No *Entiendo*: The Effects of Bilingualism on Hispanic Earnings

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The authors are listed in alphabetical order to indicate that each contributed equally to the development of the paper. The authors would like to thank the participants in the Political Science Department Faculty Seminar at Columbia University for their comments and the support received from Columbia's Institute for Social and Economic Research and Policy. Cortina would like to thank the Center for Mexican American Studies at the University of Houston for their support.

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ABSTRACT: This paper examines whether the ability to communicate in English and Spanish is rewarded in labor markets. Using data from the 2000 U.S. Census we find that among Hispanics, earnings are higher as the ability to speak English increases. We also find that bilingualism, is associated with higher wages reversing the negative effect found in earlier studies. The reversal could be explained by increasing immigration, and from economic integration with Latin America. Our results also show that bilingualism is negatively correlated with wages among different occupational categories and sectors, but particularly among managers and those employed in the public sector.

Introduction

This paper examines the economic consequences of bilingualism among Hispanics in the United States. Using census data for the year 2000 we explore whether the ability to effectively speak English and Spanish is rewarded in labor markets.

We argue that foreign language proficiency has the potential to affect wages and employment, and expect to find a positive correlation between income and individual ability to speak English and Spanish. Our expectation is based on the stylized arguments in the literature on the economics of language. First, language skill is traditionally considered a form of *human capital* which makes an individual more productive and hence better rewarded in labor markets (Chiswick & Miller 2007, pp. xx). Second, among the immigrant community in the United States English language proficiency is an important determinant of labor market performance.

Yet the empirical literature on bilingualism reveals a different pattern. An earlier study by de la Garza et al. (2000), using a sample drawn from the 1990 Census, found a negative correlation between bilingualism and wages. These results are confirmed by Fry & Lowell's (2003) analysis using data from the 1992 National Adult Literacy Survey commissioned by the U.S. Department of Education. Fry & Lowell find that once nativity, educational attainment, or residency are controlled for, second language skills have no effect on wages. They argue that labor markets neither value foreign language fluency, nor provide clear incentives for its acquisition or maintenance (Fry & Lowell, 2003, pp. 138). Those incentives could have arisen in recent years given the changes in the composition of the U.S. population, in the domestic front, and economic integration with Latin America, in the international front. Given the recent growth of the Hispanic

purchasing power and the process of economic integration with countries of the Western Hemisphere, it is conceivable that employers would increasingly demand workers who can effectively speak English and are proficient in Spanish. Hence it is reasonable to expect bilingualism to be rewarded in the market place at the turn of the 21st Century.

In order to isolate the value of bilingualism we focus our analysis on the Hispanic population of the U.S. We present three different sets of findings regarding the role of English language proficiency and bilingualism, and the differential effects on wages in the whole population and within different sectors and occupational categories. Overall, we find that after controlling for education and other individual level characteristics such as age, gender, occupational category, economic sector of employment, region of residence and nativity, we find that English language proficiency is positively correlated with income. Wages decrease monotonically as the ability to speak English falls, which is consistent with other findings in the literature on the effect of English proficiency on income, discussed in section 3 of the paper.[2] These results are also consistent with a key finding in the empirical literature on Latino earnings and socioeconomic achievements.[3] Our results thus indicate that English proficiency is a key determinant of the success in labor markets[4] and that individuals with limited command of English (Spanish monolinguals and those who Speak English poorly according to Census data) are likely to

[2] As reported in section 3 we also find that individuals that speak Spanish at home and speak English well are associated with earnings that are 1.6 percentage points lower than the baseline category; income is 9.9 percentage points lower for those that speak English not well, and 20.0 percentage points lower for those who do not speak English at all.

[3] See, inter alia, Grenier 1984; McManus, Gould, and Welch 1983; Tainer 1988; Tienda and Neidert 1984; Chiswick & Miller 2002

[4] For those arriving in the U.S. becoming proficient in English is equivalent to acquiring a market-valued skill or human capital, and is likely to be reflected in higher incomes. See footnote 3.

earn systematically less in all employment sectors and occupational categories.[5] We note, however, that low English proficiency is also associated with low levels of socialization regarding mainstream culture and labor market practices in the United States, which are likely to differ from those in the country of origin of the worker. In other words, the lack of familiarity with mainstream labor market requirements including language could easily contribute to the lower wages manifested in our results.

Our results indicate that bilingualism, operationalized as the command of Spanish and the ability to speak English very well, is associated with higher income in the total sample. The positive effect of bilingualism is, however, substantively small: On average the income level of bilingual Hispanics who speak Spanish at home and English very well, is only 3 percentage points higher than the income of our baseline category (Hispanics who only speak English).[6] These findings are consistent with recent Hispanic demographic and economic trends. Hispanics now constitute the largest minority in the United States, and their purchasing power is growing at triple the rate of the overall US population. Their spending power in 2003 was $653 million, a sum that is expected to reach more than $1 trillion in 2008 (Franco 2004). Further adding to their growing

[5] The hypotheses that English proficiency is valued, and that Hispanics that who only speak Spanish earn lower incomes, was verified by de la Garza et al. (2000) in the 1990 census data. The results are confirmed in our analysis of individual data for the year 2000, which we discuss in more detail in section 3.

[6] The census codes regarding English ability do not differentiate between the English language ability of monolinguals who speak only English and bilinguals who speak English very well. Consequently, these codes erroneously imply that bilinguals, including the native born who received all their education in the United States, have lower language skill than English monolinguals. There is no way to recode the data to correct for this inaccuracy. Nonetheless, we would argue that knowing a second language as well as being a native English speaker adds to an individual's economically valuable skills, and therefore it is not surprising that bilinguals who speak English very well would earn more than English monolinguals. Indeed, as we will argue, the surprise is that such a skill is so poorly rewarded.

economic clout is the role they may play regarding trade and investment in Mexico and Spanish-speaking Latin America in general.[7]

Our last set of results uncovers a negative correlation between bilingualism and income in different occupational categories and industries. In manufacturing, for instance, we find a positive correlation between bilingualism and income among non-supervisory laborers; yet the correlation becomes negative among those in managerial positions. Moreover, in the public sector, where we would assume that the ability to speak both Spanish and English would be especially valuable, bilingualism is correlated with lower income in both supervisory and non-supervisory categories.

We see no clear economic argument explaining why English and Spanish fluency would diminish an individuals' market value. Even if speaking Spanish per-se were not valued in labor markets, why would *bilingualism* –the ability to speak English very well *and* Spanish- be associated with lower wages? To the extent that Latinos are bilingual and speak English fluently and therefore are able to move across labor markets, they should earn at least as much as those who only speak English. If the pay is lower in jobs where speaking Spanish is a precondition for being hired, those individuals who also

[7] Between 1992 and 2003, Latin America was the fastest growing US regional trade partner. Total US merchandise trade with Latin America grew by 154% during that period, compared to 88% for Asia, 89% for the EU, 78% for Africa, and 102% for the world. Mexico was accountable for most of US trade growth with Latin America from 1992 to 2003, as the largest and fastest growing trade partner in that region. By 2003, furthermore, Mexico accounted for two-thirds of the region's trade with the US, and 11.9% of total world trade with the US (Hornbeck, 2004, pp. 1-3). On a historical-cost basis, from 1990 to 2000, US direct investment in Latin America increased 265%. (Bureau of Economic Analysis, 2006). The economic trends are reaffirmed by intergovernmental initiatives: the US has signed and enacted bilateral investment treaties (BITs) with the following Latin American countries (the year of signing is in parentheses): Argentina (1991), Bolivia (1998), Ecuador (1993), El Salvador (1999 but pending implementation), Honduras (1995), Nicaragua (1995, pending implementation), Panama (1982, amended in 2000), and most recently Uruguay (2005, pending implementation) (US Department of State, 2006).

speak English *very well* should be able to move to more rewarding jobs that demand a good command of English.

Additionally, bilinguals should earn higher incomes if they hold jobs for which English monolinguals are unqualified such as those dealing with Hispanic local and international markets or supervising Spanish dominant staff as is often true in the construction industry and large segments of the service sector including education, health services, wholesale and retail trade. These expectations seem to be borne out when the data is partitioned into different subsamples according to sector of employment (see Figures 7-13 below).

However, the negative association between bilingualism and income in managerial and supervisory positions in manufacturing suggests that there are restrictions to the ability of bilingual individuals to move across labor markets and up the income ladder. In other words, unless bilingualism is associated with restrictions to sectoral or regional mobility that force Spanish-speaking Hispanics to remain attached to lower paying jobs, bilinguals would seek to raise their wages by seeking new employment. Note that these restrictions to labor mobility could be associated with non-economic conditions under which some or many bilingual individuals are willing to supply their services to the market. Some may prefer employment opportunities in the provision of ethnic goods, or in regional markets closer to their community even if the pay is lower. Yet lower wages and limited employment opportunities could be driven by demand, conditions that are usually associated with glass-ceilings, selective employment or even discrimination in the marketplace. We have not way to discriminate between the relative

influence of the non-economic preferences of Hispanics versus discrimination in the labor market with the data at hand.

Language Proficiency, Bilingualism and Earnings

As has been indicated, this paper aims at assessing empirically how language proficiency affects wages. We try to answer the following question: Is the ability to speak English and Spanish fluently rewarded in US labor markets?

Several studies have explored the relationship between language proficiency and income. Chiswick (1978) and Mincer (1974), among others, have shown that English proficiency in the U.S. is correlated with human capital and education; educational attainment, in turn, is key in explaining earnings.[8] Proficiency in the dominant language in the host country complements the individual's skills, making them more productive. This productivity is usually rewarded in the market place. Using U.S. Census data from 1980, Chiswick & Miller (1992) estimate that among foreign men the gap in earnings between those that were proficient English and those that were not was roughly 17%. Fluency in the local language has also been shown to have a positive effect on wages in studies conducted in Canada and Australia (Chiswick & Miller 1995), and Israel (Chiswick 1998; Chiswick and Repetto 2001). It has also been shown that English proficiency leads to a narrowing of the immigrant-native earnings gap.[9] Upon arrival immigrants learn English and have high rates of participation in schooling, which allows

[8] These studies show that variation of income across individuals in the U.S. immigrant labor market can be explained by schooling and labor market experience. See Chiswick & Miller (2002, pp. 33).

[9] See Chiswick (1978); Chiswick & Miller (2002); Card (2005). Lubotsky (2000), on the other hand, acknowledges that while earnings of immigrants tend to improve over time (about 10-15% over twenty years) this improvement is not enough to offset the original difference in earnings with natives (roughly 35-40%).

them to assimilate into the U.S. labor markets. Hence our first hypothesis is whether income increases with English proficiency.

Moreover, Hispanics who are Spanish monolinguals or Spanish dominant differ from those who are English dominant in key ways. Most significantly, their educational attainment and related skill levels tend to be lower than that of their English-dominant counterparts, and these skill differentials are likely to affect earnings in two ways: less skills make individuals less productive and also reduce their ability to move across sectors in search for higher paying jobs.[10] Hence individuals who speak Spanish only, or who are not fully proficient in English should earn less than Hispanics who are English monolinguals or bilinguals who speak English very well.

In principle, bilingualism makes individuals mobile across jobs and labor markets. They may either take a job where speaking Spanish is a required part of the job, where it is an advantage, or any other job where Spanish is not required. Unlike English monolinguals, they are not constrained to take jobs in one job market. To the extent that bilingualism is associated with sectoral labor mobility its effect on income should be neutral at a minimum. If speaking a second language is an essential skill or advantageous, then we could expect bilingualism to be rewarded.[11] Hence, following de la Garza et al. (2000) we posit our second hypothesis: bilingualism has a positive affect on income.

Alternatively, it is possible that there is no reward for being bilingual; i.e., that speaking English and Spanish is not rewarded in labor markets. In this case there should

[10] Lack of skill is associated with depressed income, and the inability to move to more rewarding jobs.
[11] This argument is eloquently presented by Carliner (1981), and is the basis of Fry & Lowell's (2003) analysis of the effects of bilingualism on wages using the 1992 National Adult Literacy Survey.

be no relationship between bilingualism and income. However, bilingual individuals should earn no less than monolingual English speakers, since their ability to speak English very well should allow these individuals to move from the low paying jobs/activities where Spanish is required, to higher paying jobs where speaking English fluently is.

Last, it is possible that speaking Spanish is that speaking Spanish is only valuable in lower paying activities or even that it is penalized in labor markets. Employers may require employees to speak only English and thus may refuse to hire Spanish dominant Hispanics. Additionally, Hispanics tend to cluster in areas of the country where they could either face competition from the large pool of migrants with similar skills or they could be employed in smaller (usually family-run) businesses that cater to the Hispanic community. These firms specializing in the provision of ethnic goods and other services usually operate in the more competitive markets where barriers to entry are low, limiting the ability of the firms to pay higher wages. The tendency for Hispanic immigrants to concentrate in historically established communities or in new communities established by new immigrants and the social networks they create such as those recently developed in Georgia and North Carolina (TRPI 2004) reduces the incentives to move across the country in search of more rewarding opportunities.

The lower earnings of Spanish speakers could be the associated with the interaction of two conditions. First, reduced sectoral and regional mobility, which is associated with the existence of immigrant communities and social networks, and the individual's alleged preference for consumption of *ethnic goods*, which are more likely to be supplied in the regions of higher migrant density. And, second, shifts in labor supply

resulting from immigration of individuals with similar skill levels into their areas of settlement, which has increased considerably since the 1970s, and dramatically in the past fifteen years.

An overwhelming majority of those who arrive as adults without a high school diploma will never earn as much as the average native (Duleep & Regets 2002; Card 2005). There are several reasons for the persistence of this gap. Among them, those who do not speak English are subject to additional competition from an ever-increasing pool of migrants arriving in the country. The influx of immigrants has expanded the supply of less skilled workers, exerting downward pressure on the income of those Hispanics with similar skill endowments who only speak Spanish or who know some English but are Spanish dominant.[12]

In recent years a larger proportion of immigrants arriving in the U.S. is less skilled than the average American. This is reflected in their lower level of education attainment: one third of high-school dropouts in the U.S. are foreign born.[13] Card (2005) shows that "while immigrants comprised only 13% of the working age population in 2000, they made up 28% of the population with less than a high school diploma, and over half of all those with less than 8 years of schooling" (Card 2005, 302). Camarota and Krikorian (1999, pp. 157) document that in the 1990s immigrants tended to disproportionately concentrate in bottom fifth of the labor market. Immigrants coming from Spanish-speaking Latin America tend to have lower average years of schooling than

[12] Borjas, Freeman and Katz (1997) find that between one fourth and one-half of the drop in relative wages of low skilled workers can be accounted for by immigration; see Blanchflower & Slaughter (1999), pp. 81.
[13] Camarota and Krikorian (1999); Bean, Brown and Rumbaut (2006)

natives (Card 2005, pp. 301).[14] Hispanic immigrants who are not fully proficient in English tend to have similar educational attainment levels and skills as other migrants do, and are hence more likely to compete with them for jobs. The picture is slightly different at the upper end of income and education distributions, where immigrants are more likely to have an advanced degree (Card 2005, pp. 301).

There is reason to believe that the relationship between language abilities and income could vary across sectors and labor markets depending on the combination of workers' skills demanded and supplied. To test this, we further break down our sample into different sectors of the economy. Overall, we expect bilingualism to be positively rewarded across sectors; yet we expect bilingualism's effect on wages to be more evident in those sectors where there is a substantial representation of Hispanic workers, or in sectors that cater to Spanish-speaking customers at home and abroad. For instance, the effect of bilingualism on wages should be positive in the agricultural, mining, and construction sectors as well as in manufacturing where the skill may be a valuable tool that allows workers to communicate with their supervisors. In the service sector we expect bilingualism to be positive given that the skill may be a valuable asset that would increase communication between customers and service providers on the one hand, and potentially help businesses to expand their services within the Hispanic market on the other. Lastly, in the public sector bilingualism should be correlated with higher wages given the rise of the Hispanic population as the biggest minority of the nation. So being

[14] Additionally, the education in immigrant sending countries is likely to be of lower quality than education in the U.S. (see Card 2005, pp. 316; Bratsberg & Terrell 2002).

bilingual in the public sector would facilitate communication between government officials and a substantial part of their constituency.

Empirics

To evaluate these hypotheses we conduct a series of statistical tests using the United States 2000 Census five-per-cent Public Use Microdata Sample (PUMS). The five-per-cent PUMS is a random sample containing individual records of the characterist0ics for a 5 percent of the people in the 2000 U.S. Census data (roughly 14 million observations).[15] We fit the following regression model:

$$\log(y_i) = \beta_0 + \beta_j X_{ji} + \gamma_k Z_{ki} + \varepsilon_i$$

where $\log(y_i)$ is the natural logarithm of wages and income salary for individual i, which is truncated at 1, that is, our subsample only includes those individuals with wage and salary incomes greater than 0 in 1999. X_{ji} is a series of indicator variables measuring an individual's language ability, while Z_{ki} represents a matrix of educational, sociodemographic, occupational, and regional controls.

The sample is limited to Hispanics between 18 and 64, the group most likely to be in the labor force, this left us with 710,087 observations.[16] Limiting the sample to Latinos allows us to focus on the effects of language without having to deal with the

[15] PUMS contains individual weights for each person to ensure that no group in the Census sample is over-sampled. When applied to individual records the weights can be used to expand the sample to the total population in the Census. See U.S. Census Bureau (2003). Census 2000, Public Use Microdata Sample, (PUMS), United States, Technical Documentation. Washington, DC: U.S. Census Bureau, 2003

[16] In this paper we use the terms Hispanic and Latino interchangeably to refer to persons in the United States who can trace their origin to the Spanish countries. According to the U.S. Census, origin is ancestry, lineage, heritage, nationality group, or country of birth. People of Hispanic origin may be of any race.

effects of racial and ethnic discrimination that would be present if we included non-Hispanic whites and African Americans in the analysis.

The analysis controls for the effects of education using a series of indicator variables to account for different levels of educational attainment: No school and 1st-4th grade, 5th-8th grade, 9th grade, 10th grade, 11th grade, 12th grade, no diploma, high school graduate, some college, associate degree, bachelors, masters, professional, and doctorate. We code no school and 1st-4th grade as the baseline (excluded) category. We also control for gender (female), age and age squared to account for experience in the marketplace, citizenship status (whether the individual is a U.S. citizen), sector of employment (Agriculture, mining and construction; manufacturing; service and public sector), occupation (management, professional, and related occupations; service occupations; sales and office occupations; farming, fishery, and forestry occupations; constructions, extraction, and maintenance occupations; and production, transportation, and material moving occupations), and geographic region of residence (Northeast, Midwest, West, and South). The latter is essential because of wage differences across geographically dispersed labor markets and because of the clustering patterns that characterize Latino settlements. We classify individuals into five different categories according to their self-reported language ability (see Table 1 for descriptive statistics):

- Spanish monolingual
- Spanish is spoken at home and respondent speaks English not very well
- Spanish is spoken at home and respondent speaks English well

- Spanish is spoken at home and respondent speaks English very well

- English monolingual.[17]

[Table 1. About here]

As mentioned previously, we face a problem defining bilingualism: The 2000 Census identifies individuals that speak Spanish at home and provides a measure of English proficiency based on self-reporting. We created a scale combining the two to define bilingualism. Note that the highest level of English ability for those who speak Spanish at home is "speaks English very well." This seems to suggest that the English ability of those individuals who describe themselves in this way is lower than that of English monolinguals. However, many native born bilingual Latinos are as fluent in English as are Hispanic English monolinguals. Consequently, our measure of bilingualism could be understating the English abilities of bilinguals.

Another problem in the empirical strategy is that we cannot control for quality of education and levels of assimilation/acculturation, which are likely to affect earnings. The history of the relationship of Latinos to educational institutions from primary school through college strongly suggests that even if they have the same amount of education as non-Hispanic whites, Latinos do not receive the same quality of education. Their schools are more likely to be overcrowded and to offer fewer enrichment programs; and their parents are less prepared to assist with homework and provide assistance in the form of books and computers. Lacking data on such characteristics makes it difficult to

[17] We create indicator variables for each category. English monolingual serves as the baseline or omitted category in the statistical analyses.

determine the validity of the educational data gathered by the census. Nonetheless, years of school are the best data available to us. Figure 1 shows the distribution of education by English ability. A general pattern that arises from Figure 1 is that Spanish monolinguals and those bilinguals who speak little English, tend to have less years of schooling (5th-8th grade and 9th grade respectively) than those English monolinguals and bilinguals who speak English well or very well who are high school graduates. Individuals classified as English monolinguals and those that speak Spanish and English well or very well show roughly similar educational attainment levels.

[Figure 1. About here]

Even though the Hispanic population tends to cluster in specific geographic areas, their English ability seems not to vary substantially by region (see Figure 2). In all four regions the plurality tends to speak English very well while less than 10% are Spanish monolinguals.

[Figure 2. About here]

In terms of sector and occupation, a greater proportion of Spanish monolinguals and those who speak little English tend to work in agriculture, construction, and manufacturing. However, regardless of their English ability, most Hispanics work in the service industry (See Figure 3).

[Figure 3. About here]

The type of occupation also varies by English ability. For instance, bilingual Latinos who speak English well and very well are more likely to be found in managerial,

professional, service, and sales & office occupations while Spanish monolinguals and those who do not speak English well are in construction, production, and transportation occupations (see Figure 4).

[Figure 4. About here]

Results

Our dependent variable is wage-based income. Transforming the value of income as provided by PUMS into its natural log allows us to interpret the coefficients obtained as semi-elasticies: the coefficients on the categorical independent variables (difference in group means) multiplied by one hundred, is approximately equal to a percent change in the dependent variable. Table 2 illustrates the average income for each of our 5 categories of English ability. The trend is clear: the better the command of English the higher the average income.

[Table 2. About here]

Table 3 reproduces the results of the truncated multivariate regression analysis for the entire sample. We tested the sensitivity of the model to different statistical specifications. We fitted the Model 1 using classic regression with weights and raw data. Overall, the results are almost identical; however, the truncated regression approach makes more sense given the inherit nature of the data.[18] The table shows that on average the income level of bilingual Hispanics, those that speak Spanish at home and English very well, is only 3 percentage points higher than the income of those Hispanics who only speak English after accounting for educational attainment, gender, age, citizenship,

[18] All models fitting a classic regression are available upon request.

sector, region of employment and occupation. Income decreases monotonically as the ability to speak English falls: the income of those who speak Spanish at home and English well, on the other hand, is 1 percentage points lower than the baseline category (English monolinguals), 9 percentage points lower for those that speak English not well, and 19 percentage points lower for those who do not speak English at all.[19] These findings are consistent with theories of language as a tool of labor market assimilation.

Since the aggregate data might be masking differences in labor demand across sectors of the economy, in tables 4 through 10 we report results obtained by breaking down the data by industrial sectors since the presence of Spanish speaking workers varies across sectors.

In agriculture, mining and construction bilingualism is associated with higher income: those who speak Spanish and English very well earn on average 4 percentage points more than those in the baseline category; those that speak Spanish and English well are associated with 5 percentage points more in income. The difference between those who speak English very well and well may be because the former may be overqualified given the characteristics of this particular sector. The sign turns negative for those that speak Spanish and English not well or not at all: they earn from 3 to 16 percent less than those who only speak English (see Table 4).

[Table 4. About here]

[19] Running these models on a sample with weights makes no substantial difference. These results are available from the authors upon request.

In manufacturing the results differ with occupational categories. Among blue collar workers (defined as production occupations except supervisors) the coefficient is positive for those who speak English very well and well. They earn 4 and 7 percentage points higher income respectively than those in the base category (see Table 5).

[Table 5. About here]

The wages of those in supervisory and managerial positions in manufacturing for those who speak English very well and well turns negative: they are associated with 5 and 19 percentage points lower income than Hispanics who only speak English (see Table 6).

[Table 6. About here]

The results for the service sector indicate that the income of those who speak English very well and Spanish at home is roughly 3 percentage points higher than the income of those in the baseline category. Also income decreases monotonically with poorer English proficiency: the coefficient is roughly 2 percentage points lower for those who speak English well, 10 percentage points lower for those who speak English not well, and 20 percentage points lower for those that don't speak English (see Table 7).

[Table 7. About here]

In the public sector the results are negative for all categories: when compared with the baseline category those who speak Spanish and English very well earn 2 percentage points less; those who speak English well, not well and not at all earn respectively 11, 22 and 18 percent age points less than those who only speak English.

[Table 8. About here]

The coefficients remain negative and significant for all but for Spanish monolinguals when the sample is split between managerial and non-managerial occupations (see Tables 9 and 10).

[Table 9 and Table 10. About here]

As for the other variables that have a direct effect on income and wages we found that an increase in years of schooling (up to graduate school) is associated on average with higher wages. However, this monotonic relationship is not always true for all the sectors. For example, the monotonic increase on wages in the manufacturing sector for managerial occupations is true even for those who have a graduate degree (See Table 6). This suggests that different industries require different job skills and those industries that will require more specialized skills will pay for them. The coefficient for age, which can be viewed as a proxy for experience, increases at decreasing rates, that is, it is positive for the linear term and negative for the quadratic term. Finally, as previous research has found, women tend to earn less than men, while, U.S. citizens on average, tend to earn more than those who are not U.S. citizens.

Figures 5-21 present the results from additional tests conducted within sub-samples of the data in graphic format.[20] The comparison of the coefficients of the effect of bilingualism across different occupations suggests that the association of bilingualism

[20] The graphs plot the point estimate, 95 and 99 percent confidence intervals (dot, thick and thin lines respectively). Please refer to Appendix 1 for a description of the categories included in each occupation, and industry covered in the analyses. The full set of results in tabular format is available from the authors upon request.

on wage-based income is negative among managerial, business operations specialists and financial specialists (Figures 5, 6 and 7). The relationship is positive for education and training (Figure 8) healthcare support (Figure 9), protective service (Figure 10) and food preparation and serving (Figure 11) occupations.[21] The breakdown by industry (Figures 6-17) shows that in all sub-sectors, except finance and real estate, and tranportation and warehousing, bilingual Hispanics tend to earn more than English monolinguals. These findings are consistent with our expectations about changing demographic and economic conditions that make the ability to speak Spanish a valuable asset in the market. Last, we find that the association between bilingualism and income is substantively larger in the regions with lower concentration of Hispanics (Northeast and Midwest); yet the positive association remains across all regions (see Figures 18-21). In all but three of the sub-samples used in our analyses, we find that income increases monotonically with the ability to speak English, consistent with the results for the whole population.

Discussion

Overall our results for the whole pooled sample suggest that wage-based income increases monotonically with individual's ability to speak English, consistent with the prevailing wisdon the literature on the importance of local language proficiency (Chiswick 1978; Mincer 1974; Chiswick & Miller 2007). We also find that bilingualism is no longer penalized as it seems to have been in 1990 (de la Garza et al. 2000). Overall, earnings of Hispanics who speak Spanish at home and also speak English very well are slightly higher that those of Hispanics who only speak English. And the positive effect of

[21] In food preparation and serving occupations the results suggest that all Hispanics with a minimum command of English earn more than English monolinguals.

bilingualism on earnings holds after controlling for educational attainment, region, sector of employment, occupation, age and gender. This pattern supports our expectation that recent U. S and Hispanic social, demographic and economic trends have increased the market value of Spanish/English bilingualism. In the past decade Mexico and the rest of Latin America have become increasingly important to nationional economic life. Additionally, supplying goods and services to the ever-growing Hispanic community in the United States, especially those who are Spanish dominant, and managing workers with minimal English language skills who hardly speak English are also likely to create better paid job opportunities for bilingual Latinos who can communicate with their customers, employees and subordinates in Spanish, and in English with their supervisors, business owners, and upstream and downstream suppliers. This skill would enable Latinos to serve both Spanish-speaking and English-speaking customers and to have access to trade and investment opportunities in Latin America would give bilinguals an edge over English monolinguals.

These developments help explain the discrepancy between the overall positive albeit small coefficient in the whole sample, and the negative findings for 1990 reported by de la Garza et al. (2000). It is especially noteworthy that our results also show that bilingualism has a negative impact on wages in key sectors of the economy, especially in more rewarding managerial occupations. This result is puzzling and worth discussing in more detail. Bilingualism, namely proficiency in English and Spanish, is considered a skill, and skill tends to be rewarded in labor markets. Yet our results oblige us to reject an unconditional interpretation of that perspective and to re-evaluate how the market evaluates bilingualism.

There are sound theoretical reasons to expect English fluency to have a positive effect on earnings, but there is no comparable basis for predicting that bilinguals who know English well would be punished in higher occupation levels and in some sectors of the labor market as we found in our analyses. In manufacturing, for instance, we find that bilingual blue-collar workers who speak English well or very well receive higher earnings than similarly situated English monolinguals, but bilingual supervisory and managerial employees earn less than their monolingual counterparts. This may be because being bilingual is correlated with unobservable characteristics that are negatively valued in the market place but which our models do not identify. One such trait would be a lack of familiarity with mainstream labor practices and other values. Hispanics who speak English only are more likely to be third or even fourth generation Americans, and hence are better assimilated to American labor practices.

An alternative explanation for for the negative coefficient on bilingualism found in the sub-sample of managerial and supervisory positions in manufacturing is that bilingual Latinos who hold higher status jobs confront a glass ceiling. In other words, such Latinos are the victims of negative discrimination. An alternative explanation could be traced to a different pattern of regional clustering of bilingual individuals who prefer to work in ethnic enclaves If bilingual Latinos in managerial position are clustered in this sector, this means they work in small or medium sized firms characterized by low barriers to entry and no economies of scale. These firms are forced to minimize costs and hence cannot afford paying higher wages to their managers. Still we need to explain why bilingual Latinos are more likely to be employed in the former rather than the latter, given the earnings differentials.

More significantly, we find that bilinguals employed in the public sector make systematically less money than those who only speak English. And these results hold for all occupational categories in the sector. Given that the public sector provides a wide range of crucial goods and services to Spanish dominant Latinos it is remarkable that those that speak Spanish seem to be penalized. These results suggest that in this sector bilingual Latinos have a limited number of opportunities to climb up to more rewarding positions, or even could even be experiencing systematic negative discrimination.

One possibile mitigating factor is that bilinguals may have characteristics that lower their value in labor markets irrespective of their quality and skill as workers. Most specifically, compared to English monolinguals, Spanish speakers are much more likely to speak accented English, a trait employers especially frown on if the accent is heavy (Davila, Bohara, and Saenz 1993). Depending on how stringently accented English is evaluated, punishing bilinguals who speak with an accent could be considered discrimination. Moreover, employers could exaggerate the importance they assign to accents as a means to justify discrimination in hiring and wages.

Another unobserved characteristic that surely affects wages but which census data do not capture is the quality of education Latinos receive. Given that Hispanics live in areas with high Hispanic concentrations, they are likely to attend similar types of educational institutions wherever they reside, and as has been well documented, the quality of educational services in those schools is lower than that of schools in more integrated schools which are attended by Hispanics who are more likely to be English dominant. To the extent these patterns accurately describe the educational experiences of Latinos, our measure of educational attainment, i.e., years of school completed, may

falsely suggest that Latinos and non-Hispanic whites who attended school for the same number of years are comparably educated.[22]

[Table 11. About here]

Interpreting the meaning of "years of school" in this way makes our findings less puzzling but no less discomforting since it implies that Spanish speakers are systematically exposed to educational services of lower quality that puts them at a disadvantage in the marketplace. Nonetheless, the findings that the value of being fluent in both English and Spanish is negative, albeit within those sectors of employment and occupations that are usually associated with higher responsibility and pay, is not only puzzling but also distressing

Conclusion

This paper tries to assess the effect of bilingualism on income among. To isolate the effect of bilingualism we limit our analysis to a sample Hispanics drawn from the year 2000 U.S. Census five-per-cent PUMS. In contrast with earlier research that tested similar hypotheses on census data for the year 1990, we find that in 2000 that bilingual Latinos who speak English very well on average earn at least as much as those who speak only English. Yet we also find that bilingualism is not rewarded in all sectors and occupational categories of the labor market. Our results show a negative correlation between bilingualism and income for managerial and supervisory employees in manufacturing, and for all those employed in the public sector.

[22] Table 9 illustrates the income and wages for non-Hispanic whites and Latinos by educational attainment. On average, Latinos earn 19 percentage points less than non-Hispanic whites with the same educational attainment. This difference is more evident at higher levels of education. For instance, Hispanic professionals earn 46 percentage points less than non-Hispanic white professionals.

We point to several possible explanations for these findings: negative discrimination, reduced inter-industry and regional mobility and competition; and differential access to quality educational services. We acknowledge that our analysis has several shortcomings associated with the validity of our measures of bilingualism and educational attainment. We have no way to overcome these limitations, however.

We suggest two different routes that would help extend our research and help us overcome these limitations. The first would be to analyze the effect of bilingualism within jobs that require certification, such as teachers and nurses. In these cases, the existence of certification requirements would allow us to control for skill regardless of language problems such as accented English. Alternatively, we could look at the difference in performance between English monolinguals and bilinguals who speak English ver well within groups of individuals graduating from similar institutions, such as Ivy League universities, who have secured jobs in the same industry or sector. Controlling for quality of education would allow us to further isolate the effect of bilingualism on income.

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Appendix A. Occupation and Industry Codes

2000 Occupation Codes

Management Occupations
- Chief Executives
- General and Operations Managers
- Legislators
- Advertising and Promotions Managers
- Marketing and Sales Managers
- Public Relations Managers
- Administrative Services Managers
- Computer and Information Systems Managers
- Financial Managers
- Human Resources Managers
- Industrial Production Managers
- Purchasing Managers
- Transportation, Storage, and Distribution Managers
- Farm, Ranch, and Other Agricultural Managers
- Farmers and Ranchers
- Construction Managers
- Education Administrator
- Engineering Managers
- Food Service Managers
- Funeral Directors
- Gaming Managers
- Lodging Managers
- Medical and Health Services Managers
- Natural Sciences Managers
- Postmasters and Mail Superintendents
- Property, Real Estate, and Community Association Managers
- Social and Community Service Managers
- Managers, All Other

Financial Specialists
- Accountants and Auditors
- Appraisers and Assessors of Real Estate
- Budget Analysts
- Credit Analysts
- Financial Analysts
- Personal Financial Advisors
- Insurance Underwriters
- Financial Examiners
- Loan Counselors and Officers
- Not used
- Tax Examiners, Collectors, and Revenue Agents
- Tax Preparers
- Financial Specialists, All Other

Protective Service Occupations
- First-Line Supervisors/Managers of Correctional Officers
- First-Line Supervisors/Managers of Police and Detectives
- First-Line Supervisors/Managers of Fire Fighting and Preventions Workers
- Supervisors, Protective Service Workers, All

Business Operations Specialists
- Agents and Business Managers of Artists, Performers, and Athletes
- Purchasing Agents and Buyers, Farm Products
- Wholesale and Retail Buyers, Except Farm Products
- Purchasing Agents, Except Wholesale, Retail, and Farm Products
- Claims Adjusters, Appraisers, Examiners, and Investigators
- Not used
- Compliance Officers, Except Agriculture, Construction, Health and Safety, and Transportation
- Cost Estimators
- Not used
- Human Resources, Training, and Labor Relations Specialists
- Logisticians
- Management Analysts
- Meeting and Convention Planners
- Other Business Operations Specialists

Education, Training, and Library Occupations
- Postsecondary Teachers
- Preschool and Kindergarten Teachers
- Elementary and Middle School Teachers
- Secondary School Teachers
- Special Education Teachers
- Other Teachers and Instructors
- Archivists, Curators, and Museum Technicians
- Librarians
- Library Technicians
- Teacher Assistants
- Other Education, Training, and Library Workers

Healthcare Support Occupations
- Nursing, Psychiatric, and Home Health Aides
- Occupational Therapist Assistants and Aides
- Physical Therapist Assistants and Aides
- Massage Therapists
- Dental Assistants
- Medical Assistants and Other Healthcare Support Occupations

Food Preparation and Serving Occupations
- Chefs and Head Cooks
- First-Line Supervisors/Managers of Food Preparation and Serving Workers
- Cooks
- Food Preparation Workers
- Bartenders
- Combined Food Preparation and Serving Workers, Including Fast Food
- Counter Attendants, Cafeteria, Food Concession, and Coffee Shop
- Waiters and Waitresses
- Food Servers, Nonrestaurant
- Dining Room and Cafeteria Attendants, Bartender Helpers, and Miscellaneous Food Preparation and Serving Related Workers
- Dishwashers
- Hosts and Hostesses, Restaurant, Lounge, and Coffee Shop
- Food Preparation and Serving Related Workers, All Other

Other

- Fire Fighters
- Fire Inspectors
- Bailiffs, Correctional Officers, and Jailers
- Not used
- Detectives and Criminal Investigators
- Fish and Game Wardens
- Miscellaneous Law Enforcement Workers
- Police Officers
- Transit and Railroad Police
- Animal Control Workers
- Private Detectives and Investigators
- Security Guards and Gaming Surveillance Officers
- Not used
- Crossing Guards
- Lifeguards and Other Protective Service Workers

Codes for Industry (IND) and NAICS Industry (INDNAICS) in the 2000 Census and ACS Samples

Wholesale Trade

Motor vehicles, parts and supplies
Furniture and home furnishing
Lumber and other construction materials
Professional and commercial equipment and supplies
Metals and minerals, except petroleum
Electrical goods
Hardware, plumbing and heating equipment, and supplies
Machinery, equipment, and supplies
Recyclable material
Miscellaneous durable goods
Paper and paper products
Drugs, sundries, and chemical and allied products
Apparel, fabrics, and notions
Groceries and related products
Farm product raw materials
Petroleum and petroleum products
Alcoholic beverages
Farm supplies
Electronic markets, agents and brokers
Miscellaneous nondurable goods
Not specified trade

Transportation and Warehousing

Air transportation
Rail transportation
Water transportation
Truck transportation
Bus service and urban transit
Taxi and limousine service
Pipeline transportation
Scenic and sightseeing transportation
Services incidental to transportation
Postal service
Couriers and messengers
Warehousing and storage

Finance, Insurance, Real Estate, and Rental and Leasing

Banking and related activities
Savings institutions, including credit unions
Non-depository credit and related activities
Securities, commodities, funds, trusts, and other financial investments
Insurance carriers and related activities
Real estate
Automotive equipment rental and leasing
Video tape and disk rental
Other consumer goods rental
Commercial, industrial, and other intangible assets rental and leasing

Retail Trade

Automobile dealers
Other motor vehicle dealers
Auto parts, accessories, and tire stores
Furniture and home furnishings stores
Household appliance stores
Radio, TV, and computer stores
Building material and supplies dealers
Hardware stores
Lawn and garden equipment and supplies stores
Grocery stores
Specialty food stores
Beer, wine, and liquor stores
Pharmacies and drug stores
Health and personal care, except drug, stores
Gasoline stations
Clothing and accessories, except shoe, stores
Shoe stores
Jewelry, luggage, and leather goods stores
Sporting goods, camera, and hobby and toy stores
Sewing, needlework and piece goods stores
Music stores
Book stores and news dealers
Department stores
Miscellaneous general merchandise stores
Florists
Office supplies and stationary stores
Used merchandise stores
Gift, novelty, and souvenir shops
Miscellaneous stores
Electronic shopping and mail-order houses
Electronic shopping
Electronic auctions
Mail-order houses
Vending machine operators
Fuel dealers
Other direct selling establishments
Not specified trade

Professional, Scientific, Management, Administrative

Legal services

Accounting, tax preparation, bookkeeping and payroll services

Architectural, engineering, and related services

Specialized design services

Computer systems design and related services

Management, scientific and technical consulting services

Scientific research and development services

Advertising and related services

Veterinary services

Other professional, scientific and technical services

Management of companies and enterprises

Employment services

Business support services

Travel arrangements and reservation services

Investigation and security services

Services to buildings and dwellings

Landscaping services

Other administrative, and other support services

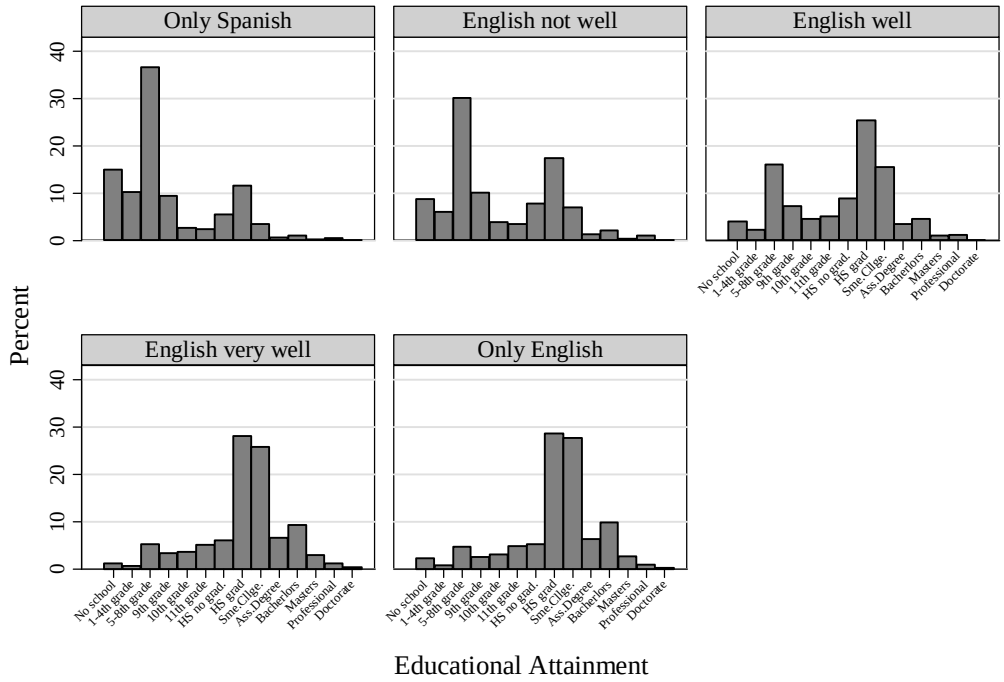
Waste Management Industry

Waste management and remediation services

Table 1. Descriptive Statistics

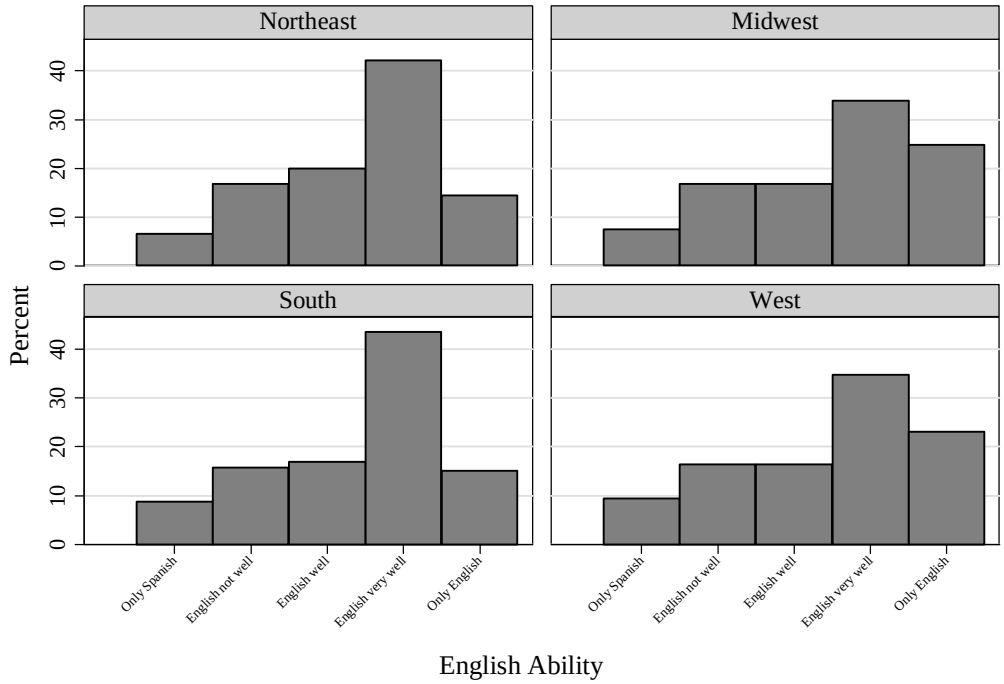
Variable	Obs	Mean	Std. Dev.
Income and Wages	710,087	22,637	25,769
English at home & Only English	710,087	0.19	0.40
Spanish at home & English very well	710,087	0.39	0.49
Spanish at home & English well	710,087	0.17	0.38
Spanish at home & English not well	710,087	0.16	0.37
Spanish at home & no English	710,087	0.08	0.28
No Schooling	710,087	0.04	0.20
1st-4th grade	710,087	0.02	0.16
5th-8th grade	710,087	0.13	0.34
HS No Diploma	710,087	0.20	0.40
High school graduate, or GED	710,087	0.25	0.43
Some college, no degree	710,087	0.20	0.40
Associate degree, occupational program	710,087	0.05	0.21
Bachelors degree	710,087	0.07	0.26
Master's, Professional and Doctorate	710,087	0.03	0.18
Female	710,087	.42	0.49
Age	710,087	35.00	11.25
Age squared	710,087	1,345	858.52
Native Born	710,087	0.47	0.50
Northeast	710,087	0.15	0.35
South	710,087	0.34	0.47
West	710,087	0.42	0.49
Midwest	710,087	0.10	0.29
Management, Professional and Related Occupations	710,087	0.17	0.38
Service occupations	710,087	0.21	0.41
Sales & office occupations	710,087	0.23	0.42
Farming, fishing and forestry	710,087	0.03	0.17
Construction, extraction and maintenance occupations	710,087	0.13	0.34
Production, transportation and material moving occupations	710,087	0.23	0.42

Figure 1. Education by English Ability



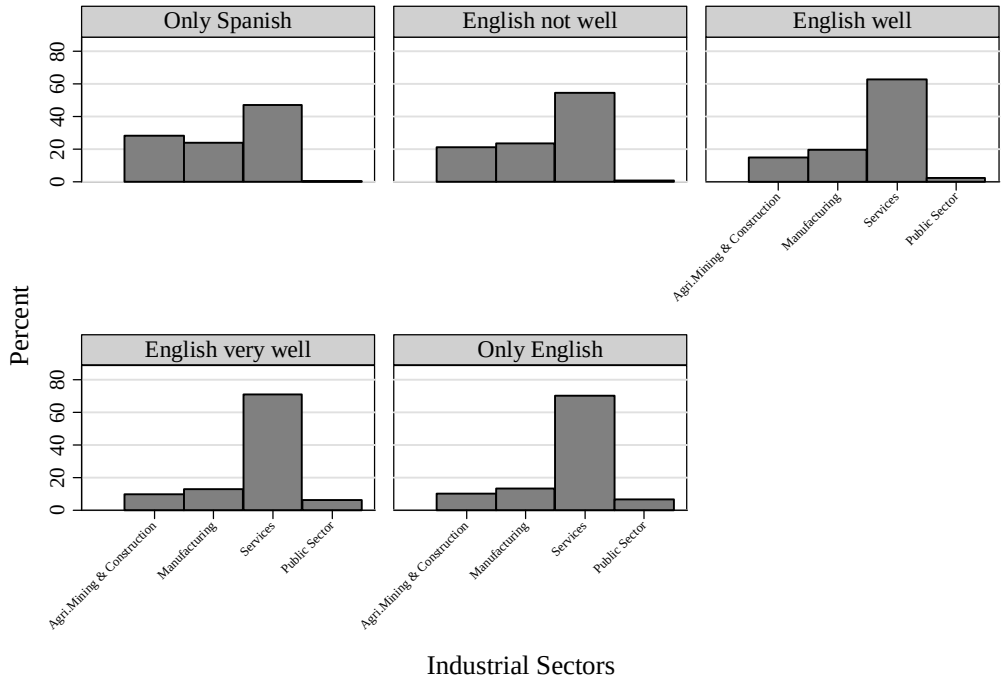
Source: IPUMS 5% 2000

Figure 2. English Ability by Census Regions



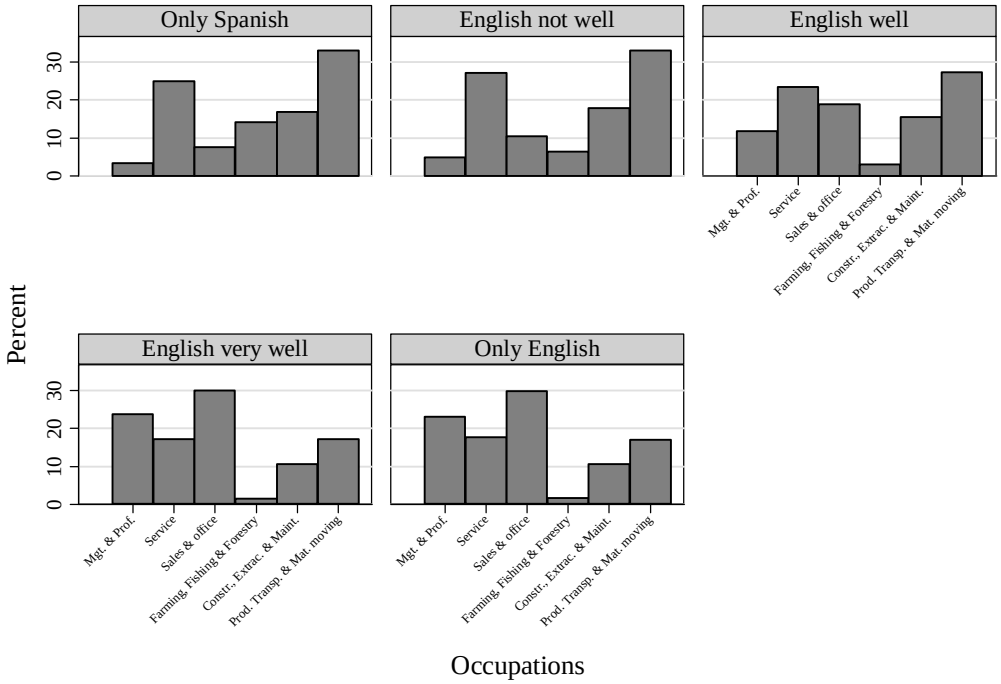
Source: IPUMS 5% 2000

Figure 3. Industrial Sectors by English Ability



Source: IPUMS 5% 2000

Figure 4. Professional Occupations by English Ability



Source: IPUMS 5% 2000

Table 2. Wage and Salary Income by Language Ability 2000

Group	Observations	Mean $USD	Std. Dev.
Spanish Only	61,543	14,638	19,750
English not well	115,407	17,845	21,036
English well	121,299	22,163	23,492
English very well	274,339	25,168	27,613
Only English	137,492	25,607	28,381

Source: IPUMS 5% 2000

Table 3. Multiple Regression Analysis: log of income and wages on socio-demographic, educational, regional, and occupation Baseline Model

Log (Income and Wages)	Coef.	Robust Std. Err.	t	P>t	[95% Conf.	Interval]
Spanish at home & English very well	0.030	0.003	9.760	0.000	0.024	0.036
Spanish at home & English well	-0.011	0.004	-2.890	0.004	-0.018	-0.004
Spanish at home & English not well	-0.091	0.004	-21.840	0.000	-0.100	-0.083
Spanish at home & no English	-0.192	0.005	-37.210	0.000	-0.202	-0.182
5th-8th grade	0.058	0.004	12.900	0.000	0.049	0.067
High school graduate, or GED	0.228	0.005	46.700	0.000	0.219	0.238
Some college, no degree	0.305	0.005	58.660	0.000	0.295	0.315
Associate degree, occupational program	0.423	0.007	64.250	0.000	0.410	0.436
Bachelors degree	0.570	0.006	89.700	0.000	0.558	0.582
Graduate	0.666	0.008	84.190	0.000	0.651	0.682
Female	-0.454	0.002	-188.650	0.000	-0.459	-0.449
Age	1.314	0.007	200.590	0.000	1.301	1.327
Age squared	-0.001	0.000	-170.490	0.000	-0.001	-0.001
U.S. Citizen	0.039	0.003	14.170	0.000	0.034	0.045
Northeast	-0.040	0.005	-8.370	0.000	-0.049	-0.030
South	-0.120	0.004	-29.150	0.000	-0.128	-0.112
West	-0.062	0.004	-15.430	0.000	-0.070	-0.054
Management, Professional and Related Occupations	0.136	0.015	9.250	0.000	0.107	0.164
Service occupations	-0.328	0.015	-22.400	0.000	-0.357	-0.299
Sales & office occupations	-0.090	0.015	-6.200	0.000	-0.119	-0.062
Farming, fishing and forestry	-0.433	0.015	-27.990	0.000	-0.464	-0.403
Construction, extraction and maintenance occupations	-0.021	0.015	-1.420	0.155	-0.050	0.008
Production, transportation and material moving occupations	-0.112	0.015	-7.670	0.000	-0.140	-0.083
Constant	7.122	0.019	369.790	0.000	7.084	7.159
Sigma	0.891	0.001	659.660	0.000	0.889	0.894

Number of observations = 710,087; Wald Chi2 (23) =2.1e+05 ; Prob > Chi2 = 0; Estimated R2 = .24

Table 4. Multiple Regression Analysis: log of income and wages on socio-demographic, educational, regional for the Agricultural, Mining and Construction Sector

Log (Income and Wages)	Coef.	Robust Std. Err.	z	P>z	[95% Conf. Interval]	
Spanish at home & English very well	0.038	0.009	4.120	0.000	0.020	0.056
Spanish at home & English well	0.053	0.010	5.220	0.000	0.033	0.073
Spanish at home & English not well	-0.032	0.010	-3.170	0.002	-0.053	-0.012
Spanish at home & no English	-0.163	0.011	-14.430	0.000	-0.186	-0.141
5th-8th grade	0.069	0.009	7.780	0.000	0.052	0.086
HS No Diploma	0.065	0.009	6.990	0.000	0.047	0.084
High school graduate, or GED	0.205	0.010	20.410	0.000	0.185	0.224
Some college, no degree	0.289	0.012	23.660	0.000	0.265	0.313
Associate degree, occupational program	0.411	0.019	21.590	0.000	0.374	0.449
Bachelors degree	0.447	0.021	21.770	0.000	0.406	0.487
Graduate	0.399	0.034	11.710	0.000	0.332	0.465
Female	-0.552	0.011	-50.770	0.000	-0.573	-0.531
Age	0.877	0.017	52.090	0.000	0.844	0.910
Age squared	-0.001	0.000	-43.860	0.000	-0.001	-0.001
U.S. Citizen	0.058	0.007	8.590	0.000	0.045	0.071
Northeast	-0.103	0.016	-6.480	0.000	-0.134	-0.072
South	-0.168	0.012	-13.890	0.000	-0.192	-0.145
West	-0.082	0.012	-6.890	0.000	-0.106	-0.059
Management, Professional and Related Occupations	0.355	0.355	1.000	0.318	-0.341	1.051
Service occupations	-0.318	0.355	-0.890	0.371	-1.015	0.379
Sales & office occupations	0.216	0.355	0.610	0.542	-0.480	0.912
Farming, fishing and forestry	-0.393	0.355	-1.110	0.268	-1.089	0.303
Construction, extraction and maintenance occupations	0.004	0.355	0.010	0.991	-0.691	0.700
Production, transportation and material moving occupations	0.023	0.355	0.060	0.949	-0.673	0.718
Constant	7.971	0.357	22.320	0.000	7.271	8.671
Sigma	0.831	0.004	227.950	0.000	0.824	0.838

Number of observations = 101,435; Wald Chi2 (24) =23,795 ; Prob > Chi2 = 0; Estimated R2 = .21

Table 5. Multiple Regression Analysis: log of income and wages on socio-demographic, educational, regional for the Manufacturing Sector Production Occupations (Except Supervisors)

Log (Income and Wages)	Coef.	Robust Std. Err.	z	P>z	[95% Conf. Interval]	
Spanish at home & English very well	0.042	0.012	3.610	0.000	0.019	0.065
Spanish at home & English well	0.069	0.012	5.710	0.000	0.045	0.092
Spanish at home & English not well	-0.040	0.012	-3.280	0.001	-0.064	-0.016
Spanish at home & no English	-0.151	0.014	-10.820	0.000	-0.178	-0.124
5th-8th grade	0.058	0.011	5.220	0.000	0.036	0.080
HS No Diploma	0.073	0.011	6.410	0.000	0.051	0.096
High school graduate, or GED	0.216	0.012	18.370	0.000	0.193	0.239
Some college, no degree	0.300	0.014	21.210	0.000	0.272	0.327
Associate degree, occupational program	0.338	0.025	13.720	0.000	0.290	0.386
Bachelors degree	0.190	0.028	6.810	0.000	0.135	0.245
Graduate	0.123	0.037	3.290	0.001	0.050	0.197
Female	-0.469	0.007	-70.420	0.000	-0.482	-0.455
Age	0.835	0.020	42.280	0.000	0.796	0.873
Age squared	-0.001	0.000	-34.750	0.000	-0.001	-0.001
U.S. Citizen	0.084	0.007	11.250	0.000	0.070	0.099
Northeast	-0.182	0.011	-15.850	0.000	-0.205	-0.160
South	-0.175	0.010	-18.090	0.000	-0.194	-0.156
West	-0.138	0.009	-15.500	0.000	-0.156	-0.121
Constant	7.975	0.040	200.470	0.000	7.897	8.053
Sigma	0.802	0.005	177.860	0.000	0.793	0.811

Number of observations = 67,415; Wald Chi2 (18) =12,239 ; Prob > Chi2 = 0; Estimated R2 = .18

Table 6. Multiple Regression Analysis: log of income and wages on socio-demographic, educational, and region for the Manufacturing Sector Managerial Occupations

Log (Income and Wages)	Coef.	Robust Std. Err.	z	P>z	[95% Conf.	Interval]
Spanish at home & English very well	-0.046	0.016	-2.910	0.004	-0.077	-0.015
Spanish at home & English well	-0.188	0.024	-7.730	0.000	-0.236	-0.140
Spanish at home & English not well	-0.316	0.036	-8.740	0.000	-0.386	-0.245
Spanish at home & no English	-0.454	0.065	-7.020	0.000	-0.581	-0.327
5th-8th grade	-0.010	0.067	-0.160	0.876	-0.141	0.120
HS No Diploma	0.044	0.065	0.680	0.499	-0.084	0.172
High school graduate, or GED	0.127	0.062	2.040	0.041	0.005	0.248
Some college, no degree	0.228	0.062	3.700	0.000	0.107	0.349
Associate degree, occupational program	0.324	0.063	5.160	0.000	0.201	0.446
Bachelors degree	0.566	0.062	9.150	0.000	0.445	0.687
Master's, Professional and Doctorate	0.690	0.065	10.680	0.000	0.563	0.816
Female	-0.282	0.015	-18.380	0.000	-0.312	-0.252
Age	1.235	0.054	22.680	0.000	1.128	1.342
Age squared	-0.001	0.000	-19.100	0.000	-0.001	-0.001
U.S. Citizen	0.101	0.019	5.310	0.000	0.064	0.138
Northeast	0.004	0.027	0.160	0.869	-0.049	0.058
South	-0.054	0.023	-2.330	0.020	-0.100	-0.009
West	-0.012	0.022	-0.520	0.601	-0.055	0.032
Constant	7.564	0.125	60.620	0.000	7.320	7.809
Sigma	0.696	0.010	67.330	0.000	0.676	0.716

Number of observations = 10,531; Wald Chi2 (18) =3,341 ; Prob > Chi2 = 0; Estimated R2 = .20

Table 7. Multiple Regression Analysis: log of income and wages on socio-demographic, educational, regional for the Service Sector

Log (Income and Wages)	Coef.	Robust Std. Err.	z	P>z	[95% Conf.	Interval]
Spanish at home & English very well	0.034	0.004	9.010	0.000	0.027	0.042
Spanish at home & English well	-0.020	0.005	-4.010	0.000	-0.029	-0.010
Spanish at home & English not well	-0.097	0.006	-17.440	0.000	-0.108	-0.086
Spanish at home & no English	-0.200	0.007	-27.120	0.000	-0.214	-0.186
5th-8th grade	0.051	0.007	6.970	0.000	0.037	0.066
HS No Diploma	0.024	0.007	3.350	0.001	0.010	0.038
High school graduate, or GED	0.209	0.007	29.350	0.000	0.195	0.222
Some college, no degree	0.267	0.007	36.060	0.000	0.252	0.281
Associate degree, occupational program	0.380	0.009	42.870	0.000	0.363	0.398
Bachelors degree	0.541	0.009	63.310	0.000	0.525	0.558
Graduate	0.663	0.010	66.020	0.000	0.643	0.683
Female	-0.435	0.003	-147.760	0.000	-0.441	-0.429
Age	1.425	0.008	172.560	0.000	1.409	1.441
Age squared	-0.002	0.000	-146.970	0.000	-0.002	-0.002
U.S. Citizen	0.013	0.004	3.530	0.000	0.006	0.020
Northeast	0.026	0.006	4.180	0.000	0.014	0.038
South	-0.077	0.006	-13.530	0.000	-0.088	-0.065
West	-0.021	0.006	-3.790	0.000	-0.032	-0.010
Management, Professional and Related Occupations	0.114	0.093	1.230	0.220	-0.068	0.296
Service occupations	-0.340	0.093	-3.650	0.000	-0.522	-0.157
Sales & office occupations	-0.085	0.093	-0.910	0.361	-0.267	0.097
Farming, fishing and forestry	-0.409	0.094	-4.350	0.000	-0.594	-0.225
Construction, extraction and maintenance occupations	-0.016	0.093	-0.170	0.863	-0.199	0.166
Production, transportation and material moving occupations	-0.158	0.093	-1.700	0.090	-0.340	0.024
Constant	6.877	0.095	72.710	0.000	6.691	7.062
Sigma	0.926	0.002	554.300	0.000	0.923	0.929

Number of observations = 458,526; Wald Chi2 (24) =1.4e+05 ; Prob > Chi2 = 0; Estimated R2 = .24

Table 8. Multiple Regression Analysis: log of income and wages on socio-demographic, educational, regional for the Public Sector

Log (Income and Wages)	Coef.	Robust Std. Err.	z	P>z	[95% Conf.	Interval]
Spanish at home & English very well	-0.022	0.010	-2.280	0.022	-0.041	-0.003
Spanish at home & English well	-0.106	0.017	-6.410	0.000	-0.139	-0.074
Spanish at home & English not well	-0.222	0.036	-6.160	0.000	-0.293	-0.152
Spanish at home & no English	-0.178	0.065	-2.750	0.006	-0.305	-0.051
5th-8th grade	-0.092	0.089	-1.040	0.301	-0.267	0.082
HS No Diploma	0.089	0.078	1.140	0.256	-0.065	0.242
High school graduate, or GED	0.464	0.075	6.180	0.000	0.317	0.611
Some college, no degree	0.608	0.075	8.110	0.000	0.461	0.755
Associate degree, occupational program	0.670	0.076	8.870	0.000	0.522	0.818
Bachelors degree	0.832	0.075	11.040	0.000	0.685	0.980
Graduate	0.973	0.077	12.720	0.000	0.823	1.123
Female	-0.279	0.010	-26.930	0.000	-0.299	-0.259
Age	1.565	0.031	50.560	0.000	1.505	1.626
Age squared	-0.002	0.000	-42.840	0.000	-0.002	-0.002
U.S. Citizen	0.108	0.020	5.500	0.000	0.069	0.146
Northeast	0.098	0.024	4.120	0.000	0.051	0.144
South	0.000	0.020	0.000	1.000	-0.040	0.040
West	0.070	0.020	3.440	0.001	0.030	0.110
Management, Professional and Related Occupations	0.109	0.018	5.980	0.000	0.073	0.144
Service occupations	0.132	0.018	7.520	0.000	0.098	0.167
Sales & office occupations	-0.104	0.019	-5.540	0.000	-0.141	-0.067
Farming, fishing and forestry	-0.315	0.085	-3.720	0.000	-0.481	-0.149
Construction, extraction and maintenance occupations	0.049	0.020	2.520	0.012	0.011	0.087
Production, transportation and material moving occupations	-0.056	0.027	-2.060	0.040	-0.109	-0.003
Constant	6.261	0.095	65.980	0.000	6.075	6.447
Sigma	0.743	0.007	111.310	0.000	0.730	0.757

Number of observations = 30,176; Wald Chi2 (24) =12,530 ; Prob > Chi2 = 0; Estimated R2 = .19

Table 9. Multiple Regression Analysis: log of income and wages on socio-demographic, educational, regional for the Public Sector (Managerial Occupations Only)

Log (Income and Wages)	Coef.	Robust Std. Err.	z	P>z	[95% Conf.	Interval]
Spanish at home & English very well	-0.045	0.017	-2.700	0.007	-0.077	-0.012
Spanish at home & English well	-0.109	0.029	-3.700	0.000	-0.166	-0.051
Spanish at home & English not well	-0.212	0.075	-2.830	0.005	-0.359	-0.065
Spanish at home & no English	-0.236	0.126	-1.870	0.062	-0.484	0.012
5th-8th grade	-0.271	0.215	-1.270	0.206	-0.692	0.149
HS No Diploma	-0.289	0.184	-1.570	0.115	-0.649	0.071
High school graduate, or GED	-0.192	0.176	-1.090	0.274	-0.537	0.152
Some college, no degree	-0.105	0.175	-0.600	0.549	-0.448	0.238
Associate degree, occupational program	-0.047	0.176	-0.270	0.789	-0.391	0.297
Bachelors degree	0.137	0.175	0.790	0.432	-0.205	0.480
Graduate	0.305	0.175	1.740	0.082	-0.039	0.649
Female	-0.213	0.015	-14.340	0.000	-0.242	-0.184
Age	1.565	0.060	26.260	0.000	1.448	1.681
Age squared	-0.002	0.000	-22.720	0.000	-0.002	-0.002
U.S. Citizen	0.086	0.035	2.470	0.013	0.018	0.154
Northeast	0.091	0.037	2.490	0.013	0.020	0.163
South	0.040	0.032	1.270	0.203	-0.022	0.102
West	0.079	0.031	2.520	0.012	0.018	0.140
Constant	6.952	0.215	32.340	0.000	6.531	7.374
Sigma	0.675	0.012	55.060	0.000	0.651	0.700

Number of observations = 8,402; Wald Chi2 (19) =2,373 ; Prob > Chi2 = 0; Estimated R2 = .18

Table 10. Multiple Regression Analysis: log of income and wages on socio-demographic, educational, regional for the Public Sector (Non-Managerial Occupations Only)

Log (Income and Wages)	Coef.	Robust Std. Err.	z	P>z	[95% Conf.	Interval]
Spanish at home & English very well	-0.0110	0.0119	-0.9300	0.3530	-0.0343	0.0122
Spanish at home & English well	-0.1015	0.0199	-5.1000	0.0000	-0.1405	-0.0625
Spanish at home & English not well	-0.1963	0.0408	-4.8100	0.0000	-0.2764	-0.1163
Spanish at home & no English	-0.1372	0.0736	-1.8600	0.0630	-0.2815	0.0072
5th-8th grade	-0.0505	0.0936	-0.5400	0.5890	-0.2339	0.1329
HS No Diploma	0.1053	0.0826	1.2700	0.2020	-0.0566	0.2672
High school graduate, or GED	0.5089	0.0792	6.4300	0.0000	0.3538	0.6641
Some college, no degree	0.6706	0.0790	8.4800	0.0000	0.5157	0.8255
Associate degree, occupational program	0.7462	0.0800	9.3200	0.0000	0.5893	0.9030
Bachelors degree	0.9065	0.0803	11.2900	0.0000	0.7492	1.0639
Graduate	0.9644	0.0859	11.2200	0.0000	0.7960	1.1328
Female	-0.3918	0.0114	-34.3900	0.0000	-0.4142	-0.3695
Age	1.6614	0.0361	46.0500	0.0000	1.5906	1.7321
Age squared	-0.0019	0.0000	-38.6700	0.0000	-0.0020	-0.0018
U.S. Citizen	0.1379	0.0232	5.9400	0.0000	0.0924	0.1833
Northeast	0.1136	0.0298	3.8200	0.0000	0.0553	0.1719
South	-0.0247	0.0255	-0.9700	0.3320	-0.0748	0.0253
West	0.0598	0.0254	2.3500	0.0190	0.0099	0.1097
Constant	6.0949	0.1036	58.8300	0.0000	5.8919	6.2980
Sigma	0.770	0.008	97.800	0.000	0.755	0.786

Number of observations = 21,774; Wald Chi2 (19) =8,126 ; Prob > Chi2 = 0; Estimated R2 = .20

Figure 5. Regression Coefficient Plot for Management Occupations

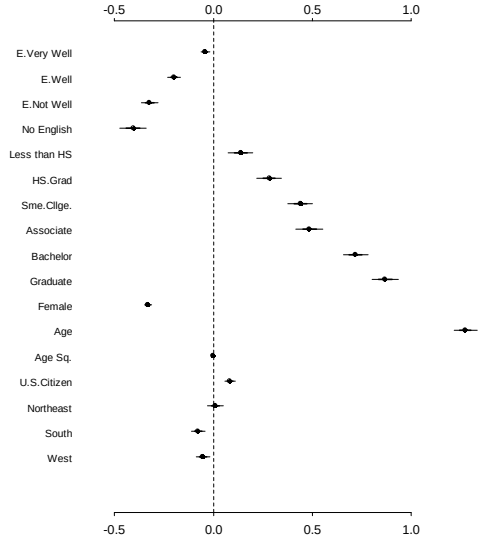


Figure 6. Regression Coefficient Plot for Business Operations Specialists Occupations

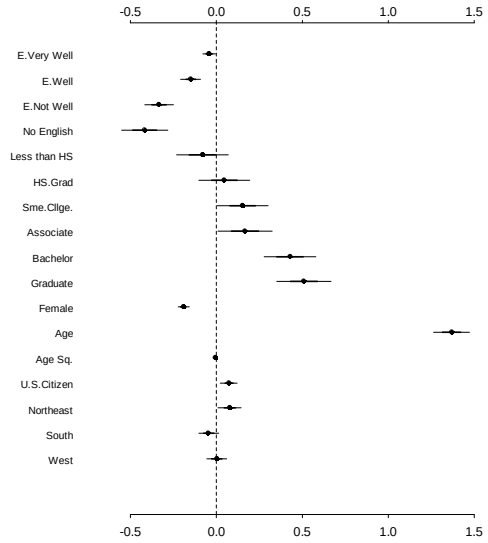


Figure 7. Regression Coefficient Plot for Financial Specialists Occupations

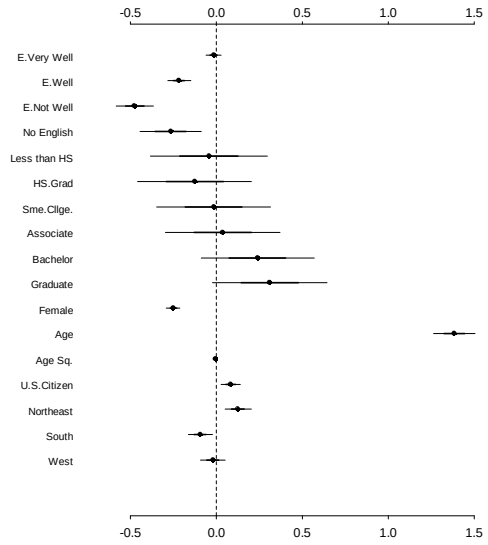


Figure 8. Regression Coefficient Plot for Education, Training, and Library Occupations

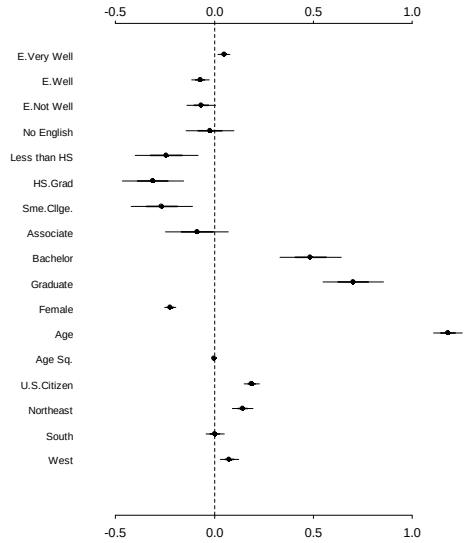


Figure 9. Regression Coefficient Plot for Healthcare Support Occupations

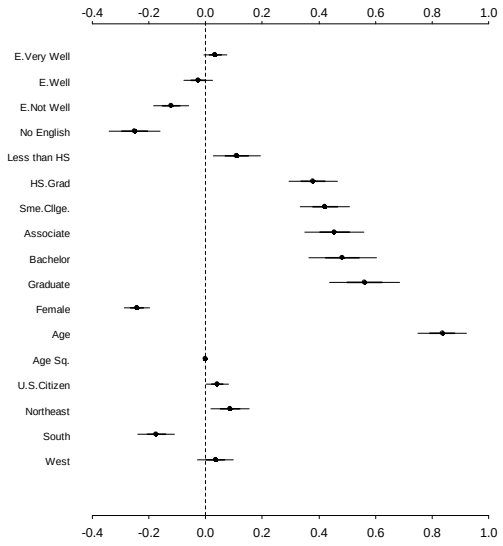


Figure 10. Regression Coefficient Plot for Protective Service Occupations

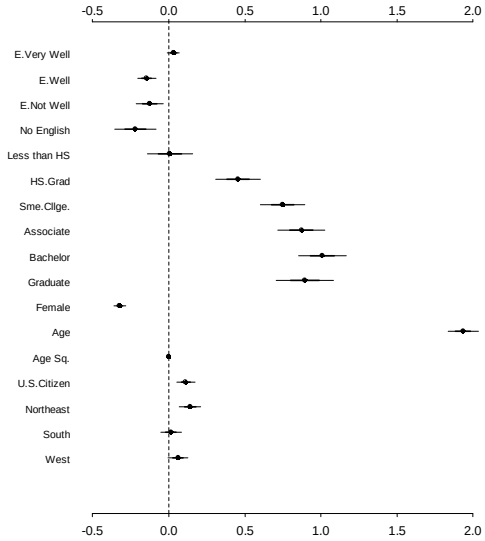


Figure 11. Regression Coefficient Plot for Food Preparation and Serving Occupations

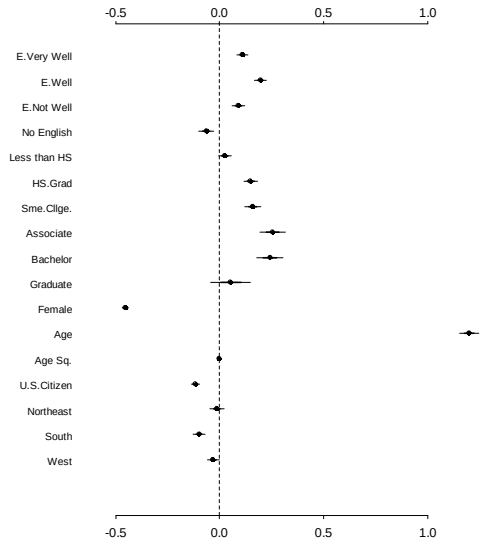


Figure 12. Regression Coefficient Plot for Wholesale Trade Industry

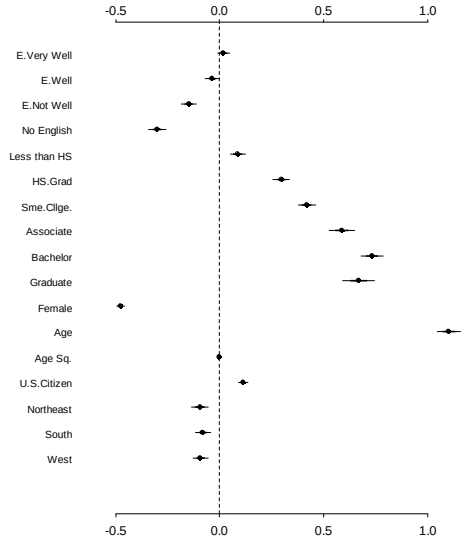


Figure 13. Regression Coefficient Plot for Retail Trade Industry

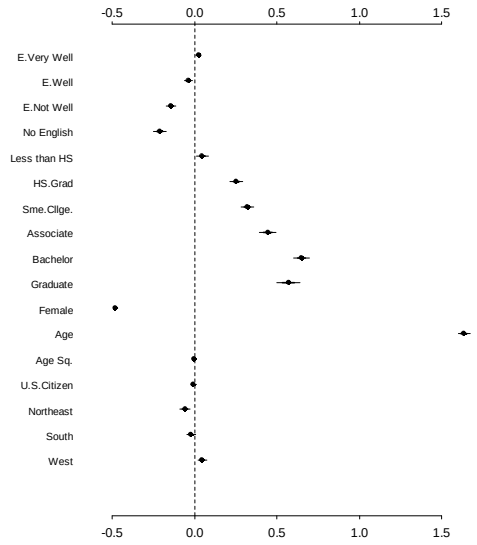


Figure 14. Regression Coefficient Plot for Transportation and Warehousing Industry

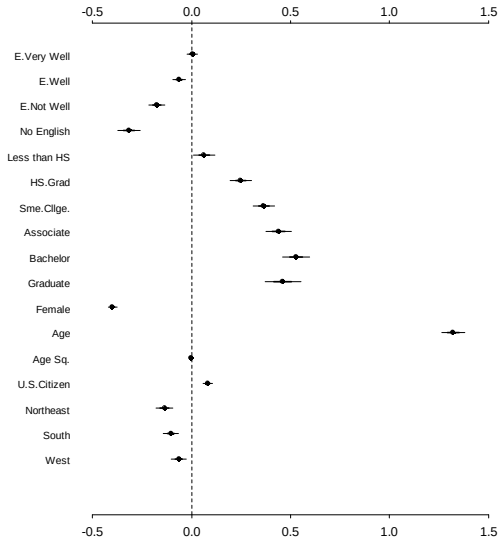


Figure 15. Regression Coefficient Plot for Finance, Insurance, Real Estate, and Rental and Leasing Industry

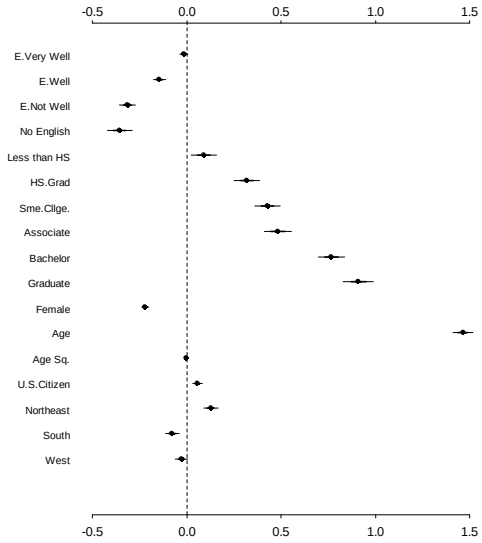


Figure 16. Regression Coefficient Plot for Professional, Scientific, Management, Administrative Industry

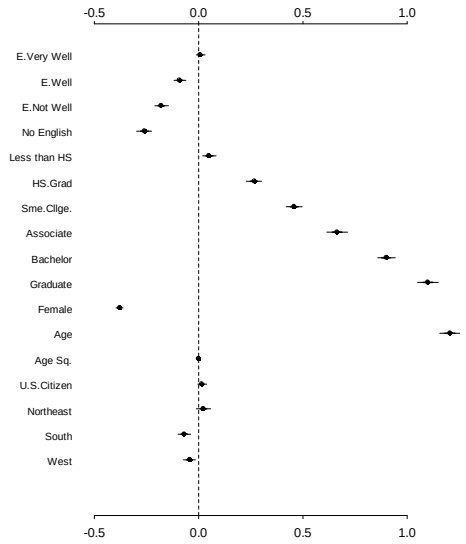


Figure 17. Regression Coefficient Plot for Waste Management Services Industry

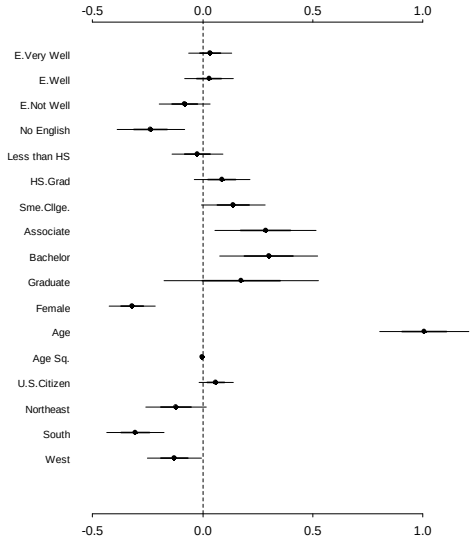


Figure 18. Regression Coefficient Plot for Northeast

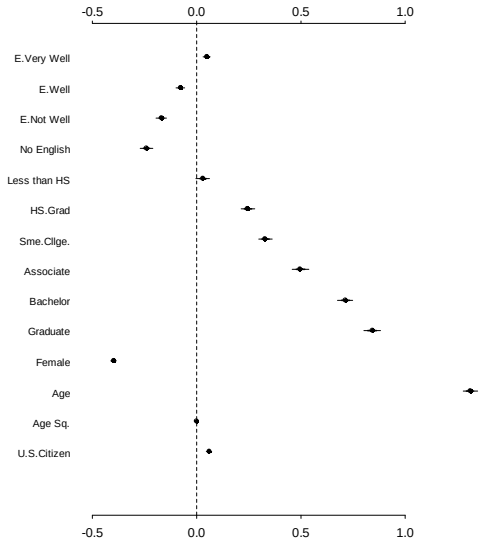


Figure 19. Regression Coefficient Plot for Midwest

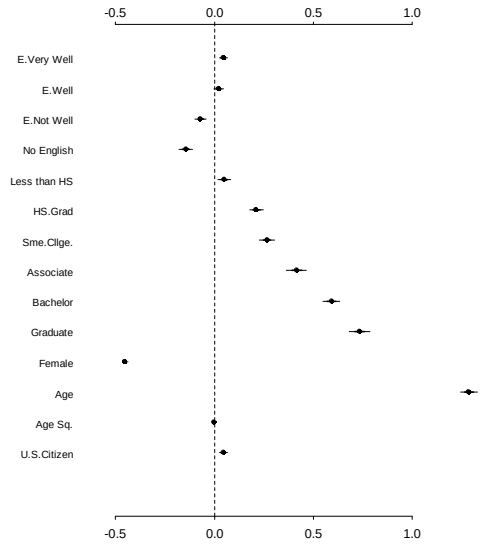


Figure 20. Regression Coefficient Plot for South

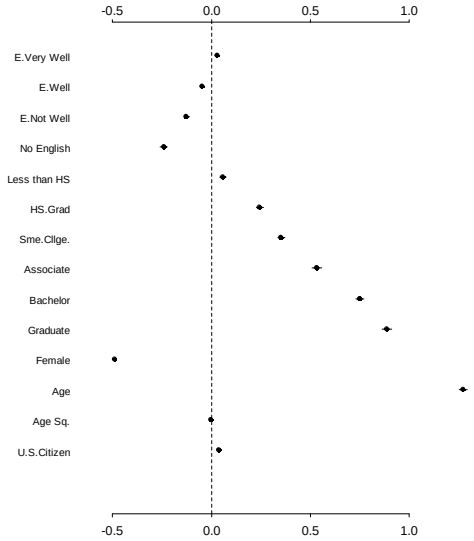


Figure 21. Regression Coefficient Plot for West

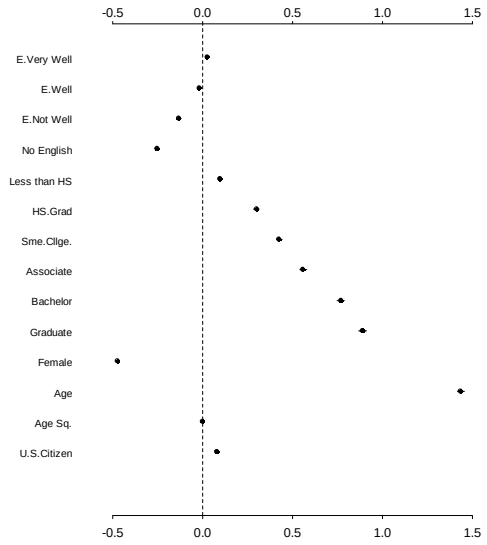


Table 11. Income and Wages by Educational Attainment by Race/Ethnicity

Years of Education	White	Hispanic	% Difference
No School	$ 13,000	$ 13,800	6%
1 – 4th Grade	$ 13,100	$ 13,000	-1%
Elementary School	$ 14,000	$ 14,000	0%
12th Grade	$ 17,000	$ 15,000	-12%
HS Graduate	$ 21,000	$ 17,000	-19%
Some College	$ 23,000	$ 20,000	-13%
Bachelor's Degree	$ 36,000	$ 31,000	-14%
Masters	$ 45,000	$ 40,000	-11%
Professional	$ 57,000	$ 30,700	-46%
Doctorate	$ 57,000	$ 46,600	-18%
Average	$ 29,610	$ 24,110	-19%

Source: IPUMS 5% 2000