ASSIMILATION OR SEGMENTATION? IMMIGRANT AND NATIVE MALE EARNINGS TRAJECTORIES IN THE LOW-SKILL LABOR MARKET

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ABSTRACT

We use monthly SIPP data from 1996 to 2000 to estimate the determinants of differentiation in intercepts and slopes for earning growth among low-skill immigrant and native male workers. Our findings provide further depth of understanding to the "mixed" picture of segmentation in the low-skill labor market that has been reported by others. On the positive side, many immigrants are employed alongside natives in similar industries and occupations. Both groups show wage gains over time, and generally receive similar returns to years of schooling completed. Immigrants also receive substantial returns to acculturation, measured as age at arrival and citizenship status. African immigrants appear to be particularly successful in the labor market. On the negative side, immigrants are less likely to occupy supervisory and managerial jobs than natives. Low-skill immigrants earn less than low-skill natives, and this is particularly the case for those from certain South and Central American countries, as well as from China, Korea, and Vietnam. Hispanic immigrants receive lower returns to education than do white immigrants. Furthermore, education, age at arrival, and citizenship do not explain the earnings disadvantages experienced by those from the countries listed above.

Since the 1960's, there has been an increase in the educational attainment gap between U.S. immigrants and natives. This shift in skill composition has led to the concentration of immigrants in low-skilled jobs and occupations. Indeed, the U.S. economy's continued strong demand for low-skill workers, combined with the rising educational attainment of natives, has been a major force keeping immigration pressure high. This observation raises classic demographic and labor market questions: Is the employment of these immigrant workers segmented from that of native U.S. workers, or are they assimilating into the American labor force? Are immigrants' employment and earnings commensurate with their skills and credentials, or do they face discriminatory barriers? How do the over-time earnings trajectories of immigrants compare to those of otherwise identical natives? These issues have occasioned much analysis and debate (Alba and Nee 2003; Borjas 1999; Card 2005; Duleep and Dowhan 2002; Hirschman 2005; Smith 2006; Zeng and Xie 2004), yet they have not been examined with longitudinal earnings data for a large national sample of immigrant and native low-skill workers.[1]

Doing so is the goal of this paper. Even as native workers with a high school or lesser education sometimes denigrate low-paying, "dead end" jobs, many similarly educated immigrants regard these jobs as more attractive than those available in their home countries. Generations of immigrants have progressed upwards from humble labor market beginnings. But such progress can be widespread only if immigrant workers are not ghettoized in segmented labor markets, nor discriminated against in promotion and earnings opportunities. The existence of such segmentation and discrimination can be

[1] Duleep and Dowhan (2002) use longitudinal Social Security data to compare earnings growth rates for immigrant cohorts from different vintages against those of natives. Their study provides an overview of change and stability in immigrant earnings growth rates over time. Our study complements this research by focusing on the individual-level determinants (schooling, age at immigration, citizenship, race/ethnicity, country of origin) of these growth rates for low-skill immigrant and native workers in the recent past.

tested by examining whether the education, skills, and training of immigrant workers are rewarded at rates similar to those of native workers, and whether the two groups show similar earnings growth over time. We test for this by estimating earnings growth curve models in which both the intercept and growth rates vary according to personal characteristics such as immigrant status, years of schooling completed, and race/ethnicity. These are fit to Survey of Income and Program Participation (SIPP) monthly earnings data for prime-age male, low-skill workers, 1996 – 2000. The result is an unprecedented level of detail in examining how earnings trajectories differ for immigrant and native workers in the low-skill labor market.

BACKGROUND

The Immigration Act of 1965, as well as subsequent developments and policies, increased the annual flow of immigrants to the United States, and led to shifts in their average skill levels (educational attainment), country of origin, and ethnic/racial composition (Alba and Nee, 2003). During the 1970s, approximately 400,000 immigrants were admitted annually, with the foreign born representing roughly five percent of the total population. Immigration surged during the early to mid 1990s, with approximately 800,000 immigrants admitted annually (in 1990 alone, about 1.8 million immigrants were admitted). This rise in immigration resulted in a foreign born population that, by 2000, composed 11 percent of the U.S. total.

In 1970, the foreign-born population was dominated by European immigrants, who represented more than half of the total foreign born population. Latino immigrants made up less than a fifth of the foreign born population, and Asian immigrants less than one tenth. By 2000, however, the regional composition of the foreign born had changed

greatly, with Latino immigrants constituting more than half (52%) of the foreign born population, followed by Asian (26.4%), and European (15.8%) immigrants.

As the foreign born population grew, and new immigrants sought employment, the foreign born proportion of the labor force grew at an even faster rate. In 1970, immigrants represented about five percent of the civilian labor force; by 2000 this figure had risen to nearly 13 percent. In traditional immigrant-receiving metropolitan areas, immigrants compose upwards of half of the labor force (CBO 2005). This rise in immigration, particularly from Mexico, was accompanied by a decline in the average skill level (educational attainment) of the foreign-born population. As a consequence, from 1980 to 1994, the proportion of the low-skilled labor force that was foreign born grew from 12.4 to 29.2 percent (Enchautegui 1998). The possible displacement of low-skilled native workers has received the greatest attention from economists and demographers (Borjas 2001; Borjas, et al. 1996; Card 2001, 2005; Frey 1996). By contrast, the labor market experiences of the low-skill immigrants themselves have gone relatively unexamined. Nor have immigrant and native worker outcomes within the low-skill labor market been compared. Such comparisons are provided below.

LABOR MARKET SEGMENTATION

Analyses of the low-skill labor market usually begin with the notion of labor market segmentation. As described in a recent review and extension of this work (Hudson 2007), this research literature dates back to Doeringer and Piore's (1971) discussion of firm internal labor markets, and focuses on the distinction between "good" jobs in the core of the economy, and "bad" jobs in the periphery. These are distinguished as follows. Good jobs typically pay higher wages and are connected to job ladders with upward wage

trajectories, have relatively good job security, and include fringe benefits such as health insurance and pensions. By contrast, bad jobs pay lower wages and are associated with little or no wage growth, provide little job security, and do not include fringe benefits. Crucially, there is also little occupational mobility between the two employment sectors, so that disadvantaged workers, typically ethnic minorities and workers with low levels of education, are permanently consigned to low-paying, peripheral employment.

For more than 30 years, researchers have studied and debated the extent to which such segmentation characterizes the U.S. economy. Results have been mixed. After reviewing these findings, and undertaking his own empirical research, Hudson (2007) reaches the following conclusions. First, labor market segmentation has increased over this time period, at least partly because of the sharp rise in the share of the labor force represented by low-skilled immigrant workers. Second, the economy is characterized by three segments, with about one-third of all workers employed in the primary, or "good jobs" portion, 42 percent employed in an intermediary portion where jobs have mixed characteristics, some from the primary sector, and others from the periphery, while about 20 percent of workers are employed in peripheral jobs. Third, most workers who begin their careers in peripheral jobs eventually move up to better jobs. Finally, over the past 25 years, being an immigrant non-citizen has become a stronger determinant of peripheral employment than race or gender.

In summary, and consistent with prior research, Hudson reaches mixed conclusions about labor market segmentation. On the negative side, many workers are employed in bad jobs in the periphery or mixed segments of the economy. This is

particularly the case for non-citizens. On the positive side, many workers who begin in such jobs show improved employment and wage growth over time.

Similar findings are reported by Newman (1999, 2006). She has published two volumes examining the employment careers of individuals who, in 1993, were either hired or rejected applicants to minimum wage, fast-food jobs in Harlem, New York. In the second of these volumes, she includes analyses of SIPP data from 1996 – 2000, thereby seeking to generalize her results to the nation as a whole (see Newman, 2006, chapter five and Appendix D). She concludes that many of these workers saw significant wage gains during this time period, and that (a) these results extend to other, less expansive economic periods, and (b) these results extend to low-wage workers throughout the nation. She reviews the human capital earnings literature, and argues that it applies even to the low-skill labor market. Thus she emphasizes that the educational differentiation of these workers is important in who succeeds in the labor market, even though the educational distribution of low-skill workers is centered in the lower part of the U.S. educational distribution. However, her regression analyses of SIPP data (Appendix Tables D11 and D12, pp. 330-331) do not actually show this for low-skill workers. That is, her regressions of deflated wage rate growth (Table D11) and of which workers become "high flyers" (high wage growth over the period) fail to show statistically significant effects of educational attainment categories below and including high school graduation on wage growth. Nor do these regressions account for immigration status, country of origin, or other important characteristics of workers. In the present paper, we *do* account for a wide variety of such characteristics. We do so within a random coefficients regression model which is well-suited to a detailed analysis

of the available data. Thus, our research extends the work of Hudson (2007) and Newman (2006) in significant ways.

HYPOTHESIZED EFFECTS

Age

As individuals progress through the life course, employment experience increases, productivity-related skills are perfected, and social networks extend and strengthen. Consequently, earnings should trend upward with age. On the other hand, empirical earnings functions find that earnings increase at a decreasing rate as workers approach the end of their careers (Hanushek and Welch 2006). This has been explained as "decreasing returns to human capital investment" toward the end of the work career, and can be expected to be particularly the case for male, low-skilled jobs, where physical strength and stamina may be important. Net of human capital, and in the absence of discrimination (a null hypothesis we are testing), we hypothesize that immigrants and natives should have the same age/earnings profiles.

Education

Empirically-estimated earnings functions have well established that years of schooling are positively associated with earnings (Hanushek and Welch 2006). This relationship is explained by a combination of the skills and credentials gained from schooling. Positive returns to education have been found so widely, that we expect to find them even within the low-skill labor market, among workers with no more than a high school diploma. We expect this to be the case not only for the worker's "starting wage" where the data begin in 1996, but also for the slope of their subsequent monthly earnings growth through to 2000.

Acculturation, Age at Arrival, and Citizenship

Immigrant assimilation refers to a process whereabouts immigrant groups grow to accept the attitudes, behaviors and beliefs of the dominant (generally Anglo) group, as well as to cultivate the network connections (and thus, social capital) with the dominant group that are generally necessary for upward mobility in the labor market. This classical perspective dates back to the writings of Park's (1950) "race-relations cycle" and Gordon's (1964) synthesis of immigration research. With the growing interest in socioeconomic stratification during the latter part of the Twentieth Century, and the expansion of quantitative research within sociology, assimilation research began to emphasize the importance of socioeconomic assimilation—the ability of immigrant and/or minority groups to achieve economic parity with the dominant group (Alba and Nee 2003). This contemporary version of the classical assimilation model focuses on the joint roles of acculturation (the adoption of mainstream values, attitudes, behaviors, network connections and thus social capital) and status attainment (education, language ability, occupational skills and credentials).

Past researchers have assumed acculturation to be positively related to the immigrant's current age, as well as to how young he or she was when they arrived here (Chiswick 1978). Immigrants who arrive during the early part of their childhood (the *1.5* generation) should be particularly advantaged in that they not only will have received a majority of their schooling in the U.S., but the critical early years of socialization and network-building will have taken place in the U.S. Further, early exposure to the customs, attitudes, and behaviors of Americans will build social capital and ease incorporation into the broader society. Consistent with past research we expect to find

age at arrival to be negatively related to earnings, where immigrants who arrive earlier receive an earnings premium, compared to immigrants who arrive later in the employable years.

Recent research has also implicated the importance of citizenship in removing barriers and creating new opportunities for economic success (Bratsberg, Ragan, and Nasir 2002; Hudson 2007). Not only does naturalization provide access to public sector jobs, but it also increases access to many jobs in the private sector. We anticipate that in comparison to non-naturalized immigrants, both initial earnings and earning growth will be higher for immigrants who have gained citizenship status.

Race/Ethnicity

Decades of research have documented the earnings disadvantage experienced by African Americans (Massey and Denton 1993, Wilson 1997). The legacies of residential and socioeconomic segregation and discrimination in the housing and labor markets, combined with the decentralization of employment away from the central city have created an African American wage deficit that is substantial and persistent. Consistent with past research we expect to find lower earnings for African Americans than for Anglos.

While the historical racial experiences of Hispanic-Americans are markedly different than those for African Americans, we expect to find that the earnings of Hispanics will be lower than Anglos. Research has indicated that discrimination towards Hispanics is prevalent in both the housing and labor markets, both of which may limit job opportunities and earnings potential (Reimers 1983, Turner and Ross 2005). We thus

hypothesize the earnings of Hispanics to be lower than those the Anglos, albeit to a lesser degree than the wage deficit experienced by African Americans.

The strong school and labor market performance of Asian Americans has caused them to be characterized as a "model minority" (Waters and Eschbach 1995). Across a variety of social dimensions, the economic and social assimilation of Asian Americans has been rapid (Sakamota and Furuichi 2002, Zeng and Xie 2004). The explanations for the higher socioeconomic status of Asian Americans are varied, but the relationship is largely uncontested. Accordingly, we expect to find no difference in earnings between Asians and Anglos.

DATA AND METHODS

We analyze longitudinal data from the 1996 panel of the Survey of Program Participation (SIPP) to estimate the returns to human capital and acculturation. The SIPP design draws a nationally-representative sample of U.S. households and interviews each member of selected households every four months for four years. Though interviews are conducted tri-annually, respondents are asked to provide employment and earnings information for both the reference month and the preceding three months; thus providing earnings data for all 12 months of the year.

We limit our analysis to men with a high school diploma or less, who reported being between the ages of 18 and 40 at the time of the first interview in 1996. We then constructed a person-month database where each respondent contributes four person-months every wave they participated in. One of the many advantages of using such a procedure is that it allows individuals to enter and the exit the analysis based on where certain conditions are met or attrition. For each person-month we record a number of

time-varying covariates, including employment status and personal income. Employment status refers to whether the respondent worked (part-time /full-time) during the reference period, and personal income is reported as monthly earnings in dollars.

We also measure age at first interview, race (Hispanic, and non-Hispanic white, black, and Asian), and educational attainment. For immigrants we generate four dummy variables referring to the age at which the respondent arrived in the U.S. The first age dummy refers to immigrants who arrived in the U.S. before age 13, and is consistent with the standard definition of the 1.5 generation (Rumbaut and Ima 1988). The second age dummy refers to immigrants who arrived in the U.S. between ages 13 and 18; the third between 19 and 28; and the fourth, the reference category, between 29 and 40 years of age.

Since we seek to estimate the trends and determinants in full-time wage rates, we delete all observations where the individual was employed less than full-time. We additionally set a lower monthly income bound of $400, assuming that no full-time worker would accept a wage of lower than $2.85/hr (at 35 hours/wk) and an upper bound of $7000 ($35/hr at 40 hours/wk). These restrictions result in a sample that consists of 5,247 respondents who contribute 55,264 person-months of full-time wage data.

Analytic Strategy

To best make use of the longitudinal nature of the data and to model both initial wages and wage growth, we employ hierarchical linear modeling (HLM) techniques (Bryk and Raudenbush 1992), also known as random coefficient models (Greene 2000), where both the intercept and the slope are a function of time-invariant person specific characteristics.

More specifically, we estimate random-coefficients growth curve models that follow the general form:

$$Ln(wages)_{ij} = \beta_0 + \beta_1 time_{ij} + r_{ij}$$

$$\beta_0 = \gamma_{00} + \gamma_{01}X_j + \gamma_{02}W_j + \gamma_{03}Z_j + \gamma_{04}(X_j*W_j) + \gamma_{05}(W_j*Z_j) + \gamma_{06}(X_j*W_j*Z_j) + \mu_{0j}$$

$$\beta_1 = \gamma_{10} + \gamma_{11}X_j + \gamma_{12}W_j + \gamma_{03}Z_j + \gamma_{14}(X_j*W_j) + \gamma_{15}(W_j*Z_j) + \gamma_{16}(X_j*W_j*Z_j) + \mu_{1j}$$

where i refers to chronological month and j represents individuals. Each value of i corresponds to the number of months elapsed since first interview wave of the survey. There are, then, 48 possible values of i. $Ln(wages)_{ij}$ represents logged personal income of respondent j at month i. β_0 is the intercept which is a function of person-specific characteristics X, W, and Z. X_j is a dichotomous indicator of immigrant status for person j; W_j and Z_j are vectors of time-invariant characteristics for person j. (X_j*W_j), (W_J*Z_j) and $(X_j*Z_i*W_j)$ are vectors of interaction terms; μ_j are unobserved differences that affect income; and r_{ij} is a stochastic error term.

These models allow both the intercepts and slopes to be correlated (tau), and for autoregressive error terms to adjust for serial correlation and heterogeneity in the variance within individuals (rho). We utilize the SAS Institute's *PROC MIXED* to specify these options and estimate our models (Littell, et al. 2006).

RESULTS

Table 1 shows descriptive statistics for the variables used in the analysis, by month and nativity status. Several observations stand out. First, at all months, the gap in earnings between natives and immigrants is substantial. Second, the earnings of both immigrants and natives grow steadily during the survey period, with the growth between the first and last months being slightly higher for immigrants than for natives (about 18 percent

compared to about 22 percent, respectively). Third, the average age of immigrants is slightly lower than natives. This is because immigrants tend to be selected on age and consequently, are younger than their native counterparts. Fourth, low-skilled immigrants have attained significantly less education than natives; a difference of about 2.5 years of education. Fifth, the racial composition of natives and immigrants is very different. Among natives, whites make up a majority of the population (83%), followed by African Americans (9%), Hispanics (7%) and Asians (1%). The foreign-born population is represented heavily by Hispanics (72%), followed by whites (17%), Asians (10%), and blacks (2%). Sixth, nearly half of immigrants arrived in the U.S. before age 19, with about 20 percent arriving during the early part of their childhood. Only 8 percent of low-skilled immigrants arrived in the U.S. after age 29. Finally, slightly more than one-third of low-skill immigrant workers in 1996 had gained citizenship.

[TABLE 1 ABOUT HERE]

Table 2 shows the industry and occupation of the jobs held by immigrant and native low-skill workers in 1996, by decreasing order of employment share for each group. For both immigrant and native low-skill male workers, the largest share, by far, of employment, was in construction, constituting 11.1 percent of immigrant employment, and 13.2 percent of native employment. This is an important corrective to much of the discussion by Newman (1999, 2006), whose original sample was collected from applicants to fast food jobs in New York City. It seems likely that this focus on fast food establishments caused Newman to miss the fact that, at least for males, construction work is the predominant employer of low-skill workers, both for immigrants and natives.

[TABLE 2 ABOUT HERE]

For immigrants, eating and drinking places are the second most likely employer of low-skill workers, constituting 8.1 percent of jobs. This is followed by agricultural production (3.7 percent) and landscape and horticultural services (3.4 percent). For natives, trucking is the second most common employer (3.3 percent), followed by eating and drinking places (2.9 percent) and justice, public order, and safety (2.6 percent).

Where detailed occupations are concerned, immigrants are most likely to be cooks (5.8 percent), followed by janitors and cleaners (4.3 percent), truck drivers (4.3 percent) machine operators (4.1 percent) and farm workers (4 percent). Natives are most likely to be truck drivers (6 percent), followed by sales supervisors (3.1 percent), production supervisors (2.9 percent) and machine operators (2.8 percent). The greater industrial and occupational concentration of immigrants is not surprising, due to their weaker language skills, lack of citizenship, greater concentration in Western and Southwestern agriculture, employment discrimination, and historical and cultural experiences, skills, and other factors. The greater advantage of natives in moving into supervisory and management jobs is also not unexpected.

Table 3 reports growth-curve regression coefficients for the determinants of earnings, for the pooled sample of immigrants and natives. The table is divided into two parts; the upper half indicates effects on initial earnings (intercept) and the lower half indicates effects on earnings trajectories (slopes). Coefficients from a growth-curve model can be interpreted as one would interpret OLS coefficients, with each regression coefficient indicating the change in logged earnings that would result from a one unit-change in the predictor variable, other variables held constant. (Because earnings are logged, the coefficients give an approximate indication of the percentage change in

earnings associated with a one-unit change in the independent variables.) We also include estimates of rho (ρ), the correlation between an individual's error terms over time, and tau (τ), the correlation between the estimated intercepts and slopes. These are reported at the bottom of the table.

Model 1 shows base-line differences in initial earnings (in 1996) and subsequent monthly earnings growth between natives and immigrants. The intercept differential for immigrant indicates that foreign born men initially (when the data begin in 1996) earn about 23.8 percent less than natives. The coefficient for time indicates that low-skilled men's earnings grew by a statistically significant 0.3 percent each month, with the difference in growth between natives and immigrants being statistically insignificant at the 5 percent level. The high correlation between error terms (ρ) is expected given the non-independence of individual monthly earnings. Also, the negative relationship between individual estimated intercepts and slopes (τ) reveals that earnings trajectories are flatter for workers with higher initial earnings. This commonly-observed finding is often attributed to regression to the mean.

Model 2 adds age and age^2 at month 1 in 1996, as well as an interaction between age and immigrant status, to the intercept equation, and also adds age to the slope equation. Not surprisingly, we find that older workers had higher wages when the data began in 1996, but that this age effect increased at a decreasing rate. This is a common finding in human capital earnings functions. This is also shown by the (small, but significant) negative effect of age on the slope coefficient – older workers show a lower rate of monthly earnings growth over the 1996 – 2000 time period.

[TABLE 3 ABOUT HERE]

Model 3 adds race/ethnicity dummy variables, and interactions between these variables and immigrant status, to the equations for the constant and slope in Model 2. Looking first at the equation for the intercept, we see that with race/ethnicity in the equation, the immigrant dummy variable is no longer significant, showing that among white low skill workers when the data began in 1996, immigrants earn approximately the same as natives. Further, black and Hispanic natives were earning approximately 14.9 percent and 9.7 percent less than white natives. Also, at this time, Hispanic immigrants were earning 26.2 percent less than native Hispanics. Only for Hispanics was the earnings decrement between natives and immigrants this large and statistically significant. Thus Hispanic immigrants suffer a "double decrement" – for their ethnicity and for their immigrant status.

For the slope (growth) equation over 1996 – 2000, only one variable was significant. Black immigrants had significantly higher earnings growth than black natives. This is not completely surprising, since the relative economic success of immigrants from the West Indies and Africa has been documented previously (Arthur 2000; Butcher 1994; Model 1995).

Model 4 adds education, the interaction between education and immigrant status, and the three-way interactions among education, immigrant status, and race to the intercept and slope equations. The intercept coefficient for education is positive and significant, indicating that earnings in 1996 were about 8 percent higher for each year of education that the worker had attained. This is an important finding. It shows that even in the low-wage labor market, restricted to workers with a high school education or less, years of schooling completed is strongly and significantly related to earnings. This

strongly supports the human capital interpretation of educational attainment, even at the low end of the educational distribution. It is also consistent with Newman's (2006) findings regarding the subsequent earnings careers of her sample of fast food applicants from Harlem, New York, first interviewed in 1993.

Perhaps even more important is the failure to find a significant interaction between education and immigrant status. This indicates that the earnings gains experienced by better-educated workers apply equally to immigrants as well as natives. The only exception is the significantly negative three way interaction for education* Hispanic*Immigrant. Hispanic immigrants receive lower returns to schooling than do other immigrants. In addition, with these variables in the intercept equation, the overall effect of immigrant (which applies to white immigrants) is very close to zero, and the effect for Hispanic (natives) is no longer significant. Further, the interactions between race and immigrant are not significant either. Where the returns to education for immigrants are concerned they are in general positive, but significantly smaller for Hispanics than for Whites. Thus we see that the lower earnings of immigrants in models 1 and 2 are entirely due to lower earnings for Hispanic immigrants, as shown in model 3. Then, model 4 reveals that Hispanic immigrants earn less than the reference group (white natives) because their returns to education are lower.

As for the effects of these variables in the slope coefficient equation, none are significant. With this large number of variables in the slope coefficient equation, the overall finding is that, on average, wages for low-skill workers grew by 1.2 percent per month in a way that was relatively undifferentiated across individuals.

Thus far, our analyses have used combined data for natives and immigrants. However, it is also of interest to test for differential earnings by immigrants from different nations and regional groupings of nations, as well as for the effects of age of arrival in this country, and citizenship. To do so, we restrict attention to data for immigrants alone, since these variables are not measured for natives. The results are shown in Table 4. As before, we estimate a series of increasingly complex random coefficient growth curve regression models for earnings, with exogenous variables affecting both the intercepts and slopes.

[TABLE 4 ABOUT HERE]

Model 1 includes age, age^2, and dummy variables for the country or region of origin (Canada is the base, or comparison group) in the intercept equation. The same variables, with the exception of age^2, are in the slope equation. Consistent with the findings in the pooled (immigrants plus natives) models in Table 3, the intercept equation estimates in Model 1 show that earnings increase with age, but at a decreasing rate. A number of the dummy variable coefficients for nations and regions are significant. The largest of these are the negative coefficients for the Middle East, El Salvador, Guatemala, Mexico, China, Korea, and Vietnam. Immigrants from these areas were earning substantially less than those from Canada when earnings were first observed in 1996. By contrast, the earnings of immigrants from Europe, Russia, Puerto Rico, Africa, India, and the Philippines were not significantly different than those from Canada. As in the previous analysis, the slope coefficient shows a positive rate of monthly wage growth during the 1996 – 2000 period, with slightly slower growth among workers who were

older when this period began. None of the national/regional dummy variables are significant in the slope equation.

Model 2 adds education to Model 1. This is significant in the intercept equation, indicating that, for every additional year of schooling completed, earnings at the beginning of 1996 increased by 3.1 percent. This is a substantial effect, and strongly supports the human capital model of earnings determination, even within the population of immigrant workers with less than or equal to a high school degree. It also supports and extends Newman's (2006) finding that, within the low-wage population, years of education completed is a strong predictor of earnings success. With education controlled, some of the negative and significant national/regional dummy variable coefficients decrease in magnitude. However, these decreases are not in general large, and the coefficients continue to be significant. Neither education, nor the national/regional dummy variables are significant in the slope equation for monthly earnings growth during 1996 – 2000.

Model 3 adds dummy variables for age of arrival to the U.S. to the equation. The first dummy (*Age Arrival ≤ 12*) captures immigrants who received most, if not all, of their education in the U.S., and is characteristic of the *1.5* generation. The second dummy (*Age Arrival 13-18*) captures immigrants who could have received some secondary schooling in the U.S. The third dummy (*Age Arrival 19-28*) refers to immigrants who arrived during the early part of their employable years, though they may have some work experience outside of the U.S. The reference group is immigrants who arrived between the ages of 29 and 40, and refers to immigrants who have considerable work experience, as well as their formative educational experience, outside the U.S.

We find that all three age of arrival variables are statistically significant in the intercept equation. Arriving at an age younger than 29 significantly increases earnings in 1996, net of other variables. Compared to workers who were older than 29 when they arrived, those who were less than or equal to 12 years of age earned 33.7 percent more; those who were 13 – 18 years of age earned 31.9 percent more; and those who were 19 – 28 years of age earned 20.8 percent more. These are large effects, and indicate the importance of the human and social capital gained from early U.S. acculturation in increasing earnings growth. Thus, even after years of schooling differences are controlled for, immigrants who arrived during the childhood and early employable years have considerably higher earnings than immigrants who arrive later in the lifespan. With these variables in the intercept equation, the negative and significant dummy variables for immigrants from the Middle East, El Salvador, Guatemala, Mexico, Korea and Vietnam are further reduced, although they still remain significant.

As before, very few variables are significant in the slope equation, although there is a small but significant growth decrement for those who arrived at age 12 or younger. This is difficult to explain, although it could be due to some additional regression to the mean for those who had showed above-average wage growth prior to 1996.

The final model in Table 4 adds citizenship status to the intercept and slope equations. As expected, among these low-skill immigrant workers, citizenship is significantly and positively related to earnings when the data begin in 1996. Other things being equal, citizens earned 11.7 percent more than non-citizens. This supports Hudson's (2007) observation that citizenship plays a significant role in labor market segmentation. With citizenship in the equation, the coefficients of the other variables change only

modestly. Thus, citizenship acts as a relatively independent force on the earnings of low-skill workers.

As with the other models in this table, neither citizenship nor most of the other variables are significant in the slope equation. This is likely because the four years from 1996 to 2000 are a relatively narrow period, when compared to the worker's prior employment career, in which to observe earnings differentiation.

DISCUSSION

We used monthly SIPP data from 1996 to 2000 to estimate the determinants of differentiation in intercepts and slopes for earning growth among low-skill (high school education or less) immigrant and native male workers. These calculations provide more detail about the operation of the low-skill labor market than has been available before. In particular, they address the following questions. First, to what extent are immigrant workers segmented away from native workers within the low-skill labor market? Are they employed in different or similar jobs? Do they earn less, and if so, by how much, and what is the trend in this differential over time? Second, what determines earnings in the low-skill labor market? Is years of schooling positively associated with earnings growth? If so, does differential educational attainment explain the lower earnings of immigrants? Finally, restricting attention to immigrants, what are the patterns of their differential earnings? Is their a wage premium for arrival to the United States at an earlier age and/or for citizenship status? Do these effects explain earnings differentials across counties of origin?

We found both similarities and differences in the jobs held by low-skill immigrant and native male workers. Similarities include the fact that both groups of low-skill

workers are likely to be employed as janitors and cleaners, truck drivers, construction laborers, machine operators, gardeners, and auto mechanics. Differences include the high share of immigrants employed as cooks and as farm workers, and the high share of natives employed as sales and production supervisors, as well as miscellaneous managers and administrators. The advantage enjoyed by natives in moving into supervisory and managerial employment within the low-skill labor market is clear.

We found that, when the data began in 1996, immigrants earned approximately 23.8 percent less than natives. During the 1996-2000 period, the average low-skill worker's wage increased by 0.3 percent per month, for an average annual increase of approximately 4 percent. This rate was slightly higher for immigrants. Not surprisingly, older workers were earning more in 1996, but their monthly wages grew over the 1996 – 2000 period at a slower rate than did those of younger workers. Black native workers earned less than whites, and Hispanic immigrant workers earned less than white immigrants in 1996. These ethnic differences are generally consistent with prior findings, and clearly show the earnings disadvantages experienced by black natives and Hispanic immigrants.

Education was strongly and positively related to earnings in the low-skill labor market, with each additional year of schooling (below 12 years, the ceiling for our sample) leading to an 8 percent increase in earnings for natives. This return to education did not differ significantly for white, black, or Asian immigrants. However, Hispanic immigrants earned six percentage points less for each year of schooling, so that they only gained a 2 percent increase in earnings for each additional year of schooling. These results both support the human capital model, and also raise the question of what

combination of occupational or industrial segregation, discrimination, and human and social capital might account for the lower return to education experienced by Hispanic immigrants.

Our final set of calculations restricted attention to immigrant workers, and asked how their earnings were differentiated by country or region of origin, education, age at arrival in the U.S., and citizenship status. We found that, by comparison with immigrants from Canada, lower earnings were achieved by immigrants from the Middle East, El Salvador, Guatemala, Mexico, China, Korea, and Vietnam. Higher earnings (than Canadian immigrants) were achieved by African immigrants. We also found that years of schooling, younger age at arrival in the U.S., and citizenship all increased earnings, and did so relatively independently of one another, and of nation of origin. Thus, these variables do not explain the country of origin earnings differentials summarized above.

Our findings provide further depth of understanding to the "mixed" picture of segmentation in the low-skill labor market that has been reported by others. On the positive side, many male immigrants are employed alongside natives in similar industries and occupations. Both groups show wage gains over time, and they generally receive similar returns to years of schooling completed. Immigrants also receive substantial returns to acculturation, such as younger age at arrival and citizenship status. Immigrants from Africa have higher earnings than the comparison group of Canadian immigrants.

On the negative side, immigrants are less likely to occupy supervisory and managerial jobs than natives. Immigrants earn less than natives, and this is particularly the case for those from certain South and Central American countries, as well as from China, Korea, and Vietnam. Hispanic immigrants receive lower returns to education than

do white immigrants. Education, age at arrival, and citizenship do not explain the earnings disadvantages experienced by those from the countries listed above.

Thus, human capital earnings models apply in low-skill labor markets, but they are far from fully explaining the worker earnings differentiation observed there. We encourage future studies to delve deeper into the causal mechanisms that may explain these patterns, including those underlying occupational and industrial segregation, discrimination, and social capital and network effects on employment and earnings.

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TABLE 1: Desciptive statistics for variables used in analysis for immigrant and natives

Immigrants	Pooled	Month 1	Month 12	Month 24	Month 36	Month 48
Income	1900.63	1766.02	1892.96	1876.96	1984.18	2159.43
Log Income	7.42	7.34	7.41	7.42	7.46	7.57
Age	31.67	31.74	31.86	31.62	31.86	32.11
Black	0.02	0.02	0.02	0.02	0.02	0.03
Hispanic	0.72	0.72	0.69	0.73	0.70	0.71
Asian	0.10	0.10	0.11	0.09	0.11	0.10
Education	9.15	9.24	9.34	9.10	9.28	9.18
Immigration age:						
0-12	0.20	0.21	0.22	0.19	0.21	0.17
13-18	0.27	0.26	0.25	0.26	0.25	0.28
19-28	0.45	0.44	0.43	0.47	0.43	0.45
29-40	0.08	0.09	0.10	0.08	0.11	0.10
Citizen	0.36	0.35	0.36	0.36	0.37	0.38
Natives						
Income	2380.85	2205.45	2275.73	2329.45	2417.53	2610.18
Log Income	7.65	7.57	7.62	7.64	7.67	7.75
Age	31.96	32.07	32.17	31.99	31.78	31.84
Black	0.09	0.08	0.10	0.08	0.08	0.08
Hispanic	0.07	0.08	0.08	0.08	0.07	0.07
Asian	0.01	0.01	0.01	0.01	0.01	0.01
Education	11.67	11.69	11.67	11.66	11.69	11.67

TABLE 2: Industries and occupations employing immigrant and native low-skill male workers, in order (descending) of employment share, 1996

Immigrants		Natives	
Industry	Percent	Industry	Percent
Construction	11.08	Construction	13.22
Eating and drinking places	8.1	Trucking services	3.25
Agricultural Production, crop	3.7	Eating and drinking places	2.94
Landscape and horticultural services	3.44	Justice, public order, and safety	2.61
Grocery stores	3.13	Motor vehicles and equipment	2.33
Automotive repair	2.72	Motor vehicle dealers	2.33
Hotels and motels	2.26	Grocery stores	2.27
Groceries and related products	1.99	Machinery, except electrical	2.02
Electrical machinery	1.78	Groceries and related products	1.99
Trucking services	1.61	General government	1.9
Fabricated structural metal products	1.56	Automotive repair	1.78
Misc. fabricated metal products	1.38	Furniture and fixtures	1.29
Services to dwellings	1.34	Hospitals	1.25
Agricultural Production, livestock	1.32	Misc entertainment and rec services	1.19
Apparel and accessories, except knit	1.14	Fabricated structural metal products	1.13
Scrap and waste materials	1.14	Printing and publishing	1.12
Motor vehicle dealers	1.11	Misc plastic products	0.97
Machinery, except electrical	1.08	Machinery, equipment and supplies	0.95

Immigrants		Natives	
Occupation	Percent	Occupation	Percent
Cooks	5.78	Truck drivers	5.95
Janitors and cleaners	4.29	Supervisors, sales	3.12
Truck drivers	4.25	Supervisors, production	2.87
Misc machine operators	4.08	Misc machine operators	2.79
Farm workers	4.04	Managers and administrators	2.53
Gardeners	3.05	Janitors and cleaners	2.51
Construction laborers	2.41	Auto mechanics	2.35
Assemblers	2.35	Construction laborers	2.09
Laborers, except construction	2.35	Carpenters	2.00
Shipping/Receiving clerks	1.61	Assemblers	1.94
Supervisors, sales	1.55	Laborers, except construction	1.82
Auto mechanics	1.55	Gardeners	1.50
Welders and cutters	1.55	Sales representatives, mining, manufact	1.41
Truck and tractor operators	1.53	Machine operators	1.40
Carpenters	1.52	Industrial machine repairers	1.39
Supervisors, production	1.43	Welders and cutters	1.37
Food preparation	1.42	Truck and tractor operators	1.36
Painters	1.40	Machinists	1.26

TABLE 3: Growth curve regression coefficients predicting monthly logged earnings

	(1)		(2)		(3)		(4)	
Intercepts								
Constant	7.49040	***	5.70130	***	5.62640	***	4.73820	***
	(0.0144)		(0.2301)		(0.2261)		(0.2563)	
Immigrant	-0.23830	***	-0.26920	*	0.10580		-0.01950	
	(0.0243)		(0.1070)		(0.1183)		(0.3633)	
Age (months)			0.00809	***	0.00865	***	0.00822	***
			(0.0013)		(0.0013)		(0.0012)	
Age^2			-0.00000	***	-0.00000	***	-0.00000	***
			(0.0000)		(0.0000)		(0.0000)	
Age*Immigrant			0.00007		-0.00024		-0.00011	
			(0.0003)		(0.0003)		(0.0003)	
Black					-0.14870	***	-0.15590	***
					(0.0444)		(0.0434)	
Hispanic					-0.09716	*	-0.05861	
					(0.0460)		(0.0454)	
Asian					-0.13100		-0.02942	
					(0.3351)		(0.3295)	
Black*Immigrant					-0.19650		-0.70730	
					(0.1399)		(1.0463)	
Hispanic*Immigrant					-0.26200	***	0.47840	
					(0.0710)		(0.3217)	
Asian*Immigrant					-0.06052		-0.06820	
					(0.3439)		(0.5828)	
Education							0.08164	***
							(0.0115)	
Education*Immigrant							0.00880	
							(0.0295)	
Education*Black*Immigrant							0.04382	
							(0.0903)	
Education*Hispanic*Immigrant							-0.05967	*
							(0.0279)	
Education*Asian*Immigrant							-0.00724	
							(0.0421)	
Slopes								
Time	0.00336	***	0.01101	***	0.01128	***	0.01230	**
	(0.0008)		(0.0018)		(0.0018)		(0.0043)	
$Time^2$	0.00002		0.00002		0.00002		0.00002	
	(0.0000)		(0.0000)		(0.0000)		(0.0000)	

Immigrant	0.00108	+	0.00099		-0.00034		0.00406	
	(0.0006)		(0.0006)		(0.0014)		(0.0091)	
Age (months)			-0.00002	***	-0.00002	***	-0.00002	***
			(0.0000)		(0.0000)		(0.0000)	
Black					-0.00146		-0.00149	
					(0.0012)		(0.0012)	
Hispanic					0.00029		0.00027	
					(0.0013)		(0.0013)	
Asian					-0.00229		0.00073	
					(0.0140)		(0.0140)	
Black*Immigrant					0.01160	**	-0.70730	
					(0.0039)		(1.0463)	
Hispanic*Immigrant					0.00077		0.47840	
					(0.0020)		(0.3217)	
Asian*Immigrant					0.00462		-0.06820	
					(0.0142)		(0.5828)	
Education							-0.00011	
							(0.0003)	
Education*Immigrant							-0.00038	
							(0.0008)	
Education*Black*Immigrant							-0.00566	
							(0.0096)	
Education*Hispanic*Immigrant							0.00039	
							(0.0007)	
Education*Asian*Immigrant							-0.00000	
							(0.0011)	
Groups	5247		5247		5247		5247	
Observations	55264		55264		55264		55264	
Covariance Parameters								
P	0.6557		0.6557		0.6558		0.6559	
T	-0.4563		-0.4364		-0.4451		-0.4444	

TABLE 4: Growth curve regression coefficients predicting monthly logged earnings, among immigrants

	(1)		(2)		(3)		(4)	
Intercepts								
Constant	6.13560	***	5.70270	***	5.40040	***	5.46390	***
	(0.4677)		(0.4631)		(0.4708)		(0.4689)	
Age (months)	0.00705	**	0.00728	***	0.00675	**	0.00650	**
	(0.0023)		(0.0023)		(0.0023)		(0.0023)	
Age^2	-0.00000	*	-0.00000	*	-0.00000	*	-0.00000	*
	(0.0000)		(0.0000)		(0.0000)		(0.0000)	
Canada	ref		ref		ref		ref	
England	0.00761		-0.00066		0.03060		0.04640	
	(0.2542)		(0.2488)		(0.2439)		(0.2431)	
Germany	-0.02973		-0.03630		-0.07801		-0.11220	
	(0.2829)		(0.2775)		(0.2732)		(0.2729)	
Other Europe	-0.07508		-0.07713		-0.05620		-0.04625	
	(0.2049)		(0.2007)		(0.1967)		(0.1961)	
East Europe/Russia	-0.17450		-0.16470		-0.01019		-0.06358	
	0.30990		0.30410		0.30160		0.30130	
Oceania	0.14350		0.13770		0.24840		0.23350	
	(0.2964)		(0.2904)		(0.2858)		(0.2851)	
Middle East	-0.79550	***	-0.75930	***	-0.68100	**	-0.67280	**
	(0.2399)		(0.2352)		(0.2316)		(0.2308)	
El Salvador	-0.52720	**	-0.43550	*	-0.36960	+	-0.33720	+
	(0.2031)		(0.1997)		(0.1965)		(0.1962)	
Guatemala	-0.58300	**	-0.47200	*	-0.39740	+	-0.36310	+
	(0.2177)		(0.2144)		(0.2107)		(0.2104)	
Mexico	-0.57170	**	-0.44830	*	-0.40630	*	-0.37850	*
	(0.1900)		(0.1875)		(0.1843)		(0.1840)	
Other Latin America	-0.41840	*	-0.37450	*	-0.31910		-0.30530	
	(0.2059)		(0.2018)		(0.1984)		(0.1978)	
Puerto Rico	-0.32740		-0.32400		-0.26430		-0.33110	
	(0.2207)		(0.2162)		(0.2123)		(0.2136)	
Other Caribbean	-0.36780	+	-0.36390	+	-0.32910	+	-0.32270	+
	(0.2094)		(0.2051)		(0.2014)		(0.2007)	
Africa	0.54110		0.55850		0.61660	+	0.66320	+
	(0.3837)		(0.3761)		(0.3696)		(0.3689)	
China	-0.48420	*	-0.46340	*	-0.35130		-0.37310	+
	(0.2306)		(0.2259)		(0.2234)		(0.2228)	
India	-0.36480		-0.37070		-0.29010		-0.26320	

	(0.2645)		(0.2589)		(0.2545)		(0.2538)	
Korea	-0.47920	*	-0.49190	*	-0.40860	+	-0.41630	+
	(0.2379)		(0.2331)		(0.2293)		(0.2286)	
Philippines	-0.04460		-0.05402		-0.03414		-0.07192	
	(0.2490)		(0.2438)		(0.2395)		(0.2392)	
Vietnam	-0.60890	*	-0.55500	*	-0.50300	*	-0.51050	*
	(0.2383)		(0.2338)		(0.2297)		(0.2290)	
Other Asia	-0.26530		-0.26100		-0.22790		-0.24750	
	(0.2108)		(0.2065)		(0.2025)		(0.2020)	
Education			0.03078	***	0.02991	***	0.02898	***
			(0.0061)		(0.0061)		(0.0061)	
Age Arrival ≤ 12					0.33690	***	0.29630	***
					(0.0804)		(0.0820)	
Age Arrival 13 - 18					0.31890	***	0.27100	***
					(0.0752)		(0.0719)	
Age Arrival 19 - 28					0.20790	**	0.19230	**
					(0.0695)		(0.0696)	
Citizen							0.11660	*
							(0.0497)	
Slopes								
Time	0.01493	*	0.01482	*	0.02073	**	0.02124	**
	(0.0060)		(0.0066)		(0.0073)		(0.0074)	
$Time^2$	0.00002		0.00002		0.00002		0.00002	
	(0.0000)		(0.0000)		(0.0000)		(0.0000)	
Age	-0.00003	***	-0.00003	***	-0.00004	***	-0.00004	***
	(0.0000)		(0.0000)		(0.0000)		(0.0000)	
Canada	ref		ref		ref		ref	
England	-0.00465		-0.00471		-0.00580		-0.00557	
	(0.0066)		(0.0066)		(0.0066)		(0.0066)	
Germany	-0.00645		-0.00629		-0.00411		-0.00432	
	(0.0090)		(0.0090)		(0.0090)		(0.0090)	
Other Europe	0.00149		0.00143		0.00143		0.00140	
	(0.0054)		(0.0054)		(0.0054)		(0.0054)	
East Europe/Russia	-0.00306		-0.00320		-0.00512		-0.00383	
	(0.0090)		(0.0089)		(0.0089)		(0.0089)	
Oceania	-0.00540		-0.00550		-0.00764		-0.00772	
	(0.0081)		(0.0080)		(0.0080)		(0.0080)	
Middle East	0.00376		0.00291		0.00136		0.00123	
	(0.0066)		(0.0066)		(0.0066)		(0.0066)	
El Salvador	-0.00042		-0.00750		-0.00215		-0.00210	
	(0.0053)		(0.0053)		(0.0053)		(0.0053)	
Guatemala	0.00616		0.00623		0.00523		0.00520	

	(0.0059)	(0.0059)	(0.0059)	(0.0059)
Mexico	0.00108	0.00087	-0.00004	-0.00000
	(0.0049)	(0.0050)	(0.0049)	(0.0050)
Other Latin America	-0.00072	-0.00094	-0.00231	-0.00209
	(0.0055)	(0.0055)	(0.0054)	(0.0055)
Puerto Rico	-0.00355	-0.00352	-0.00422	-0.00428
	(0.0060)	(0.0060)	(0.0059)	(0.0060)
Other Caribbean	0.00333	0.00317	0.00260	0.00246
	(0.0057)	(0.0057)	(0.0056)	(0.0056)
Africa	-0.01554	-0.01598	-0.01784	-0.01753
	(0.0114)	(0.0113)	(0.0113)	(0.0113)
China	0.00212	0.00194	0.00039	0.00039
	(0.0064)	(0.0064)	(0.0064)	(0.0064)
India	-0.00126	-0.00127	-0.00257	-0.00254
	(0.0070)	(0.0070)	(0.0069)	(0.0069)
Korea	0.00742	0.00729	0.00596	0.00595
	(0.0062)	(0.0062)	(0.0062)	(0.0062)
Philippines	-0.00277	-0.00282	-0.00421	-0.00421
	(0.0070)	(0.0069)	(0.0069)	(0.0069)
Vietnam	0.00553	0.00545	0.00419	0.00405
	(0.0063)	(0.0063)	(0.0062)	(0.0063)
Other Asia	0.00078	0.00081	0.00000	0.00010
	(0.0057)	(0.0056)	(0.0056)	(0.0056)
Education		-0.00005	0.00002	0.00002
		(0.0002)	(0.0002)	(0.0002)
Age Arrival ≤ 12			-0.00521 *	-0.00541 *
			(0.0024)	(0.0025)
Age Arrival 13 - 18			-0.00250	-0.00265
			(0.0023)	(0.0023)
Age Arrival 19 - 28			-0.00098	-0.00112
			(0.0021)	(0.0021)
Citizen				0.00022
				(0.0015)
Groups	1294	1294	1294	1294
Observations	16535	16535	16535	16535
Covariance Parameters				
ρ	0.6933	0.6933	0.6931	0.6931
τ	-0.5273	-0.5354	-0.5197	-0.5197