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Are there rewards for language skills? Evidence from the earnings of registered nurses

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Abstract

The existing empirical evidence on whether U.S. labor markets reward workers for second-language skills is meager and conflicting. Employing data from the National Sample Survey of Registered Nurses in 2000 and 2004, this study reexamines the positive bilingual–earnings relationship found in the most current research on this topic. We test the relationship using alternative models that explain the wages earned by nurses. The advantage of this approach is that it permits an assessment of how sensitive the results are to changes in the variables used in the model. We find the evidence of a positive bilingual effect on earnings to be mixed. The relationship is sufficiently frail that statistically significant results eventually dissolve as more precise occupational characteristics are included in the wage equation. Moreover, using more current data, we find no evidence of a wage premium paid to nurses for second-language skills. We offer possible explanations for this lack of evidence within this specific occupation.
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1. Introduction

The body of empirical research on the effects on economic status of English language proficiency for foreign workers is quite plentiful.[1] Among the universal findings is that fluency in the English language has a significant effect on the wages of non-natives, *ceteris paribus*.

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The mechanism by which language proficiency affects wages is through increased productivity and better integration into information networks.

To what extent, however, has the growth in immigration in the U.S. induced an increase in demand by the employer for workers who can speak both English and another language? The essential substance of this question is that an increase in demand for bilingual workers could result in a wage premium paid for such second-language skills. In addition to the limited quantity of empirical attention given to this question, recent research investigating the value of second-language skills in the U.S., specifically Spanish, has provided mixed results. Fry and Lowell (2003), using a relatively broad occupation class and 1992 data, find that the labor market does not value bilingualism and therefore no incentives exist to acquire or maintain these skills. Kalist (2005) argues for a more detailed occupational class, specifically jobs requiring extensive customer contact. Employing data from the 2000 National Sample Survey of Registered Nurses, Kalist (2005) finds support for the hypothesis that earnings are a function of second-language skills.

If U.S. labor markets value bilingualism, earnings advantages from second-language skills would be a relatively recent phenomenon. Fry and Lowell (2003, p. 128) assert that "an increasingly global economy, multinational corporations, and import/export businesses need those rare workers. . .who can speak both English and another language." In addition, "decades of growing immigration have created diverse communities of non-native-English speakers across the country (p. 128)." Also, Kalist (2005, p. 102) points out that, "the Hispanic population in the United States increased by 57.9% from 1990 to 2000" and in 2002, "there were 38.7 million Hispanics living in the U.S. (p. 102)." Further, according to the Census Bureau's 2005 American Community Survey, over 29% of all Spanish speakers speak English "not well" or "not at all."[2]

A report by the Access Project found that patients who needed and received interpretation services rated their health care experience more positively than those patients who needed interpretation services but did not receive them.[3] In addition to patient satisfaction, there is evidence that language barriers lead to disparities in care that may compromise health outcomes. In 2005–06, Hasnain-Wynia, Yonek, Pierce, et al. (2006, p. 1), with The Health Research and Education Trust, acknowledged that "health care providers from across the country have reported language difficulties and inadequate funding of language services to be major barriers to LEP individuals' access to health care and a serious threat to the quality of care they receive." Timmins (2002) points out that the adverse affect on quality from language barriers has lead to increased use of expensive diagnostic tests, increased use of emergency services and decreased use of primary care services, and poor or no patient follow-up when follow-up is indicated.

A fundamental question, then, is to what extent health care providers are actually rewarded in the labor market, especially in the market for Spanish-speaking patients, when *a priori*, it seems that better communication with patients should improve the customer service aspect of medical care and also provide better technical, clinical quality of care. Stated as a hypothesis, an increase in the proportion of the U.S. population that is native Hispanic increases the demand for a larger proportion of the health-care labor force that is bilingual, thereby increasing the wages paid to those health-care practitioners who possess second-language skills, *ceteris paribus*.[4]

2. Theoretical framework

In this study, we examine using data from the National Sample Survey of Registered Nurses 2000 (NSSRN), whether Spanish-speaking bilinguals receive a wage premium for this particular skill. Our choice of subject for this study – registered nurses – is dictated by two factors. First, we consider that registered nurses are utilized and rewarded for language skills because economies of scope are present. In general, economies of scope exist if the joint output (health care and language services) of a single input used by the health care provider generates more output than two independent inputs, when each produces a single product or service. In this case, it might cost less for a hospital to use the single input (registered nurse) to produce the services (health care and language services) rather than two individual inputs (for example, registered nurse and interpreter). In this study we do not attempt to test for the existence of economies of scope, however, consider that Kalist (2005) reports interpreter fees range from $150 to $180 per hour in California. Hawryluk (2002) also reports that Medicaid's total reimbursement per patient office visit is only $24. Further, Hasnain-Wynia et al. (2006) find that only 3% of hospitals receive direct reimbursement for language services even though virtually all hospitals are required by law to provide language services to patients with LEP, and they are prohibited from asking patients to pay for these services. To the extent that health care providers pay registered nurses a wage (including a premium for second-language skills) that is less than the interpreter fee, they could experience economies of scope.

The second reason we focus on registered nurses for our analysis is so that we can augment what was first established in Kalist (2005). We contend that when analyzing the factors that impact the wages earned within a detailed occupational class, in this case nursing, it is important to differentiate between the alternative categories of registered nurses. These categories can be different across many dimensions, such as basic and current educational preparation, and the degree and type of patient care provided. Although the previous literature controls for registered nurses (RNs) who provide direct patient care, a distinction is not made with respect to the type of direct patient care. For example, there are noticeable differences in the types of care provided by a Staff RN and an Advanced Practice RN, the latter possibly holding a position as a nurse anesthetist.[5] As a result of the disparities that exist in the types of direct patient care provided and formal training required between these RNs, the average wages paid to each will be noticeably different, *ceteris paribus*. We argue that controlling for the disparities that exist in the types of direct patient care provided, or those positions in nursing that require other duties in addition to direct patient care, will allow us to more closely identify the effect of bilingualism on the wages paid to RNs. For example, to the extent that an omitted variable bias exists, if there is a positive correlation between the relatively higher wage primary positions and *Speaks Spanish*, when including indicators for a RN's primary position, the coefficient on *Speaks Spanish* would not be statistically significant if RNs do not receive a wage premium for Spanish-speaking skills. In other words, without controlling for a RN's primary position, the coefficient on *Speaks Spanish* is capturing its own effect and the effect of a RN's primary position on her wages.

Further, one would expect that if registered nurse labor markets value second-language skills, they are indifferent among ethnic groups when rewarding these skills, holding other factors

constant. Therefore, if there is a wage premium paid for the "excess demand" language, we should observe an earnings advantage for both language groups: Hispanics that speak both English and Spanish and non-Hispanics with these same skills. We will test this hypothesis as we continue to augment Kalist (2005).

The goal of this analysis is to empirically test for a positive bilingual–earnings relationship within nursing, such as that found in a previous study. To minimize the possibility of spurious results when making comparisons to what was found in the previous study, we will utilize the same data as used in Kalist (2005); the National Sample Survey of Registered Nurses 2000. However, we also want to provide a more contemporary analysis when testing the hypothesis that RNs receive a wage premium for Spanish-speaking skills. Indeed, upon further reflection of the anecdotal evidence provided earlier, it would suggest that at least more recently a value does exist for registered nurses with second-language skills. Also, consider that although Kalist (2005) finds evidence that nurses with second-language skills earn a premium for these skills (implying an increased demand for RNs with these skills), one criticism when the supply of and demand for Spanish-speaking nurses is investigated is that the demand side is evaluated by conducting an Internet search during the latter part of 2004. So while it may be true that, according to Kalist (2005), there appears to be a relatively strong demand for Spanish-speaking RNs in 2004, unfortunately, finding this demand for Spanish-speaking RNs on Monster.com and Careerbuilder.com in 2004 does not necessarily imply a wage premium paid for these language services in 2000. Therefore, to empirically investigate what the anecdotal evidence suggests, we run additional human capital wage models employing data from the National Sample Survey of Registered Nurses 2004.

In summary, we will attempt initially to replicate the findings of Kalist (2005) so that the reader can observe that our final results are achieved after augmenting Kalist's (2005) specification. These changes also make it a significant extension from the previous literature because they address one of the key components within the field of nursing that was previously overlooked, "primary position," which is elaborated upon below in Section 3 of this study. We will also search for the positive bilingual–earnings relationship for both Hispanic and non-Hispanic RNs separately. The advantage of this approach is that it will permit an assessment of how sensitive the results are to specification changes. Finally, we will test for the positive bilingual–earnings relationship using the National Sample Survey of Registered Nurses 2004. This will provide us with a more contemporary analysis with respect to the demand for Spanish-speaking RNs.

We employ a standard human capital earnings model to investigate differential reward structures in nursing for second-language skills. This study follows the convention of previous research on the determinants of wages of registered nurses.

3. Data and descriptive patterns

The purpose of this study is to reexamine the relationship between Spanish as a second language and the wages paid to RNs. We test the hypothesis using self-reported data from the NSSRN 2000. In the empirical work, we control for RNs' human capital and job characteristics.

Various years of the NSSRN have been previously utilized to analyze human capital theory, providing a wealth of information for researchers.[6] These earlier studies, include regressions which control for the usual demographic variables. For example, there are dummy variables for race, ethnicity, marital status, educational preparation/attainment, graduate of foreign nursing school, rural location, presence of children, practice setting, and state of employment. Variables for experience and a quadratic in experience are also included. Given that the inclusion of such variables has become standard procedure in related studies, we do not discuss the hypothesized effects of these control variables on registered nurses' wages. Similar to Kalist (2005), the key variables of interest are a dummy variable for Spanish-speaking and its interaction with the fraction of the population that is Hispanic in the RN's county of employment. The 2000 survey is of particular interest because it is the first to include questions about an RN's second-language skills. However, because it is a survey, there is the possibility that a response bias exists. Furthermore, we have no way of knowing how sophisticated, if at all, a respondent is in her second-language skill.

As a point of reference, we attempt initially to replicate the results found in Kalist (2005). That is, we will closely follow the author's methodology and specification when setting up for our analysis. Therefore, we restrict our data to RNs with positive wages in 2000 and those without missing observations for key variables. These restrictions result in a sample size of 22,104 observations for our preliminary analysis.[7] Of these 22,104 observations, 759 RNs reported speaking fluent Spanish as a second language and 1438 reported speaking a language other than English or Spanish as a second language.

The descriptive statistics for the variables used in the regressions are summarized in Table 1.[8] The last column gives the results of t-tests that compare differences in means of the variables between Spanish-speaking and non-Spanish-speaking RNs. Other than size of the means (and t-statistics), all descriptive statistics in Table 1 are reasonably similar to those in Kalist (2005). The mean wage of Spanish-speaking RNs is $26.22 per hour, which is statistically different from the mean wage of non-Spanish-speaking RNs, which is $24.26 per hour. *Speaks Spanish* is a dummy variable measuring a RNs self-reported claim that she speaks Spanish as a second language. *Hispanic County* is a measure of the percentage of a county's population that is Hispanic. *Speaks Spanish Interacted with Hispanic County* is an interaction term between *Speaks Spanish* and *Hispanic County*. The variable *Speaks Other Language* is a dummy variable indicating if a RN speaks a language in addition to or other than Spanish as a second language. *Basic Nursing Education Outside U.S.* is a dummy variable indicating if a RN received her initial nursing education outside the U.S. The education variables *Current Diploma*, *Current ADN*, *Current BSN*, and *Current MSN or Doctorate* indicate each RNs current level of education. As stated previously and distinctive from Kalist (2005), we include control variables for the RN's "primary position," allowing thereby for heterogeneity within nursing. Specifically, these primary positions are: *Staff RN*, *Charge RN*, *Advanced Practice RN*, *RN Educator*, *RN Management*, and *Administrator*. When the primary position control variables are included in the model, *Staff RN* will be the reference category. We also include indicators for the RN's primary nurse setting and other demographic factors such as gender, race, marital status, and children status. The RN's experience (and a quadratic reflecting experience) is also included. Finally, indicators for RNs working in rural areas and within patient care are also included.

Table 1
Model descriptive statistics: variable means.

Model variables	Spanish-speaking RNs	Non-Spanish-speaking RNs	*t*-Test
Demographics			
Wage in U.S. dollars (2000)	26.22	24.26	−4.44
	(19.74)	(11.60)	
Female (%)	0.89	0.94	5.53
Married (%)	0.69	0.71	0.97
No children (%)	0.39	0.42	1.42
Experience (years)	13.94	16.15	5.36
	(10.44)	(11.21)	
Race/ethnicity			
Hispanic (%)	0.41	0.01	−78.87
Asian (%)	0.04	0.04	0.31
Non-White (%)	0.05	0.06	0.4
Other Race (%)	0.05	0.02	−4.63
White (%)[a]	0.45	0.87	30.32
Current education			
Diploma (%)	0.09	0.18	7.02
ADN (%)[a]	0.39	0.37	−1.3
BSN (%)	0.35	0.34	−0.94
MSN or Doctorate (%)	0.17	0.11	−5.06
Setting			
Patient care (%)	0.54	0.54	0.29
Hospital (%)	0.57	0.61	2.18
Nursing home (%)	0.04	0.08	3.73
Ambulatory care (%)	0.09	0.09	0.42
Public health (%)	0.18	0.12	−4.55
Nursing education (%)	0.03	0.02	−0.17
Occupational health (%)	0.01	0.01	0.23
Student health (%)	0.04	0.04	−1.24
Other setting (%)[a]	0.04	0.03	−2.23
Miscellaneous			
Speak other (%)	0.14	0.06	−8.49
RN foreign school (%)	0.06	0.03	−3.07
Rural (Non-MSA employment) (%)	0.19	0.29	5.89
Hispanic county (%)	0.19	0.07	−34.61
Primary position			
Staff RN (%)[a]	0.51	0.57	3.41
Charge RN (%)	0.09	0.09	−0.47
Advanced practice RN (%)	0.15	0.09	−6.55
RN educator (%)	0.03	0.03	0.68
RN management (%)	0.17	0.16	−0.37
Administrator (%)	0.05	0.06	1.38
N	759	21,345	

Notes: Standard deviations are in parentheses. Column 4 reports the *t*-statistic from a *t*-test that the differences in means equal zero between the Spanish-speaking and non-Spanish-speaking samples. Data are from the National Sample Survey of Registered Nurses 2000.

[a] Indicates the reference category.

4. Empirical results

4.1. Baseline model

Estimating by ordinary least squares (OLS), adopting the White (1980) correction for heteroskedasticity, yields the results presented in Table 2. Because there is a wide spectrum of opinions on the role of sampling weights for analytical inference, we estimated the models with and without the sample survey weights provided with the NSSRN 2000.[9] The results of the baseline model are in columns (1) and (7) and are consistent with those in Kalist (2005). In particular, the model reports a positive and statistically significant coefficient on the measure for bilingualism (*Speaks Spanish*). Additionally, the coefficients on the control for the proportion of a county's population that is Hispanic (*Hispanic County*) and the interaction term (*Speaks Spanish Interacted with Hispanic County*) are statistically significant and the correct sign. The coefficient on the interaction term is both negative and statistically significant. The interpretation of this result is that there is a wage premium paid for bilingualism but it is a decreasing function of a county's population that is Hispanic. That is, according to Kalist (2005), in counties with a higher proportion of Spanish-speaking residents there is a relatively higher demand for Spanish-speaking nurses, but the supply effect is large enough to have a negative impact on the wage premium.

4.2. Primary position variables

Earlier in this study, we argued that our replication of Kalist's (2005) results could suffer from an omitted variable bias because we did not include controls for a RN's primary position. As a preliminary investigation, Table 3 is a list of the correlation coefficients between *Speaks Spanish* and each primary position. Also included is each primary position's average wage, according to the sample. Interestingly, the correlation coefficient for Staff RN and *Speaks Spanish* is negative and statistically significant at the one percent level. Moreover, the correlation coefficient Advanced Practice RN and *Speaks Spanish* is positive and statistically significant at the one percent level. Further inspection verifies that on average, Advanced Practice RNs receive a higher wage than all other primary positions.

To study the robustness of the positive bilingual effect, we estimate a human capital wage equation with the inclusion of primary position intercepts. The results in models (2) and (8) in Table 2 are mixed. When using survey sample weights, the coefficient on *Speaks Spanish* is statistically significant; however, compared to the baseline model, the measured effect for the bilingual–earnings relationship is reduced by approximately 16%. In contrast, without using the survey sample weights, the measured effect of bilingualism on the wages of RNs disappears when the primary position intercepts are included in the model. Finally, not only are the coefficients on each of the primary position variables statistically significant, inclusion of these variables slightly increases the F-statistic and *Adjusted* R^2, improving the explanatory power of the model. Additionally, the R-squared form of the F-statistic was used to compare model (2) to model (1) and model (8) to model (7) for the weighted and non-weighted regressions, respectively. The F-statistics are 245.04 and 183.78; since these are both well above their respective 1% critical values, we reject the null hypothesis in both cases. In other words, the

Table 2
OLS estimates.

Dependent variable: log of wage	With sample weights					
	(1)	(2)	(3)	(4)	(5)	(6)
Explanatory variable	Baseline model	Primary position intercepts	Hispanic/non-Hispanic intercepts	Non-Hispanics only	Non-Hispanics only with primary position intercepts	Full model
Speaks Spanish	0.061	0.051				
	(3.18)***	(2.72)***				
Non-Hispanic Speaks Spanish			0.041	0.042	0.03	0.03
			(1.77)*	(1.78)*	(1.34)	(1.33)
Hispanic Speaks Spanish			0.056			0.058
			(1.28)			(1.32)
Speaks Spanish Interacted with Hispanic County	−0.002	−0.002				
	(2.82)***	(2.70)***				
Non-Hispanic Speaks Spanish Interacted with Hispanic County			−0.0001	−0.0001	−0.0001	−0.0001
			(0.09)	(0.10)	(0.12)	(0.11)
Hispanic Speaks Spanish Interacted with Hispanic County			−0.003			−0.003
			(3.29)***			(3.19)***
Hispanic County	0.004	0.004	0.004	0.004	0.004	0.004
	(10.13)***	(9.96)***	(10.09)***	(10.02)***	(9.89)**	(9.94)***
Speaks Other Language	−0.007	−0.006	−0.008	−0.01	−0.009	−0.007
	(0.59)	(0.48)	(0.70)	(0.87)	(0.73)	(0.57)
Hispanic	0.007	0.007	0.024	0.024	0.019	0.019
	(0.36)	(0.36)	(0.86)	(0.86)	(0.66)	(0.67)
Asian	0.027	0.038	0.027	0.028	0.04	0.038
	(1.57)	(2.25)**	(1.57)	(1.63)	(2.30)**	(2.25)**
Non-White	0.052	0.052	0.052	0.052	0.052	0.052
	(5.16)***	(5.23)***	(5.15)***	(5.19)***	(5.27)***	(5.23)***
Other Race	0.018	0.016	0.018	0.021	0.019	0.017
	(1.03)	(0.95)	(1.04)	(1.18)	(1.09)	(0.96)
Basic Nursing Education Outside U.S.	−0.013	−0.0002	−0.012	−0.01	0.003	0.0002
	(0.70)	(0.01)	(0.68)	(0.55)	(0.13)	(0.01)

Experience	0.02	0.017	0.02	0.02	0.017	0.017
	(26.24)***	(23.18)***	(26.22)***	(26.17)***	(23.09)***	(23.17)***
Experience Squared	−0.0003	−0.0003	−0.0003	−0.0003	−0.0003	−0.0003
	(17.17)***	(15.15)***	(17.15)***	(17.10)***	(15.06)***	(15.14)***
Patient Care	−0.001	0.004	−0.001	−0.001	0.004	0.004
	(0.33)	(0.99)	(0.35)	(0.30)	(1.00)	(0.96)
Hospital	0.043	0.072	0.044	0.045	0.074	0.072
	(3.39)***	(5.73)***	(3.40)***	(3.51)***	(5.84)***	(5.75)***
Nursing Home	−0.038	−0.062	−0.037	−0.035	−0.061	−0.062
	(2.51)**	(4.26)***	(2.51)**	(2.34)**	(4.13)***	(4.25)***
Ambulatory Care	−0.112	−0.107	−0.111	−0.11	−0.106	−0.107
	(7.65)***	(7.67)***	(7.64)***	(7.52)***	(7.57)***	(7.65)***
Public Health	−0.071	−0.065	−0.071	−0.069	−0.064	−0.065
	(5.10)***	(4.87)***	(5.10)***	(4.93)***	(4.74)***	(4.87)***
Nursing Education	−0.022	0.013	−0.021	−0.02	0.015	0.014
	(1.01)	(0.54)	(0.99)	(0.93)	(0.59)	(0.56)
Occupational Health	−0.05	−0.049	−0.05	−0.048	−0.047	−0.049
	(1.9)*	(1.89)*	(1.9)*	(1.8)*	(1.82)*	(1.89)*
Student Health	−0.109	−0.068	−0.109	−0.106	−0.066	−0.068
	(5.74)***	(3.64)***	(5.72)***	(5.55)***	(3.49)***	(3.62)***
Female	−0.072	−0.053	−0.072	−0.071	−0.053	−0.054
	(6.79)***	(5.45)***	(6.80)***	(6.66)***	(5.41)***	(5.46)***
Married	0.005	0.005	0.005	0.006	0.006	0.005
	(0.93)	(1.01)	(0.93)	(1.20)	(1.30)	(1.01)
No Children	0.0001	−0.001	0.00007	−0.001	−0.002	−0.001
	(0.03)	(0.19)	(0.01)	(0.11)	(0.32)	(0.20)
Current Diploma	−0.011	−0.011	−0.011	−0.012	−0.012	−0.011
	(1.41)	(1.45)	(1.41)	(1.52)	(1.59)	(1.45)
Current BSN	0.046	0.038	0.046	0.047	0.038	0.038
	(8.43)***	(7.15)***	(8.44)***	(8.47)***	(7.14)***	(7.15)***
Current MSN or Doctorate	0.237	0.08	0.237	0.237	0.079	0.08
	(24.70)***	(6.32)***	(24.68)***	(24.52)***	(6.22)***	(6.31)***
Rural	−0.076	−0.086	−0.076	−0.076	−0.086	−0.086
	(11.11)***	(12.98)***	(11.08)***	(11.08)***	(12.95)***	(12.95)***
Charge RN		0.023			0.023	0.023
		(2.95)***			(2.91)***	(2.94)***
Advanced Practice RN		0.258			0.26	0.258
		(18.77)***			(18.75)***	(18.76)***
RN Educator		0.105			0.106	0.104

Table 2 (*Continued*)

Dependent variable: log of wage	With sample weights					
	(1)	(2)	(3)	(4)	(5)	(6)
Explanatory variable	Baseline model	Primary position intercepts	Hispanic/non-Hispanic intercepts	Non-Hispanics only	Non-Hispanics only with primary position intercepts	Full model
		(5.51)***			(5.57)***	(5.51)***
RN Management		0.061			0.06	0.061
		(9.71)***			(9.54)***	(9.71)***
Administrator		0.22			0.222	0.22
		(19.46)***			(19.56)***	(19.46)***
Constant	2.869	2.822	2.869	2.864	2.816	2.822
	(132.99)***	(134.41)***	(132.91)***	(130.76)***	(132.24)***	(134.33)***
F	83.8	88.5	81.7	82.9	87.7	86.4
Adjusted R^2	0.25	0.29	0.25	0.25	0.29	0.29
N	21,829	21,829	21,829	21,516	21,516	21,829
Dependent variable: log of wage	Without sample weights					
	(7)	(8)	(9)	(10)	(11)	(12)
Explanatory variable	Baseline model	Primary position intercepts	Hispanic/non-Hispanic intercepts	Non-Hispanics only	Non-Hispanics only with primary position intercepts	Full model
Speaks Spanish	0.035	0.025				
	(2.01)**	(1.51)				
Non-Hispanic Speaks Spanish			0.015	0.016	0.006	0.006
			(0.73)	(0.74)	(0.29)	(0.29)
Hispanic Speaks Spanish			0.027			0.03
			(0.76)			(0.84)
Speaks Spanish Interacted with Hispanic County	−0.001	−0.001				
	(2.21)**	(2.16)**				
Non-Hispanic Speaks Spanish Interacted with Hispanic County			0.001	0.001	0.0004	0.0004
			(0.63)	(0.61)	(0.42)	(0.45)
Hispanic Speaks Spanish Interacted with Hispanic County			−0.002			−0.002
			(2.68)***			(2.62)***

Hispanic County	0.004	0.004	0.004	0.004	0.004	0.004
	(10.46)***	(10.34)***	(10.46)***	(10.44)***	(10.36)***	(10.35)***
Speaks Other Language	−0.007	−0.006	−0.008	−0.01	−0.008	−0.007
	(0.67)	(0.61)	(0.78)	(0.91)	(0.81)	(0.69)
Hispanic	0.009	0.012	0.026	0.026	0.022	0.022
	(0.55)	(0.72)	(1.23)	(1.22)	(1.02)	(1.03)
Asian	0.024	0.036	0.023	0.025	0.038	0.036
	(1.69)*	(2.59)**	(1.65)*	(1.77)*	(2.68)***	(2.56)**
Non-White	0.048	0.048	0.047	0.049	0.049	0.048
	(5.34)***	(5.44)***	(5.28)***	(5.36)***	(5.50)***	(5.39)***
Other Race	0.019	0.017	0.02	0.021	0.019	0.018
	(1.32)	(1.21)	(1.34)	(1.40)	(1.30)	(1.23)
Basic Nursing Education Outside U.S.	−0.017	−0.003	−0.016	−0.015	−0.002	−0.003
	(1.20)	(0.25)	(1.16)	(1.07)	(0.15)	(0.22)
Experience	0.019	0.017	0.019	0.019	0.017	0.017
	(28.96)***	(25.56)***	(28.92)***	(28.86)***	(25.43)***	(25.53)***
Experience Squared	−0.0003	−0.0003	−0.0003	−0.0003	−0.0003	−0.0003
	(17.94)***	(15.74)***	(17.91)***	(17.94)***	(15.72)***	(15.72)***
Patient Care	0.0001	0.006	0.00004	0.0002	0.006	0.006
	(0.03)	(1.52)	(0.01)	(0.04)	(1.52)	(1.50)
Hospital	0.054	0.081	0.054	0.056	0.084	0.081
	(4.48)***	(6.85)***	(4.49)***	(4.66)***	(7.02)***	(6.86)***
Nursing Home	−0.039	−0.061	−0.039	−0.036	−0.059	−0.061
	(2.87)***	(4.60)***	(2.88)***	(2.62)***	(4.38)***	(4.61)***
Ambulatory Care	−0.1	−0.098	−0.1	−0.099	−0.097	−0.098
	(7.49)***	(7.56)***	(7.50)***	(7.33)***	(7.40)***	(7.56)***
Public Health	−0.07	−0.064	−0.07	−0.067	−0.061	−0.064
	(5.48)***	(5.11)***	(5.50)***	(5.26)***	(4.91)***	(5.12)***
Nursing Education	−0.017	0.018	−0.017	−0.016	0.018	0.019
	(0.91)	(0.84)	(0.90)	(0.84)	(0.82)	(0.85)
Occupational Health	−0.03	−0.03	−0.03	−0.027	−0.027	−0.03
	(1.37)	(1.37)	(1.37)	(1.19)	(1.22)	(1.37)
Student Health	−0.102	−0.061	−0.101	−0.098	−0.058	−0.061
	(6.07)***	(3.65)***	(6.04)***	(5.81)***	(3.43)***	(3.62)***
Female	−0.083	−0.063	−0.083	−0.083	−0.063	−0.063
	(9.23)***	(7.67)***	(9.23)***	(9.06)***	(7.57)***	(7.68)***
Married	0.008	0.007	0.008	0.009	0.009	0.007
	(1.73)*	(1.68)*	(1.72)*	(2.06)**	(2.03)**	(1.66)*
No Children	−0.002	−0.004	−0.002	−0.003	−0.004	−0.004
	(0.50)	(0.85)	(0.50)	(0.58)	(0.95)	(0.86)

Table 2 (*Continued*)

Dependent variable: log of wage	Without sample weights					
	(7)	(8)	(9)	(10)	(11)	(12)
Explanatory variable	Baseline model	Primary position intercepts	Hispanic/non-Hispanic intercepts	Non-Hispanics only	Non-Hispanics only with primary position intercepts	Full model
Current Diploma	−0.009	−0.009	−0.009	−0.01	−0.01	−0.009
	(1.28)	(1.43)	(1.28)	(1.40)	(1.57)	(1.43)
Current BSN	0.046	0.037	0.046	0.046	0.037	0.037
	(9.59)***	(7.85)***	(9.59)***	(9.58)***	(7.81)***	(7.85)***
Current MSN or Doctorate	0.242	0.079	0.242	0.243	0.079	0.079
	(28.60)***	(7.09)***	(28.58)***	(28.43)***	(7.05)***	(7.09)***
Rural	−0.077	−0.087	−0.077	−0.077	−0.087	−0.086
	(13.44)***	(15.68)***	(13.42)***	(13.39)***	(15.62)***	(15.66)***
Charge RN		0.022			0.022	0.022
		(3.36)***			(3.31)***	(3.36)***
Advanced Practice RN		0.273			0.275	0.273
		(22.11)***			(22.06)***	(22.10)***
RN Educator		0.109			0.111	0.108
		(6.38)***			(6.50)***	(6.37)***
RN Management		0.06			0.06	0.06
		(10.84)***			(10.73)***	(10.84)***
Administrator		0.21			0.211	0.21
		(21.97)***			(21.96)***	(21.94)***
Constant	2.863	2.816	2.863	2.854	2.806	2.816
	(151.99)***	(152.79)***	(152.03)***	(149.04)***	(149.99)***	(152.80)***
F	103.3	108.7	100.8	102	107.4	106.1
Adjusted R^2	0.26	0.29	0.26	0.26	0.3	0.29
N	21,829	21,829	21,829	21,516	21,516	21,829

Notes: Robust *t*-statistics (absolute value) in parentheses. All regressions control for state of employment. Observations in models (1)–(6) are weighted by their respective sample weight provided with the NSSRN 2000.

* Significant at 10%.

** Significant at 5%.

*** Significant at 1%.

Table 3
Correlations between speaks Spanish and primary position.

	Staff RN	Charge RN	Advanced Practice RN	RN Educator	RN Management	Administrator
Corr. Coeff.	−0.023	0.003	0.044	−0.005	0.003	−0.009
P-value	0.001	0.639	0.000	0.494	0.714	0.167
Mean Wage	$22.87	$22.71	$33.10	$27.11	$23.99	$27.39
Std. Dev.	($9.72)	($8.26)	($20.46)	($12.38)	($12.73)	($10.67)
N	12,659	1991	1945	644	3592	1273

additional variables included in model (2) and model (8) are each jointly significant in the registered nurse wage equations.

4.3. Language group variables

To test for the positive bilingual–earnings relationship among ethnic groups, we include intercepts for non-Hispanics and Hispanics that speak Spanish as a second language. Of the 759 RNs who reported speaking Spanish as a second language, 59% are non-Hispanic. The variables *Non-Hispanic Speaks Spanish* and *Hispanic Speaks Spanish* take the place of *Speaks Spanish* from our baseline model. Each language group also has its own interaction term. For this specification, the reference group consists of Hispanics and non-Hispanics who do not speak Spanish. These results are presented in models (3) and (9) for the weighted and unweighted regressions, respectively. Interestingly, when using sample weights, the results provide statistical evidence of a positive bilingual–earnings relationship for non-Hispanics but not for Hispanics with matching skills.

One interpretation for the observed positive bilingual–earnings relationship for non-Hispanics only is that the coefficient for Hispanic bilinguals is biased downward because it is confounded with English-speaking skills and other human capital factors. However, we argue that if the wages of Hispanics are negatively affected due to their English-speaking skills, the coefficient on *Basic Nursing Education Outside U.S.* would be negative (and statistically significant) as it is most likely true that RNs receiving their nursing education outside the U.S. are those who are less proficient in English. Moreover, a brief comparison between Hispanic and non-Hispanic RNs reveals that 6.7 and 5.1%, respectively, received their basic nursing education outside the U.S.

Nevertheless, we augment the specification of our human capital model this time to exclude Hispanics who speak both Spanish and English. The results in models (4) and (10) once again are mixed. For the weighted regression (model (4)), the results are quite similar to those in model (3). Note that the coefficient on *Non-Hispanic Speaks Spanish* is positive and statistically significant. The results within the non-weighted non-Hispanics regression (model 10) are similar to model (9). Observe that the coefficient on *Non-Hispanic Speaks Spanish* is not statistically significant. Ultimately, however, when including the primary position intercepts to the model with non-Hispanics only, as shown in models (5) and (11), there is no statistical evidence that a premium is paid to non-Hispanics for bilingual skills. Once again, we use the *R*-squared form of the *F*-statistic to compare model (5) to model (4) and to

compare model (11) to model (10) for the weighted and non-weighted regressions, respectively. The F-statistics are 153.13 and 155.31; since these are both well above their respective 1% critical values, we reject each of the null hypotheses. In other words, the additional variables included in model (5) and model (11) are each jointly significant in the registered nurse wage equations.

Finally, if Hispanics who speak Spanish are negatively affected due to their English-speaking skills, and to the extent that there is multicollinearity between *Hispanic Speaks Spanish* and *Basic Nursing Education Outside U.S.*, we might expect the coefficient on the former to be negative (and statistically significant) if we exclude the latter from the model. Although not included in Table 2, we estimated our human capital model this time to exclude *Basic Nursing Education Outside U.S.* The coefficient on *Hispanic Speaks Spanish* in fact becomes positive but is not statistically significant.[10]

4.4. Primary position and language group variables

Next, we specify the full model; both primary position and language group intercepts are included. As can be observed in models (6) and (12), there is no statistical evidence of a positive bilingual–earnings relationship. Similar to what we observed in models (2) and (8), the coefficients on each of the primary position variables are significantly strong and as we presented in our earlier discussion, these variables provide more precise measures of occupational-specific characteristics. Further, the F-statistics to compare model (6) to model (1) and to compare model (12) to model (7) for the weighted and non-weighted regressions, respectively, are 150.92 and 113.19. Once again, these are both well above their respective 1% critical values. Thus it appears, relative to the baseline models (weighted and non-weighted), overall seven of the ten specifications provide no statistical evidence that a positive bilingual–earnings relationship exists for RNs.

4.5. Results: NSSRN 2004

To provide a more contemporary analysis, we estimate a human capital wage model for RNs using NSSRN 2004. Table 4 provides the results from two specifications: the baseline model (model 1) and model 2; primary position intercepts included.[11] Perhaps in contrast to what might be expected, none of the specifications provide evidence of a positive bilingual–earnings relationship. Recall that our baseline model is a replication of Kalist's (2005) specification. This may well be the most important finding in this analysis.

In sum, Table 2 has shown the previously found positive bilingual–earnings effect is not robust; rather, it appears to be driven by an omitted variable bias. The positive effect holds for the models with no primary position controls or with only simple aggregate language group measures – the formulation used in earlier studies. As more detailed controls for the differences in nursing functions are added, however, the positive bilingual–earnings effect diminishes in absolute value and becomes statistically insignificant. As language groups are disaggregated, evidence also weakens. Finally, as Table 4 reveals, with more recent data the estimated coefficient for the Spanish-speaking variable fails to obtain statistical significance under two different model specifications.

Table 4
OLS estimates using NSSRN 2004.

Dependent variable: log of wage	With sample weights		Without sample weights	
Explanatory variable	(1) Baseline model	(2) Primary position intercepts	(3) Baseline model	(4) Primary position intercepts
Speaks Spanish	0.04	0.036	0.005	−0.002
	(1.31)	(1.20)	(0.17)	(0.09)
Hispanic County	0.004	0.005	0.004	0.004
	(8.78)***	(9.44)***	(7.77)***	(8.55)***
Speaks Spanish Interacted with Hispanic County	−0.003	−0.003	−0.001	−0.002
	(2.76)***	(3.19)***	(1.56)	(2.15)**
F	53.84	60.41	64.45	72.38
Adjusted R^2	0.20	0.23	0.20	0.23
N	18,174	18,174	18,174	18,174

Notes: Robust *t*-statistics (absolute value) in parentheses. All regressions include variables listed in Table 2 and state of employment. Observations in models (1) and (2) are weighted by their respective sample weight provided with the NSSRN 2004.

** Significant at 5%.

*** Significant at 1%.

5. Discussion and conclusion

This study employs data from the National Sample Survey of Registered Nurses in 2000 and 2004 to further examine the positive bilingual–earnings relationship found in an earlier study. We find a similar positive bilingual–earnings gradient in the baseline model when regressing the natural log of nursing wages on *Speaks Spanish*, *Hispanic County*, and *Speaks Spanish Interacted with Hispanic County*. Our results from alternative specifications demonstrate, however, that the positive bilingual–earnings gradient is sufficiently frail that the estimated bilingual premium disappears as we control for various factors that were previously unaccounted for in the earlier study. Our results also demonstrate that when using more recent data, there is unquestionably no evidence of a positive bilingual–earnings relationship in nursing.

Given the specific time frame sampled, we found little statistical support for the hypothesis that an increase in the proportion of the U.S. population that is native Hispanic increases the demand for the proportion of the nursing labor force that is bilingual, thereby increasing the wages paid to those health-care practitioners who possess second-language skills. A potential explanation for the lack of statistical evidence of a reward to nurses who are bilingual is that in many health care settings, such as hospitals, the provision of language services is available through other mechanisms. These additional mechanisms include telephone, hospital-employed, volunteer (through community language banks), and contract interpreters. In this case, our findings suggest that economies of scope are not present. However, it may be true that economies of scale are present and the health care provider utilizes a division of labor and employs a specific mechanism, other than its nursing force, to provide language services. In general, a health care provider enjoys economies of scale when it can double its output for less than twice the cost. Hasnain-Wynia et al. (2006) find that 43% of the hospital respondents

encounter patients with limited English proficiency daily and 20% report weekly encounters. Overall, they conclude that 8 out of 10 hospitals frequently treat patients with limited English proficiency. Perhaps these frequencies suggest that it is possible for health care providers to enjoy economies of scale in addition to the dissemination of better products and services through specialization and division of labor.

A study by Wilson-Stronks and Galvez (2007) found that 97% of the hospitals in their national survey used telephone interpreters for their language-service needs.[12] Also, in a study by Hasnain-Wynia et al. (2006), (92) percent of hospitals surveyed nationally cited telephonic services for providing language services.[13] However, it is not obvious that all or most health care providers utilize resources separate from nurses to provide language services. For example, when asking hospitals to identify the types of resources available to them for providing language services, the survey questions in both studies were developed so that respondents were asked to check "all that apply." In both surveys, it was also found that a relatively large percentage of hospitals also cited bilingual staff, in a dual role, as a resource available for providing language services. That is, 90 and 82% of surveyed hospitals utilize bilingual staff in the Wilson-Stronks and Galvez (2007) and Hasnain-Wynia et al. (2006) studies, respectively.[14] And in the latter study, when the survey asked how hospitals pay for language services, the most frequent response (57%) was through "per-hour" charges. However, the authors define this response as an indication that hospitals contract with or pay external interpretation agencies for freelance interpreters on a per-hour basis. No other possible responses, except for "other" (17%), indicate that hospitals pay their bilingual staff for language services. Unfortunately in the NSSRN, there are no questions asking nurses to indicate if they have interpreter certification. Future research should consider the establishment of the certified interpreter occupation to better understand the implications of labor markets rewarding bilingual skills.

Our test for the positive bilingual–earnings relationship among ethnic groups provided some statistical evidence of a positive bilingual–earnings relationship for non-Hispanics but not for Hispanics with matching skills. Because the coefficient on *Basic Nursing Education Outside U.S.* is not statistically different from zero, we contend that there is not a negative effect on the wages of those RNs with relatively lower English-speaking proficiencies, if they exist. As a potential explanation, however, it is plausible that Hispanic RNs that speak Spanish as a second language are working in areas with relatively larger Hispanic populations. In these areas, the supply effect may have mitigated the demand effect and would explain why we only observe a wage premium for non-Hispanic RNs that speak Spanish as a second language.

We also cannot rule out the possibility that some other bias exists, for example a measurement bias, which would result in an observed wage premium for non-Hispanics who speak Spanish but not for Hispanics who speak Spanish. For example, to the extent that learning to speak Spanish is correlated with some other traits or characteristics, such as innate ability or higher productivity or a stronger work ethic, we could argue that the coefficient on *Non-Hispanic Speaks Spanish* is actually measuring the effect of this unobserved characteristic on the wages of RNs. Unfortunately, our attempts to find a suitable instrument for such unobserved characteristics were not successful. Future research would benefit by including the consideration that perhaps a second-language skill is actually some other marker that has a positive relationship with in earnings in general.

Within the framework of the health care labor market, to the extent that a RN serves a function as a client advocate and educator, we might expect that the market will increase the value of bilingualism. As compared to the more recent surveys of hospitals conducted by Wilson-Stronks and Galvez (2007) and Hasnain-Wynia et al. (2006), using NSSRN data is limited to information collected in 2004. To the extent that recent trends in immigration would increase the appeal of the hypothesis tested in this analysis, there should be interest in a more contemporary analysis. Future research should consider utilizing the NSSRN 2008, when these data become available.

In conclusion, as our results show, care should be taken when analyzing the possible returns to bilingualism using any occupation. In this study, because each alternative specification addressed the issue that an omitted variable bias possibly exists, future analysis should be directed at including the appropriate variables in the human capital model.

Notes

1. For example, see McManus, Gould, and Welch (1983), Grenier (1984), and Chiswick and Miller (1995).
2. U.S. Bureau of the Census, American Community Survey (2005) *Language Spoken at Home* (Table S1601), available at http://factfinder.census.gov.
3. The Access Project. "What a Difference an Interpreter Can Make." April 2002.
4. It is assumed here that the market for health-care labor is not monopsonistic, or that the market power exerted by monopsonies and the effects of second-language skills on RN wages are separate. For studies of monopsony in the market for RNs, see Link and Landon (1975), Sullivan (1989), and Hirsch and Schumacher (1995).
5. There are four types of Advanced Practice RNs: nurse practitioner, nurse-midwife, clinical nurse specialist, and nurse anesthetist. Because the position of advanced practice requires additional formal training, holding other factors constant, we would expect that Advanced Practice RNs earn a relatively higher wage-per-hour.
6. For example, see Mennemeyer and Gaumer (1983), Botelho et al. (1998), and Spetz (2002).
7. Our sample size differs from Kalist (2005) in that we do not necessarily assume that wages less than $8 or over $120 an hour are either survey coding errors or anomalous cases. After analyzing specific cases when wages fall within these regions, we then made the decision on which of these were most likely coding errors. Finally, although the magnitudes of the effects are not identical, we are able to qualitatively replicate Kalist's (2005) results.
8. The observations used for the summary statistics are not weighted by their respective sample weights provided with the NSSRN 2000.
9. See DuMouchel and Duncan (1983), Skinner et al. (1989), Pfeffermann (1993, 1996), Winship and Radbill (1994), Magee, Robb, and Burbidge (1998), and Chambers and Skinner (2003) on the justification of using survey weights in multiple regression analysis.
10. The results of this regression are available upon request.

11. Although not shown in Table 4, all previously included control variables are included in the additional specifications using NSSRN 2004 data. The results are almost identical to those using data from NSSRN 2000 and are available upon request.
12. This 2005 survey consists of a random sample of 30 hospitals in all regions of the United States.
13. The survey was conducted by the Health Research and Educational Trust (HRET) in 2005–06. In total, 861 hospitals responded to the survey.
14. In Hasnain-Wynia et al. (2006), the survey actually differentiates between "bilingual clinical staff" and "bilingual non-clinical staff." Above, we provide the percentage of hospitals that receive language services from bilingual clinical staff to get a better inference that a registered nurse might be providing these services.

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