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**The Effect of Naturalization on Wage Growth—  
A Panel Study of Young Male Immigrants**

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## **Abstract**

For young male immigrants, naturalization facilitates assimilation into the U.S. labor market. Following naturalization, immigrants gain access to public-sector, white-collar, and union jobs, and wage growth accelerates. These findings are consistent with the proposition that naturalization fosters labor market success of immigrants by removing barriers to employment. Although the faster wage growth of immigrants who naturalize might alternatively be explained by greater human capital investment prior to naturalization, stemming from a long-term commitment to U.S. labor markets, there is no evidence that wage growth accelerates or that the distribution of jobs improves until after citizenship is attained. Finally, the gains from naturalization are greater for immigrants from less-developed countries and persist when we control for unobserved productivity characteristics of workers.

JEL classification: J61, J31

## I. Introduction

Prior studies suggest that new immigrants assimilate into the labor market by acquiring such skills as language proficiency, familiarity with the host country's culture, and contacts in the labor market, thereby promoting rapid wage growth. In this paper, we investigate whether acquisition of U.S. citizenship by young male immigrants also facilitates the assimilation process. In particular, the study examines whether naturalization leads to higher wages, either immediately or by accelerating wage growth. Because evidence from cross-sectional data may confound the true effects of citizenship and unobservable characteristics of naturalized citizens, our analysis relies heavily on longitudinal data.

Naturalization is the process through which an immigrant obtains citizenship in the host country. In the United States, general requirements for naturalization include legal immigrant admission, five years of continuous residence in the country, and an age of at least 18 years. In addition, the immigrant must be of good moral character and must pass a test of proficiency in the English language and knowledge of the U.S. government and U.S. history. Approximately 4 percent of those who naturalize are exempted from one or more of these requirements. For example, immigrants who are spouses of U.S. citizens need reside in the country only three years prior to naturalization. As immigration has increased, so too has the number of immigrants who naturalize. From a rate of 220,000 per year in the 1980s, naturalizations rose to an average of 740,000 during fiscal years 1996-99 (U.S. Immigration and Naturalization Service, 1997; 1998; 1999a).<sup>1</sup> These developments make it increasingly important that we understand the consequences of naturalization.

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<sup>1</sup> Jasso and Rosenzweig (1986, 1990), Portes and Curtis (1987), and Yang (1994) study the determinants of the naturalization decision; DeSipio (1987) provides a partial review of this literature. For a discussion of U.S. policy on naturalization, see Briggs (1996), chapter 3.

There are at least two channels through which citizenship may impact the wage growth of U.S. immigrants.<sup>2</sup> First, naturalization allows entry into certain jobs. For example, employment in many federal agencies, think tanks, and the defense industry is limited to U.S. citizens. Many states also require citizenship for jobs involving public safety, including police officer. In addition, some employers may prefer to hire naturalized citizens over non-naturalized immigrants because of a taste for discrimination by employers, employees, customers, or unions (Becker, 1971) or because a U.S. passport (available only to U.S. citizens) reduces the likelihood of employer sanctions resulting from employing an illegal immigrant (Bucci and Tenorio, 1997). U.S. citizens may also be preferred because of the greater ease with which those who have a U.S. passport may travel abroad. Especially in certain white-collar positions, travel can be an important component of the job. In addition, employers may prefer naturalized citizens to other immigrants because of a concern that noncitizens may be less committed to the job and are more likely to return to the home country. When citizens and noncitizens are equally qualified for a job, employers may legally use U.S. citizenship as the basis for employment.

Alternatively, the naturalization decision may reflect the immigrant's decision to stay in the United States. As in Mincer and Polachek's (1974) study of family investments in human capital, the long-term commitment to residence in the United States encourages investment in U.S.-specific human capital, thus accelerating wage growth.<sup>3</sup> In this scenario, higher wages of those who naturalize result not from citizenship but from the preceding commitment to remain in

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<sup>2</sup> The literature examining wage growth of immigrants is surveyed in Greenwood and McDowell (1986), Schoeni (1997), and Borjas (1999).

<sup>3</sup> Borjas (1982) describes a similar process for political refugees in the United States. Because political refugees face high costs of return migration, they have a greater incentive to invest in U.S.-specific human capital. Consistent with this scenario, Borjas finds high rates of wage growth among Cuban immigrants. See also Stewart and Hyclak (1984) and Greenwood and McDowell (1986), who outline similar arguments.

the United States and to acquire additional skills valued in the U.S. labor market. It is not obvious which of these two stories is more appropriate.

In addition, citizenship may be correlated with wages because of unmeasured productivity characteristics of those who naturalize. In that event, the effects of naturalization and personal characteristics may be confounded. To disentangle these effects and to study the dynamics of wage change and naturalization, the empirical analysis incorporates panel data.

The present research is motivated in part by an observation in Chiswick's (1978) seminal paper on immigrant wage assimilation. Based on 1970 census data, Chiswick reports that naturalized foreign-born men earn 15 percent more than non-naturalized men with similar socioeconomic characteristics. However, Chiswick downplays the naturalization effect because it falls to 7 percent (and loses statistical significance) when he controls for years since migration in the wage regression.<sup>4</sup>

In the next section, we sketch a framework for analyzing differences in wages and the job distribution of immigrants who naturalize and those who do not. The empirical analysis of the following two sections presents wage and probit equations relying first on cross-sectional data, including the 1990 census and 1994-98 current population surveys, and then on a longitudinal sample of foreign-born youths drawn from the National Longitudinal Survey of Youth. Cross-sectional data indicate that wages are positively correlated with naturalization and that this effect is most pronounced for immigrants from less-developed countries. Immigrants who naturalize also have a more favorable job distribution. What cross-sectional analysis cannot reveal is whether the higher wages and superior job distribution are the result of naturalization *per se*,

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<sup>4</sup> In subsequent work based on 1980 census data, Chiswick and Miller (1992, 1993) place the earnings premium associated with citizenship at approximately 5 percent.

greater investment in human capital of those who eventually naturalize, or favorable personal characteristics of these immigrants. Such questions can be answered only with longitudinal data.

Longitudinal analysis reveals that naturalization is associated with faster wage growth even after accounting for unobserved characteristics of the immigrant. Naturalization is followed by an immediate increase in white-collar employment and a growing presence in public-sector and union jobs. These findings are consistent with the story that naturalization leads to superior employment opportunities. In contrast, there is no evidence that wage growth begins prior to naturalization, as one would anticipate if immigrants who planned to naturalize invested heavily in human capital prior to naturalization. The final section draws implications on the importance of citizenship for assimilation into the U.S. labor market.

## **II. Framework**

Citizenship provides various benefits, including greater employment opportunities. For certain jobs, citizenship is required. For example, in the October 1999 issue of *Job Openings for Economists*, 19 of 45 job announcements aimed at Ph.D. economists by non-academic employers in the United States explicitly required U.S. citizenship. Included were positions with the CNA Corporation, the National Institute of Standards and Technology, and such federal agencies as the Bureau of Labor Statistics and the Federal Trade Commission. For other jobs, citizenship is preferred.

Other benefits of citizenship include the ability to vote, run for political office, sponsor adult relatives, draw full Social Security benefits upon retiring abroad, and eligibility for various fellowships and educational programs (Rhodes Scholarships, Fulbright programs, etc.). As the INS (1999b, p. 3) notes: “A U.S. passport allows citizens the freedom to travel. In addition,

citizens receive U.S. Government protection and assistance when abroad.” There are also costs to citizenship. Those who naturalize are subject to any military draft, must forfeit rights in the home country, and must agree to be fingerprinted. Immigrants must acquire sufficient knowledge of English to demonstrate proficiency in English reading, writing, speaking, and listening; must learn enough U.S. history and civics to pass a test over this subject matter; and must pay a naturalization application fee. Immigrants must also avoid activities that could lead to disqualification, such as failure to support dependents; smuggling illegal aliens into the country; habitual drunkenness; and crimes involving substance abuse, moral turpitude, or two or more gambling offenses.

The value of citizenship is likely to vary from immigrant to immigrant depending on the weights attached to the various costs and benefits. In addition, there may be systematic differences based on country of origin. If barriers to employment are greater for immigrants from less-developed countries, and if naturalization lowers these barriers, then the benefits of citizenship will generally be greater for immigrants from less-developed countries.

The value of citizenship is also likely to be related to the employment preferences of the immigrant. An immigrant who wishes to work in the public sector, where many jobs are reserved for citizens, is likely to benefit to a greater degree than is an immigrant for whom employment opportunities are not constrained by citizenship. Similarly, when international travel is required, as it is for certain white-collar jobs, the benefits of citizenship may be greater than when citizenship conveys no such advantages. For such reasons, the wage advantage of citizenship is likely to be greater in certain lines of work than in others, and therefore immigrants who prefer such lines of work have a greater incentive to naturalize. Accordingly, the benefits to

those who naturalize may overstate the benefits that would accrue to immigrants who do not naturalize.

As already noted, wages may be correlated with naturalization for several reasons. First, naturalization allows entry into otherwise restricted jobs. This is especially likely to be the case for white-collar and public-sector employment. To the extent there is queuing for union jobs, citizenship may also enhance prospects of obtaining union employment.

Alternatively, the decision to naturalize may reflect a commitment to remain in the United States. Those who plan to work in U.S. labor markets long term have a greater incentive than other immigrants to invest in human capital valued in U.S. labor markets. In that event, those who naturalize will receive higher wages because of their greater human capital even if naturalization itself has no effect on wages. Indeed, because wages are likely to grow with the acquisition of human capital, those who eventually naturalize can be expected to experience faster wage growth even prior to naturalization.

Finally, immigrants who naturalize may have different unmeasured productivity than immigrants who do not naturalize. Those who naturalize must demonstrate proficiency in the English language, an ability to learn U.S. history, test-taking skills, good moral character, and a commitment to the United States. Given such favorable characteristics, it is possible that immigrants who happen to naturalize would do better in the U.S. labor market even if they were not naturalized, and that their higher wages merely capture the correlation between naturalization and unobservable characteristics of the immigrant.<sup>5</sup>

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<sup>5</sup> Correlation between unmeasured characteristics and naturalization can also arise from selective return migration. For example, extending the Roy-model, Borjas and Bratsberg (1996) show that skill levels of immigrants who return migrate differ from those of immigrants who stay in the United States.



Based on the preceding discussion, the relationship between wages and naturalization can be modeled by the following equation:

$$(1) \quad \ln w_{it} = \alpha_0 N_{it} + \alpha_1 N_{it} (X_{it} - X_{iN}) + \alpha_2 D_i X_{it} + \gamma_1 X_{it} + \gamma_2 X_{it}^2 + \delta Z_{it} + \mu_i + u_{it},$$

where  $w_{it}$  denotes the hourly wage of individual  $i$  in year  $t$ ;  $N_{it}$  is an indicator variable set to unity if the foreign-born is a naturalized U.S. citizen in year  $t$  and  $D_i$  a time-invariant indicator for those who eventually naturalize;  $X_{it}$  measures labor market experience, with  $X_{iN}$  denoting experience at the time of the naturalization event; and  $Z_{it}$  is a vector of control variables. The regression error is specified with two components, with  $\mu_i$  capturing time-invariant unobserved characteristics of the individual.

This specification allows naturalization to raise wages either immediately ( $\alpha_0 > 0$ ) or by accelerating wage growth following naturalization ( $\alpha_1 > 0$ ). Both results are consistent with the proposition that naturalization creates better job opportunities. In addition, faster wage growth is permitted prior to naturalization for immigrants who eventually naturalize ( $\alpha_2 > 0$ ), as would be expected if immigrants who naturalize increase human capital investment in advance of naturalization. Finally, unmeasured personal characteristics are allowed to differ across individuals to capture the possibility that higher wages of immigrants who naturalize result from their superior unmeasured productivity rather than from naturalization. Equation (1) forms the basis for longitudinal estimation.

For large, cross-sectional data sets, including the decennial censuses and the current population surveys, data are not available for year of naturalization. Therefore, in our cross-sectional analyses, the terms  $(X_{it} - X_{iN})$  and  $D_i X_{it}$  drop out of the equation, as does  $\mu_i$ , and the

coefficient of  $N_{it}$  captures the net wage advantage of immigrants who are naturalized. Although cross-sectional estimates are in a sense less revealing, they are based on much larger samples, which allows us to examine the effect of naturalization by country of origin.

*Higher Wages through Better Jobs?* The discussion to this point suggests that wages and the distribution of jobs are intimately related. Indeed, the higher pay of immigrants who have naturalized may reflect the superior jobs in which they work. To examine this issue more formally, we estimate probit equations that link the likelihood of being in a preferred job category to the worker's naturalization status. Given limitations of the data, the cross-sectional probit analysis is, of necessity, static. It provides an indication of the extent to which the higher pay of those who naturalize is related to a superior job distribution. In contrast, the longitudinal data contain information on date of naturalization, which allows us to track the time path of any movement to better jobs.

For the longitudinal analysis, the following probit equation is estimated:

$$(2) \quad \Pr(job_{it} = 1) = \Phi(\beta_0 N_{it} + \beta_1 Y_{it} + \beta_2 Y_{it}^2 + \beta_3 D_i + \pi V_{it}),$$

where  $job_{it}$  is an indicator variable alternatively reflecting white-collar, public-sector, or union employment of individual  $i$  in year  $t$ ;  $N_{it}$  and  $D_i$  as previously defined capture naturalization status as of year  $t$  and whether or not the individual ever naturalizes;  $Y_{it}$  denotes years since the naturalization event;  $V_{it}$  is a vector of control variables; and  $\Phi$  is the cumulative standard normal distribution function.

This model provides indirect evidence as to the reasons for higher pay of immigrants who have naturalized. According to the first scenario, higher wages result to a considerable extent

from the movement into better jobs following naturalization. If this story is true, the job distribution should change following naturalization. If the change is immediate, the coefficient of naturalization in the dynamic probit equation should be positive ( $\beta_0 > 0$ ). If the movement is gradual, the probability of being in a select job should rise with years since naturalization ( $\beta_1 > 0$ ).

A changing job distribution is also consistent with the second story. Those who make a long-term commitment to remain in the United States and to invest in U.S.-specific human capital can be expected to have better jobs than immigrants who have not made such a commitment. But because the human capital investment precedes citizenship, the movement to preferred jobs should also begin prior to naturalization.

Finally, those who naturalize may have been more likely, even in the absence of naturalization, to hold good jobs ( $\beta_3 > 0$ ). Indeed, differences in the distribution of jobs may be independent of the naturalization event ( $\beta_0 = \beta_1 = \beta_2 = 0$ ). On a theoretical basis then, one would expect the distribution of jobs to display different time patterns depending on the reason that naturalized citizens have higher wages. Therefore, looking at the dynamics of job changes sheds light on why and how naturalization is associated with higher pay.

### **III. Wages, Job Distribution, and Naturalization— Evidence from Cross-Sectional Data**

We begin the empirical analysis by reexamining the association between pay and naturalization in cross-sectional data along the lines of Chiswick (1978), but based on data from the 1990 census and the 1994-98 current population surveys. The census samples, drawn from the 5/100 public-use micro data files, are restricted to foreign-born men aged 18-64 who were

neither enrolled in school nor on active military duty, reported positive values for hours worked per week and weeks worked in 1989, and earned at least \$1,000 wage or salary income in 1989. Similarly, the CPS samples, drawn from the 1994-1998 Outgoing Rotation Groups,<sup>6</sup> are restricted to men aged 18-64 who were not enrolled in school and reported positive weekly earnings and usual hours worked per week at the time of the interview. To screen out immigrants who are not likely eligible for naturalization, we further restrict samples to those with at least five years of residence in the United States.<sup>7</sup> The CPS data contain observations from several years, so it is possible to implement the synthetic panel approach of Borjas (1985; 1994) with these data to separate assimilation and cohort effects on wages. Because this methodology uses wages of native-born workers to identify period effects, the CPS samples of immigrant men are augmented with 10 percent random-sample extracts of native-born men. Sample sizes are 201,857 for the census data and 67,748 (36,019 immigrants and 31,729 natives) for the CPS data; descriptive sample statistics are presented in Appendix Table A-1.

Table 1 reports estimates of the coefficient  $\alpha_0$  of Equation (1) for both census data (panel A) and CPS data (panel B). The table shows that immigrants who are naturalized U.S. citizens earn higher wages than immigrants who are not naturalized. According to estimates in column 1, naturalized male immigrants earned 9.1 percent higher pay in census data ( $\exp(.0868) - 1 = .0907$ ) and 10.7 percent higher pay in CPS data than non-naturalized immigrants with similar socioeconomic characteristics. Part of the pay differential between naturalized and non-naturalized immigrants reflects the fact that naturalized immigrants on average have spent more

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<sup>6</sup> The Outgoing Rotation Groups first included information on country of birth and year of immigration in 1994.

<sup>7</sup> Unfortunately, neither census nor CPS data contain information on immigrant status of those who are not naturalized, and the broader group of non-naturalized immigrants includes illegal immigrants, foreign-borns with temporary visas (either with or without work authorization), and permanent residents (“green-card” holders). We return to wage differences according to legal status in the next section.

time in the United States. When the regression controls for years since arrival (column 2), the wage advantage of naturalized immigrants over non-naturalized immigrants falls to 6.6 percent in census data and 7.4 percent in CPS data. These figures are almost identical to the association between earnings and naturalization uncovered by Chiswick (1978) in 1970 census data.<sup>8</sup>

In columns 3-5, the regression specifications sequentially add control variables for country/continent of birth, industry, and occupation. Results show that the association between wages and naturalization is reduced somewhat when industry and occupational controls are included in the model. The implication is that a portion of the pay advantage stems from naturalized immigrants being employed in better-paying industries and occupations than non-naturalized immigrants. However, the estimated association between naturalization and the hourly wage of the immigrant remains sizable and statistically significant even after the regressions control for industry and occupation.

The regression results from census and CPS data indicate large differences in pay between naturalized and non-naturalized U.S. immigrants. Because these findings are based on cross-sectional data, we are unable to conclude that the higher pay is associated with naturalization *per se*, as opposed to unmeasured characteristics of those who naturalize. Further, because census and CPS data provide no information on date of naturalization, we are unable to address the important issue of whether higher wages precede or follow the naturalization event.

In the next section, therefore, we turn to longitudinal data, which allow estimation of the effect of naturalization on pay after controlling for unobserved productivity characteristics of the worker. The longitudinal data are drawn from the National Longitudinal Survey of Youth (NLSY)—a data set with a younger age distribution than the samples underlying the regression

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<sup>8</sup> In a regression of log annual earnings using a specification that closely resembles that in column 2, Chiswick

results reported in Table 1. To obtain a benchmark for the longitudinal study, we first estimate the naturalization effect in census and CPS data for samples of young male immigrants, restricting samples to those less than 30 years of age.<sup>9</sup> Regression results are presented in Table 2, panels A and B. The panels show that naturalized youths earn a sizable wage advantage over non-naturalized youths, between 5.4 percent and 11.8 percent depending on sample and control variables. When the regression controls for years since arrival (columns 2-5), coefficient estimates in Table 2 are somewhat higher than those reported in Table 1, suggesting that the effect of naturalization on wages may be slightly larger for young immigrants than for older immigrants.

For comparative purposes, Table 2 also presents random-effects estimates based on the NLSY sample, which will be described in the following section. As the table reveals, the correlation between naturalization and wages is comparable in all three samples of young workers. Therefore, findings based on longitudinal analysis of the NLSY sample cannot be attributed to an anomalous relationship between the variables in this sample.

Because white-collar, public-sector, and union jobs are commonly associated with higher pay, we next examine the relationship between naturalization and likelihood of employment in each of these sectors. Table 3 shows that, in both census and CPS data, white-collar and public-sector employment rates are significantly higher for immigrants who are naturalized U.S. citizens than for immigrants who are not. Controlling for individual characteristics such as age and time since migration, naturalization raises the probit index for white-collar employment by about .11 standard deviation. For example, as implied by the coefficient in column 1, the probability of holding a white-collar job increases from .532 to .574 following naturalization when evaluated at

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reports a coefficient on *Alien* (non-naturalized immigrant) of  $-.0679$ , or minus 7.0 percent.

the sample mean. Because public-sector employment rates are generally much lower than those of white-collar employment, the relative impact of naturalization is even greater on employment in the public sector. According to the coefficient estimate in column 3 and evaluated at the sample mean, naturalization is associated with a 50 percent rise in public-sector employment, with the employment rate increasing from .029 to .043. Data on union status are not available in the census, but in the CPS the likelihood of holding a union job is 5.0 percentage points higher if the immigrant is naturalized (the sample mean of union employment is .153).<sup>10</sup> Results of Table 3 are therefore consistent with the proposition that U.S. citizenship facilitates entry into certain higher-paying jobs.

*Country Effects.* The results presented to this stage do not allow for the possibility that the effect of naturalization varies across immigrants based on country of origin. But if naturalization expands job opportunities of immigrants and leads to higher wages, the economic value of citizenship may be greatest for immigrants whose job opportunities are restricted most severely by lack of citizenship. We hypothesize that job restrictions are greatest for immigrants from less developed countries and therefore such immigrants benefit disproportionately from citizenship. To test this proposition, we augment the wage and employment equations with the 1975 per-capita GDP of the source country and an interaction term between naturalization status and per-capita GDP.<sup>11</sup> Results are presented in Table 4.

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<sup>9</sup> The sampling rule creates youth samples with the same mean age as the NLSY sample (25 years).

<sup>10</sup> Funkhouser (1993) studies unionization behavior of U.S. immigrants and concludes that the propensity to unionize resembles that of natives.

<sup>11</sup> Data on per-capita GDP are collected from Summers and Heston (1991) and U.S. Arms Control and Disarmament Agency (1984); GDP is expressed in 1985 U.S. dollars. Restricting the analysis to countries with at least 50 observations in the 1990 census sample, GDP data are available for 90 countries representing 91.1 percent of the original sample (individuals who do not report exact country of birth make up another 3.9 percent of the sample). Some countries are not represented in the CPS data because of the generally smaller sample size. To facilitate interpretation of the coefficient of *Naturalized*, the interaction term uses the deviation of the GDP variable from its sample mean.

As the results in columns 1 and 2 reveal, immigrants from highly developed countries receive a smaller premium from naturalization than do immigrants from less developed countries. When the regression controls for industry and occupation, as in column 2, the coefficient of the interaction term shows that the naturalization premium falls by a statistically significant .7 percentage point for each \$1,000 increase in the per-capita GDP of the source country.<sup>12</sup> To illustrate, going from the level of development of El Salvador (1975 per-capita GDP of \$2,035) to that of Italy (\$8,282) is associated with a reduction of the naturalization premium from .072 to .029 (the sample mean per-capita GDP is \$4,948). The remaining columns of Table 4 show that, as was true for wages, the association between naturalization and employment in white-collar or public-sector jobs is weaker the more developed is the source country. The correlation between naturalization and union employment, however, is not affected by the level of development of the source country (column 5).

Prior studies have found that source country GDP has a positive impact on earnings of immigrants in the United States (Jasso and Rosenzweig, 1986). This effect is also evident in Table 4. For each \$1,000 increase in per-capita GDP, hourly wages rise by about 2 percent. Interestingly, controlling for basic socioeconomic characteristics of the immigrant, we find no correlation between the level of source country development and employment rates in white-collar and public-sector jobs (columns 3 and 4) and a negative correlation between development and union employment (column 5).

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<sup>12</sup> To avoid biases in standard errors caused by within-country correlations of regression errors (Moulton, 1986), regressions are estimated allowing for a country-of-birth random effect.



#### **IV. Evidence on the Effect of Naturalization from the National Longitudinal Survey of Youth**

In this section, we present evidence on the effect of naturalization on hourly pay based on a sample of foreign-born youths drawn from the NLSY. The NLSY is a longitudinal survey of 12,686 youths aged 14-22 when first interviewed in 1979.<sup>13</sup> The original sample included 874 persons who were born abroad, but we restrict the analyses to the non-military subsamples, which contain 810 foreign-born persons. The 1990 interview contained a supplemental questionnaire on immigration issues—including whether the immigrant had naturalized and the year and month of naturalization—that was completed by 683 foreign-born survey participants, of whom 344 were males. The present study tracks these individuals through the first 13 waves of the NLSY (1979-1991). Thirty-four male youths were naturalized at the time of the first interview in 1979, and 95 had naturalized by 1990.<sup>14</sup>

Information on hourly wages, job tenure, and collective bargaining coverage are matched each year to the individual's primary job (or "CPS job"), which is the focus of our analysis. We further augment the base NLSY data with information on work experience drawn from the NLSY Work History data set. Thus our experience measure is actual work experience computed from weeks the individual worked between January 1, 1975, and the interview date. We drop observations for any year in which the individual reports earning less than \$1.50 or more than \$300 per hour (1987 constant dollars) or being enrolled in school. Also excluded are observations with missing information on key variables used in the analysis. (We impute

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<sup>13</sup> Because we include the supplemental samples of the NLSY designed to oversample Hispanic, black, and economically disadvantaged white youths, immigrants from Mexico and Central America are over-represented in the NLSY data. For example, 46.7 percent of our NLSY sample of foreign-born youths were born in Mexico, compared to 25.8 percent of the census sample. Because of small samples representing individual countries, we are unable to study GDP interaction effects in the NLSY sample.

education for 13 observations and SMSA residence for 85 observations with values that are missing but are the same in prior and subsequent years.) The sample restrictions leave a sample of 2,514 observations of 332 immigrant males.

An important advantage of panel data is that they allow us to account for individual heterogeneity in unobservable characteristics when estimating the wage model in Equation (1). Diagnostic tests concerning treatment of the individual-specific component of the error term,  $\mu_i$ , overwhelmingly reject both OLS and random-effects specifications of the equation. First, a Lagrange multiplier test of the null hypothesis that the variance of  $\mu_i$  is zero (Baltagi, 1995)—an assumption implicit in the OLS formulation of the model—yields a  $\chi^2(1)$  test statistics of 889.15. In addition, a Hausman specification test strongly rejects the hypothesis of zero correlation between  $\mu_i$  and the regressors—an assumption needed for consistency of the random-effects estimator—with a  $\chi^2(35)$  test statistic of 185.44.<sup>15</sup> We conclude that there is considerable individual heterogeneity in the error term of the wage equation in our samples of immigrant youths and proceed by treating the individual component as a fixed effect.<sup>16</sup>

Results from the fixed-effects estimation of the wage equation are reported in Table 5. Column 1 shows that the positive impact of naturalization on wages persists even when the model includes an individual fixed effect. We therefore rule out differential unobserved

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<sup>14</sup> In addition, the sample includes five individuals who recently had filed applications for naturalization at the time of the 1990 interview and who are eligible for inclusion in the regression sample in 1991. We treat these as naturalized in 1991, but results are similar if these observations are excluded from the sample.

<sup>15</sup> Critical values at the 1 percent significance level are 6.63 for the  $\chi^2(1)$  distribution and 57.43 for the  $\chi^2(35)$  distribution.

<sup>16</sup> For added flexibility, we estimated the fixed-effects wage model allowing for AR(1) processes and heteroscedasticity of the error term. Likelihood-ratio tests favor an error specification that contains both an individual-specific AR(1) process and individual-specific heteroscedasticity over the simpler specifications of no AR(1) or a common AR(1) process. Accordingly, reported results are based on models in which the time-variant error component is written,  $u_{it} = \rho_i u_{it-1} + \varepsilon_{it}$ , with  $E(\varepsilon_{it}) = 0$  and  $V(\varepsilon_{it}) = \sigma_i^2$ . Results from error specifications with no AR(1) or common AR(1) processes are qualitatively similar to those reported in the paper and are available upon request.

characteristics of immigrants who do and do not obtain U.S. citizenship as the reason for the cross-sectional correlation between naturalization and wages.

When *Experience Since Naturalization* is added to the equation (column 2), its coefficient is positive and highly significant, whereas the coefficient of *Naturalized* falls from .056 to .023 and loses statistical significance. The implication is that naturalization leads to higher pay primarily through more rapid wage growth rather than a one-time boost in pay. Indeed, following naturalization returns per year of experience are 2.6 percentage points higher.

But when do the wage gains associated with naturalization first appear? According to one story previously sketched, those who naturalize can expect higher pay in advance of their naturalization. The decision to seek U.S. citizenship leads to a corresponding decision to invest more heavily in human capital. Assuming that returns on that investment are received prior to naturalization, the wage gains of immigrants will precede naturalization.

Two tests are conducted to address the timing of wage gains. In the first test, a dummy variable is added to allow for higher wages the year prior to naturalization. The estimated coefficient of this variable is not only statistically insignificant, but it is also negative in sign (Table 5, column 3).

Next, we allow for the possibility that the experience-earnings profile is steeper for immigrants who naturalize even prior to naturalization. In Table 5, column 4 the specification includes a term that interacts experience with an indicator variable capturing whether or not the immigrant had naturalized by the end of the sample period. The estimated coefficient of this interaction term is negligible and not statistically significant, indicating that immigrants who eventually naturalize do not have steeper experience-earnings profiles prior to naturalization than do other immigrants. Rather, the faster wage growth of those who naturalize first occurs

following naturalization.<sup>17</sup>

*Legal Status of Immigrants.* The empirical analysis has not considered the potential importance of legal status of immigrants who are not U.S. citizens. But experience obtained while working illegally may be valued less highly than legal experience. In addition, employment opportunities may improve once an immigrant obtains a green card. Tracking immigrants who legalized following passage of the 1986 *Immigration Reform and Control Act (IRCA)*, Rivera-Batiz (1999) concluded that legalization resulted in significantly higher earnings for immigrants. This raises the question of whether our findings overstate the effect of naturalization given that the samples of non-naturalized immigrants from all three data sources likely include some illegal immigrants.

Fortunately, the NLSY data contain detailed information on immigrant status. The majority of individuals in our sample were legal immigrants or were authorized to work when first employed in the United States, but the sample includes a small number of immigrants who worked illegally (in the country illegally or without a work permit) before becoming a permanent resident.<sup>18</sup> In column 5, we report tentative evidence of the importance of legal status on wages based on the limited number of non-residents in the sample. Results show that permanent residency leads to a statistically significant 8.1 percent boost in wages and that wage growth of

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<sup>17</sup> As further robustness checks, we examined the effect of naturalization using instrumental variables that account for possible endogeneity in the timing of naturalization and, alternatively, a first-difference model that allows for fixed effects in wage growth. Using quartic polynomials of time since entry into the United States and age as instruments, the coefficient estimate (standard error) of *Experience Since Naturalization* is .0287 (.0053) and .0214 (.0162) in model specifications equivalent to those in Table 5, columns 2 and 4. Further, based on a first-difference log wage regression that controls for observable characteristics (including industry and occupation) and individual fixed effects, the coefficient (and standard error) of *Naturalized* is .0289 (.0690). Although standard errors are much larger in the alternative estimation procedures, the similarity of parameter estimates to those reported in Table 5 suggests that our key findings are not the result of time-variant unobserved individual heterogeneity or misspecification of the regression model.

<sup>18</sup> Forty-seven individuals in the sample entered the United States illegally, and another 30 arrived on a non-immigrant visa restricting employment. Of these, 40 individuals accrued some experience prior to obtaining

illegal immigrants is 1.7 percentage points lower per year than that of legal immigrants.<sup>19</sup> These results are consistent with the conclusion of Schoeni (1997, p. 711), based on estimates from Borjas and Tienda (1993), that “the wage penalty for being illegal may be as great as 7 to 10 percent” and with Schoeni's prediction of differential wage growth of legal and illegal immigrants. But while these results add to the scant literature on the importance of legal status for immigrants, what is most important for the present study is the finding that coefficients of the variables capturing naturalization are largely unaffected by inclusion of the legal status controls.

*Naturalization and a Changing Job Distribution.* Having demonstrated that wage growth accelerates following naturalization, we next examine whether the job distribution also changes. Table 6 addresses this issue by providing probit estimates based on equation 2. Immigrants who have naturalized are more likely than other immigrants to hold white-collar positions (column 1). Of course, immigrants who naturalize may have been more likely to be in white-collar jobs even prior to naturalization. But when we allow for this possibility (column 2), the probability of white-collar employment is still significantly higher after the immigrant naturalizes. There is no evidence that the likelihood of white-collar employment increases with the length of time that an immigrant has been a U.S. citizen (column 3). Instead, naturalization appears to be followed by an immediate shift to white-collar employment.

Table 6 shows that naturalization is also associated with a greater likelihood of public-sector employment, but in contrast to the shift to white-collar employment, the switch to public-sector jobs is gradual and apparently delayed. Starting approximately two years after

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permanent residency and 21 were still illegal immigrants as of 1990 (nineteen of whom report having applied for legalization under *IRCA*).

<sup>19</sup> The *Permanent Residence* variable captures the wage gains of immigrants who obtain a green card after previously being in the United States illegally or on a temporary visa. We uncover no evidence of a differential effect for those who entered the country illegally versus those who were in the United States on a temporary visa. Nor do we

naturalization, the probability of public-sector employment increases significantly with years of citizenship. After five years of citizenship (and evaluated at the sample mean), an immigrant is 3.3 percentage points more likely to be in the public-sector than he was prior to naturalization.

According to the estimates of column 8, young immigrants who naturalize are inherently less likely to be unionized than other immigrants, but once we take this into account naturalization boosts the probability of unionization by 9.0 percentage points when evaluated at the sample mean. As column 9 indicates, the probability of unionization increases with years since naturalization, analogous to the situation with public-sector jobs.

In summary, for young male immigrants, naturalization is followed by an immediate increase in white-collar employment and by a growing presence in public-sector and union jobs. Even when we allow for inherent differences in the job distributions of immigrants who naturalize during the sample period and immigrants who do not, naturalization is followed by a movement into jobs generally viewed as attractive. There is no evidence of a movement to these jobs prior to naturalization, as might occur because of increased investment in U.S.-specific human capital investment in advance of naturalization. Instead, these findings support the claim that naturalization increases access to preferred jobs, which often are unavailable to non-citizens.

*Labor Mobility and Wage Growth.* The faster wage growth of young immigrants following naturalization may result in part from faster early-career wage growth in public-sector, white-collar, and union jobs. In addition, faster wage growth may be correlated with labor turnover. Job-matching models, such as those by Burdett (1978) and Jovanovic (1979), predict positive returns to voluntary job mobility, and recent empirical studies find significant wage losses following involuntary turnover (Ruhm, 1991; Jacobson, LaLonde, and Sullivan, 1993). To

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uncover differential wage growth before and after legalization—but the sample size may be too small to pick up such

allow for these possibilities, we estimate a more flexible version of the wage equation that permits different experience profiles in public-sector, white-collar, and union jobs and, in one specification, also allows wages to vary with labor market turnover—measured by cumulative quits and layoffs.<sup>20</sup> Results appear in Table 7, columns 1 and 2.

Wage growth is significantly faster in public-sector and white-collar jobs. Indeed, the faster wage growth in these jobs, which immigrants move into following naturalization, accounts for more than one-third of the steepening of the wage profile following naturalization. But even with the addition of these interaction terms, the coefficient of *Experience Since Naturalization* remains statistically significant.

The job-turnover variables (column 2) reveal that voluntary mobility is associated with significantly higher earnings and involuntary mobility with significantly lower earnings. These findings are consistent with those of Keith and McWilliams (1995), who also study NLSY data. Our parameter estimates are larger than theirs, however, indicating a stronger relationship between wages and job mobility for young immigrant males than for young native-born males. Addition of the labor mobility variables reduces the estimated coefficient of *Naturalized* but has little overall effect on results.

*Native-Born Workers.* The preceding results demonstrate that immigrants who naturalize experience faster wage growth than other immigrants. But how does wage growth of those who naturalize compare with wage growth of native-born workers? Do immigrants who naturalize also gain relative to workers born in the United States? To answer this question, we replicate the analyses after adding to the sample native-born workers of the same ethnicity. Apart from

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effects.

yielding information on the earnings profiles of native-born workers, the new regressions provide a robustness test of the findings previously reported using an alternative reference group. For this exercise, the native sample was re-weighted to mimic the ethnic composition of the immigrant sample (heavily Hispanic). In the process, we drew random samples of 3,712 observations of 445 U.S.-born males from the NLSY data.

Table 7, columns 3 and 4, presents results based on the key prior specifications for the pooled sample consisting of immigrants who naturalize, those who do not naturalize, and native workers. In the models estimated, the slope of the experience profile is allowed to differ for each of the three groups of workers.<sup>21</sup> Of particular relevance, the coefficient of *Experience Since Naturalization* is highly significant and comparable to that of the prior regressions, indicating that the faster wage growth following naturalization is not the consequence of choice of reference group.<sup>22</sup> Interestingly, wage growth of young immigrants who do not naturalize is .5 percentage point higher per year than that of the ethnicity-weighted reference group of native workers. The early-career experience profiles implied by the parameter estimates of column 3 are illustrated in Figure 1, which summarizes one of the key findings of our study: Male immigrants who naturalize experience faster wage growth than other immigrants and native males, but the faster wage growth does not occur until naturalization takes place.

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<sup>20</sup> Construction of the sector-specific experience and the labor mobility series draws on the individual work-history data. The algorithm creating these series accumulates work experience by sector or type of employment and past labor mobility by type (voluntary or involuntary).

<sup>21</sup> In the interest of parsimony, the specification restricts the coefficient of the quadratic experience term to be equal across groups. A more flexible specification that allows second-order effects to differ across groups yields qualitatively identical results, as do specifications that include higher-order polynomials of experience.

<sup>22</sup> We obtained similar parameter estimates when we dropped immigrants who do not naturalize from the sample.



## V. Conclusions

Cross-sectional census and CPS data reveal that naturalized immigrants earn higher wages and have a more favorable job distribution than immigrants who have not naturalized. What cross-sectional analysis cannot determine is whether these labor market advantages are the consequence of naturalization or reflect unmeasured productivity of immigrants who naturalize. In what we believe is the first panel study of the effect of naturalization on wage growth, we track the wages of young male immigrants over the period 1979-91. Using a fixed-effects estimator, we find that naturalization has a highly significant impact on the earnings of immigrants even after allowing for differences in unobserved personal characteristics of immigrants.

Wage growth accelerates following naturalization, and immigrants move into better jobs. Their probability of white-collar and public-sector employment increases, as does their access to jobs in the union sector. These findings support the view that immigrants who have not achieved citizenship face barriers to certain jobs. Although results are also consistent with the view that immigrants invest more heavily in human capital in anticipation of naturalization and receive returns on this investment only after naturalization, there is no compelling reason that returns on such investment would be delayed.

The economic gains from citizenship appear greater for immigrants from less developed countries and are also likely to depend on the employment preferences of immigrants. Because citizenship is more important in certain jobs (e.g., the public sector), those who choose other lines of work may receive lower economic benefits if they naturalize and therefore have less incentive to naturalize. Analogous to Lee's (1978) study of unionization and Willis and Rosen's (1979) study of college attendance, returns to naturalization may be lower for immigrants who do

not naturalize. Future work might address this issue drawing on the methodology of the Willis-Rosen study, but this requires larger longitudinal samples of immigrants who do and do not naturalize than are presently available and identification of instruments that enter the naturalization decision and not the wage-determination process.

Although the number of illegal immigrants in the sample is small, the evidence available suggests that returns to experience are lower when the immigrant is working illegally and that wages rise when an immigrant receives a green card.

These findings have important implications for the literature on assimilation and for U.S. policy on naturalization. They indicate that naturalization is not an insignificant event that occurs during the assimilation process, nor does it merely capture length of stay in the United States. To the contrary, naturalization accelerates the process of labor market assimilation. The act of naturalization appears to remove certain employment barriers and to provide greater access to white-collar, public-sector, and union employment. For young male immigrants, success in the U.S. labor market is intimately related to citizenship.

## References

- Baltagi, Badi H. *Econometric Analysis of Panel Data*. Chichester, UK: John Wiley & Sons, 1995.
- Becker, Gary S. *The Economics of Discrimination*. Chicago, IL: University of Chicago Press, 1971.
- Borjas, George J. "The Earnings of Male Hispanic Immigrants in the United States." *Industrial and Labor Relations Review* 35 (April 1982): 342-53.
- Borjas, George J. "Assimilation, Changes in Cohort Quality, and the Earnings of Immigrants." *Journal of Labor Economics* 3 (October 1985): 463-89.
- Borjas, George J. "The Economics of Immigration." *Journal of Economic Literature* 32 (December 1994): 1667-1717.
- Borjas, George J. "The Economic Analysis of Immigration." In *Handbook of Labor Economics, Volume 3*, edited by O. Ashenfelter and D. Card. Amsterdam: Elsevier (1999): 1697-1760.
- Borjas, George J., and Bernt Bratsberg. "Who Leaves? The Outmigration of the Foreign-Born." *The Review of Economics and Statistics* 87 (February 1996): 165-76.
- Borjas, George J., and Marta Tienda. "The Employment and Wages of Legalized Immigrants." *International Migration Review* 27 (Winter 1993): 712-47.
- Briggs, Vernon M. *Mass Immigration and the National Interest*. Armonk, N.Y.: M.E. Sharpe, 1996.
- Bucci, Gabriella A., and Rafael Tenorio. "Immigrant-Native Wage Differentials and Immigration Reform." *Review of Development Economics* 1 (October 1997): 305-23.
- Burdett, Kenneth. "A Theory of Employee Search and Quit Rates." *American Economic Review* 68 (March 1978): 212-20.
- Chiswick, Barry R. "The Effect of Americanization of the Earnings of Foreign-born Men." *Journal of Political Economy* 86 (October 1978): 897-921.
- Chiswick, Barry R., and Paul W. Miller. "Language in the Labor Market: The Immigrant Experience in Canada and the United States." In *Immigration, Language and Ethnic Issues: Canada and the United States*, edited by Barry R. Chiswick. Washington, DC: American Enterprise Institute, 1992.

- Chiswick, Barry R., and Paul W. Miller. "The Endogeneity between Language and Earnings: International Analyses." *Journal of Labor Economics* 13 (April 1995): 246-88.
- DeSipio, Louis. "Social Science Literature and the Naturalization Process." *International Migration Review* 21 (Summer 1987): 352-71.
- Funkhouser, Edward. "Do Immigrants Have Lower Unionization Propensities Than Natives?" *Industrial Relations* 32 (Spring 1993): 249-61.
- Greenwood, Michael J., and John M. McDowell. "The Factor Market Consequences of U.S. Immigration." *Journal of Economic Literature* 24 (December 1986): 1738-72.
- Jacobson, Louis S., Robert J. LaLonde, and Daniel G. Sullivan. "Earnings Losses of Displaced Workers." *American Economic Review* 83 (September 1993): 685-709.
- Jasso, Guillermina, and Mark R. Rosenzweig. "What's in a Name? Country-of-Origin Influences on Earnings of Immigrants in the United States." *Research in Human Capital and Development: Migration, Human Capital, and Development* 4 (1986): 75-106.
- Jasso, Guillermina, and Mark R. Rosenzweig. *The New Chosen People: Immigrants in the United States*. New York: Russell Sage, 1990.
- Jovanovic, Boyan. "Job Matching and the Theory of Turnover." *Journal of Political Economy* 87 (October 1979): 972-90.
- Keith, Kristen, and Abigail McWilliams. "The Wage Effects of Cumulative Job Mobility." *Industrial and Labor Relations Review* 49 (October 1995): 121-37.
- Lee, Lung-Fei. "Unionism and Wage Rates: A Simultaneous Equations Model with Qualitative and Limited Dependent Variables." *International Economic Review* 19 (June 1978): 415-33.
- Mincer, Jacob, and Salomon Polachek. "Family Investments in Human Capital: Earnings of Women." *Journal of Political Economy* 82 (March-April 1974): S76-108.
- Moulton, Brent. "Random Group Effects and the Precision of Regression Estimates." *Journal of Econometrics* 32 (August 1986): 385-97.
- Portes, Alejandro, and John W. Curtis. "Changing Flags: Naturalization and Its Determinants Among Mexican Immigrants." *International Migration Review* 21 (Summer 1987): 352-71.
- Rivera-Batiz, Francisco L. "Undocumented Workers in the Labor Market: An Analysis of the Earnings of Legal and Illegal Mexican Immigrants in the United States." *Journal of Population Economics* 12 (February 1999): 91-116.

- Ruhm, Christopher J. "Are Workers Permanently Scarred by Job Displacement?" *American Economic Review* 81 (March 1991): 319-24.
- Schoeni, Robert F. "New Evidence on the Economic Progress of Foreign-Born Men in the 1970s and 1980s." *Journal of Human Resources* 32 (Fall 1997): 683-740.
- Stewart, James B., and Thomas Hyclak. "An Analysis of the Earnings Profiles of Immigrants." *The Review of Economics and Statistics* 66 (May 1984): 292-96.
- Summers, Robert, and Alan Heston. "The Penn World Table (Mark 5): An Expanded Set of International Comparisons, 1950-1988." *Quarterly Journal of Economics*, May 1991, 106(2), 327-68.
- U.S. Arms Control and Disarmament Agency. *World Military Expenditures and Arms Transfers*. Washington, D.C.: Government Printing Office, 1984.
- U.S. Immigration and Naturalization Service. *Statistical Yearbook of the Immigration and Naturalization Service, 1996*. Washington, D.C.: U.S. Government Printing Office, 1997.
- U.S. Immigration and Naturalization Service. *Monthly Statistical Report, September FY 1998 Year End Report*. Washington, D.C., 1998.
- U.S. Immigration and Naturalization Service. *Monthly Statistical Report, September FY 1999 Year End Report*. Washington, D.C., 1999a.
- U.S. Immigration and Naturalization Service. *A Guide to Naturalization*. Washington, D.C., 1999b.
- Willis, Robert J., and Sherwin Rosen. "Education and Self-Selection." *Journal of Political Economy* 87 (October 1979, Part 2): S7-36.
- Yang, Philip Q. "Explaining Immigrant Naturalization." *International Migration Review* 28 (Fall 1994): 449-77.

**Table 1**  
**The Effect of Naturalization on the Hourly Wage, Adult Males**

	(1)	(2)	(3)	(4)	(5)
<b>A. 1990 Census</b>					
Naturalized	0.0868*** (0.0030)	0.0642*** (0.0030)	0.0642*** (0.0031)	0.0588*** (0.0030)	0.0509*** (0.0029)
$R^2$	0.2664	0.2740	0.2823	0.3077	0.3386
<b>B. 1994-1998 CPS (Synthetic Panels)</b>					
Naturalized	0.1013*** (0.0055)	0.0718*** (0.0056)	0.0692*** (0.0056)	0.0654*** (0.0055)	0.0499*** (0.0052)
$R^2$	0.3691	0.3778	0.3845	0.4133	0.4765
Control Variables:					
Human Capital	Yes	Yes	Yes	Yes	Yes
Immigrant Cohort	No	Yes	Yes	Yes	Yes
Country of Birth	No	No	Yes	Yes	Yes
Industry	No	No	No	Yes	Yes
Occupation	No	No	No	No	Yes

\*Statistically significant at the 10 percent level (two-tailed test).

\*\*Statistically significant at the 5 percent level (two-tailed test).

\*\*\*Statistically significant at the 1 percent level (two-tailed test).

NOTE: Standard errors are reported in parentheses. Sample sizes are 201,857 (panel A) and 67,748 (panel B). The dependent variable is the natural logarithm of the hourly wage. Human capital control variables include age and its square, schooling, English speaking ability (panel A), marital status, SMSA, health status (panel A), part-time work, and union status (panel B). Columns 2-5 sequentially add control variables for 7 (panel A) or 9 (panel B) immigrant cohorts, 9 countries/continents of birth, 13 industries, and 10 occupations. In addition, specifications in panel B include an indicator variable for immigrant; interaction terms between immigrant and the human capital, industry, and occupation variables; years since immigration and its square (columns 2-5); and indicator variables for year of observation.

**Table 2**  
**The Effect of Naturalization on the Hourly Wage, Young Males**

	(1)	(2)	(3)	(4)	(5)
<b>A. 1990 Census</b>					
Naturalized	0.0736*** (0.0060)	0.0698*** (0.0060)	0.0662*** (0.0060)	0.0591*** (0.0060)	0.0526*** (0.0059)
$R^2$	0.1547	0.1567	0.1644	0.1876	0.2046
<b>B. 1994-1998 CPS (Synthetic Panels)</b>					
Naturalized	0.1117*** (0.0114)	0.1013*** (0.0116)	0.0825*** (0.0117)	0.0735*** (0.0114)	0.0573*** (0.0111)
$R^2$	0.2893	0.2938	0.3036	0.3449	0.3865
<b>C. NLSY79 (Random Effects)</b>					
Naturalized	0.0770** (0.0302)	0.0771** (0.0306)	0.0716** (0.0307)	0.0665** (0.0304)	0.0587** (0.0294)
$R^2$	0.3196	0.3220	0.3275	0.3541	0.3791
Control Variables:					
Human Capital	Yes	Yes	Yes	Yes	Yes
Immigrant Cohort	No	Yes	Yes	Yes	Yes
Country of Birth	No	No	Yes	Yes	Yes
Industry	No	No	No	Yes	Yes
Occupation	No	No	No	No	Yes

\*Statistically significant at the 10 percent level (two-tailed test).

\*\*Statistically significant at the 5 percent level (two-tailed test).

\*\*\*Statistically significant at the 1 percent level (two-tailed test).

NOTE: Standard errors are reported in parentheses. Sample sizes are 44,130 (panel A), 15,676 (panel B), and 2,514 (panel C). The dependent variable is the natural logarithm of the hourly wage. Human capital control variables include age and its square (panels A and B), experience and its square (panel C), tenure and its square (panel C), schooling, English speaking ability (panel A), interview in English (panel C), marital status, SMSA, health status (panel A), part-time work, and union status (panels B and C). Columns 2-5 sequentially add control variables for 5 (panel A), 7 (panel B), or 4 (panel C) immigrant cohorts, 9 countries/continents of birth, 13 industries, and 10 occupations. In addition, specifications in panel B include an indicator variable for immigrant; interaction terms between immigrant and the human capital, industry, and occupation variables; years since immigration and its square (columns 2-5); and indicator variables for year of observation.

**Table 3**  
**The Effect of Naturalization on Type of Employment, Census/CPS Probit Regressions**

	White Collar		Public Sector		Union
	(1)	(2)	(3)	(4)	(5)
Naturalized	0.1077*** (0.0065)	0.1171*** (0.0164)	0.1781*** (0.0127)	0.1532*** (0.0308)	0.1909*** (0.0182)
Pseudo- $R^2$	0.1639	0.1523	0.0700	0.1097	0.0319
Data Source	Census	CPS	Census	CPS	CPS

\*Statistically significant at the 10 percent level (two-tailed test).

\*\*Statistically significant at the 5 percent level (two-tailed test).

\*\*\*Statistically significant at the 1 percent level (two-tailed test).

NOTE: Standard errors are reported in parentheses. Sample sizes are 201,857 (Census) and 36,019 (CPS). Regressions also control for age and its square, schooling, marital status, SMSA, and years since migration and its square.



**Table 4**  
**Naturalization-GDP Interaction Effects on Wages and Employment**

	Dependent Variable:				
	ln(Hourly Wage)		White-Collar Employment	Public-Sector Employment	Union Employment
	(1)	(2)	(3)	(4)	(5)
Naturalized	0.0644*** (0.0033)	0.0511*** (0.0031)	0.0991*** (0.0069)	0.1778*** (0.0137)	0.1871*** (0.0197)
Naturalized*GDP	-0.0093*** (0.0010)	-0.0070*** (0.0009)	-0.0211*** (0.0021)	-0.0227*** (0.0037)	0.0057 (0.0062)
GDP	0.0223*** (0.0026)	0.0173*** (0.0015)	-0.0016 (0.0015)	-0.0004 (0.0029)	-0.0190*** (0.0042)
Comment		Adds Controls for Industry, Occupation			

\*Statistically significant at the 10 percent level (two-tailed test).

\*\*Statistically significant at the 5 percent level (two-tailed test).

\*\*\*Statistically significant at the 1 percent level (two-tailed test).

NOTE: Standard errors are reported in parentheses. Samples consist of 184,017 immigrants from 90 countries (columns 1-4) and 32,584 immigrants from 78 countries (column 5). GDP denotes 1975 per-capita GDP expressed in thousands of 1985 U.S. dollars and enters regressions as deviation from sample mean value. Specifications in columns 1 and 2 include a country-of-origin random effect and control for age and its square, schooling, English speaking ability, marital status, SMSA, health status, part-time work, and 7 immigrant cohorts. Columns 3-5 report results from probit regressions; additional control variables are age and its square, schooling, marital status, SMSA, and years since migration and its square.

**Table 5**  
**The Effect of Naturalization on Wage Growth, NLSY79 Fixed-Effects Regressions**

	(1)	(2)	(3)	(4)	(5)
Naturalized	0.0559*** (0.0197)	0.0230 (0.0200)	0.0200 (0.0239)	0.0198 (0.0237)	0.0212 (0.0238)
Experience Since Naturalization		0.0258*** (0.0033)	0.0254*** (0.0033)	0.0245*** (0.0066)	0.0253*** (0.0067)
Year Before Naturalization			-0.0064 (0.0254)		
Experience*(Ever Naturalized)				0.0013 (0.0060)	-0.0005 (0.0061)
Permanent Resident					0.0780*** (0.0267)
Experience* (Illegal 1990)					-0.0171*** (0.0040)
Experience	0.0607*** (0.0042)	0.0566*** (0.0043)	0.0566*** (0.0043)	0.0564*** (0.0044)	0.0615*** (0.0044)
Experience <sup>2</sup>	-0.0013*** (0.0003)	-0.0014*** (0.0003)	-0.0014*** (0.0003)	-0.0014*** (0.0003)	-0.0017*** (0.0003)

\*Statistically significant at the 10 percent level (two-tailed test).

\*\*Statistically significant at the 5 percent level (two-tailed test).

\*\*\*Statistically significant at the 1 percent level (two-tailed test).

NOTE: Standard errors are reported in parentheses. Sample consists of 2,514 observations of 332 immigrants. The dependent variable is the natural logarithm of the real hourly wage. Regressions also include tenure and its square, schooling, interview in English, marital status, SMSA, part-time work, union status, and controls for 13 industries and 10 occupations. Regressions are estimated with individual-specific AR(1) process and heteroscedasticity of time-variant error component.

**Table 6**  
**The Effect of Naturalization on Type of Employment, NLSY79 Probit Regressions**

	White Collar			Public Sector			Union		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Naturalized	0.4750*** (0.0742)	0.3460*** (0.1183)	0.2999* (0.1642)	0.4569*** (0.1346)	0.5443* (0.2976)	-0.3207 (0.4166)	-0.0886 (0.0797)	0.2709* (0.1403)	-0.0827 (0.1972)
Years Since Naturalization			0.0044 (0.0324)			0.1811*** (0.0625)			0.0947*** (0.0357)
(Years Since Naturalization) <sup>2</sup>			0.0002 (0.0016)			-0.0067** (0.0028)			-0.0040** (0.0017)
Ever Naturalized		0.1466 (0.1046)	0.1464 (0.1046)		-0.0978 (0.2947)	-0.0903 (0.2947)		-0.4010*** (0.1275)	-0.3985*** (0.1275)
Pseudo-R <sup>2</sup>	0.1071	0.1076	0.1078	0.1240	0.1242	0.1478	0.0209	0.0248	0.0275

\*Statistically significant at the 10 percent level (two-tailed test).

\*\*Statistically significant at the 5 percent level (two-tailed test).

\*\*\*Statistically significant at the 1 percent level (two-tailed test).

NOTE: Standard errors are reported in parentheses. The sample consists of 2,514 observations of 332 individuals. Regressions also control for age and its square, schooling, marital status, SMSA, and years since migration and its square.

**Table 7**  
**The Effect of Naturalization on Wage Growth, NLSY79 Extended Specifications and Samples**

	(1)	(2)	(3)	(4)
Naturalized	0.0209 (0.0241)	0.0126 (0.0231)	0.0456* (0.0231)	0.0503** (0.0225)
Experience Since Naturalization	0.0155** (0.0070)	0.0179*** (0.0070)	0.0290*** (0.0065)	0.0240*** (0.0064)
White-Collar Experience	0.0247*** (0.0037)	0.0221*** (0.0037)		0.0210*** (0.0019)
Public-Sector Experience	0.0456*** (0.0085)	0.0390*** (0.0086)		0.0283*** (0.0033)
Union Experience	0.0015 (0.0040)	0.0024 (0.0041)		0.0018 (0.0019)
Quits		0.0294*** (0.0071)		0.0230*** (0.0043)
Layoffs		-0.0497*** (0.0084)		-0.0267*** (0.0049)
Experience* Immigrant			0.0049*** (0.0018)	0.0089*** (0.0018)
Experience*(Ever Naturalized)	0.0008 (0.0064)	-0.0023 (0.0062)	-0.0030 (0.0060)	-0.0069 (0.0060)
Permanent Resident	0.0941*** (0.0274)	0.0758*** (0.0270)	0.0912*** (0.0215)	0.0915*** (0.0227)
Experience* (Illegal 1990)	-0.0137*** (0.0041)	-0.0152*** (0.0042)	-0.0179*** (0.0040)	-0.0166*** (0.0042)
Experience	0.0605*** (0.0046)	0.0583*** (0.0057)	0.0475*** (0.0027)	0.0444*** (0.0032)
Experience <sup>2</sup>	-0.0020*** (0.0003)	-0.0018*** (0.0003)	-0.0011*** (0.0002)	-0.0016*** (0.0002)
Sample Includes Natives?	No	No	Yes	Yes

\*Statistically significant at the 10 percent level (two-tailed test).

\*\*Statistically significant at the 5 percent level (two-tailed test).

\*\*\*Statistically significant at the 1 percent level (two-tailed test).

NOTE: Standard errors are reported in parentheses. Sample consists of 2,514 observations of 332 immigrants (columns 1-2) and 6,226 observations of 777 immigrants and natives (columns 3-4). The dependent variable is the natural logarithm of the real hourly wage. Regressions also include tenure and its square, schooling, interview in English, marital status, SMSA, part-time work, union status, and controls for 13 industries and 10 occupations. Regressions are estimated with individual-specific AR(1) process and heteroscedasticity of time-variant error component.

**Table A1**  
**Descriptive Sample Statistics, Immigrant Samples**

	1990 Census		1994-1998 CPS		NLSY79	
	Mean	Std.Dev.	Mean	Std.Dev.	Mean	Std.Dev.
ln(wage)	2.383	0.734	2.390	0.588	1.972	0.485
Naturalized	0.439	0.496	0.337	0.473	0.183	0.387
Age	39.459	11.309	38.607	10.740	24.947	3.893
Experience					6.176	3.452
Tenure					2.448	2.667
Education	11.479	4.863	12.004	4.331	11.187	3.112
English Proficiency	0.802	0.399				
English Interview					0.823	0.382
Married	0.715	0.452	0.682	0.466	0.395	0.489
SMSA	0.942	0.233	0.866	0.341	0.879	0.327
Health	0.033	0.179			0.027	0.162
Part-time	0.059	0.235	0.054	0.225	0.049	0.215
Union			0.153	0.360	0.230	0.421
Years Since Migration	18.902	10.064	18.637	10.476	13.414	7.907
Immigrant Cohort:						
1990-92			0.058	0.234		
1985-89			0.187	0.390		
1980-84	0.253	0.435	0.252	0.434		
1975-79	0.198	0.398	0.153	0.360	0.378	0.485
1970-74	0.165	0.371	0.122	0.328	0.257	0.437
1965-69	0.130	0.337	0.084	0.278	0.213	0.410
1960-64	0.101	0.301	0.054	0.226	0.254	0.435
1950-59	0.117	0.322	0.058	0.234		
Pre-1950	0.036	0.187	0.014	0.116		
Country of Birth:						
Mexico (Omitted)	0.258	0.438	0.286	0.452	0.467	0.499
Other Central America	0.139	0.346	0.155	0.362	0.192	0.394
South America	0.050	0.218	0.055	0.227	0.064	0.244
Africa	0.021	0.144	0.016	0.126	0.007	0.084
Jpn/Korea/Twn/Singapore	0.049	0.216	0.046	0.210	0.014	0.117
Other Asia	0.178	0.382	0.196	0.397	0.025	0.156
Australia/Can/NZld/UK	0.072	0.259	0.053	0.224	0.039	0.195
Other Europe	0.194	0.395	0.136	0.342	0.156	0.363
Other or N/A	0.038	0.190	0.057	0.233	0.009	0.095
Industry:						
Agriculture (Omitted)	0.058	0.234	0.044	0.205	0.072	0.258
Mining	0.006	0.076	0.004	0.067	0.003	0.056
Construction	0.108	0.311	0.087	0.283	0.074	0.262
Manufacturing	0.250	0.433	0.252	0.434	0.288	0.453

Transportation, Comm	0.075	0.263	0.079	0.270	0.058	0.233
Wholesale Trade	0.054	0.226	0.044	0.205	0.035	0.183
Retail Trade	0.154	0.361	0.166	0.372	0.218	0.413
Finance, Ins, Real Estate	0.047	0.213	0.046	0.209	0.043	0.202
Business/Repair Services	0.058	0.234	0.074	0.261	0.072	0.259
Personal Services	0.030	0.171	0.038	0.191	0.031	0.174
Entertainment	0.013	0.113	0.016	0.124	0.014	0.116
Professional Services	0.117	0.322	0.122	0.327	0.071	0.257
Public Administration	0.029	0.169	0.029	0.167	0.022	0.148
Occupation:						
Managl/Profl (Omitted)	0.233	0.423	0.219	0.413	0.102	0.302
Technical	0.036	0.187	0.030	0.172	0.024	0.154
Sales	0.080	0.271	0.068	0.252	0.061	0.240
Adm. Support/Clerical	0.059	0.236	0.059	0.236	0.080	0.271
Service	0.123	0.328	0.157	0.363	0.157	0.364
Farming/Forestry/Fish	0.055	0.229	0.047	0.212	0.074	0.262
Precision Prod/Craft	0.190	0.393	0.178	0.383	0.204	0.403
Operators-Machine	0.103	0.304	0.113	0.317	0.142	0.350
Operators-Transport	0.053	0.225	0.058	0.234	0.072	0.259
Operators-Handlers	0.066	0.248	0.070	0.255	0.083	0.276
Observations	201,857		36,019		2,514	

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**Table A2**  
**Log Wage Regressions**

	(1)	(2)	(3)	(4)
Naturalized	.0509 (.0029)	.0499 (.0052)	.0587 (.0294)	.0503 (.0225)
Education	.0258 (.0004)	.0560 (.0013)	.0306 (.0053)	-.0042 (.0045)
Immigrant*Education		-.0247 (.0015)		
Married	.1376 (.0032)	.0910 (.0054)	.0679 (.0184)	.0335 (.0061)
Immigrant*Married		-.0140 (.0075)		
SMSA	.1760 (.0059)	.1076 (.0052)	.1114 (.0343)	.0439 (.0121)
Immigrant*SMSA		-.0407 (.0084)		
Part-time	.2146 (.0057)	-.2114 (.0111)	-.0223 (.0326)	.0067 (.0101)
Immigrant*Part-time		.0344 (.0149)		
Union		.1565 (.0064)	.0954 (.0189)	.0951 (.0066)
Immigrant*Union		-.0151 (.0091)		
Age	.0473 (.0009)	.0467 (.0015)		
Immigrant*Age		-.0101 (.0021)		
Age <sup>2</sup>	-.0005 (.0000)	-.0005 (.0000)		
Immigrant*Age <sup>2</sup>		.0001 (.0000)		
Experience			.0448 (.0075)	.0444 (.0032)
Experience <sup>2</sup>			-.0007 (.0005)	-.0016 (.0002)
Tenure			.0460 (.0083)	.0361 (.0024)
Tenure <sup>2</sup>			-.0036 (.0008)	-.0028 (.0002)
Years Since Migration		.0075 (.0028)		
(Years Since Migration) <sup>2</sup>		-.0001 (.0001)		

English Proficiency	.1221 (.0040)		
English Interview		.0496 (.0277)	.0282 (.0127)
Health	-.0982 (.0075)	-.0192 (.0432)	.0139 (.0123)
Experience Since Naturalization (Ever Naturalized)* Experience Immigrant*Experience			.0240 (.0064) -.0069 (.0060) .0089 (.0018)
Permanent Resident  (Illegal 1990)*Experience			.0915 (.0227) -.0166 (.0042)
White Collar Experience			.0210 (.0019)
Public Sector Experience			.0283 (.0033)
Union Experience			.0018 (.0019)
Quits			.0230 (.0043)
Layoffs			-.0267 (.0049)
Immigrant		.6489 (.0599)	
Immigrant Cohort 1985-89		-.0004 (.0108)	
1980-84		.0076 (.0168)	
1975-79	.0552 (.0041)	.0302 (.0244)	
1970-74	.0866 (.0044)	.0536 (.0314)	-.0143 (.0394)
1965-69	.1058 (.0048)	.0784 (.0399)	.0629 (.0439)
1960-64	.1216 (.0054)	.1231 (.0507)	.0252 (.0449)
1950-59	.1255 (.0056)	.1497 (.0725)	
Pre-1950	.1587 (.0083)	.2013 (.1154)	
Country of Birth:			
Central America, Except Mexico	.0117 (.0048)	.0174 (.0074)	.0137 (.0404)
South America	.0616 (.0069)	.0745 (.0108)	.1287 (.0582)



Africa	.0674 (.0099)	.0047 (.0185)	-.2084 (.1733)	
Japan/Korea/Taiwan/ Singapore	.1054 (.0071)	.1403 (.0119)	.1509 (.1072)	
Other Asia	.0720 (.0049)	.0911 (.0077)	.0094 (.0799)	
Australia/Canada/New Zealand/United Kingdom	.1732 (.0063)	.1667 (.0113)	.1131 (.0752)	
Other Europe	.1515 (.0047)	.1258 (.0083)	.0724 (.0423)	
Other or N/A	-.0085 (.0075)	.0929 (.0109)	.0194 (.1432)	
Constant	.6340 (.0229)	.5926 (.0427)	1.1991 (.1147)	
Observations	201,857	67,748	2,514	6,226
Sample Includes Natives?	No	Yes	No	Yes
Table Reference	Table 1A(5)	Table 1B(5)	Table 2C(5)	Table 7(4)
Methodology	OLS	Synthetic Panels	Random Effects	Fixed Effects
Data Source	1990 Census	1994-98 CPS	NLSY79	NLSY79

NOTE: Standard errors are reported in parentheses. The dependent variable is the natural logarithm of the hourly wage. Regressions also include controls for 13 industries, 10 occupations, and, in column (2), year of observation. Omitted immigrant cohort is 1980-84 in column (1), 1990-1992 in column (2), and 1975-1978 in column (3).

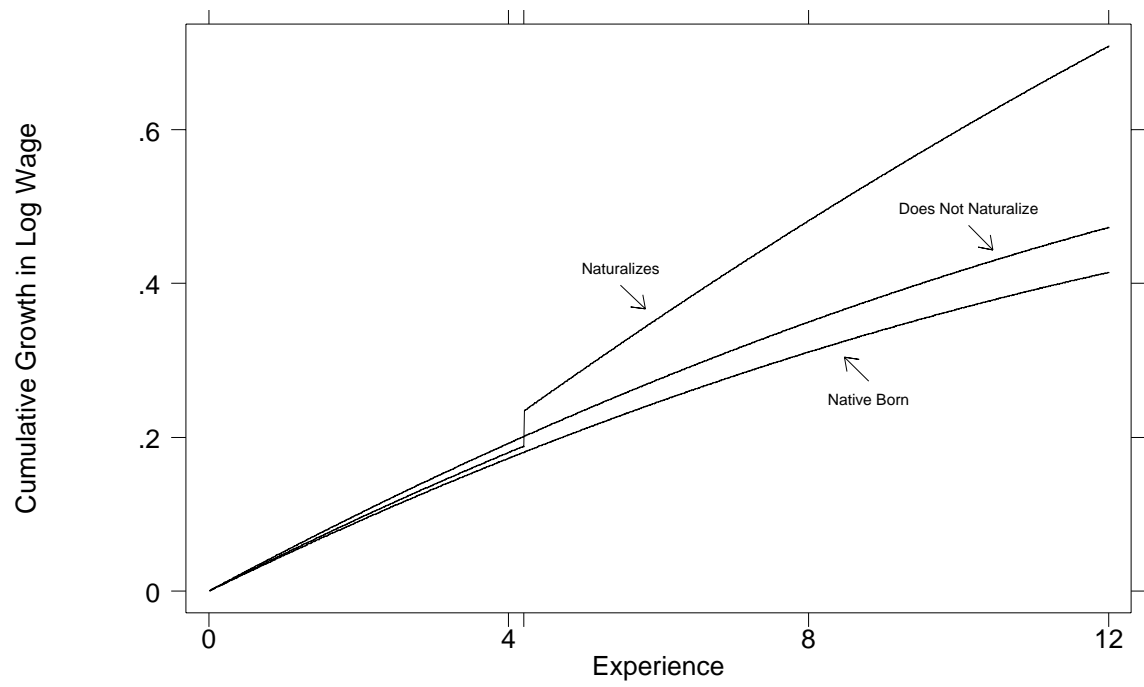


FIG. 1.—Predicted wage profiles of natives and immigrants who do and do not naturalize. Figure is based on parameter estimates from Table 7, column 3. Native sample is stratified to match ethnic composition of immigrant sample. For immigrants who naturalize, mean experience at naturalization is 4.2 years.