groups and for ten age groups in our pooled U.S. and Puerto Rican census file. The coefficients on the schooling dummies, given in columns 2 and 3 of table 6.8, reveal a *nonlinear* relation between years of schooling and migration that was hidden in the comparison of mean education of migrants and nonmigrants: the probability of migration is smallest for the least educated and for the most educated and highest for those who graduate grade school but do not go beyond high school. The limited migration of the least educated—who are the most affected by the minimum, who have the lowest employment rates, and who have the smallest rewards from schooling—appears to be due to their lack of spoken English (and/or lack of information related to the possession of that language skill). Of men with zero to six years of schooling, only 13 percent of those in Puerto Rico could speak English, compared to 31 percent of those

17. As an alternative estimate of PMIN, we assumed that the 1969 earnings distribution given in the 1970 Census would have held in 1979 absent the minimum wage, inflated 1969 earnings by the rate of growth of average hourly earnings in manufacturing, and estimated the proportion of workers by education in the inflated distribution likely to be paid the 1979 U.S. minimum or less. The results were sufficiently similar to those in the text that we forgo presenting them.

Table 6.8            Estimated Proportions of Workers Subject to the Minimum in Puerto
                     Rico and Migrant Status

| | Proportion Paid Minimum or Below or Not Employed | Proportion of Migrants, 1980 | |
| Education | | Not Adjusted | Adjusted for Language |
| --- | --- | --- | --- |
| 0–6 | .67 | .09 | .00 |
| 7–8 | .58 | .16 | .00 |
| 9–11 | .54 | .17 | − .03 |
| 12 | .40 | .09 | − .14 |
| 13–15 | .25 | .08 | − .23 |
| 16 + | .09 | .00 | − .36 |
| | Females | | |
| 0–6 | .73 | .11 | .04 |
| 7–8 | .71 | .19 | .02 |
| 9–11 | .64 | .19 | − .03 |
| 12 | .55 | .11 | − .14 |
| 13–15 | .38 | .07 | − .25 |
| 16 + | .14 | .01 | − .37 |

*Source:* Column 1 estimated from regressions in appendix C, using 1980 Puerto Rican Census. Column 2 estimated from regressions in appendix C, using 1980 Puerto Rican and U.S. Censuses. Column 3 estimated from regressions in appendix C, using 1980 Puerto Rican and U.S. Censuses, with inclusion of dummy variable for English-speaking proficiency.

with seven to eight years of schooling, 59 percent of high school graduates, and 92 percent of college graduates. Even among migrants there was a marked difference in the ability to speak English: 47 percent of migrants with zero to six years of schooling reported speaking English well, compared to 58 percent of migrants with seven to eight years of schooling, 96 percent of high school graduates, and 99 percent of college graduates.[18] Since persons with the least English-speaking ability are unlikely to migrate, language skill is an omitted variable associated with education that depresses the migration of the less educated. Adding dummy variables for ability to speak English to our migrant regression turns the inverse U-shaped education-migration relation into a monotonic relation in column 3 of table 6.8. As migrants improve their English, the estimated effect of English speaking on migration to the United States will be biased upward, which will in turn bias the estimated coefficients on education groups in the migration regression, but this bias is unlikely to

18. These calculations are based on questions on English-speaking ability asked in both the U.S. and the Puerto Rican Censuses. The U.S. Census had a fourfold categorization: speaking English very well, well, not well, and not at all. The Puerto Rican Census had a threefold categorization: speaking English easily, with difficulty, and not at all. We collapsed the speaking very well and the speaking well categorizations in the U.S. Census so that we had comparable three-way groupings.

account for the elimination of the inverse U-shaped education-migration relation on addition of the English-speaking variable to our regression.[19]

The correlations between PMIN and the adjusted or unadjusted proportion migrating are high. For men, the correlations are 0.99 with the adjusted proportion migrating and 0.77 with the unadjusted proportion. For women, the correlations are .99 with the proportion of migrants corrected for language and .84 with the proportion of migrants absent the language adjustment. Still, since those most affected by the minimum have lower wages, it is possible that the correlation between PMIN and the proportion of migrants by education group is due not to the minimum but to differences in earnings by education group. To assess this possibility, we calculated employment rates and earnings by schooling group for workers on the island and for migrants to the United States. Figure 6.4 shows that ln differences in weekly earnings between migrants and nonmigrants fell sharply with education, consistent with the earnings differential explanation of the greater migration of the less educated. It also shows that ln differences in employment rates between migrants and nonmigrants fell with education, consistent with the minimum wage/joblessness interpretation of the greater migration of the less educated. With both factors working in the same direction, it is difficult to assess their relative importance. In any case, the result is that persons with the skills likely to make them affected by the minimum dominated the 1970s migrant flow.[20]

### 6.4    Effects of Migration on the Puerto Rican Job Market

We argue next that, regardless of the causal effect of the minimum wage on Puerto Rican migration, migration has been a key "safety valve" in the Puerto Rican job market without which it would have been virtually impossible to impose the U.S.-level minimum on the island. Migration reduced joblessness, raised the average skills of workers and the marginal productivity of labor, and contributed to the growth of real earnings on the island.

19. In the underlying data, the zero to six years of schooling group has a lower proportion in the United States than the seven to eight years of schooling group, but it has a higher proportion in the United States for those who speak English well, who speak English somewhat, and for those who do not speak English. To see if this pattern might be due to those in the United States learning English, we estimated migration status equations comparable to those in app. C for recent migrants, who have less time to improve their English proficiency. In our regressions (which eliminated pre-1975 migrants from the sample), we obtained results similar to those for all migrants: additional of English-speaking dummies explained the low migration rate among the zero to six years of schooling group.

20. If the minimum wage induced the less qualified to migrate, we would expect migrants to do especially poorly in the U.S. labor market conditional on education. Ramos has shown that, in 1980, migrant males, particularly the most recent migrants, had lower earnings than otherwise comparable to U.S.-born Puerto Ricans. We estimated log earnings equations for a pooled sample of U.S.-born Puerto Ricans and migrants in 1970 and found a smaller effect for all migrants in 1970 than in 1980, but we found equally large gaps between the earnings of recent migrants and those of U.S.-born Puerto Ricans in 1970 as in 1980.
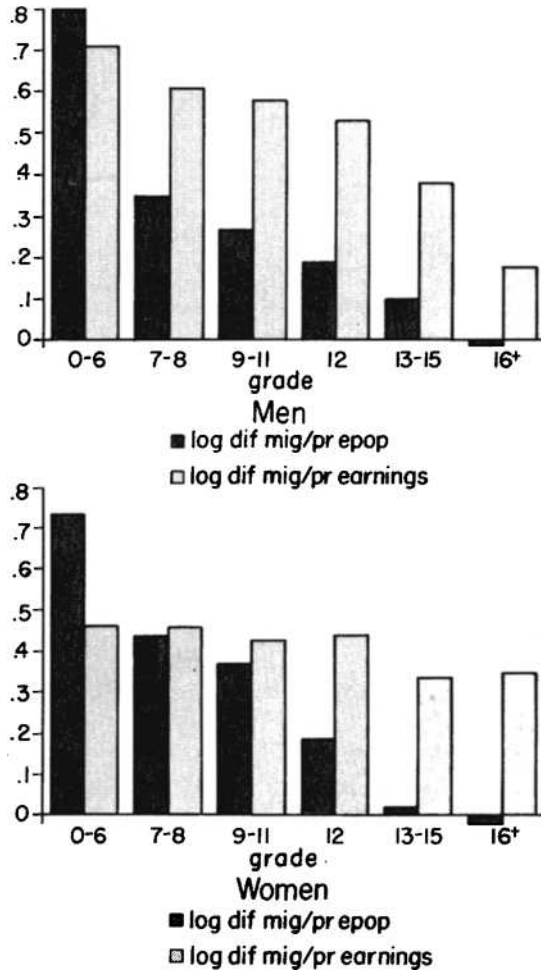
**Fig. 6.4**   **Log difference of employment to population and earnings by education group, migrants to Puerto Ricans**

### 6.4.1   Migration and Joblessness in the Presence of the Minimum

What might the employment-population rate and unemployment rate have been in Puerto Rico with a U.S.-level minimum wage but no outlet for migration?

Consider first the potential labor market effects of imposing the U.S. minimum in the 1970s and 1980s if no Puerto Rican migrated to the United States after 1974. In this case, there would have been approximately 232,000 additional persons of working age on the island,[21] increasing the working-age pop-

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21. This estimate is the sum of approximately 90,000 net migrants from 1975 through early 1980 (based on the 1980 Census of Population) and 200,000 net migrants from passenger traffic

ulation by about 10 percent. If the number of jobs for the less skilled was fixed because the minimum disallowed employment-creating movements down the demand curve, all migrants whose characteristics would have earned them less than the minimum as well as those with characteristics that would have made them unemployed would have been jobless on the island. To find out how many migrants would fit in this set, we estimated the effect of age and schooling on the probability that someone in Puerto Rico would have been jobless or paid the minimum or less and applied the resultant equation to the characteristics of recent migrants. The calculation indicates that 77 percent of migrants would have been jobless on the island and just 23 percent employed.[22] Hence, 199,000 of the 232,000 "return migrants" would have lacked jobs, and just 53,000 would have found work. Assuming that the "return migrants" participated in the labor force at the same rate as they did in the United States (56 percent), the number of additional unemployed workers would be 69,000. Because the island employment-population rate was already low (.359), however, the addition of these workers would have reduced the island employment-population rate by only .013, or 3 percent. But, because there would have been more unemployed than employed return migrants, the unemployment rate would have risen by 4 percentage points, from 17 to 21 percent. Similar calculations assuming that return migrants would have found employment at the 31 percent rate of employment of migrants in the three months preceding migration given in the "Encuesta de migracion" suggest a substantial 3 percentage point rise in the unemployment rate, although only a 0.5 percentage point fall in the employment-population rate on the island.

### 6.4.2 Long-Run Migration

How might the Puerto Rican labor market have fared in the entire post–World War II era if Puerto Ricans had never had the option of migrating to the United States? For simplicity, we answer this question assuming that all Puerto Rican migrants to the United States had remained residents of the island and that other factors that determine economic well-being were unchanged on the island. As other factors would also have changed, our exercise should be viewed not as a prediction of what might actually have happened but rather as a way to demonstrate the magnitude of the economic effects of immigration on the island. A full analysis of what might have happened absent migration requires a complete model of the Puerto Rican economy that lies beyond the scope of this study.

Absent migration from Puerto Rico to the United States, the one-third of

data. This gives 290,000 migrants. On the basis of 1980 Census data, approximately 80 percent will be between age 16 and age 64, giving the 232,000 in the text.

22. We base this estimate on a two-stage analysis. First, we estimated separately for sex the relation between being employed at above-minimum wages in Puerto Rico in the 1980 Census and a set of education and age dummy variables. Then we predicted the proportion of recent migrants who would have been employed on the island, given that equation. The equations are given in app. C.

the Puerto Rico born of working age living in the United States would be on the island, raising the working-age population by about 50 percent, or 0.40 ln points. Assuming, as in our earlier calculation for the effects of migration after 1974, that 70–80 percent of these return migrants were jobless in the presence of a U.S.-level minimum wage even if island productivity remained unaffected (i.e., if capital also increased by one-third or so) and that 56 percent would have been in the work force, the rate of unemployment would have risen to 30–35 percent. This effect is so large as to call into question the assumption that the U.S.-level minimum could have been applied to the island absent migration. More likely than not, the result would have been similar to that in 1935, when Congress quickly rescinded the U.S.-level minimum and chose instead the industry-council mode of setting minima. Put differently, massive migration to the United States was a prerequisite for applying the U.S. minimum to the island in the 1970s.

What might have been the level of wages on the island absent migration and absent the minimum wage? If nothing else changed, labor supply would have been 0.40 ln points higher in 1980 than it was. Given an elasticity of substitution of $\sigma$, a fixed capital stock, labor's share of output of $a$, and market clearing, a 0.40 ln point increase in the work force would reduce pay by $[\sigma/(1 - a)].40$ ln points.[23] At any plausible levels of $a$ and $\sigma$, the change in labor supply would have a devastating effect on real wages. For instance, with a Cobb-Douglas production function and labor's share of two thirds of GNP,[24] a 0.40 ln point increase in labor supply would reduce average earnings by 1.2 ln points, or to 30 percent of their current level. Even with a relatively small elasticity of substitution of, say, 0.15, comparable to our estimated elasticity of employment to the minimum wage, wages on the island would have been cut by 0.18 ln points, to 84 percent of their current level. Of course, the economy would have made other adjustments: the return to capital would have risen, inducing greater investment that would have partially restored the capital/labor ratio; fertility might have fallen; investments in human capital might have risen; and so on. But the first-order effect of massive return migration would clearly fall on real wages.

Given the lower education of migrants, moreover, there would be an additional reduction in earnings and productivity due to the reduced qualifications of the work force. If all the Puerto Rico born had remained on the island, the average education of the Puerto Rican work force would be roughly 0.3 years

23. With market clearing, the elasticity of substitution $(\sigma)$ is $(K' - L') / (w' - r')$, so that, with fixed capital stock, $L' = -\sigma(w' - r')$. The factor price frontier equation is $aw' + (1 - a)r' = 0$, where the price of output is the numeraire. Substituting for $r'$, we obtain $L = -\sigma\{w' + [a/(1 - a)]w'\}$, which simplifies to $L = \sigma w'/(1 - a)$, as in the text.

24. In 1980, compensation of employees was $7,202 million, national income was $9,722 million, and GNP was $11,031 million. Thus, labor's share of national income was 0.74, or approximately three-quarters, while its share of GNP was .65, or approximately two-thirds (see Junta de Planificacion, "Informe economico al gobernador," 1981). In the 1950s, labor's share of output was smaller owing to the greater importance of agriculture.

lower, implying that wages would have been some 2 percent less owing to educational qualifications. In addition, if we follow Ramos and interpret the within-education differential in earnings between migrants and U.S.-born Puerto Ricans as indicating the lower qualifications of migrants, we estimate that the earnings power of the return migrants would be 13 percent less than that of nonmigrants, reducing the productivity and earnings of the average Puerto Rican by 4 percent. All told, even with a 0.15 elasticity of substitution, we estimate that, absent migration (and further capital investments), real earnings in Puerto Rico would conservatively be on the order of 25 percent lower in 1988 than in fact they were. The implication is that, at the minimum, one-quarter of the long-term trend in real earnings on the island (an increase of 174 percent from 1951 to 1988) can be attributed to migration to the United States.

### 6.5    Conclusion

This paper has shown that the imposition of the U.S.-level minimum wage to Puerto Rico distorted the Puerto Rican earnings distribution, substantially reduced employment on the island, reallocated labor across industries, and affected the characteristics of migrants to the United States. In addition, we argued that, absent migration of the less skilled, imposition of a U.S.-level minimum on the island would have raised unemployment so much as to call into question the viability of such a policy. Thus, migration was a prerequisite for the high minimum wage. Our estimates indicate further that migration was a major contributor to the growth of real earnings on the island. All told, the massive migration from Puerto Rico demonstrates both the interplay between domestic labor market policy—in this case, imposition of a minimum wage with a bite—and migration and the potential contribution of migration to the growth of real wages in a source economy.

# Appendix A
## *Documentation for the Puerto Rican Minimum Wage Time-Series Data Set*

### Minimum Wage–Related Variables

*Average minimum wages* (AVEMIN) is a weighted average of forty-four industry minimums (thirty-seven three-digit manufacturing and seven one-digit industries). The data were gathered from the individual U.S. Department of Labor reports (the "Minimum Wage Industry Studies") that record the industry minimums in the years when industry committees set minima. The reports usually give minima for very detailed occupations. To arrive at a single minimum wage for each industry, the data had to be amalgamated. Because em-

ployment by occupation was unavailable, we took a simple average of the occupational minimum.

*Average coverage* (AVECOV) is a weighted average of coverage for the eight one-digit industries, based on table 1 of U.S. Department of Commerce (1979, 2:634). All three-digit manufacturing industries are covered by the same figure. The Department of Commerce table gives the number of wage and salary workers covered by the changes in the minimum wage law (in 1966 and 1974). This number was divided by total employment in each industry to determine the effect of the minimum on the entire economy. Since the law changed in the middle of 1974, the coverage figure for that year is the average between the 1973 and the 1975 numbers. We also created average coverage excluding agriculture and government (COVAG), for wage and salary workers (AVENCOV), and for wage and salary workers excluding agriculture and government (NCOVAG).

*Economy-wide coverage* (COVT) is based on coverage figures for 1962, 1964, 1965, 1966, 1969, 1970, 1971, 1972, 1975, and 1976 from U.S. Department of Labor, Employment Standards Administration (1977). For 1976, the figures are the same as in table 1 of U.S. Department of Commerce (1979, 2:634). We divided the figures by total employment to obtain the coverage number.

*Average wage* (AVEWAG) is the weighted average of the forty-four industry average hourly earnings. The thirty-seven detailed three-digit manufacturing earnings are from the Departamento del Trabajo's "Census of Manufacturing Industries" (1956–87). The Census was collected every October through 1981 and then not again until March 1983, so there are no figures for 1982. In the time-series analysis, the 1982 figure is the average between 1981 and 1983. For the years 1950–55, the Census was not conducted, so we applied the change in one-digit manufacturing hourly earnings from each year to 1956 to the 1956 three-digit earnings, on the assumption that earnings in each detailed sector changed at the same rate as the average in manufacturing. The one-digit industry data were obtained from the "Salario semanal mediano de los empleados asalariados por grupo industrial principal" (Departamento del Trabajo y Recursos Humanos). This source gives weekly earnings by month. To make hourly earnings, we divided the July weekly earnings by thirty-two hours.

*Average manufacturing wage* (MFGWAG) comes from the *Yearbook of Labour Statistics* (1950–87).

*Kaitz minimum wage index* (KAITZ) is the employment-weighted average of coverage times minimum/hourly earnings:

$$\Sigma a_i (m/w)_i c_i,$$

where $a_i$ is the share of employment in industry $i$, $m_i$ is the minimum in industry $i$, $w_i$ is average hourly earnings in industry $i$, and $c_i$ is the coverage in that industry. The index used the coverage, minimum, and hourly earnings figures described above. We also created a Kaitz index for wage and salary workers (NKAITZ).

The *employment by industry* numbers used in the weighting come from two sources. The individual manufacturing industry numbers are from the Departamento del Trabajo's "Census of Manufacturing Industries" for the three-digit manufacturing industries (1956–87). To get the 1950–55 numbers, we took the ratio of employment in all manufacturing in each of these years to employment in all manufacturing in 1956 and multiplied this by the 1956 employment in the detailed industry. For the remaining seven one-digit industries, the employment numbers are from the Departamento del Trabajo's "Seria historica del empleo, desempleo y grupo trabajador en Puerto Rico."

We used thirty-seven three-digit manufacturing industries: footwear, leather gloves, electrical, women's and children's clothing, children's outerwear, corsets and brassieres, men's and boy's clothing, leather handbags, women's outerwear, miscellaneous apparel, miscellaneous fabricated textiles, toys and athletic goods, jewels and jewelry, costume jewelry, office and art supplies, alcoholic beverages, cigars, tobacco, drugs, petroleum, chemicals, food, household furniture, other furniture, sawmills, paper and allied products, cement, cut stone and asbestos, portland cement and pottery, glass, sugar, textile mill products, plastics, rubber, footwear, professional instruments, and machinery and transportation equipment.

We used seven one-digit industries: transportation, construction, services, trades, finance, agriculture, and public administration.

### Macroeconomic Variables

*Puerto Rican deflator* (PRDEF) is from the Junta de Planificacion's "Informe economico al gobernador," 1954 base year.

*Puerto Rican GNP* (PRGNP) is from the Junta de Planificacion's "Informe economica al gobernador," 1954 constant dollars.

These series *Puerto Rican employment to population ratio* (PREPOP and PREPOPF) come from the monthly household surveys done in Puerto Rico. The PREPOP series combines two series: 1950–63 uses the fiscal year fourteen years old and over, reported in the Departamento del Trabajo's "Seria historica del empleo, desempleo y grupo trabajador en Puerto Rico" (table IV); 1964–87 uses the calendar year sixteen years old and over numbers from the Departmento del Trabajo's "Empleo y disemployeo en Puerto Rico" (table 17), adjusted to the 1980 Census benchmark. The PREPOPF series uses the fiscal year fourteen years old and over numbers for the entire time period, also adjusted to a 1980 Census benchmark.

*Puerto Rican unemployment rate* (PRUNEMP) is from the Departamento del Trabajo's "Seria.historica del empleo, desempleo y grupo trabajador en Puerto Rico." This series comes from the monthly household surveys done in Puerto Rico similar to our Current Population Survey.

*U.S. GNP* (USGNP) is from the *Economic Report of the President*.

Table 6A.1 gives figures for both the minimum wage–related variables and the macroeconomic variables.

**Table 6A.1**  **Data in the Time-Series Analysis**

| Year | Minimum Wage–related Variables | | | | | | Macroeconomic Variables | | | | | | Year | Dummy 1974 |
|------|--------|---------|-------|--------|------|---------|-------|--------|---------|--------|---------|---------|------|------------|
| | AVEMIN | AVEWAGE | KAITZ | AVECOV | COVT | MFGWAGE | PRDEF | PREPOP | PREPOPF | PRGNP | PRUNEMP | USGNP | | |
| 1950 | .198 | .398 | .155 | .201 | .29 | .43 | .859 | .470 | .470 | 878.7 | .154 | 1,203.7 | 1 | 0 |
| 1951 | .209 | .410 | .164 | .207 | .29 | .45 | .881 | .449 | .449 | 925.0 | .160 | 1,328.2 | 2 | 0 |
| 1952 | .225 | .421 | .180 | .226 | .29 | .48 | .953 | .434 | .434 | 1,015.9 | .148 | 1,380.0 | 3 | 0 |
| 1953 | .311 | .480 | .229 | .231 | .29 | .50 | .970 | .428 | .428 | 1,081.3 | .145 | 1,435.3 | 4 | 0 |
| 1954 | .313 | .508 | .211 | .224 | .29 | .52 | 1.000 | .415 | .415 | 1,104.4 | .153 | 1,416.2 | 5 | 0 |
| 1955 | .369 | .547 | .231 | .236 | .29 | .57 | 1.003 | .419 | .419 | 1,138.5 | .132 | 1,494.9 | 6 | 0 |
| 1956 | .447 | .601 | .257 | .245 | .29 | .64 | 1.011 | .412 | .412 | 1,185.1 | .133 | 1,525.6 | 7 | 0 |
| 1957 | .488 | .685 | .251 | .244 | .29 | .76 | 1.035 | .412 | .412 | 1,221.8 | .128 | 1,551.1 | 8 | 0 |
| 1958 | .555 | .716 | .258 | .238 | .29 | .83 | 1.089 | .397 | .397 | 1,258.4 | .142 | 1,539.2 | 9 | 0 |
| 1959 | .588 | .789 | .266 | .260 | .29 | .87 | 1.110 | .394 | .394 | 1,363.6 | .133 | 1,629.1 | 10 | 0 |
| 1960 | .616 | .840 | .268 | .270 | .29 | .92 | 1.138 | .403 | .403 | 1,473.2 | .118 | 1,665.3 | 11 | 0 |
| 1961 | .608 | .875 | .251 | .269 | .29 | .99 | 1.173 | .397 | .397 | 1,562.8 | .127 | 1,708.7 | 12 | 0 |
| 1962 | .707 | .933 | .270 | .279 | .29 | 1.06 | 1.216 | .385 | .385 | 1,683.9 | .128 | 1,799.4 | 13 | 0 |
| 1963 | .723 | 1.036 | .255 | .279 | .29 | 1.13 | 1.247 | .395 | .395 | 1,820.7 | .110 | 1,873.3 | 14 | 0 |
| 1964 | .809 | 1.097 | .274 | .294 | .31 | 1.18 | 1.298 | .396 | .396 | 1,916.8 | .112 | 1,973.3 | 15 | 0 |
| 1965 | .834 | 1.176 | .271 | .302 | .31 | 1.23 | 1.327 | .401 | .401 | 2,083.0 | .117 | 2,087.6 | 16 | 0 |

| | | | | | | | | | | | | | |
|------|-------|-------|------|------|-----|------|-------|------|------|---------|------|---------|----|----|
| 1966 | .854  | 1.288 | .325 | .444 | .44 | 1.29 | 1.358 | .399 | .399 | 2,223.2 | .123 | 2,208.3 | 17 | 0  |
| 1967 | .971  | 1.371 | .365 | .448 | .44 | 1.39 | 1.421 | .399 | .399 | 2,328.4 | .116 | 2,271.4 | 18 | 0  |
| 1968 | 1.104 | 1.512 | .381 | .455 | .44 | 1.55 | 1.500 | .403 | .403 | 2,455.3 | .103 | 2,365.6 | 19 | 0  |
| 1969 | 1.149 | 1.667 | .360 | .455 | .49 | 1.65 | 1.552 | .399 | .399 | 2,684.0 | .103 | 2,423.3 | 20 | 0  |
| 1970 | 1.209 | 1.856 | .347 | .458 | .47 | 1.76 | 1.616 | .428 | .395 | 2,901.4 | .107 | 2,416.2 | 21 | 0  |
| 1971 | 1.224 | 1.990 | .331 | .457 | .47 | 1.87 | 1.708 | .423 | .398 | 3,075.6 | .116 | 2,484.8 | 22 | 0  |
| 1972 | 1.257 | 2.144 | .316 | .449 | .47 | 2.00 | 1.780 | .423 | .393 | 3,215.9 | .119 | 2,608.5 | 23 | 0  |
| 1973 | 1.262 | 2.281 | .304 | .452 | .47 | 2.13 | 1.817 | .421 | .389 | 3,450.3 | .116 | 2,744.1 | 24 | 0  |
| 1974 | 1.681 | 2.452 | .381 | .544 | .60 | 2.32 | 1.946 | .405 | .358 | 3,493.6 | .132 | 2,729.3 | 25 | 1  |
| 1975 | 1.871 | 2.562 | .434 | .594 | .66 | 2.56 | 2.082 | .368 | .336 | 3,424.7 | .181 | 2,695.0 | 26 | 2  |
| 1976 | 2.034 | 2.681 | .442 | .588 | .64 | 2.78 | 2.174 | .364 | .334 | 3,461.6 | .195 | 2,826.7 | 27 | 3  |
| 1977 | 2.198 | 3.023 | .435 | .590 | .64 | 3.02 | 2.240 | .358 | .364 | 3,623.5 | .199 | 2,958.6 | 28 | 4  |
| 1978 | 2.509 | 3.323 | .456 | .596 | .64 | 3.36 | 2.340 | .362 | .360 | 3,817.4 | .181 | 3,115.2 | 29 | 5  |
| 1979 | 2.768 | 3.589 | .468 | .594 | .64 | 3.69 | 2.483 | .360 | .360 | 4,025.0 | .170 | 3,192.4 | 30 | 6  |
| 1980 | 2.997 | 3.883 | .461 | .589 | .64 | 4.02 | 2.716 | .359 | .355 | 4,076.8 | .171 | 3,187.1 | 31 | 7  |
| 1981 | 3.264 | 4.181 | .467 | .587 | .64 | 4.39 | 2.954 | .343 | .328 | 4,127.0 | .199 | 3,248.8 | 32 | 8  |
| 1982 | 3.305 | 4.318 | .461 | .585 | .64 | 4.64 | 3.175 | .318 | .314 | 3,976.5 | .228 | 3,166.0 | 33 | 9  |
| 1983 | 3.350 | 4.456 | .454 | .583 | .64 | 4.83 | 3.321 | .321 | .329 | 3,894.8 | .234 | 3,279.1 | 34 | 10 |
| 1984 | 3.350 | 4.498 | .449 | .586 | .64 | 5.02 | 3.461 | .334 | .332 | 4,048.4 | .207 | 3,501.4 | 35 | 11 |
| 1985 | 3.350 | 4.565 | .440 | .579 | .64 | 5.19 | 3.548 | .331 | .338 | 4,172.8 | .218 | 3,607.5 | 36 | 12 |
| 1986 | 3.350 | 4.725 | .426 | .581 | .64 | 5.31 | 3.697 | .351 | .362 | 4,281.6 | .189 | 3,713.3 | 37 | 13 |
| 1987 | 3.350 | 4.879 | .409 | .582 | .64 | 5.33 | 3.787 | .369 | .377 | 4,496.7 | .168 | 3,819.6 | 38 | 14 |

# Appendix B

## Log Earnings Equations for Men in Puerto Rico and for Migrants to the United States

| | Log Wage | | | | Log Annual Earnings | | | |
| | 1980 | | 1970 | | 1980 | | 1970 | |
| | Mig. | PR | Mig. | PR | Mig. | PR | Mig. | PR |
|---|---|---|---|---|---|---|---|---|
| Grade com- | .036 | .077 | .048 | .071 | .048 | .127 | .048 | .071 |
| plete | (.003) | (.001) | (.004) | (.002) | (.003) | (.001) | (.004) | (.002) |
| Experience: | | | | | | | | |
| 0–5 | −.51 | −.47 | −.52 | −.39 | −.96 | −.96 | −.52 | −.40 |
| | (.05) | (.02) | (.07) | (.04) | (.05) | (.02) | (.07) | (.04) |
| 6–10 | −.40 | −.31 | −.26 | −.29 | −.60 | −.57 | −.26 | −.29 |
| | (.03) | (.02) | (.05) | (.03) | (.04) | (.02) | (.05) | (.03) |
| 11–15 | −.15 | −.21 | −.09 | −.16 | −.24 | −.37 | −.08 | −.16 |
| | (.03) | (.02) | (.04) | (.02) | (.04) | (.02) | (.05) | (.02) |
| 16–20 | −.09 | −.10 | −.04 | −.06 | −.11 | −.20 | −.04 | −.06 |
| | (.03) | (.02) | (.05) | (.02) | (.04) | (.02) | (.05) | (.02) |
| 21–25 | −.05 | −.07 | −.04 | −.07 | −.04 | −.13 | −.04 | −.08 |
| | (.03) | (.02) | (.05) | (.03) | (.04) | (.02) | (.05) | (.03) |
| 26+ | . . . | . . . | . . . | . . . | . . . | . . . | . . . | . . . |
| Constant | 1.43 | .51 | .69 | −.07 | 8.76 | 7.36 | .69 | −.07 |
| $R^2$ | .04 | .12 | .07 | .16 | .08 | .23 | .07 | .16 |
| N | 6,247 | 26,193 | 1,912 | 8,694 | 6,275 | 26,743 | 1,912 | 8,694 |

*Source:* 1980 and 1970 Puerto Rican and U.S. Censuses.

*Note:* "Mig." is Puerto Rican men who have migrated to the United States; "PR" is men in Puerto Rico. Standard errors are given in parentheses.

# Appendix C

## The Effects of Age, Grade, and English Ability on Employment in Puerto Rico and Emigration to the United States

| Controls | Probability Not Employed or Paid ≤$2.95 in Puerto Rico | | Probability Migrant | | Probability Migrant Adjusted for English | |
|---|---|---|---|---|---|---|
| | Male | Female | Male | Female | Male | Female |
| **Age:** | | | | | | |
| 16–20 | .09 | .01 | − .02 | − .02 | .06 | .06 |
| | (.01) | (.01) | (.01) | (.01) | (.01) | (.01) |
| 21–25 | .01 | − .02 | .01 | .02 | .08 | .09 |
| | (.01) | (.01) | (.01) | (.01) | (.01) | (.01) |
| 26–30 | − .10 | − .07 | .06 | .06 | .09 | .10 |
| | (.01) | (.01) | (.01) | (.01) | (.01) | (.01) |
| 31–35 | − .17 | − .08 | .08 | .07 | .08 | .08 |
| | (.01) | (.01) | (.01) | (.01) | (.01) | (.01) |
| 36–40 | − .18 | − .08 | .07 | .06 | .06 | .07 |
| | (.01) | (.01) | (.01) | (.01) | (.01) | (.01) |
| 41–45 | − .20 | − .09 | .06 | .05 | .03 | .05 |
| | (.01) | (.01) | (.01) | (.01) | (.01) | (.01) |
| 46–50 | − .16 | − .08 | .06 | .04 | .03 | .03 |
| | (.01) | (.01) | (.01) | (.01) | (.01) | (.01) |
| 51–55 | − .13 | − .05 | .05 | .03 | .02 | .03 |
| | (.01) | (.01) | (.01) | (.01) | (.01) | (.01) |
| 56–60 | − .07 | − .02 | .02 | .01 | .01 | .00 |
| | (.01) | (.01) | (.01) | (.01) | (.01) | (.01) |
| 61–64 | . . . | . . . | . . . | . . . | . . . | . . . |
| **Grade:** | | | | | | |
| 0–6 | .57 | .57 | .09 | .11 | .01 | .04 |
| | (.01) | (.01) | (.01) | (.01) | (.01) | (.01) |
| 7–8 | .50 | .55 | .16 | .19 | .00 | .02 |
| | (.01) | (.01) | (.01) | (.01) | (.01) | (.01) |
| 9–11 | .46 | .52 | .17 | .19 | − .03 | − .03 |
| | (.01) | (.01) | (.01) | (.01) | (.01) | (.01) |
| 12 | .33 | .42 | .09 | .11 | − .14 | − .14 |
| | (.01) | (.01) | (.01) | (.01) | (.01) | (.01) |
| 13–15 | .20 | .26 | .08 | .07 | − .23 | − .25 |
| | (.01) | (.01) | (.01) | (.01) | (.01) | (.01) |
| 16+ | . . . | . . . | 0 | .01 | − .36 | − .37 |
| | | | (.01) | (.01) | (.01) | (.01) |
| **English ability:** | | | | | | |
| Well | | | | | .43 | .46 |
| | | | | | (.01) | (.01) |
| Not well | | | | | .16 | .20 |
| | | | | | (.01) | (.01) |
| Not at all | | | | | . . . | . . . |
| Constant | .33 | .44 | . . . | . . . | . . . | . . . |
| $R^2$ | .17 | .20 | .17 | .18 | .34 | .35 |
| N | 48,270 | 53,349 | 56,810 | 63,561 | 56,451 | 63,210 |

*Source:* 1980 Puerto Rican and U.S. Censuses.
*Note:* Standard errors are given in parentheses.

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