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## ABSTRACT

### Why Is the Payoff to Schooling Smaller for Immigrants?\*

This paper is concerned with why immigrants appear to have consistently lower partial effects of schooling on earnings than the native born, both across destinations and in different time periods within countries. It uses the Over-Under-Required education approach to occupations, a new decomposition technique developed especially for this approach, and data from the 2000 Census of the United States. Based on the average (mean or mode) level of schooling in their occupation, the schooling of the native and foreign born adult men is divided into the “required” (average) level, and years of under- or overeducation. Immigrants have a wider variance in schooling, with an especially large proportion undereducated given the average schooling level in their occupation. Immigrants are shown to receive approximately the same rate of return to the “required” (occupational norm) level of education, but experience a smaller negative effect of years of undereducation, and to a lesser extent a small positive effect of overeducation. About two-thirds of the smaller effect of schooling on earnings for immigrants is due to their different payoffs to undereducation and overeducation. The remainder is largely due to their different distribution of years of schooling. The country-of-origin differences in the returns to under- and overeducation are consistent with country differences in the international transferability of skills to the US and the favorable selectivity of economic migrants, especially those from countries other than the English-speaking developed countries.

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## WHY IS THE PAYOFF TO SCHOOLING SMALLER FOR IMMIGRANTS?

### I. INTRODUCTION

One of the most striking empirical regularities that has emerged from comparative analyses of the earnings of immigrants and the native born is that the partial effect on earnings of a year of schooling is lower for the foreign born than for the native born. In Chiswick's (1978) early study, based on the 1970 US Census, the partial effect of a year of schooling on earnings for the native born was 7.2 percent, and that for the foreign born 5.7 percent.

This pattern has been repeated in analyses of the US labor market based on more recent data, and in analyses of other labor markets. For example, Baker and Benjamin (1994) report that the partial effect of years of schooling on earnings in the Canadian labor market was 7.3 percent for natives and 4.8 percent for immigrants in 1971, 6.6 percent and 4.4 percent respectively for these groups in 1981, and 7.6 percent and 4.9 percent respectively for the two groups in 1986.

For the Australian labor market in 1981, Chiswick and Miller (1985) report that the partial effect of schooling was 8.2 percent for the native born and 6.6 percent for the foreign born. Similarly, for the United Kingdom, Chiswick (1980) reports that in 1972 the partial effect of schooling was 7.5 percent for the native born and 5.7 percent for the foreign born. These findings are not limited to English speaking destinations. Similar findings emerge for Israel (see Chiswick (1979)) and Germany (Dustmann (1993)).

Various reasons for the smaller partial effect of schooling among the foreign born have been expressed, though a convincing explanation has not emerged to date. Chiswick (1978), for example, examined whether the smaller partial effect was due to schooling acquired abroad. However, it was found that "an extra year of schooling prior to immigration raises earnings by 5.8 percent, while an extra year after immigration raises earnings by 5.0 percent" (Chiswick (1978, p.911))<sup>1</sup>. In other words, the pattern of effects is contrary to that expected. Chiswick and Miller (1985) conduct similar analyses for the

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<sup>1</sup> Chiswick's (1978) partitioning of schooling into its pre- and post- migration components used information on age at arrival, and had substantial measurement error.

Australian labor market. While they find that schooling acquired after migration was associated with a larger increase in earnings than schooling acquired before migration, the difference in partial effects was small (0.4 of one percentage point) and could not account for the smaller effect of years of schooling on earnings among the foreign born.

Chiswick (1978) offered several other explanations for the lower effect of schooling among immigrants, including effects associated with being raised in a home less familiar with the language and institutions of the United States, labor market discrimination against immigrants that increases with the level of schooling, and the self-selection of immigrants. There was little empirical support for the first two of these hypotheses, and the third one could not be tested. It is based on an interaction between motivation/ability and level of schooling in the migration decision, such that among those with little schooling, only the most able and most highly motivated migrate, while among those with high levels of schooling the immigrants are drawn more widely from the underlying ability distribution. In this situation, as Chiswick (1978, p. 912) explains, “Then, a regression equation which did not include ability or motivation variables would show an upward-biased intercept and a downward-biased slope coefficient of schooling”.

A final explanation for the lower effect of schooling among immigrants, which has been a recurring theme in the literature, is that it reflects the less-than-perfect international transferability of human capital skills. Chiswick (1979), for example, argued that the human capital skills of immigrants from developed, English-speaking countries will be highly transferable to the US labor market, and the return to schooling for these groups should be similar to the return for the native born. Other (non-refugee) immigrants will have lower skill transferability, and this will be revealed as a low partial effect of schooling for these immigrants compared to the native born. For refugees, there will be an even lower degree of international skill transferability, and a concomitant lower partial effect of schooling. The empirical evidence reported by Chiswick was consistent with this international skill transferability hypothesis.

This paper revisits the issue of the lower partial effect of schooling among the foreign born, and asks whether this arises from a mismatch between immigrants’ skills and the requirements of the jobs they secure in the host country’s labor market. In doing so it draws on a growing literature that documents the extent to which worker’s skills are

correctly matched to the requirements of the jobs they hold (see Hartog (2000), Daly *et al.* (2000) and Kiker *et al.* (1997)). It is reported in this literature that one-fifth to one-half of all workers may be working in jobs that do not appear to be well suited to their schooling level. This so-called “mismatch” will be shown to be associated with a pattern of earnings across schooling levels that mirrors that described by Chiswick (1978) (1979) as arising from self-selection in migration and the less-than-perfect international transferability of human capital. In this paper occupational distributions are taken as given, although in a related paper the reasons for the occupational mismatches are the subject of investigation (Chiswick and Miller (2004)).

The structure of the paper is as follows. Section II presents descriptive material on the extent of over- and under-education among immigrants in the United States, using data from the 2000 Census. It also outlines a model of the earnings determination process that is based on these concepts of over- and under-education. The empirical analysis in the subsequent sections is limited to males aged 25 to 64 years. Section III examines variations in earnings according to the match between the immigrants’ educational attainments and the requirements of their jobs. These analyses are conducted separately for the native born and the foreign born. Section IV then focuses on the extent to which the greater incidence of mismatch among the immigrant labor force can account for their lower partial effect of schooling. Section V conducts similar analyses among the foreign born for a number of birthplace groups. Section VI contains a brief summary and conclusion, with implications for the immigrant adjustment literature.

## **II. OVER- AND UNDER-EDUCATION IN THE US IN 2000**

Becker’s (1964) and Mincer’s (1974) human capital model implicitly assumes that all education (schooling in Becker (1964), on-the-job training in Mincer (1974)) possessed by a worker is required to perform the duties expected in the worker’s job. This view has been challenged over the past few decades by proponents of the under- and over-education hypothesis. Under this alternative, each job is seen as having a “required” or reference level of education that is needed for satisfactory job performance. However, within any job, there may be workers with levels of education greater than the reference

level. These workers are termed “overeducated”. There may also be workers with levels of education less than this reference level. These workers are termed “undereducated”.

The reference level of education has been determined in three ways in the overeducation/undereducation literature, namely job analysis, worker self-assessment and realized matches. Job analysis is the use of “objective” evaluations of the required level of education for the job titles in an occupational classification, such as the US Department of Labor’s Dictionary of Occupational Titles (see, for example, Rumberger 1981).

Worker self-assessment refers to workers’ self-reports on either minimum levels of education required to perform the tasks in their jobs, or on whether they have more or less education than is actually required in their particular jobs (*e.g.*, Duncan and Hoffman 1981).

The final method, and that which is most amenable for use with Census data of the type used in this study, is the realized matches procedure. This is based on the actual educational attainments of workers in each occupation. Two alternatives have been used. The first, typified by Verdugo and Verdugo (1989), is based on the mean and standard deviation of educational attainments within each occupation. Workers whose educational attainments are greater than one standard deviation above the mean value for their occupation are categorized as “overeducated”. Conversely, workers whose educational attainments are more than one standard deviation below the mean value for their occupation are categorized as “undereducated”. Finally, workers whose educational attainments fall within plus or minus one standard deviation of the mean value for their occupation of employment are considered to be adequately educated.

Cohn and Khan (1995) and Kiker *et al.* (1997) have preferred the use of the modal year of education in the worker’s occupation in the realized matches procedure. When using the mode, workers whose educational attainments are greater than the modal value are categorized as “overeducated”; those whose educational attainments are less than the modal value are categorized as “undereducated”; and workers whose level of education is the same as the modal value for their occupation are termed adequately educated.

A range of limitations and benefits have been identified in the literature for each of these three measures (see Hartog 2000). For example, it has been argued that workers' tendency to inflate the education requirements of their jobs, and their lack of knowledge of hiring standards, limits the usefulness of the worker self assessment method. In addition, worker answers to questions such as on the level of education required to perform in a job may variously solicit responses that focus on the usual job tasks or the more demanding job tasks<sup>2</sup>. The pattern of responses may vary across types of workers.

Similarly, concern has been expressed over whether the job analysis data are really objective, as the assessment made may simply reflect the characteristics of workers currently in jobs, rather than the characteristics "needed" to perform the tasks required in the jobs. Employers may differ in their relative employment of production workers, managerial workers, technology, and physical capital. These differences may result in different levels of schooling among production workers in the same occupation and industry.

It is generally reported, however, that the results obtained from empirical studies are not sensitive to the type of measurement used (see Hartog 2000). In this research the realized matches procedure will be used. Both the mean with a one standard deviation threshold and the mode are used as the bases for the computations.

Table 1 lists information by country of birth on the modal level of schooling and on the distribution of the workforce across the three mutually exclusive and exhaustive categories of (i) overeducated, (ii) undereducated and (iii) "correctly" matched workers. This information has been compiled using the 2000 US Census. Workers have been allocated to the three categories listed in Table 1 using the realized matches procedure. In implementing this procedure, the educational requirements of the jobs have been compiled using the modal educational attainment of **all** workers in each three-digit occupation. In all 510 occupations are used in the analysis. Workers whose level of schooling is greater than the mode are categorized as "overeducated", while workers whose level of schooling is less than the mode are labeled "undereducated". Workers

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<sup>2</sup> A job may require only 12 years of schooling for, say, 80 percent of the time, but may require the skills of 16 years of schooling 20 percent of the time. Is a person with 14 years of schooling in this job over- or under- educated?



whose level of schooling is equal to the modal level of educational attainment for their occupation are categorized as “correctly matched”. Appendix A contains further details.

The modal level of schooling for native-born males aged 25-64 is 12 years, as is that of the foreign born in the same age group. Using the modal value for each person’s occupation, around 32 percent of native-born male workers are overeducated, 25 percent undereducated, and 43 percent are matched to the requirements of the jobs in which they work. This evidence is reasonably consistent with measures of the incidence of over- and under-education for the total US labor market presented in previous studies. Hence, Cohn and Khan (1995), using the worker self-assessment method and data for 1985, reported that 33 percent of workers were overeducated, 20 percent undereducated and 47 percent had a level of education considered adequate for their job. Similarly, Daly *et al.* (2000), using the same method of analysis as Cohn and Khan (1995), report that the percentage representations in the overeducation, undereducation and adequately educated categories were 32, 21 and 47, respectively. However, Cohn and Khan (1995) also used the realized matches method with the mean level of education of the workers’ occupations (with a threshold of plus or minus one standard deviation) and found percentage representations in the overeducation, undereducation and adequately educated categories of 13, 12 and 75, respectively. These figures are quite close to those reported in Appendix B using the same methodology. There do not appear to be any studies of the US labor market using the realized matches method with the modal level of education.

**Table 1**  
**Modal Schooling Level and Incidence of Over- and Under-Education by Nativity and other Characteristics, Males 25-64, 2000 US Census**

	Modal Schooling (years)	% overeducated	% correctly matched	% undereducated
Native Born	12.0	32.24	42.52	25.24
Foreign Born	12.0	28.25	27.87	43.89
• Region of Birth				
United Kingdom	16.0	37.69	38.02	24.28
Ireland	12.0	34.73	40.48	24.79
Western Europe	16.0	43.91	34.59	21.50
Southern Europe	12.0	23.99	25.12	40.88
Eastern Europe	12.0	40.02	37.01	22.96
Former USSR	16.0	50.11	33.05	16.84
Indo China	14.0	27.11	33.30	39.60

Philippines	16.0	49.29	36.06	14.65
China	17.5	44.18	31.80	24.02
South Asia	16.0	53.09	33.91	13.00
Other South Asia	16.0	48.05	31.17	20.78
Korea	16.0	44.61	40.17	15.22
Japan	16.0	36.39	44.49	19.12
Middle East	16.0	46.62	31.92	21.46
Sub Sahara Africa	16.0	29.00	33.01	17.99
North America	16.0	35.34	40.18	24.47
Mexico	5.5	10.55	16.98	72.47
Cuba	12.0	26.92	28.68	44.40
Caribbean	12.0	24.01	32.29	43.70
Central and South America–Spanish	12.0	24.67	26.71	48.62
Central and South America–non Spanish	12.0	26.79	33.68	39.53
Australia, New Zealand	16.0	31.82	35.22	32.96

Note: The modal level of schooling of each occupation is computed using information on all workers. See Appendix A for details. Correctly matched workers are defined as those with the modal years of education in their occupation.

Source: 2000 United States Census, 1% PUMS.

In comparison, while approximately the same percentage of foreign-born workers as of native-born workers are overeducated, the percentage representation in the undereducated and correctly matched categories for the foreign born differs appreciably from that for the native born<sup>3</sup>. Thus, 44 percent of foreign-born workers are undereducated and only 28 percent are correctly matched to the requirements of their jobs<sup>4</sup>. The workers who are undereducated can be viewed as working in jobs that are above their measured schooling level. To the extent that they are able to perform to a reasonable standard in these jobs (see Section III), it implies that they have other unmeasured attributes, such as motivation, effort, apprenticeship or on-the-job training that can compensate for their measured schooling deficiency. Alternatively, there may be variability in skill requirements for jobs within the occupational categories.

<sup>3</sup> It should be noted that the “correctly matched” level of education for an occupation is dominated by the educational attainment of the native born workers who comprise 86 percent of the sampled labor force, and the majority of workers in each of the 510 occupations.

<sup>4</sup> There is a much wider variance of schooling for the foreign born than for the native born. See Table 2.

There are also noticeable variations in the extent of overeducation and undereducation across birthplace regions. Countries with a high incidence of overeducation are the Former USSR, Philippines, South Asia, Other South Asia and Sub Saharan Africa, while those with a low incidence of overeducation are Southern Europe, Indochina, Mexico, Cuba, Caribbean, Central and South America – Spanish speaking and Central and South America – non Spanish speaking. Immigrants with a high modal level of schooling are generally characterized by a high incidence of overeducation, while those with a low modal level of schooling have a high incidence of undereducation. The simple correlation coefficient between the incidence of overeducation and the modal level of schooling for the birthplace regions displayed in Table 1 is 0.819. The simple correlation coefficient between the incidence of undereducation and the modal level of schooling from Table 1 is -0.861. However, the simple correlation coefficient between the incidence of workers being correctly matched to the requirement of their jobs and the modal level of education is much lower, 0.597.

This type of analysis was repeated using the mean level of education in each occupation as the benchmark. Relevant details are reported in Appendix B, Table B.1. The important feature of this table is that the pattern of results is the same as reported above. In other words, the salient features of this analysis appear to be insensitive to the underlying methodology, of mode or mean, as the measure of the match.

When examining the consequences for earnings of overeducation and undereducation, researchers have made use of a variant of the human capital earnings function that has been termed the ORU (Overeducation/Required education/Undereducation) specification. In this model, the variable for actual years of education is decomposed into three terms<sup>5</sup>.

That is,

$$(1) \quad \ln Y_i = \alpha_0 + \alpha_1 \text{Over\_Educ}_i + \alpha_2 \text{Req\_Educ}_i + \alpha_3 \text{Under\_Educ}_i + \dots + u_i$$

where

- Over\_Educ** = years of surplus or over education
- Req\_Educ** = required years of education
- Under\_Educ** = years of deficit or under education

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<sup>5</sup> The log linear specification of the relation between the natural logarithm of earnings and years of schooling was first developed and estimated in Becker and Chiswick (1966).

and the actual years of education equals  $\text{Over\_Educ} + \text{Req\_Educ} - \text{Under\_Educ}$ . Note that for each individual, “Over\_Educ” and “Under\_Educ” cannot both be positive. Either one or both must be zero.

Some studies have utilized variants of this model. One of the more popular has replaced the overeducation and undereducation variables, which are measured in years, by dummy variables for whether the workers are, respectively, over- or under-educated (see Kiker *et al.* (1997)). As this entails a loss of information regarding the magnitude of the mismatch, the model outlined in (1) is preferred, and provides the basis for the study of earnings presented in the following section.

### III. EARNINGS AND JOB MATCHING

Table 2 presents the results for the regression estimates of earnings equations for the United States’ adult men in paid employment (2000). The table contains estimates for both the native and the foreign born. Columns (i) and (iv) provide the results based on the standard model, while columns (ii) and (v) give the results generated by the ORU model. For both the standard and ORU models, a set of non-education explanatory variables is entered into the specification. Hence, the natural logarithm of annual earnings is related to educational attainment (either actual years of education or the three education variables that characterize the ORU model), potential labor market experience (computed using the proxy  $\text{Age} - \text{Years of Schooling} - 6$ ), the natural logarithm of weeks worked, dummy variables for married (spouse present), race, armed forces veteran status, resident of a metropolitan area, resident of a southern state, and English language skills, and, among the foreign born, variables for duration of residence in the US and citizenship.

**Table 2**  
**Regression Estimates of Earnings Equations, Total Adult Men in Paid Employment,**  
**Over/Under Education based on Modal Education**  
**U.S. 2000<sup>(a)</sup>**

Variable	Native Born			Foreign Born		
	(i)	(ii)	Mean/(SD)	(iv)	(v)	Mean/(SD)
Constant	4.404 (197.30)	3.822 (171.34)	1.0 (0.0)	5.913 (110.05)	4.463 (79.10)	1.0 (0.0)

Education	0.106 (205.73)	(c)	13.666 (2.51)	0.053 (68.77)	(c)	11.873 (4.78)
Required Education <sup>(b)</sup>	(c)	0.153 (258.48)	13.574 (1.98)	(c)	0.153 (93.79)	13.247 (1.94)
Overeducation	(c)	0.056 (54.03)	0.698 (1.21)	(c)	0.045 (19.70)	0.710 (1.35)
Undereducation	(c)	-0.066 (70.71)	0.606 (1.39)	(c)	-0.022 (22.19)	2.084 (3.39)
Experience (Exp)	0.034 (73.77)	0.036 (80.95)	22.390 (10.44)	0.011 (11.11)	0.018 (18.09)	22.211 (10.90)
Exp <sup>2</sup> /100	-0.056 (56.69)	-0.063 (64.89)	6.102 (5.09)	-0.016 (8.09)	-0.031 (16.42)	6.123 (5.59)
Logs Weeks Worked	0.995 (182.20)	0.985 (181.83)	3.822 (0.41)	0.865 (72.85)	0.855 (72.79)	3.766 (0.47)
Married	0.269 (113.22)	0.253 (108.14)	0.654 (0.48)	0.208 (35.72)	0.188 (33.25)	0.645 (0.48)
Race (black)	-0.155 (44.26)	-0.136 (39.45)	0.103 (0.30)	-0.186 (17.99)	-0.128 (12.70)	0.076 (0.26)
Veteran	-0.048 (18.07)	-0.033 (12.68)	0.240 (0.43)	-0.093 (7.42)	-0.058 (4.74)	0.050 (0.22)
Metropolitan	0.212 (36.44)	0.190 (33.06)	0.960 (0.20)	0.138 (5.14)	0.128 (4.92)	0.990 (0.10)
South	-0.057 (25.43)	-0.063 (28.55)	0.361 (0.48)	-0.069 (11.73)	-0.075 (13.08)	0.281 (0.45)
Speaks English Very Well	-0.057 (11.67)	-0.062 (12.90)	0.049 (0.22)	-0.088 (9.69)	-0.073 (8.38)	0.333 (0.47)
Speaks English Well	-0.092 (7.44)	-0.104 (8.58)	0.008 (0.09)	-0.267 (27.65)	-0.178 (18.90)	0.249 (0.43)
Speaks English Not Well	0.007 (0.36)	-0.016 (0.86)	0.004 (0.06)	-0.374 (34.87)	-0.276 (26.43)	0.193 (0.39)
Speaks English Not at All	0.126 (1.29)	0.011 (0.12)	0.0002 (0.01)	-0.379 (28.09)	-0.322 (24.67)	0.072 (0.26)
Years since Migration (YSM)	(c)	(c)	(c)	0.008 (9.70)	0.010 (12.09)	16.622 (10.95)
YSM <sup>2</sup> /100	(c)	(c)	(c)	-0.008 (4.00)	-0.011 (5.71)	3.961 (4.78)
Citizen	(c)	(c)	(c)	0.073 (11.05)	0.072 (11.26)	0.414 (0.49)
$\bar{R}^2$	0.3384	0.3608		0.3733	0.4139	
Sample Size	533,306	533,306	533,306	84,194	84,194	84,194

Notes: (a) Heteroscedasticity consistent “t” statistics in parentheses.

(b) Computed using the realized matches procedure with the mode as the reference level of schooling.

(c) Variable not relevant or not entered into specification.

Source: 2000 US Census, 1% PUMS.

For the native born, according to column (i), the return to an additional year of education is 10.6 percent. This is slightly higher than has been reported from analyses of earlier data sets, though it represents a continuation of the increase in the partial effect of schooling recorded in recent decades. The remainder of the estimates in column (i) are reasonably standard, and only brief comments will be provided.

The partial effect of labor market experience on earnings is given as  $0.034 - 0.0112 \text{ EXP}$ . Evaluated at  $\text{EXP} = 10$ , this equals 2.3 percent. The elasticity of earnings with respect to weeks worked is approximately unity. A number of personal characteristics affect earnings in substantial ways. Hence, the married (spouse present) are shown to have earnings around 27 percentage points higher than the earnings of workers in other marital states, the earnings of Blacks are, on average, 16 percentage points lower than the earnings of other racial groups, veterans of the armed forces have earnings five percent lower than those of non-veterans, while residents of the Southern states have earnings six percent lower than residents of other states, and metropolitan-area residents have earnings 21 percent higher than the earnings of those residing in non-metropolitan areas.

Finally, with monolingual English speakers as the benchmark, two of the language variables are statistically significant. These are for the groups who speak a language other than English and speak English either very well or well.<sup>6</sup> In other words, these groups are bilingual in English and another language. These workers are shown to have earnings between six and nine percent lower than monolingual English speakers. As reported in previous studies, bilingualism among the native born does not pay in the U.S. labor market (Chiswick and Miller (1998) Fry and Lowell (2003)).

Results for the foreign born from a comparable specification of the earnings function are listed in column (iv). This estimating equation includes all the variables included in the column (i) model, plus several other “foreign-born” specific variables, namely variables for the length of time in the United States, and for citizenship status.

The first feature of these results is that the partial effect of years of schooling on earnings for the foreign born is only 5.3 percent. This is only one-half the effect recorded

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<sup>6</sup> Among the native born the sample sizes in the groups speaking English “not well” or “not at all” are very small.

for the native born and the difference in estimated effects is highly significant. Thus the pattern observed by Chiswick (1978), based on analyses of the 1970 Census, and found in later Censuses and in other countries, is alive and well three decades later.

The other patterns typically reported in analyses of the earnings of immigrants are also evident in the column (iv) results. Thus, the earnings-pre-immigration-experience profile is much flatter for the foreign born than for the native born. Evaluated at  $EXP = 10$ , the partial effect of a year of pre-immigration labor market experience (experience when years since migration is held constant) is only around one percentage point. As with the returns to years of schooling, the earnings increments associated with pre-immigration experience for the foreign born are only around one-half of the earnings increments associated with experience for the native born.

There are substantial earnings differentials associated with the married, race, veteran status and location variables, and the pattern and magnitudes of these are similar to those described above for the native born. The elasticity of annual earnings with respect to weeks worked is only 0.87, and this is significantly less than unity. Thus, a one percent increase in weeks worked is associated with less than a one percent increase (actually a 0.87 percent increase) in annual earnings, perhaps because of a backward bending labor supply schedule or greater seasonality of employment.<sup>7</sup>

As has been reported in previous studies, there is a pronounced relationship between earnings and proficiency in English among the foreign born (Chiswick and Miller (1992)). The highest earnings are received by monolingual English speakers. Those who speak another language and speak English very well have earnings nine percent lower than monolingual English speakers<sup>8</sup>. Immigrants in the English-speaking categories of “well”, “not well” and “not at all” have earnings between 27 and 38 percent lower than their monolingual English-speaking counterparts.

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<sup>7</sup> This estimate of 0.87 represents a continuation of the declines that have been recorded in this elasticity for the foreign born over the past three decades. Thus, analyses of 1970 Census data (Chiswick (1978)) and of 1980 Census data (Chiswick and Miller (1992)) revealed an elasticity greater than unity, and analyses of 1990 Census data (Chiswick and Miller (2002)) revealed an elasticity slightly below unity.

<sup>8</sup> Although in most research on the determinants of the English language skills of immigrants and its effects on earnings those from the English-speaking developed countries are excluded from the sample, they are included in these data.

Finally, turning to the immigrant variables, it is seen that evaluated at  $YSM = 10$ , earnings increase with years in the United States by a little under one percent per year. Citizenship among the foreign born is associated with seven percent higher earnings compared with not being a U.S. citizen.

It is noted that the  $\bar{R}^2$  for these earnings models are 0.34 for the native born, and 0.37 for the foreign born. Models for the foreign born were also estimated that included country of birth fixed effects. In this experiment, dummy variables for 21 of the 22 birthplace regions identified in Table 1 were included in the estimating equation with the UK as the benchmark. While 19 of the 21 country fixed effects were significant at the 10 percent level or better, this augmentation of the earnings equation had only a minor effect on the estimates described above. The  $\bar{R}^2$  for this model was only 0.38. That is, the addition of the 21 variables, most of which were associated with sizeable earnings effects, raised the explanatory power ( $\bar{R}^2$ ) by less than one percentage point, or put differently, the country fixed effects explain only about 1.5 percent of the unexplained variance.

Table 2, Columns (ii) and (v) list the results from the ORU model. The  $\bar{R}^2$  for this model is 0.36 for the native born and 0.41 for the foreign born. Hence the change in the specification of the education variable is associated with an increase in the adjusted  $\bar{R}^2$  of between two and four percentage points. This compares favorably with the increase of only one percentage point following the inclusion of the country fixed effects. This suggests that the ORU specification of the education variable has considerable relative explanatory capability.

For the native born (Table 2, column (ii)), the return on required education is 15.3 percent, fully four percentage points higher than that obtained when the actual years of education variable is used in the specification. The difference between these estimates is as follows.

The return to actual years of education records a mix of earnings increments to levels of education that are correctly matched to job requirements, and to years of education that are not matched to the job requirements, either because the worker has too much or too little education compared to the norm for his occupation. In comparison, the



return to required education is a return to having the extra year of education and being placed in an occupation where the education is required. Thus, there are two changes, the person's education and his occupation. Once "mismatches" are taken into account, the return to years of schooling is higher than otherwise.

The return to required years of education for the foreign born is 15.3 percent, the same as that for the native born. Consider groups of native-born and foreign-born workers with 10 and 12 years of education. If the occupations of all workers are correctly matched to their educational level, then these estimates suggest that both native-born workers and foreign-born workers with 12 years of education will have earnings approximately 31 percent higher than their respective counterparts with only 10 years of education (*i.e.*,  $2 \times 0.153$  from Table 2, columns (ii) and (v)). However, if no account is taken of mismatches as defined here, the native born workers with 12 years of education will have earnings around 21 percent ( $= 2 \times 0.106$ ) higher than their counterparts with 10 years of education, while the foreign born with 12 years of education will have earnings only 11 percent ( $= 2 \times 0.053$ ) higher than their counterparts with 10 years of education (Table 2, columns (i) and (iv)). Taking account of mismatches is obviously very important.

There are two types of mismatches: overeducation and undereducation. Among the native born, years of overeducation are associated with 5.6 percent higher earnings. That is, a year of required education is associated with 15 percent higher earnings, but a year of education beyond that which is "usual" for the worker's occupation is associated with only 5.6 percent higher earnings. As shown in Table 1, 32.24 percent of native born workers are overeducated. They have, on average, 2.17 years of surplus education<sup>9</sup>. Hence there is a considerable amount of education that is not being used effectively and which is not being well rewarded in the labor market.

Among the foreign born, years of overeducation are associated with only 4.5 percent higher earnings. This is one percentage point less than the earnings increment associated with overeducation for the native born, and this difference is statistically

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<sup>9</sup> The mean overeducation conditional upon being overeducated is 2.17 years. The mean listed in Table 2 is an unconditional mean.

significant ('t' test on the difference is 4.71). According to Table 1, 28.3 percent of the foreign born are overeducated.

Overeducated immigrants have, on average, 2.51 years of overeducation. The relatively low return to overeducation among the foreign born thus impacts on a segment of the workforce that is comparable in size to the segment of the native-born workforce affected by this phenomenon.

Years of undereducation are associated with an earnings penalty of 6.6 percent among the native born, and an earnings penalty of only 2.2 percent among the foreign born. The difference between these estimates is highly significant ('t' = 33.56). These earnings penalties impact on a major segment of the workforce. Hence, 25.24 percent of the native-born workforce is undereducated (Table 1) and the mean years of undereducation among the under-educated is 2.4. Among the foreign born the incidence of undereducation is much larger, at 43.89 percent (Table 1) and the mean years of undereducation is also much larger, it is 4.7.

The significance of these estimates is easily seen with the aid of an example. Consider five types of workers as follows:

Worker type	Actual Years of Education	Required Years of Education	ORU Classification
A	10	10	Correct Match
B	12	12	Correct Match
C	14	14	Correct Match
D	10	12	Undereducated
E	14	12	Overeducated

For this illustration, the annual earnings of the Type B workers have been set to \$30,000 among both the native born and the foreign born. Then, compared to these Type B workers, the Type A workers have two fewer years of required education. With an education coefficient of 15.3 percent, their mean annual earnings will be around \$22,093<sup>10</sup>. The Type C workers, with two extra years of required education compared to

<sup>10</sup> As  $\log(30000) = 10.309$ , this figure is computed as  $\exp(10.309 - 2 \cdot 0.153)$ .

the Type B workers, and with the payoff to each of these years of schooling being 15.3 percent, will have mean annual earnings of around \$40,741.<sup>11</sup>

Type D workers differ from Type B workers by having two fewer years of actual education. That is, they are undereducated by two years. Hence Type D workers will have mean annual earnings around \$26,291 if native born (education coefficient of minus 6.6 percent) and \$28,710 if foreign born (education coefficient of minus 2.2 percent).<sup>12</sup>

Type E workers differ from Type B workers by having two extra years of actual education. They have the same number of years of required education. Hence, they are overeducated by two years. They will have mean earnings of \$33,557 if native born, and \$32,827 if foreign born (education coefficients of 5.6 percent and 4.5 percent respectively).<sup>13</sup>

Figure 1 portrays the earnings situations of these five types of workers. Figure 1 reveals the distinctive patterns from the ORU literature. First, the solid line displays the earnings increments to correctly matched education. Second, the Type D workers, with 10 years of education, but working in an occupation that requires 12 years of education, earn more than workers who have 10 years of education and work in an occupation that requires 10 years of education (Type A), but they earn less than those with whom they share an occupation who have the correct (12 years) level of education for that occupation (Type C).

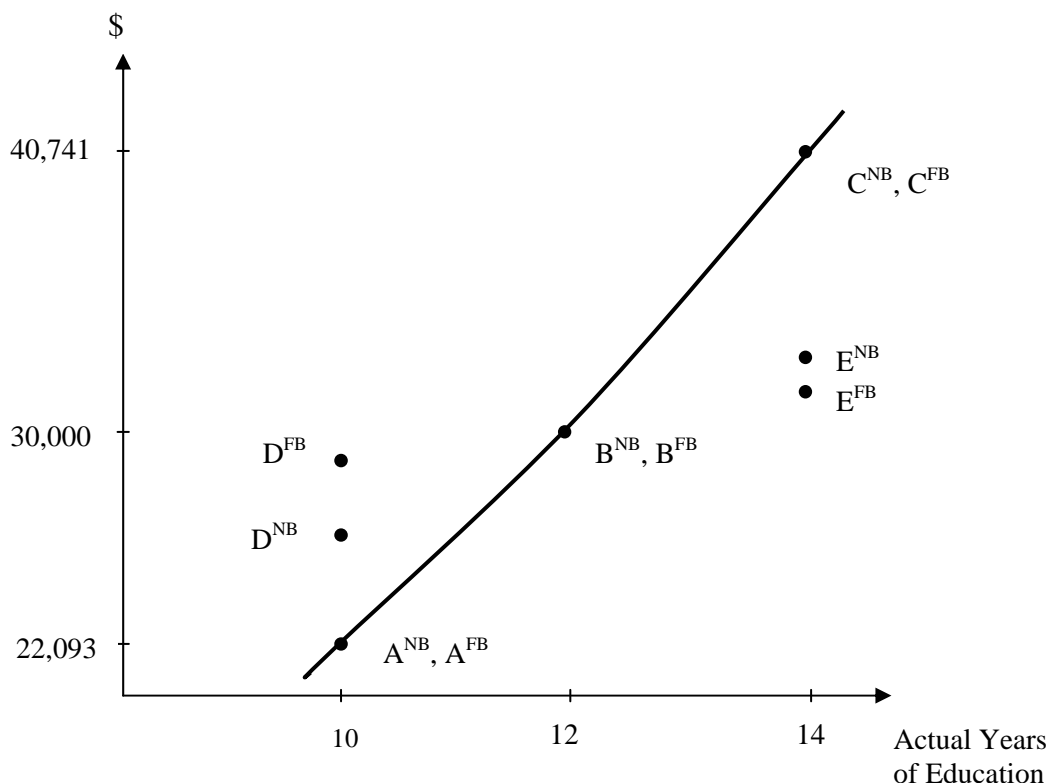
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<sup>11</sup> =  $\exp(10.309 + 2 \cdot 0.153)$ .

<sup>12</sup> =  $\exp(10.309 - 2 \cdot 0.066)$ , and  $\exp(10.309 - 2 \cdot 0.022)$  respectively.

<sup>13</sup> =  $\exp(10.309 + 2 \cdot 0.056)$ , and  $\exp(10.309 + 2 \cdot 0.045)$  respectively.

**Figure 1 Earnings Situations of Hypothetical Workers**



Third, the Type E workers, with 14 years of education who work in an occupation that requires only 12 years of education, earn more than the workers with whom they share an occupation who have the correct level of education for that occupation (Type B), but they earn far less than workers with 14 years of education who are correctly matched in an occupation (Type C).

Finally, the return to actual education will be derived from earnings-years of education gradients obtained from averages of the earnings for the workers described at each level of education<sup>14</sup>. The illustration in Figure 1 supports a lower estimate of the return to actual years of education than of the return to required years of education. It also

<sup>14</sup> The standard (or Becker and Chiswick (1966)) specification is nested within the ORU model. The latter is equivalent to the standard model when the coefficients on the three education variables are the same in absolute value. Otherwise, the returns to actual education will differ from the returns to required education.

supports a lower estimate of the return to actual years of education for the foreign born than for the native born. We return to this important issue below. However, at this stage it can be noted that the smaller earnings effect associated with undereducation among the foreign born is consistent with Chiswick's (1978) motivation/ability hypothesis. It is the less-well educated who are more likely to be undereducated. That is, these groups tend to obtain work in occupations requiring higher levels of education than they possess. They presumably are able to compete in this regard because they have relatively high levels of motivation/ability. To the extent that the foreign born at the lower levels of education are more highly selected on the basis of ability/motivation than the better educated foreign born, and as such also display higher mean levels of these unobserved productivity enhancing characteristics, it would be expected that this will be revealed in a pattern of earnings such as displayed for the Type D workers included in Figure 1.

The inclusion of the ORU variables in the earnings equation has a reasonably minor impact on all other estimates, other than for those associated with the English speaking skills variables for the foreign born. Hence, comparison of columns (iv) and (v) of Table 2 reveals changes of 9 percentage points in the case of "Speaks English Well" variable, of 10 percentage points for the "Speaks English Not Well" variable, and of 6 percentage points in the case of the "Speaks English Not at All" variable. Using the standard omitted variables formula, this implies that the ORU variables are associated with substantial partial earnings effect (confirmed in Table 2) and that English skills have pronounced effects on the likelihood of being in particular overeducation/undereducation/required education categories (see Chiswick and Miller (2004)). Indeed, an immigrant with an advanced degree who cannot speak English is likely to work in a low level of occupation.

There is only a minor change in the earnings effects associated with period of residence following the inclusion of the ORU variables in the earnings equation. This follows from the relatively weak association between period of residence and membership of the ORU categories revealed in Chiswick and Miller (2004).

#### **IV. THE PAYOFF TO SCHOOLING AMONG IMMIGRANTS**

The presentation of the earnings consequences of overeducation and undereducation in Figure 1 suggests that the keys to understanding why there is a smaller partial effect of actual years of schooling on earnings among the foreign born compared to the native born are: (i) the earnings increments associated with discrepancies between workers' actual years of education and the level of education that is used in their jobs; (ii) the distributions of overeducation and undereducation at each level of schooling for the foreign born and the native born, and (iii) the distributions of workers across the actual years of schooling categories.

In terms of the earnings increments, it has been noted above that foreign born workers who are undereducated have higher earnings relative to their compatriots with the "required" level of education than is the situation for the native born. In the case of overeducation, the foreign born have smaller gains associated with "surplus" education than the native born. Both of these patterns will lead to a smaller payoff to schooling for immigrants than for the native born.

There are also pronounced differences between the foreign born and native born in the extent of overeducation and undereducation, and in the distributions across education categories. It is apparent from Table 3 that there are several quite pronounced differences between immigrants and the native born in their educational attainments. The foreign born have a greater variance in schooling, with the main difference in actual years of education between the two birthplace groups occurring among the less-well-educated. Thus, while 8 percent of the native born have fewer than 12 years of education, 30 percent of the foreign born are in this education category. However, among the better educated, the proportional representations of the native born and foreign born are reasonably similar. While 19 percent of the native born have exactly 16 years of schooling, and a further 11 percent have 17 or more years of schooling. Among the foreign born, the percentages are 14 and 13 years, respectively.

**Table 3**  
**Distribution (%) of Workers Across Years of Overeducation and Undereducation by Years of Actual Education**

Actual Years of Education	% of Workers	Years of Undereducation					Years of Overeducation					Total
		4+	3	2	1	0	1	2	3	4+		
<b>1. Native Born</b>												
Fewer than 12	7.81	28.52	17.41	26.15	27.91	0.00	0.00	0.00	0.00	0.00	100.00	
12	39.17	9.87	0.41	9.06	6.51	61.34	12.81	0.00	0.00	0.00	100.00	
14	23.29	0.95	0.00	23.45	0.00	19.86	0.00	55.74	0.00	0.00	100.00	
16	19.22	0.19	0.34	2.71	0.00	59.54	0.00	15.21	0.00	22.01	100.00	
17+	10.50	0.00	0.38	0.10	0.42	27.22	1.15	42.76	9.06	18.92	100.00	
Total	100.00	6.35	1.63	11.58	4.78	42.95	5.14	20.40	0.95	6.22	100.00	
<b>2. Foreign Born</b>												
Fewer than 12	29.88	70.71	14.23	8.03	7.03	0.00	0.00	0.00	0.00	0.00	100.00	
12	27.82	7.62	1.00	6.23	20.16	55.10	9.90	0.00	0.00	0.00	100.00	
14	14.53	0.84	0.00	19.84	0.00	18.32	0.00	61.01	0.00	0.00	100.00	
16	14.43	0.38	0.34	2.49	0.00	51.99	0.00	14.71	0.00	30.10	100.00	
17+	13.34	0.00	0.72	0.55	0.40	19.49	0.68	39.20	9.97	29.00	100.00	
Total	100.00	23.43	4.67	7.45	7.76	28.09	2.84	16.22	1.33	8.21	100.00	

Notes: Rows and Columns may not sum to 100.00 due to rounding.

Source: 2000 US Census, 1% PUMS.

Similarly, when the years of undereducation and overeducation are examined at each education level, the main difference shows up among workers with fewer than 12 years of schooling. These workers, whether they are native born or foreign born, typically work in occupations where the norm is 15 or more years of education (that is, the workers are undereducated by at least four years). Almost 30 percent of the native born with fewer than 12 years of schooling work in occupations where the usual level of schooling is 15 years (*i.e.* the workers are undereducated by 4 years). In comparison, fully 70 percent of the foreign born with fewer than 12 years of education are in occupations where the workers typically have 15 or more years of education (that is, these workers are also undereducated by at least four years).

There are also some, more minor, differences in the extent of overeducation between the native born and foreign born among those with 16 or 17 or more years of education. The native born workers with these levels of schooling are more likely to have two years of surplus education than are the foreign born, and are less likely than the foreign born to have four or more years of surplus education. Thus, not only is overeducation more likely among the foreign born, but if overeducated, the foreign born are likely to be overeducated by a greater extent than the native born.

The implication of this overeducation and undereducation for the payoff to schooling for the foreign born can be demonstrated as follows.

First, for each of the fourteen educational attainments listed in Appendix A, a hypothetical mean earnings was constructed assuming:

- i. the workers at each educational attainment had the distribution across the undereducation, overeducation and required education categories specific to the foreign born at the particular education level;
- ii. the workers had the sample (across all levels of education) mean levels of all other characteristics that were included in the earnings equations in Table 2. This standardizes for variations in these characteristics across levels of education;
- iii. the workers had a payoff to each characteristic given by the estimates for the total foreign born sample, as per column (v) of Table 2.



A linear regression was then computed, relating these mean predictions of log earnings at each level of education to the education levels. This regression was weighted by the numbers in each education category. The return to schooling computed under this exercise was 5.39 percent, which mirrors the payoff to schooling of 5.3 percent in column (iv) of Table 2<sup>15</sup>.

Second, in forming the predictions, the effects associated with overeducation and undereducation and correctly matched education, for the foreign born, of 4.5 percent, -2.2 percent and 15.3 percent respectively, were replaced by the respective effects for the native born, of 5.6 percent, -6.6 percent and 15.3 percent. This effectively assigns a foreign born undereducated worker such as  $D^{FB}$  in Figure 1 an earnings level of  $D^{NB}$  in the same figure, and it assigns a foreign born overeducated worker such as  $E^{FB}$  in Figure 1 an earnings level of  $E^{NB}$ . A weighted linear regression was then computed, relating these predictions to the level of education. The payoff to schooling was found to be 8.4 percent. This is an estimate of the effect of actual years of schooling on earnings under the condition that the earnings effects associated with overeducation and undereducation for the foreign born – or the conditions that gave rise to these earnings effects – are the same as for the native born.

This effect of 8.4 percent can be compared with the payoff to schooling for the foreign born of 5.4 percent, estimated using the conventional model. It suggests that differences in the effects of overeducation and undereducation for the foreign born and native born account for 3.0 percentage points (or approximately 60 percent) of the 5.1 percentage points difference in the payoffs to schooling for the two birthplace groups recorded in Table 4.

Third, the predictions were computed replacing the information on the distribution of the foreign born across the overeducation and undereducation categories at each level of schooling by the data on overeducation and undereducation at the comparable levels of schooling for the native born. The purpose of this set of predictions is to ascertain the contribution that the different levels of overeducation and undereducation at each level of schooling for the foreign born and the native born make

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<sup>15</sup> A similar set of calculations for the native born yielded a payoff to their schooling of 10.5 percent, which is only marginally different from the payoff reported in Table 2.

to the lower payoff to schooling for the foreign born. This results in a further, though much more modest, increase in the payoff to schooling for the foreign born, to 8.6 percent. The reason for the minor incremental change is that, conditional on the most detailed information on level of education available (see Appendix A), there are only minor differences between the distributions of the foreign born and native born across the overeducation, required education and undereducation categories.

Fourth, the previous set of predictions, which set the earnings effects of overeducation and undereducation for the foreign born to be the same as for the native born, and also set the distribution across overeducation/undereducation categories for the foreign born at each level of actual schooling to be the same as for the native born, were related to actual years of education in a linear regression using the distribution of the native born across education levels as weights. As much of the differences in overeducation/undereducation come about because the foreign born have, on average, a lower level of education than the native born, using the distribution of the native born across education levels will effectively assign the foreign born the same overall levels of overeducation and undereducation as the native born. As expected, this simulation resulted in a payoff to schooling for the foreign born that is the same as that for the native born.

Table 4 summarizes the results of these simulations.

**Table 4**  
**Implied Payoffs to Schooling**

	<u>% Payoff</u>
Native Born	10.5
Foreign Born	
- no adjustment	5.4
(a) assuming same earnings effects to overeducation and undereducation as native born	8.4
(b) as for (a) but also same levels of overeducation and undereducation within each schooling category as native born	8.6
(c) as for (b) but also assuming same distribution across schooling categories for the foreign born as for the native born	10.5

In summary, approximately 60 percent of the difference in the payoffs to schooling for the foreign born and native born appears to be due to the differences between these birthplace groups in the partial effects on earnings associated with overeducation and undereducation. About 5 percent is due to different distributions of workers across overeducation/undereducation categories conditional upon the actual level of education. Finally, 35 percent is due to the disproportionate representation of the foreign born among the lower education categories where undereducation, which tends to flatten the earnings-education gradient, is more prevalent.

## V. ANALYSES FOR BIRTHPLACE GROUPS

Given the apparent strength of the findings above on the source of the lower payoff to schooling for the foreign born, it is of interest to carry the decomposition over to separate birthplace groups within the foreign born aggregate. Conducting the decompositions for these separate birthplaces will permit the robustness of the findings to be assessed.

Table 5 presents estimates of the relationship between earnings and actual years of education, years of required education, years of overeducation and years of undereducation for the major birthplace regions considered previously.

**Table 5**  
**Partial Effects of Education on Earnings, Foreign-born Adult Men in Paid Employment, Over/Under Education Based on Modal Education, by Birthplace, U.S. 2000<sup>(a)</sup>**

Birthplace	Actual Education	Required Education <sup>(b)</sup>	Over Education	Under Education	Sample size
United Kingdom	0.106 (12.12)	0.166 (16.60)	0.022 (1.22)	-0.084 (5.64)	1733
Ireland	0.087 (4.98)	0.098 (4.76)	0.089 (2.81)	-0.067 (1.67)	394
Western Europe	0.091 (13.46)	0.145 (18.42)	0.072 (5.76)	-0.034 (2.74)	2604
Southern Europe	0.041 (9.39)	0.127 (15.33)	0.016 (1.13)	-0.015 (2.78)	3322
Eastern Europe	0.043 (6.31)	0.095 (10.39)	0.003 (0.25)	-0.023 (1.55)	1879
USSR	0.075 (10.21)	0.149 (14.55)	0.045 (3.92)	-0.024 (1.78)	1649

Indochina	0.037 (9.50)	0.152 (18.29)	0.054 (5.18)	-0.012 (2.65)	3728
Philippines	0.071 (10.03)	0.148 (15.71)	0.030 (3.17)	-0.031 (2.63)	3374
China	0.076 (15.39)	0.144 (21.07)	0.108 (11.96)	-0.017 (2.47)	3967
South Asia	0.095 (16.77)	0.181 (25.32)	0.041 (4.95)	-0.036 (3.35)	4618
Other South Asia	0.063 (6.05)	0.165 (11.31)	0.017 (0.84)	-0.034 (2.54)	852
Korea	0.059 (6.76)	0.100 (9.75)	0.033 (2.31)	-0.035 (2.22)	1881
Japan	0.085 (6.31)	0.127 (6.77)	0.024 (0.89)	-0.072 (2.99)	711
Middle East	0.075 (13.38)	0.154 (20.85)	0.029 (2.73)	-0.039 (3.62)	3427
Sub Saharan Africa	0.062 (10.13)	0.126 (14.29)	0.027 (2.48)	-0.037 (3.69)	2129
Canada	0.110 (12.91)	0.163 (15.96)	0.029 (1.57)	-0.075 (4.39)	1983
Mexico	0.018 (13.63)	0.096 (18.38)	0.023 (3.99)	-0.012 (8.62)	27735
Cuba	0.045 (7.42)	0.135 (14.39)	0.015 (1.33)	-0.023 (2.50)	2326
Caribbean	0.038 (9.42)	0.121 (17.54)	0.039 (3.79)	-0.012 (2.52)	4809
Central and South America–Spanish	0.036 (17.11)	0.130 (22.41)	0.035 (5.91)	-0.019 (8.00)	10020
Central and South America–non- Spanish	0.067 (7.55)	0.127 (8.62)	0.076 (2.97)	-0.038 (3.25)	587
Australia, New Zealand	0.105 (6.45)	0.197 (8.35)	0.047 (1.43)	-0.065 (3.14)	466

Notes: (a) Heteroscedasticity consistent “t” statistics in parentheses.

(b) Computed using the realized matches procedure with the mode as the reference level of schooling.

Source: 2000 US Census, 1% PUMS.

According to the Table 5 information, the return to years of actual education varies from around two percent (Mexico) to 11 percent (UK, Canada and Australia). Many of the estimates for the larger birthplace groups are between four and seven percent. In comparison, the returns to required education range from 10 to 20 percent, with most estimates being between 12 and 16 percent. For each birthplace group, the

return to required education exceeds the return to actual education, with the difference in these estimates being between one (Ireland) and 12 (Indochina) percentage points.

The estimated returns to surplus education are all positive, though eight of the estimates do not differ significantly from zero. In each instance the return to surplus education is less than the return to required education. Thus, there is little extra return to education from being in an occupation for which the person has “too much” education.<sup>16</sup>

The estimated impact of undereducation is negative for each birthplace group, and each estimate is statistically significant at the 10 percent level or better. The estimated impacts are larger (in absolute value) for the UK, Ireland, Japan, Australia and Canada – the more advanced countries<sup>17</sup>. Another way of looking at these results is that workers with a relatively low level of education who are working in jobs that require a higher level of education than they actually possess do better if they are from less developed countries. Applying Chiswick’s (1978) ability/motivation hypothesis, this suggests that immigrants with low levels of education from the advanced countries are less favorably selected for immigration (or have less relevant apprenticeships or on-the-job training) than immigrants from less advanced countries.

Table 6 presents the decomposition of the difference in the return to education for the foreign born by country of birth and the native born. Results are not presented for Ireland or Japan, as there were a number of education categories where these birthplace groups were not represented, which affects the precision of the decomposition.<sup>18</sup>

The countries are listed in Table 6 according to the modal years of schooling, and within levels of schooling, according to the payoff to schooling. There are two features of this ranking. First, there is a positive relationship between the payoff to schooling within a birthplace group and the modal years of schooling. Second, for any modal level of

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<sup>16</sup> To put it in context, the cab driver with a BA earns more than the high school graduate cab driver, but the return on the extra four years of schooling is very low.

<sup>17</sup> That is, if the norm in an occupation is 16 years of schooling, those with only 12 years earn less than those who have 16 years and the earnings “penalty” is greater from the highly developed countries.

<sup>18</sup> In particular, this missing information affects the relevance of the final step outlined above, as sample weights from the native born sample for the particular education categories are applied to an education level for the foreign born for which a mean earnings could not be computed.

schooling there is considerable variation in the payoffs to schooling. For example, at 16 years as the modal level of schooling, the payoff ranges from 11.9 percent (Australia/New Zealand) to 6.4 percent (Korea). At 12 years as the modal years of schooling, the payoff ranges from 6.6 percent to 3.8 percent. Obviously there are other factors at work, and the most obvious of these is the level of economic development of the countries the immigrants came from.

The columns of Table 6 can be compared to ascertain the source of the variation in the payoffs to schooling for the particular birthplace groups and the native born. Hence, the difference between columns (ii) and (i) shows the contribution of the difference in the effect of schooling due to the difference in the partial effects on earnings of overeducation, undereducation and correctly matched education between immigrants and the native born. Similarly, the difference between columns (iii) and (ii) shows the impact of the different extent of overeducation and undereducation within education levels for immigrants and the native born. Finally, the difference between columns (iv) and (iii) shows the effect that the different distribution of the level of education of immigrants and that of the native born has on the gap between the payoffs to schooling, while column (v) reports the simple difference between the payoff to schooling between the immigrant group and the native born.

**Table 6**  
**Implied Payoffs to Schooling, Disaggregated Analysis**

<b>Country</b>	<b>(i) No Adjustment</b>	<b>(ii)</b>	<b>(iii)</b>	<b>(iv)</b>	<b>(v) 10.5 - (i)</b>	<b>Modal Years</b>
China	8.0	9.6	9.5	10.5	2.5	17.5
	<i>64%</i>		<i>(4%)</i>		<i>40%</i>	
Australia, New Zealand	11.9	10.3	10.1	10.6	(1.4)	16.0
	<i>(114%)</i>		<i>(14%)</i>		<i>36%</i>	
Canada	11.1	11.0	11.1	10.6	(0.6)	16.0
	<i>(17%)</i>		<i>17%</i>		<i>(83%)</i>	
United Kingdom	10.8	10.6	11.1	10.6	(0.3)	16.0
	<i>(67%)</i>		<i>167%</i>		<i>(167%)</i>	
South Asia	10.1	10.3	10.4	10.5	0.4	16.0
	<i>50%</i>		<i>25%</i>		<i>25%</i>	
Western	9.3	10.2	10.8	10.6	1.2	16.0

Europe						
		<i>75%</i>	<i>50%</i>	<i>(17%)</i>		
USSR	7.9	9.7	10.4	10.6	2.6	16.0
		<i>69%</i>	<i>27%</i>	<i>8%</i>		
Middle East	7.6	9.4	10.1	10.5	2.9	16.0
		<i>62%</i>	<i>24%</i>	<i>14%</i>		
Philippines	7.2	9.4	10.2	10.5	3.3	16.0
		<i>67%</i>	<i>24%</i>	<i>9%</i>		
Other South Asia	7.0	9.0	9.7	10.5	3.5	16.0
		<i>57%</i>	<i>20%</i>	<i>23%</i>		
Sub Saharan Africa	6.5	9.4	9.9	10.5	4.9	16.0
		<i>59%</i>	<i>10%</i>	<i>12%</i>		
Korea	6.4	10.4	10.5	10.5	4.1	16.0
		<i>98%</i>	<i>2%</i>	<i>0%</i>		
Indo China	4.3	8.2	8.3	10.5	6.2	14.0
		<i>63%</i>	<i>2%</i>	<i>35%</i>		
Central and South America – Non-Spanish	6.6	8.6	8.9	10.5	3.9	12.0
		<i>51%</i>	<i>8%</i>	<i>41%</i>		
Eastern Europe	4.9	9.9	10.2	10.5	5.6	12.0
		<i>89%</i>	<i>5%</i>	<i>5%</i>		
Cuba	4.4	8.6	9.3	10.5	6.1	12.0
		<i>69%</i>	<i>11%</i>	<i>20%</i>		
Southern Europe	4.1	8.5	8.7	10.5	6.4	12.0
		<i>69%</i>	<i>3%</i>	<i>28%</i>		
Caribbean	3.9	8.3	8.6	10.5	6.6	12.0
		<i>67%</i>	<i>5%</i>	<i>29%</i>		
Central and South America – Spanish	3.8	7.8	8.3	10.5	6.7	12.0
		<i>60%</i>	<i>7%</i>	<i>33%</i>		
Mexico	1.8	7.1	7.4	10.5	8.7	5.5
		<i>61%</i>	<i>3%</i>	<i>36%</i>		

Notes:

Numbers in the country name row indicate partial effects of schooling on earnings under our different assumptions (columns (i) to (v)). Numbers in the row below in *italics* indicate the contribution the difference between adjacent columns makes to the difference between the payoffs to schooling for the native born and the foreign born, where numbers in parentheses signify a higher value for the foreign born than for the native born.

(i) Implied Payoff to schooling for foreign birthplace groups, no adjustment.

(ii) Payoff to schooling for foreign birthplace group assuming same earnings effects to overeducation, undereducation and correctly matched education as the native born.

(iii) Payoff to schooling for foreign birthplace group assuming as for (ii) but also same levels of overeducation, undereducation and correctly matched education within each schooling category as the

- native born.
- (iv) Payoff to schooling for foreign birthplace group assuming as for (iii) but also assuming same distribution across schooling categories for the foreign born as for the native born.
  - (v) Payoff to schooling for native born (10.5) minus implied payoff to schooling for foreign born birthplace groups, no adjustment.

Immigrants from China have the highest modal level of schooling (17.5 years). Examination of the first row of data, for this birthplace group, shows that about two-thirds of the 2.5 percentage point difference in the payoff to schooling for immigrants from China and the native born (column (v)) is due to the different earnings effects to overeducation, undereducation and correctly matched education for the two birthplace groups  $[(9.6 - 8.0) \div 2.5 = 0.64]$ . Two-fifths is due to the different distributions across schooling categories of immigrants from China and the native born  $[(10.5 - 9.5) \div 2.5 = 0.40]$ .

Immigrants from the next three birthplace groups, Australia, Canada and the United Kingdom, all advanced English-speaking countries, have a payoff to schooling that actually exceeds that for the native born. The various adjustments considered in the table have little impact on the implied payoff to schooling. It would be expected that immigrants from these countries have a very high degree of transferability of their skills to the US labor market. Moreover, because of the relatively lower direct cost of the migration process, including adjustment to the US labor market, they would be less intensely favorably selected than economic immigrants from other developed countries<sup>19</sup>.

For the remaining countries with a modal level of schooling of 16 years, immigrants have a lower payoff to their education than the native born, with the difference in payoffs ranging from 0.4 percentage points for South Asia, to 4.1 percentage points for immigrants from Korea. For these countries, between 50 and 70 percent of the difference in the payoff to schooling is linked to the different earnings effects of overeducation, undereducation and correctly matched education (though for Korea it is 98 percent). Also, for these countries around one-quarter is due to differences

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<sup>19</sup> For the proof, see Chiswick (1999).



in the distributions of the workforces across the overeducation, undereducation and correctly matched education categories.

Immigrants from the groups of countries with a modal level of schooling of 12 years have much lower payoffs to their schooling, though again around 70 percent of the differential in the payoff to schooling is linked to the different earnings effects of overeducation, undereducation and correctly matched education. The roles played by the other two components of the decomposition vary by birthplace, and there is no obvious pattern to this variation.

Finally, for the large group of immigrants from Mexico, 61 percent of the 8.7 percentage point difference between their payoff to schooling (a meager 1.8 percent) and that for the native born (10.5 percent) is due to the different earnings effects of overeducation, undereducation and correctly matched education  $[(7.1 - 1.8) \div 8.7 = 0.61]$ . Fully 36 percent of the gap in the payoffs to schooling, however, is due to the different distributions across schooling categories for immigrants from Mexico and the native born  $[(10.5 - 7.4) \div 8.7 = 0.30]$ .

These results show that the decomposition technique outlined above, and applied to the total foreign born sample in Table 2, is robust to the choice of sample. The main finding is that between 60 and 70 percent of the difference in the payoffs to schooling between immigrants from specific birthplace groups and the native born is due to the earnings consequences of the education categories specified in the ORU earnings model.<sup>20</sup>

## VI. CONCLUSION

The finding that the payoff to schooling in the US for the foreign born is substantially less than that for the native born, documented by Chiswick (1978) for the 1970 Census, and by many other authors for later censuses and for other countries, is also a very strong feature of the data from the 2000 US Census. The analyses above show that

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<sup>20</sup> An exception is the high rate of return from schooling for immigrants from the English-speaking developed countries who presumably have a very high rate of skill transferability to the US.

while the native born have a payoff to schooling of 10.6 percent, the payoff for the foreign born is only one-half of this, 5.3 percent.

However, when the focus is on correctly matched education, defined as possessing a certain level of education and working in an occupation where this level of education is typical, the foreign born and native born are both characterized by similar earnings increments, of around 15.3 percent higher earnings per year of correctly matched education. The most striking feature of the analyses that distinguish between years of overeducation, undereducation and correctly matched education, however, is the strong relative performance of immigrants with less education than is typical for the occupations in which they work.

The framework outlined in this paper shows that this strong performance is responsible, in large part (around two-thirds) for the lower payoff to schooling for the foreign born. An exception is immigrants from the English-speaking developed countries that are so similar to the US that there is a high degree of transferability of skills and a low cost of migration, and hence a payoff to schooling comparable to that of the US native born.

While this framework can account for the differences in payoffs to schooling for the foreign born and native born, it does not explain the difference. Important concerns are the reasons behind the higher earnings of foreign-born “undereducated” men relative to native-born undereducated men, and the high proportion of immigrant men working in occupations in which their education level is substantially below that of the average (mean or modal) level. The most obvious candidate is the superior ability/motivation of the foreign born associated with self-selection in migration, as outlined in Chiswick (1978) (1999). The method applied above may provide a means of quantifying the importance of this self-selection that has to date proved to be a rather elusive concept.

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## APPENDIX A

### COMPILING THE REQUIRED EDUCATION DATA

**Education:** This is formed from the question “What is the highest degree or level of school that this person has completed”. The categorical data in the Census were converted to a continuous variable using the following scheme.

Education Category	Assumed level of Education
No schooling completed	0
Nursery school to 4 <sup>th</sup> grade	2
5 <sup>th</sup> grade or 6 <sup>th</sup> grade	5.5
7 <sup>th</sup> grade or 8 <sup>th</sup> grade	7.5
9 <sup>th</sup> grade	9
10 <sup>th</sup> grade	10
11 <sup>th</sup> grade	11
12 <sup>th</sup> grade, no diploma	11.5
High School graduate	12
Some college credit, but less than 1 year	12.5
1 or more years of college, no degree	14
Associate degree	14
Bachelor’s degree	16
Master’s degree	17.5
Professional degree	18.5
Doctorate degree	20

The modal level of education for some birthplace groups is quite low. For example, for immigrants from Mexico it is 5.5 years. This is to be interpreted as the modal education category being “5<sup>th</sup> grade or 6<sup>th</sup> grade”, and not as indicating the presence of two modes.

**Occupation:** All individuals who had worked between 1995 and 2000 were asked to provide information on their occupation. Information provided by all these respondents is used in preference to that on subsets (*e.g.* only persons who worked in 1999). This will generate more precise estimates. However, particularly when the mode is used, but also for the mean-based analyses, the use of alternative samples to construct the reference levels of education for each occupation has little impact on the results.

**APPENDIX B: Table B.1**

**Mean Schooling and Incidence of Over- and Under-Education by Nativity and other Characteristics, Males 25-64, 2000 US Census**

	Mean Schooling (years)	% overeducated	% undereducated	% correctly matched
Native Born	13.572	11.92	8.04	80.04
Foreign Born	11.791	13.94	24.48	61.59
• Region of Birth				
United Kingdom	14.966	20.42	7.72	71.86
Ireland	13.950	15.76	11.21	73.03
Western Europe	14.949	24.40	7.05	68.56
South Europe	11.985	10.76	21.70	67.53
Eastern Europe	13.821	20.80	7.98	71.22
Former USSR	14.899	32.20	5.80	62.01
Indo China	11.943	8.29	17.74	73.97
Philippines	14.327	23.80	4.35	71.86
China	14.676	27.42	11.73	60.85
South Asia	15.709	33.38	4.94	61.68
Other South Asia	14.407	28.26	9.99	61.75
Korea	14.904	25.76	5.33	68.92
Japan	15.222	20.46	6.08	73.46
Middle East	14.627	26.93	9.02	64.05
Sub Sahara Africa	14.518	27.60	7.30	65.10
Other North America	14.687	16.53	8.51	74.97
Mexico	8.337	3.59	46.93	49.48
Cuba	12.490	12.27	18.51	69.21
Caribbean	11.933	8.06	18.16	73.77
Central and South America–Spanish	11.062	10.07	27.68	62.25
Central and South America–non Spanish	12.461	7.60	15.91	76.49
Australia, New Zealand	13.554	15.27	13.10	71.63

Source: 2000 United States Census, 1% PUMS.

The data for Table B.1 have been computed by compiling the educational requirements of the jobs using the mean educational attainment of all workers in each three-digit occupation. 510 occupations are used in the analysis. Workers whose level of schooling is more than one standard deviation higher than the mean are categorized as “overeducated”, while workers whose level of schooling is less than one standard deviation below the mean are labeled “undereducated”. Workers whose level of schooling is within plus or minus one standard deviation of the mean educational attainment of the occupation of employment are categorized as “correctly matched”.

Given the use of a threshold of plus or minus one standard deviation of the mean educational attainment in categorizing workers as “correctly matched, it is expected that the incidence of correctly matched workers would be much larger than when the mode is used, and the incidence of overeducation and undereducation smaller. This expectation is evident in the comparison of Table B.1 and Table 1, and is similar to the findings reported by Kiker *et al.* (1997, p. 116), where when the mean was used 86 percent of workers were correctly matched, 9 percent overeducated and 5 percent undereducated, yet when the mode was employed the percentage of workers correctly matched, overeducated and undereducated changed to 58 percent, 26 percent and 17 percent, respectively.

**APPENDIX C: Table C.1**

**Regression Estimates of Earnings Equations, Total Adult Men in Paid Employment,  
Over/Under education Based on Mean Education, U.S. 2000<sup>(a)</sup>**

Variable	Native Born			Foreign Born		
	(i)	(ii)	Mean/(SD)	(iv)	(v)	Mean/(SD)
Constant	4.404 (197.30)	3.700 (166.32)		5.913 (110.05)	4.525 (82.04)	
Education	0.106 (205.73)	(c)	13.666 (2.51)	0.053 (68.77)	(c)	11.873 (4.78)
Required Education <sup>(b)</sup>	(c)	0.166 (265.04)	13.338 (1.82)	(c)	0.157 (100.12)	12.836 (2.03)
Overeducation	(c)	0.052 (46.66)	0.874 (1.16)	(c)	0.042 (18.24)	0.882 (1.35)
Undereducation	(c)	-0.052 (45.51)	0.543 (1.18)	(c)	-0.013 (12.35)	1.842 (3.11)
Experience (Exp)	0.034 (73.77)	0.037 (83.15)	22.390 (10.44)	0.011 (11.11)	0.019 (18.67)	22.211 (10.90)
Exp <sup>2</sup> /100	-0.056 (56.69)	-0.065 (67.53)	6.102 (5.09)	-0.016 (8.09)	-0.033 (17.44)	6.123 (5.59)
Logs Weeks Worked	0.995 (182.20)	0.977 (181.07)	3.822 (0.41)	0.865 (72.85)	0.848 (72.41)	3.766 (0.47)
Married	0.269 (113.22)	0.247 (105.95)	0.654 (0.48)	0.208 (35.72)	0.181 (32.14)	0.645 (0.48)
Race (black)	-0.155 (44.26)	-0.126 (36.68)	0.103 (0.30)	-0.186 (7.42)	-0.141 (14.01)	0.076 (0.26)
Veteran	-0.048 (18.07)	-0.035 (13.43)	0.240 (0.43)	-0.093 (17.99)	-0.065 (5.31)	0.050 (0.22)
Metropolitan	0.211 (36.44)	0.184 (32.17)	0.960 (0.20)	0.138 (5.14)	0.080 (3.06)	0.990 (0.10)
South	-0.057 (25.43)	-0.065 (29.52)	0.361 (0.48)	-0.069 (11.73)	-0.077 (13.64)	0.281 (0.45)
Speaks English Very Well	-0.057 (11.67)	-0.064 (13.25)	0.049 (0.22)	-0.088 (9.69)	-0.080 (9.21)	0.333 (0.47)
Speaks English Well	-0.092 (7.44)	-0.102 (8.47)	0.008 (0.09)	-0.267 (27.65)	-0.179 (19.11)	0.249 (0.43)
Speaks English Not Well	0.007 (0.36)	-0.017 (0.93)	0.004 (0.06)	-0.374 (34.87)	-0.252 (24.05)	0.193 (0.39)
Speaks English Not at All	0.126 (1.29)	-0.002 (0.03)	0.0002 (0.01)	-0.379 (28.09)	-0.270 (20.72)	0.072 (0.26)
Years Since Migration (YSM)	(c)	(c)	(c)	0.008 (9.70)	0.010 (11.67)	16.622 (10.95)
YSM <sup>2</sup> /100	(c)	(c)	(c)	-0.008 (4.00)	-0.010 (5.21)	3.961 (4.78)
Citizen	(c)	(c)	(c)	0.073	0.059	0.414



				(11.05)	(9.27)	(0.49)
$\bar{R}^2$	0.3384	0.3651		0.3733	0.4183	
Sample Size	533,306	533,306	533,306	84,194	84,194	84,194

Notes: (a) = Heteroscedasticity consistent “t” statistics in parentheses.

(b) = Computed using the realized matches procedure with the mean as the reference level of schooling.

(c) = Variable not relevant or not entered into specification.

Source: 2000 US Census, 1% PUMS.