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Does Being Cultured Pay? Racial and Language Concordance and its Effect on Physician Income

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DOES BEING CULTURED PAY? RACIAL AND LANGUAGE CONCORDANCE AND ITS EFFECT ON PHYSICIAN INCOME

by

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ABSTRACT

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Issues surrounding race and ethnicity in healthcare have increased in number as racial disparities as well as minority physicians become more prevalent in the USA. One such issue is the concordance rate of race and language amongst physicians and their patients.

The effect of racial concordance in physician patient relationships has been looked at to determine if it affects the perceived level of health quality. Saha et al. (1999) found that Black and Hispanic patients were more satisfied in their healthcare when treated by a physician of their own race. In this study, I establish whether or not the racial concordance has a positive effect on income. Using controls established by previous regression analyses, I measure the effect on income of racial concordance on primary care and specialty care physicians alike.

The findings of this study have importance in terms of incentives for physicians to culture themselves. If racial concordance increases income, it is likely that empathy, communication skills, and teamwork is better when physicians and patients have the same race (Cooper-Patrick et al. 1999). This suggests that physicians who are culturally competent will enjoy higher incomes, and their patients better health outcomes. Policy implications including cultural competency training in medical schools and required interpreter services may be established from these findings.

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CHAPTER ONE

INTRODUCTION

A. Racial Concordance and Communication

Minority populations have become notorious for underutilization of health care services (Burgess et al. 2008). At the same time, minority physicians are becoming more and prevalent (Brown et al. 2007). Racial concordance in the physician patient relationship is an occurrence that is a result of both of these scenarios. Previous research has shown that, not only do minority populations underutilize health care, but are actually less satisfied with their health care providers than white patients (Doescher et al. 2000). When given selection to choose a physician, minority patients often choose one of their own race (Gray and Stoddard 1997), and satisfaction improves (LaViest and Nuru Jeter 2002). Studies have posited that this could be because of better geographical location, or because of better cultural competence and communication of racially concordant physician patient groups (LaViest et al. 2003).

This study examines the relationship between race concordance, language concordance, and physician income. Communication is key in a patient-physician relationship, as, without it, patients are likely to feel uncomfortable or unwilling to follow through with physician orders. However, when patients feel as though their physician is working with them as a team rather than just giving orders, patient satisfaction and utilization of the health care system increases (Cooper Patrick et al. 1999). These improvements in health care result from better communication and mutual understanding of needs, as well as a teamwork that keeps patients invested

in their health care (Saha et al. 1999). Thus, I also test the importance of whether or not a physician utilizes an interpreter service, or has cultural competency training.

B. Income as a Measure of Utilization

Income is used in this study as a dependent measure of utilization. The more patients that a physician sees, the more that physician will be paid. Controls for capitation and other forms of prospective reimbursement are used to ensure that income is a result of patient visits. This study therefore holds importance for physicians as well as patients. If enhanced communication in terms of cultural understanding through race concordance and language leads to a higher income, it may be worthwhile for physicians to access cultural competence training and acquire another language/interpreter. In terms of demand, minority physicians may find it worthwhile to locate their practices in a place where supply of their own race and language skills is low, and demand high or increasing. For patients who are unsatisfied with their provider, it could be that they lack communication and a more participatory environment in their healthcare setting. Minority patients may be motivated to seek a physician who speaks their native language, and therefore enjoy better health outcomes through proper utilization.

C. Contributions of this Study

Using cross sectional data retrieved from the Health Tracking Physician Survey in 2008, this study conducts a regression analysis with physician income as the dependent variable. It is hypothesized that language and race concordance

between physician and patient groups increases physician income. I find that cultural competency training negatively affects physician income whereas an interpreter service positively affects income. The results on racial and language concordance depend on the race of physician and patient.

Following this introduction is Chapter Two, which is a literature review, detailing previous research studies relevant to the topic. Chapter Three highlights the econometric model, the regression equations used and an explanation of the variables, as well as how those variables were interpreted. Chapter Four is a description of the data set used, and Chapter Five shows the results of the econometric analysis. Chapter Six ends the paper with conclusions that show the policy implications of the results, and possible future research opportunities.

CHAPTER TWO

RACE AND LANGUAGE IN THE HEALTHCARE LITERATURE

To determine proper controls and a regression model, I review studies that looked at race/ethnicity and physician income. This review also covers articles that supply possible reasons for why racial and language concordance may affect income, and other authors' hypotheses.

A. Determinants of Physician Income

Weeks and Wallace's (2006) study on the effect of race on ob-gyn income uses individual level data on physicians to determine race and gender effect on income. The study used the American Medical Association (AMA) Socioeconomic Monitoring Survey (SMS) data. This dataset is composed of information on physicians practice and personal characteristics from 1992 to 2001. In order to guarantee they had the same variables for all physicians, Weeks and Wallace (2006) further specify their dataset. They do this by only including physicians who returned responses of black or white clinically practicing physicians, and eliminating those who did not answer survey questions for the variables they needed. This process involves choosing physicians who graduated from a US medical school, reported an annual income, visits seen, weeks practiced, years in practice, percent of Medicaid patients, and whether or not Medicare patients were admitted. The net income is then adjusted to 2004 dollars. They also avoid extreme outliers in income and patient visits by only accepting those within the 1st and 99th percentiles. They then

categorize their dependent variables into three classes: “Physician Work Effort,” “Provider characteristics,” and “Practice characteristics”(Weeks and Wallace 2006).

For these variables, several characteristics are observed. Weeks and Wallace (2006) take into account number of patients seen as well as hours worked, as many physicians are reimbursed via number of cases seen rather than number of hours worked. Considering race and gender may affect when someone enters medical school, years since graduating are taken into account rather than age of physician. These years are grouped into 5 year dummy variable categories to account for the inverted U shape of the physician income/age curve. Whether or not the physician is board certified or has ownership in their practice affects income, so must be involved. Medicare and Medicaid reimbursements are generally less than private insurance, so percentage of these cases affect physician income.

Weeks and Wallace (2006) use a linear regression model to compare race and gender in physician income. They thus include dummy variables for every race-gender pair they were investigating. Using SPSS software, they compute regression coefficients, 95% confidence intervals, and survey weights. If variables are not normally distributed, they are log-transformed. The final step of analysis was a multi-colinearity test.

Weeks and Wallace’s (2006) conclusions are that female and black physicians are at a disadvantage financially, even controlling for different practice habits. The study points out its failings in that there was not enough survey participation, different response rates existed for different populations, and the self reported nature of the survey has its own set of biases. Some of the biggest concerns

that the current study has are that the variables are limited by the data set, and that quality of care is not a factor.

Weeks and Wallace (2006) are cited by many other authors looking at different levels of data, or different variables, including Reyes (2007). Though Reyes' (2007) study is focused on a particular specialty of physician, it incorporates subspecialty into the regression equation, further explaining the regression. Reyes' (2007) study uses the American College of Obstetricians and Gynecologists (ACOG) individual level data set, which includes similar data as the SMS on physicians. Reyes (2007) utilizes the Princeton Survey Research data weights to adjust the data. Similar to Weeks and Wallace (2006), the data is split into personal, professional, and practice categories. Reyes (2007) uses a log-linear approach, to estimate percentage changes in income due to her variables. The "data cleaning" (Reyes 2007) process for the study includes limiting age to 80, including only those sample that had all of her variables involved, and minimizing outliers by including incomes within the 2nd and 98th percentile, and patient visits between the 1st and 99th percentile. In order to offset bias from when physicians were almost wholly male, Reyes(2007) conducts a separate analysis of obstetricians under 40 years of age. The regression equation in this study includes age, years in practice, fellowship, type of reimbursement, and other specialty specific variables. By incorporating specialty, Reyes (2007) is able to differentiate between gender bias and specialty choice. Reyes (2007) conducts a regression with all years combined (and added in a variable for which year the data was from) as well as each individual year to see the coefficient variance throughout the years. Reyes (2007) also omits a particular value

of each variable as a regression control. This study also used ordinary least squares analysis. Reyes (2007) also uses Oaxaca Decomposition to analyze the difference between gender due to physician activity and difference due to pure gender. This method can also be used for racial differences.

Among Reyes' (2007) results of lower incomes with non Caucasian race, there is a noticeable decrease in this gap throughout the year in the younger population. This suggests a narrowing gap in different race incomes. Age is not correlated with income until the interaction term age*age is involved, again correcting for the inverted U relationship between income and age.

B. Race and the Patient-Physician Relationship

Previous researchers have explained some ways to formulate a proper regression equal with controls for physician income levels. However, there are several other studies that have contributed to the topic of concordance of physician and patient race. Saha, Komaromy, Koepsell, and Bindman (1999) illustrated the subject's importance in their study.

Saha et al. (1999) begin with the knowledge that minority patients both used and appreciated fewer medical resources. Using the Commonwealth Fund Minority Health Survey of 1994, they were able to get individual level data for adults in the US. The survey gives access to healthcare, access, physician, and personal data. From these participants, Saha et al. (1999) hold approximately 3000 extra phone interviews with even amounts of white, black, and Hispanic patients. The variable categories that were created were "Racial Concordance," "Response Variables," and

"Covariates." These categories allow researchers to find the race of the patients' primary physicians, patient satisfaction with their healthcare, and control for demographic confounding.

Saha et al. (1999) analyze data significance using t-tests (continuous) and Pearson chi squared (binary, categorical) for bivariate racial concordance. The significance of the concordance is calculated using a logistic regression. As in their hypothesis, they find that black and Hispanic patients are more satisfied with their health care when seen by black and Hispanic doctors, respectively. Black patients actually are more satisfied with the physician, while Hispanic patients with their general healthcare. The study also finds that minority patients disproportionately select for racially concordant physicians. The results suggest that black patients feel they are more respected by black physicians, which could be a result of cultural similarity or the fact that, as black physicians see a large amount of black patients, "cultural competence" (Saha et al. 1999).

Saha et al. (1999) are able partially explain the findings of Doescher, Saver, Franks, and Fiscella (2000), where minority patients are less likely to be satisfied with their physician than white patients. American doctors are mostly white, so if concordance matters in all races, white patients would be more satisfied than the average with their physicians. These findings are important as they suggest a positive relationship between racial concordance and physician services use. Thus, if applied to income, it may be that physicians who practice in areas where their patients will be racially concordant, they may see and be reimbursed by more patients. The study has its limitations in that the survey held selection bias, do not

have enough detail about physician race, and the self-response survey has its own bias.

Cooper-Patrick, Gallo, Gonzales, Thi Vu, Powe, Nelson, and Ford (1999) find similar results in terms of quality of care and race concordance. The physician subjects of this study were recruited from a randomized clinical trial for depression intervention. Thus, the physicians were all from a similar area in New York, as were their patients. Similar to Saha et al. (1999) the variables involve patient and physician race and gender concordance. The measure of quality for physicians is their "Participatory Decision-Making (PDM)" (Cooper-Patrick et al. 1999), or how well the physicians and patients work as a team on a scale from 1-100. PDM is measured as the result of several participation related survey questions. This study finds that African American patients viewed their physicians PDM as lacking in general. However, the patients who have physicians who are also African American have a higher rating on the PDM scale, suggesting the racially concordant physician-patient teams are working better together. This study shows yet another reason why evaluating patient-physician race relationships is important: the ability of the physician to let the patient take some charge of their healthcare has a bearing on both patient health and satisfaction, another set of variables that can affect income. These findings are similar to Laviest and Nuru-Jeter (2002), who find that patients who are able to choose are more likely to have racially concordant relationships. Each group also records more satisfaction with their physicians than when the races did not match. Laviest and Nuru-Jeter (2002) also propose that this suggests better

physician cultural training and interpreter services are necessary for minority patients.

Brown, Scheffler, Tom, and Schulman (2007) add another layer to the study and involve market value and supply and demand for physicians. Citing that patients are more satisfied in racially concordant relationships, they hypothesize that physicians of certain races, when low in supply locally, would be rewarded from these relationships. Adding supply and demand criteria explain why, where supply is high, it is easier to tell that those who served a racially concordant population have a higher income. Brown et al. (2007) evaluate the supply for physicians as the percentage of the local physician labor force from a specific race, and demand as the percentage of that local patient group of the same ethnicity. The study then shows the difference between supply and demand as the shortage of physicians of that particular race. Brown et al. (2007) add median income for the local area, a dummy for each geographical location, percentage of local physician workforce of each race, and percentage of local population of each race as variables in their regression model. The interaction between physician race and percent of the population of the same race is used to determine whether or not racial concordance affects income, and the interaction between physician race and local physician workforce percent is used to determine if the supply and demand for that physician race affected income. Brown et al. (2007) find that racially concordant relationships are beneficial in Asian and Hispanic populations. This is assumed to be because of the possible language barriers between foreign (and sometimes native) born Asian and Hispanic patients and their doctors. Thus, this study will involve whether or not the physician

has difficulty with any languages the patients speak, as well as whether or not they have an interpreter service to aid them. This will determine whether or not the change in income is due to communication or cultural similarity.

Saha, Taggart, Komaromy, and Bindman (2000) further explore the importance of language and communication. Using a telephone survey data set from the American Commonwealth Survey, they find that 25% of Hispanic patients with Hispanic doctors specifically chose their doctors because of their race (Saha et al 2000). Of those, 42% factored in language as the reason (Saha et al 2000). Thus, determining whether or not language factors into income is an important factor.

C. Contributions to the Literature

This study improves on previous research in that it involves language as well as racial concordance when looking at the patient-physician relationship. Brown et al (2007) show how supply and demand for different races increases income in Hispanic and Asian patient-physician pairs, though it is not significant for Black patient-physician pairs. As most of the Black and white patient population speaks English, along with the fact that most physicians are White, speak English and trained in the US, communication between all groups could be optimal. However, many Asian and Hispanic patients come from abroad and may speak other languages. Physicians who understand their culture and language may have the advantage in treating these patients and having a higher patient cooperation and follow up rate. Thus, language is an important addition to look at in this model.

CHAPTER THREE

ESTIMATING THE EFFECT OF RACE AND LANGUAGE CONCORDANCE ON PHYSICIAN INCOME

In this chapter, I outline the dependent and independent variables used in the econometric analysis. I describe the econometric model and the different types of regressions run using this model. An explanation of why different models are used is provided.

A. Econometric Model to Estimate Physician Income

The following model is used to determine the effect of racial and language concordance in the patient physician relationship on physician income. This model was formed using controls similar to those found in previous research (Cooper-Patrick et al. 1999; LaViest and Nuru-Jeter 2002; Reyes 2007; Shih and Konrad 2007; Weeks and Wallace 2006):

$$\begin{aligned} INCOME = \beta_0 + \beta_x(&AGE + GENDER + SPECIALTY + BOARDCERTIFICATION \\ &+ PRACTICETYPE + HOURS + OWNERSHIP + VISITS + MEDCARE \\ &+ MEDCAID + CAP + BONUS + PATRACE + DOCRACE + CUL \\ &+ LANG + INT + BD * BP + HD * HP + AD * AP + LANG * BD \\ &+ LANG * HD + LANG * AD) + \varepsilon \end{aligned}$$

Dependent Variables for Physician Income

INCOME	One of six discrete income categories the physician belongs to
INCHOURS	INCOME/HOURS, the approximate hourly wage of the physician
PERFINCOME	One of six discrete income categories the physician belongs to, only includes physicians who have a performance based aspect to their income

Independent Variables for Control

AGE	Time since the physician started practicing medicine Reference group: physicians who began practicing before 1975
EXP1	1 if physician began practicing after 2005, 0 if before
EXP2	1 if physician began practicing in 2001-2004, 0 if otherwise
EXP3	1 if physician began practicing in 1996-2000, 0 if otherwise
EXP4	1 if physician began practicing in 1991-1995, 0 if otherwise
EXP5	1 if physician began practicing in 1986-1990, 0 if otherwise
EXP6	1 if physician began practicing in 1981-1985, 0 if otherwise
EXP7	1 if physician began practicing in 1976-1980, 0 if otherwise
GENDER	Gender of physician Reference group: female physicians
MALE	1 if male physician, 0 if female
SPECIALTY	Type of specialty training the physician has Reference group: Medical Specialties
INTERNAL	1 if physician specialized in internal medicine, 0 if otherwise
FAMILY	1 if physician specialized in family medicine, 0 if otherwise
PEDIATRICS	1 if physician specialized in pediatric medicine, 0 if otherwise
SURGICAL	1 if physician specialized in surgical medicine, 0 if otherwise
PSYCH	1 if physician specialized in psychiatric medicine, 0 if otherwise
OBGYN	1 if physician specialized in obstetric/gynecologic medicine, 0 if otherwise
BOARDCERTIFICATION	Whether or not the physician is board certified in their specialty Reference group: Not board certified

BRD	1 if physician board certified, 0 if not
PRACTICETYPE	Type of practice the physician works in Reference group: Solo/2 physician practice
GROUP	1 if the physician works in a practice with 3 or more physicians, 0 if otherwise
HMO	1 if the physician works in an HMO, 0 if otherwise
MEDSCHOOL	1 if the physician works in a medical school, 0 if otherwise
HOSP	1 if the physician works in a hospital, 0 if otherwise
OTHER	1 if the physician works in some other type of practice, 0 if in a previously defined practice type
HOURS	Number of hours the physician works per year
OWNERSHIP	Type of ownership the physician has in his/her practice Reference group: Full owner
POWN	1 if the physician is a partial owner, 0 if otherwise
EMPLOY	1 if the physician is an employee, 0 if otherwise
ICONT	1 if the physician is an independent contractor, 0 if otherwise
VISITS	Number of visits physician has per week
VISCLINIC	Number of clinic visits per week
VISHOSP	Number of hospital visits per week
VISNURS	Number of nursing home visits per week
MEDCARE	Percentage of payment that comes from Medicare patients
MEDCAID	Percentage of payment that comes from Medicaid patients
CAP	Percentage of payment that comes from capitation or other prospective payment system
BONUS	1 if the physician earns income through a bonus, 0 if not
PATRACE	Percentage of patients that are of a particular race
BP	Percentage of patients that are Black
HP	Percentage of patients that are Hispanic
AP	Percentage of patients that are Asian

DOCRACE	Physician race Reference group: White
BD	1 if physician is Black, 0 if otherwise
HD	1 if physician is Hispanic, 0 if otherwise
AD	1 if physician is Asian, 0 if otherwise
OD	1 if physician is a race not specified, 0 if race is one of the above

Independent Variables Involved in Race or Language Concordance

CUL	1 if physician has cultural competency training, 0 if not
LANG	Number of languages (other than English) that the physician's patients speak
INT	1 if the physician uses an interpreter service, 0 if not

Interaction terms

RACIAL CONCORDANCE

BDBP	Interaction between Black doctors and Black patient percentage
HDHP	Interaction between Hispanic doctors and Hispanic patient percentage
ADAP	Interaction between Asian doctors and Asian patient percentage

LANGUAGE CONCORDANCE

Black Physician	Interaction between number of languages spoken by patient base and Black physician Reference group: Black physician, all English patients
BD_LANG_1	1 if Black physician, 1 language other than English spoken, 0 if otherwise
BD_LANG_2	1 if Black physician, 2 languages other than English spoken, 0 if otherwise
BD_LANG_3	1 if Black physician, 3 languages other than English spoken, 0 if otherwise
Hispanic Physician	Interaction between number of languages spoken by patient base and Hispanic physician

	Reference group: Hispanic physician, all English patients
HD_LANG_1	1 if Hispanic physician, 1 language other than English spoken, 0 if otherwise
HD_LANG_2	1 if Hispanic physician, 2 languages other than English spoken, 0 if otherwise
HD_LANG_3	1 if Hispanic physician, 3 languages other than English spoken, 0 if otherwise
Asian Physician	Interaction between number of languages spoken by patient base and Asian physician Reference group: Asian physician, all English patients
AD_LANG_1	1 if Asian physician, 1 language other than English spoken, 0 if otherwise
AD_LANG_2	1 if Asian physician, 2 languages other than English spoken, 0 if otherwise
AD_LANG_3	1 if Asian physician, 3 languages other than English spoken, 0 if otherwise

Three dependent variables are used in this model. All three are different measures of physician income. The first is INCOME, a variable constructed from the dataset, which contains six categorical annual income values. These income categories range from the lowest being "Under $100,000" to the highest being "Over $300,000," with four categories separated by $50,000 in between. INCOME takes the average of each of the categories and turns them into dollar values, so I can use Ordinary Least Squares to analyze them. The INCOME value is lower bounded at $80,000 and upper bounded at $350,000 in effort to better capture the average incomes of low and high earning physicians. INCHOURS is INCOME divided by HOURS, in order to create an hourly income rate for physicians. PERFINCOME is a dependent variable constructed to contain those physicians who had a performance-based incentive in their income, with the same values as INCOME.

Many of the independent variables have been chosen as controls that mirror those used in previous research. Instead of using age or experience squared as an independent variable to capture the decreasing gains in income as physicians age (Reyes 2007), I use a set of dummy variables. These allow for the same occurrence to be captured using the categorical data in the dataset. The longer one has worked as a physician, the more likely he/she is to be higher paid (Shih and Konrad 2007). Thus, I expect that the EXP variables will result in negative outcomes, as they are referenced against the longest practicing group. Gender is another important control, as studies have found that male physicians tend to have higher incomes than female physicians (Cooper-Patrick et al. 1999). The specialty of physicians is an important factor to take into account, as physicians with different specialties have different reimbursement rates and salaries, resulting in an income difference (Weeks and Wallace, 2006). I expect that physicians with more specialized practices such as surgery and psychiatry to have higher incomes than those in other specialties. Board certification in one's specialty is an indicator of ability, so I expect those who are board certified to have higher incomes than those who are not (Reyes, 2007). The type of practice that a physician is in can also affect income, as, for example, those in hospital or group practices can rely on nearby referrals or benefit from a more concentrated patient base (Reyes, 2007). The number of hours that a physician work should directly correlate to their income as those who work more should have a higher annual income. The ownership in the practice is a variable that was used in previous research to indicate incentives (Weeks and Wallace, 2006). I expect that those who have full or part ownership will have high

incomes than employees and independent contractors. The number of visits that a physician has a week and where those visits are should be, similarly to hours, directly correlated to income. I expect that physicians with more visits in clinic or in a hospital to make more than those who have more nursing home visits. Previous research shows that physicians who have more Medicare and Medicaid utilizing patients tend to have lower incomes, as reimbursement rates are lower for these insurers than private insurance (Reyes, 2007). Thus, I expect that higher percentages of Medicare and Medicaid patients will result in lower incomes for physicians. Similar to Medicare and Medicaid, prospective payment systems like capitation result in the physician making fewer profits (Reyes, 2007). I expect a higher percentage of prospective payment to result in lower incomes for physicians. The bonus independent variable also acts as an indicator for ability and incentives, and I expect those who are paid extra with bonuses will enjoy higher incomes.

The variables I am interested in analyzing begin with patient race. Minority populations are outlined in previous research as having lower incomes as well as healthcare utilization (Burgess et al. 2008). It follows that I expect physicians who have a higher minority patient base, holding all else constant, to have lower incomes. The race of physicians is also a variable of interest. I use dummy variables to distinguish between White, Black, Hispanic, Asian, and other doctors. Again, as minority populations have been shown to have lower incomes, I expect Hispanic, Black, Asian, and other doctors to have lower incomes than the reference group, White physicians. These variables allow us to control the race related interaction terms in the model.

When looking at controlling language, the data offer us three different variables. The cultural competency variable shows whether or not cultural competency training has been undertaken by the physician. Due to the constraints of the data set, we do not know if this training is a punishment from being culturally incompetent, or an extra training program for physicians who have a culturally diverse patient base. If this is a punitive measure, it would seem that the physicians who had to undergo the training would have lower incomes, as they are not as effective at communicating as those who did not have to undergo the training. However, if it is an extra measure, it could be that the physicians who have undergone the training are more effective at communicating with their patient base, and thus more likely to enjoy higher incomes. I expect that this is the case, and cultural competency leads to higher physician income. The next interesting variable is LANG, or the number of languages that the patient base speaks. The more variable the patient's languages are, the less likely that the physician can communicate efficiently with all of them (Brown et al. 2007). Thus, I expect that having a more linguistically diverse patient population will lead to lower incomes for physicians. The INT variable is a binary variable that shows whether or not physicians utilize an interpreter service. As this would increase patient-physician communication, I expect that having an interpreter will increase physician income (LaViest and Nuru-Jeter 2002).

The interaction terms of interest begin with the racial concordance interaction. The variables BDBP, HDHP, and ADAP capture the racial concordance amongst Black, Hispanic, and Asian physician-patient pairs.

$$\frac{\partial Y}{\partial BP} = \beta_{BP} + \beta_{BPBD} \cdot BD$$

This example partial derivative shows the partial derivative of income over the percentage of black patients. When solved, this equation will give the coefficient of percentage of black patients plus the coefficient of the interaction between black patients and physicians and the variable of whether or not the physician is black. If the physician is not black, I simply get β_{BP}, as BD=0. If the physician is black, however, I get a value for β_{BPBD}. If this value is positive, racial concordance promotes higher income in black patient-physician relationships. If negative, the concordance leads to a lower income. A similar analysis works for Hispanic and Asian pairs.

In terms of language concordance, the data set offers us only the number of languages the patient base speaks. Thus, the language interactions BD_LANG, HD_LANG, and AD_LANG have been split into dummy variables. The dummy variables allow us to look at whether or not income rises in a given race of physicians if their patients mostly speak more languages than just English. I expect that Black doctors have decreasing incomes with more diverse patient bases, as the Black culture does not have one specific language (Brown et al. 2007). I expect the Hispanic physicians to increase in income if their patients speak one language other than English, with the assumption that this language is Spanish (Brown et al. 2007). However, as the patient population diversifies for Hispanic doctors, I expect the same communication issues as for White and Black physicians to lower income. As the Asian ethnicity is very broad and contains cultures with hundreds of different languages, I expect, contrary to the findings of Brown et al. (2007) that more

languages will decrease physician income. With more specific ethnicities and patient races, I could look at more specific interaction terms for languages, which would help with the Asian physician/patient case.

B. Estimation tools

This analysis uses ordinary least squares (OLS) and ordered probit analysis to solve the econometric model. OLS results have a bias as the dependent variable, income, is recorded in categories in the ICSPR survey. Thus, I take a discrete variable and assigned each category a numerical value to view the results as if the dependent variable was continuous. In order to try and remove this bias, I also used ordered probit analysis.

Ordered probit analysis is used when there is a discrete dependent variable with more than two possible outcomes. In this case, I have six income categories, and therefore ordered probit is required. As we cannot treat these categories as cardinal numbers, we treat them as ordered categories. Ordered probit is a maximum likelihood estimation technique. It makes the assumption that the categories for the dependent variable follow a normal cumulative distribution function. Thus, given the independent variables, it can predict how increases and decreases in independent variables will affect the probability of the dependent variable being in a certain category. This measurement is more accurate than using OLS in this study, as the OLS required manually calculated dollar values for the income categories. The ordered probit utilizes the cumulative distribution function to assume a normal function of income values throughout the dependent variable,

creating a more likely scenario(Stata Annotated Output Probit Regression, accessed 2012). Using the "margins" command in Stata, I am able to calculate the marginal effects of each of the dependent variables, which can be interpreted as the probability of a unit change in the variable resulting in a change in category (Stata Annotated Output Probit Regression, accessed 2012). The model does, however, have its own error, and is not as accurate as if I had continuous data.

CHAPTER FOUR

DESCRIPTION OF THE 2008 HEALTH TRACKING PHYSICIAN SURVEY

In Chapter four, I describe the 2008 Healthy Tracking Physician survey, from which the data were obtained. I also explain the descriptive statistics for the used dataset.

A. 2008 Health Tracking Physician Survey Explanation

The 2008 Health Tracking Physician Survey (HTPS) is a cross-sectional dataset used in this study. It is part of the Community Tracking Study series, funded by the Robert Wood Johnson Foundation and conducted by the Center for Studying Health System Change. The dataset was retrieved from the Inter-University Consortium for Political and Social Research (ICPSR).

The 2008 HTPS was administered nationally to physicians directly involved in patient care and obtained data on physician characteristics. The survey included physicians who worked for over 20 hours per week, and excluded federal employees, foreign medical school graduates who did not have US licenses, graduate medical students (interns, residents, and fellows), and physicians who were not directly involved in patient care. The survey respondents were selected with stratified random sampling with 20 strata, and the list of physicians was provided from the American Medical Association masterfile. The survey was a mail questionnaire, and includes probability weight which adjusts for bias created from nonresponse and probability of selection. The 2008 HTPS also contains a restricted data set which includes geographic information as well as a continuous income indicator, however, this was not available to the public.

B. Descriptive Statistics

The complete 2008 HTPS contains survey responses from 4,720 physicians. Table 1 (p. 37) shows the descriptive statistics for the dataset used. The responses for questions used in the construction of the cultural competency, language, interpreter, bonus, hours, and board certification had missing values, thus reducing the total number of used observations for the annual income to and the hourly wage to 4,043. To determine if performance based incentives played a part in the income, a subset of 1,802 observations with performance paid physicians was used as well.

The average income for physicians in this sample set was slightly over $200,000, or approximately $90/hour. The performance paid physicians had a higher average income of just over $216,000. The average patient breakdown was 14.97% Black, 13.85% Hispanic, and 4.70% Asian. The physicians were mostly White. On average, the physicians were not culturally competence trained, had a patient base that spoke 1 language other than English, and had an interpreter service. Black, Hispanic, and Asian physicians had, on average, about a 1% racially concordant patient base. In terms of language, Asian and Hispanic physicians were more likely to have linguistically diverse populations.

CHAPTER FIVE

REGRESSION RESULTS: RACIAL AND LANGUAGE CONCORDANCE AS A DETERMINANT OF PHYSICIAN INCOME

In Chapter five, I discuss the regression results for this analysis. The first section includes the relationship between annual income and the independent variables. In the second section, I describe the income in hourly terms, and, in the third, I use annual income and a performance paid physician subset.

A. Regression Analysis for Annual Income

The first set of regression results I report on have annual income as the dependent variable. Table 2 (p.40) shows the coefficients for 3 OLS and 1 ordered probit model regressions.

The first OLS regression in the first column of Table 2 (p.40) is a simpler version of the original model, without language interaction considered. Thus, it measures only racial concordance rather than racial and language concordance. The first control, experience, shows results contrary to expectations. The only negative value is for the least experienced physicians, who, according to the results, earn less than the reference group on average holding all else constant, which is the most experienced physicians. This is a non significant result, however, and may be because there are a small percentage of physicians in the tail end groups. The highest income bracket is the physicians who began practicing in 1991-1995. This could be a result of aging physicians working less, or moving to less intense specialties. As expected, the male gender earns more than females, which is

consistent with Cooper-Patrick et al. (1999) and Reyes (2007). In terms of specialties, Surgical and Medical specialties earn the most while Family and Pediatric specialties earn the least, on average holding all else constant. This is another expected result, as the more intense specialties earn more (Shih and Konrad, 2007). Board certification, as expected, led to higher incomes for physicians as well. In terms of practice organization, solo practitioners had the lowest income on average holding all else constant, with hospital workers having the highest. For every hour worked, physicians earned $11.51 extra on average holding all else constant. This is a smaller number than expected, possibly because the number of hours physicians work matter less than the complexity and number of cases they see. Full ownership of a practice earned physicians less than partial ownership, though more than both being an employee or independent contractor. This is again likely because those in a group practice are more specialized, while practice owners are more like solo and in primary care. The results also show that hospital visits pay more than clinic visits, likely because these visits are more complicated and reimburse more. Though the values for Nursing home visits, Medicare, Medicaid, and prospective form payments were insignificant, they had a negative value. This is likely because the more nursing home, or Medicare/Medicaid/capitation visits a physician has, the less time they have for higher reimbursing patients. Bonus eligibility positively affects income, as per expectations. Similar to how Cooper-Patrick et al. (1999) and Saha et al. (1999) reported, higher percentages of Black and Hispanic patients negatively affected physician income. This could be a result of lower incomes or lower utilization in the minorities. An increase in Asian patients,

unexpectedly, led to an average increase in income holding all else constant, though this result was non-significant. All results for race of physician are non significant, though they predicted significantly lower incomes for Black, Hispanic, and Other physicians in comparison to White and Asian physicians. Cultural competency training has a significant and large negative impact on physician income, suggesting that it indicates physicians who cannot properly communicate with their patients, rather than those who are willing to go the extra mile to communicate better. The number of non English languages that patients spoke unexpectedly increased physician income, though the effect was non significant. The interpreter service greatly increased physician income, and was significant. This could suggest that those with interpreter service are able to cater better to more linguistically diverse patients, giving them a premium in incomes as number of languages increases. The racial concordance terms for all three races were non significant, though Black and Hispanic pairs had positive values and Asian pairs had a negative effect on income.

The second OLS, in the second column of Table 2 (p.40) was created to determine whether or not interpreter was an endogenous variable. It was assumed possible that those physicians who have higher incomes are better able to hire interpreter services. However, as I can see from the regression, all values of variables are similar to OLS 1, except that the interpreter service seems to be expressed in the language variable, which is now larger and significant. This suggests that the interpreter service is not endogenous, but indeed necessary. These results reflect the findings of Brach and Fraserirector (2000), who suggested that

most interpreter services are volunteer or reimbursable, so they are not affected by physician income.

The third column of Table 2 (p.40) includes the language interaction dummies for physician patient relationships. The findings for the control variables are very similar to OLS 1, though in this regression. For language concordance, the results are non significant. Black physicians experienced the largest negative impact when their patients spoke one language other than English. When patients spoke three or more non-English languages, the negative impact was much lower. This could be because, as patients become more diversified, physicians are more incentivized (or required) to hire an interpreter, etc., to better communicate with their patients. Also, those physicians who have a wider linguistic patient base may have better language and communications themselves, leading to all sorts of patients choosing them over other physicians. For Hispanic physicians, income actually rises by a large portion when the patients speak one language other than English, but falls like the others when the patients speak two or three. Asian physicians have a negative impact regardless of how many languages patients speak other than English.

The final column of Table 2 (p.40) is the ordered probit analysis of the annual income. The ordered probit analysis is required because of the discrete nature of the dependent variable. The coefficients given are not read in dollar amounts like the OLS estimates, but rather ordered log-odds estimates. Thus, for example, if a physician began his or her practice in 2001-2005, their ordered log-odds of being in a higher income category than those who began before 1975 would increase by

0.232, on average holding all other variables constant. Thus, a positive value indicates a higher probability of being in a higher income category with a unit increase in the variable, whereas a negative value is an increased probability of being in a lower category. The cut points in Table 2 (p.40) show the values for the different categories with null values in the variables. Thus, if a physician had null values for all variables and a latent variable value between 1.206 (Cut 2) and 1.903 (Cut 3) would be in income category 3, $150,000-$200,000 annual income. (Stata Annotated Output Probit Regression, accessed 2012). The ordered probit results are similar to that of the OLS.

B. Regression Analysis for Hourly Wage

In order to obtain more variety using the categorical variables, I also divided annual income by hours worked to find average hourly wage and if it is affected by racial and language concordance. Table 3 (p. 44) shows the results of this analysis, with three columns of OLS regressions. Ordered probit was not conducted on this set of variables because they were treated as continuous.

The first column of Table 3 (p. 44) shows the simple model OLS regression with income in hourly wage rather than annual. This regression has very similar results to the second column, which once again removed interpreter services from the regression model. Though the significance and general values of the control variables were the same as those illustrated in Table 2 (p.40), this regression showed interesting results for racial and language concordance. Unlike with yearly wage, Black and Hispanic physician-patient pairings had positive (though non

significant) values for hourly wage. This could mean that Black and Hispanic physicians tended to work fewer hours a year, but do have positive effect from racial concordance at an hourly rate. Asian physician patient pairings still have a negative value.

The third column of Table 3 (p. 44) reintroduced language concordance interactions. Though insignificant, there are two interesting positive values for coefficients. In terms of language concordance, Hispanic physicians still gain an hourly premium for treating patients who speak 1 language other than English, and, at an hourly rate, Asian physicians show a similar positive value for patients who speak 1 non-English language. Again, it is possible that Asian physicians work fewer hours at a higher rate with these patients, putting a premium on language concordance.

C. Regression analysis for Performance-based Income

Looking at income may not give us the whole picture, as some physicians may simply work more or less hours, skewing the results. Thus, Table 4 (p. 48) uses a subset of physicians whose salaries are determined with performance based incentives. Thus, those who are better at communicating will have higher incomes, as their patients will have better health outcomes and satisfaction (LaViest and Nuru-Jeter, 2002).

Column 1 of Table 4 (p. 48) starts off with the simpler model used in the first columns of previous regression tables, and has similar results to column 2 of Table 4 (p. 48), the regression without interpreter. The only control variable that changes

relative to the previous two regression models is that full ownership of a practice is more beneficial than part ownership, likely because those who own a practice and pay themselves by performance of the practice can get a hefty bonus. In this case, though insignificant, the positive values suggest Hispanic physicians, Asian physicians, and Other physicians are paid more than White physicians and Black physicians. This is a positive result for our analysis, as it is those physicians who are most likely to have language concordance with non-English speakers who have higher incomes, on average holding all else constant. In this regression, the incomes of physicians drop as number of their multilingual speaking patients increases. This is also expected, as, according to Table 1 (p. 37), the large majority of physicians are White, and are therefore assumed to be less fluent than ethnic physicians in other languages. The racial concordance interactions show that Black physician and patient pairs still add a premium to physician income, though Hispanic physician patient pairs now negatively effect income, though these numbers are non significant.

In terms of language concordance, I can see from column 3 of Table 4 (p. 48) that, as the number of languages spoken by their patients increase, Black and Asian physician incomes rise, while Hispanic physicians incomes fall. This could again be a function of the language that the Hispanic physicians speak, rather than those of the patients.

CHAPTER SIX

DISCUSSION AND CONCLUSIONS

A. Summary of Results

This study takes 2008 ICPSR Health Tracking Physician Survey data and uses it to examine the effect of racial and language concordance in the physician-patient relationship and its effect on physician income. Previous research is expanded on by attempting to discover if language concordance is the cause of the premium paid to physicians in racially concordant relationships.

This study does not support the hypothesis that racial and language concordance positively effect physician income in the physician patient relationship. Due to lack of significance, though some variables had similar positive/negative signs as those expected, I could not reject the null hypothesis. From the insignificant results that were obtained, racial concordance is shown to have a positive effect on income with Black and Hispanic physician-patient pairs, but not Asian. This could be attributed to the fact that, while Black and Hispanic cultures are more specific, the Asian title has subcultures that are as dissimilar within themselves as they are to other cultures. Thus, though the race is defined as the same, the pair does not benefit from communication improvements Cooper-Patrick et al. (1999) would suggest. The study found that cultural competency training was a negative contributor to income, suggesting that cultural competency training is used when physicians have been proven to have poor communication skills, and need improvement already. Interpreter services was a large positive contributor to income. This suggests that physicians who are willing to try to find interpreter

services for their patients are likely to receive an income premium. It could also be that the use of the interpreter service draws patients from other competitors to their practice, rather than better communication with those patients. For language concordance, the null hypothesis could not be rejected. Trends in the results showed that income should increase when physicians have either all English speaking patients, or patients with a wide variety of languages. This can be explained by physicians who have all English patients not needing to become culturally competent or hire interpreter services, and having perfect communication regardless. Physicians who may be multi lingual themselves or be open to more cultures and therefore more keen on proper communication may find themselves having a more varied patient base, keeping their income high.

B. Policy Implications

Several policy implications can be gleaned from this study and possible future research. First and foremost, I have found a strong positive relationship between the use of interpreter services and physician income. If physicians were pushed to utilize more available communications tools such as these, physicians would enjoy an increase in income while patients would enjoy better health outcomes (Brach and Fraserirector, 2000). Cultural competency programs that are aimed at improving communication and understanding should also become a part of undergraduate or graduate medical training, rather than an optional or punitive action. This way, all physicians will be able to better communicate with a variety of patients and enjoy a more diverse patient base as well as offer more choice for

minority patients. This cultural competency training could also involve medical beliefs and behaviors that are common in other cultures, further specifying healthcare information for patients. Overall, the study shows that gains can be seen from the physician side as well as for patients when physicians are more aware or immersed in culture, and policy should be made to reflect that.

C. Further Research Opportunities

This study is conducted with a limited data set that had survey bias, sample selection bias, and censored data. If further research could be done to more accurately explore this hypothesis, several changes would need to be made. First, physician income should be continuous, allowing for more specific information. The language variable should include the languages that the physician speaks as well as the specific languages their patients speak, allowing the researcher to construct a more accurate interaction term without using the assumption in this study. Similar to the Brown et al. (2007) study, geographic data should be included in the study. This will allow the researcher to determine the kinds of cultures that permeate the market in which the physician is located, ruling out some serendipity in the choices of patients and their physicians. Also, physicians are not the only members of staff that can communicate with or deal with patients. Further studies should look at whether or not physicians hire multicultural staff to help acclimatize minority patients, involve family members to facilitate communication, or consult with traditional healers to better understand minority patient practices (Brach and Fraserirector 2000).

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Table 1. Descriptive statistics for dependent and independent variables used in analysis

Variable	Mean	Min	Max
Income Measurements			
Annual Income	203765.90 (90570.39)	80000	350000
Hourly Income	90.12 (49.15)	19.231	673.077
Performance based Income	216097.90 (90524.13)	80000	350000
Experience			
Beginning year of practice after 2005	0.05 (0.22)	0	1
Beginning year of practice 2001-2004	0.12 (0.34)	0	1
Beginning year of practice 1996-2000	0.17 (0.38)	0	1
Beginning year of practice 1991-1995	0.14 (0.35)	0	1
Beginning year of practice 1986-1990	0.15 (0.36)	0	1
Beginning year of practice 1981-1985	0.14 (0.35)	0	1
Beginning year of practice 1976-1980	0.10 (0.30)	0	1
Gender			
Male	0.73 (0.44)	0	1
Specialty			
Internal Medicine	0.13 (0.34)	0	1
Family Medicine	0.17 (0.38)	0	1
Pediatric Medicine	0.09 (0.29)	0	1
Surgical Medicine	0.19 (0.39)	0	1
Psychiatric Medicine	0.07 (0.25)	0	1
Obstetric/Gynecologic Medicine	0.06 (0.25)	0	1
Certification			
Board Certification	0.90 (0.30)	0	1
Type of Practice			
Group Practice	0.39 (0.49)	0	1

HMO	0.03 (0.18)	0	1
Medical School	0.07 (0.26)	0	1
Hospital	0.12 (0.33)	0	1
Other	0.04 (0.20)	0	1
Time Worked			
Hours	2425.81 (734.47)	1	4160
Ownership in Practice			
Partial Ownership	0.26 (0.44)	0	1
Employee	0.38 (0.49)	0	1
Independent Contractor	0.047 (0.21)	0	1
Visits per week			
Clinic Visits	67.97 (38.85)	0	150
Hospital Visits	13.34 (19.67)	0	70
Nursing Home Visits	0.77 (2.47)	0	10
Types of Reimbursement			
Percentage of Medicare reimbursement	31.18 (22.94)	0	100
Percentage of Medicaid reimbursement	16.73 (20.39)	0	100
Percentage of prospective payment reimbursement	11.68 (22.64)	0	100
Bonus eligibility	0.45 (0.50)	0	1
Race of patients			
Percentage of Black patients	14.97 (14.71)	0	51
Percentage of Hispanic patients	13.85 (14.42)	0	51
Percentage of Asian patients	4.69 (6.14)	0	26
Race of Physician			
Hispanic physician	0.052 (0.22)	0	1
Black physician	0.035 (0.18)	0	1
Asian physician	0.14 (0.35)	0	1

Other physician	0.01 (0.11)	0	1
Language parameters			
Cultural competency training	0.39 (0.49)	0	1
Number of non-English languages patients speak	0.89 (1.08)	0	3
Interpreter service	0.55 (0.50)	0	1
Racial Concordance			
Black physician/patient interaction	1.19 (7.06)	0	51
Hispanic physician/patient interaction	1.37 (7.33)	0	51
Asian physician/patient interaction	1.19 (4.39)	0	26
Language Concordance			
Black physician, 1 non-English language spoken by patients	0.01 (0.08)	0	1
Black physician, 2 non-English languages spoken by patients	0.01 (0.06)	0	1
Black physician, 3 non-English languages spoken by patients	0.01 (0.08)	0	1
Hispanic physician, 1 non-English language spoken by patients	0.01 (0.12)	0	1
Hispanic physician, 2 non-English languages spoken by patients	0.01 (0.07)	0	1
Hispanic physician, 3 non-English languages spoken by patients	0.01 (0.09)	0	1
Asian physician, 1 non-English language spoken by patients	0.03 (0.19)	0	1
Asian physician, 2 non-English languages spoken by patients	0.01 (0.12)	0	1
Asian physician, 3 non-English languages spoken by patients	0.02 (0.15)	0	1
Observations	4,043		

Note: Standard deviations are presented in parentheses

Table 2. Regression results for Annual Income

Dependent Variable: Income	OLS 1	OLS 2	OLS 3	Ordered probit
Experience				
Beginning year of practice after 2005	-5,511.35	-5,410.9	-5,040.61	-0.062
	(6,730.78)	(6,752.99)	(6,746.67)	(-0.103)
Beginning year of practice 2001-2004	13,147.39**	13,170.75**	13,174.48**	0.232**
	(5,330.24)	(5,331.64)	(5,334.92)	(0.082)
Beginning year of practice 1996-2000	27,644.20***	27,619.43***	27,575.03***	0.42**
	(4,947.12)	(4,954.75)	(4,948.49)	(0.076)
Beginning year of practice 1991-1995	33,609.68***	33,512.31***	33,791.17***	0.526**
	(5,123.59)	(5,131.03)	(5,127.55)	(0.078)
Beginning year of practice 1986-1990	27,117.84***	27,128.50***	27,095.52***	0.426**
	(5,006.43)	(5,014.41)	(5,006.63)	(0.076)
Beginning year of practice 1981-1985	22,513.99***	22,386.53***	22,425.80***	0.345**
	(5,122.39)	(5,129.86)	(5,127.48)	(0.079)
Beginning year of practice 1976-1980	19,345.66***	18,894.04***	19,122.79***	0.305**
	(5,463.13)	(5,454.45)	(5,462.10)	(0.083)
Gender				
Male	33,789.18***	33,944.25***	33,779.12***	0.531**
	(2,776.42)	(2,776.38)	(2,777.44)	(0.042)
Specialty				
Internal Medicine	-64,882.94***	-64,913.13***	-64,720.41***	-0.91**
	(3,931.95)	(3,929.61)	(3,940.51)	(0.060)
Family Medicine	-74,556.14***	-74,674.50***	-74,603.70***	-1.079**
	(3,853.05)	(3,858.46)	(3,859.18)	(0.060)
Pediatric Medicine	-71,552.54***	-72,029.08***	-71,603.58***	-1.074**
	(4,782.27)	(4,784.85)	(4,774.48)	(0.076)
Surgical Medicine	16,513.67***	16,695.87***	16,580.63***	0.215**
	(3,800.83)	(3,802.27)	(3,808.61)	(0.056)
Psychiatric Medicine	-40,021.34***	-40,379.86***	-39,662.60***	-0.52**
	(5,531.01)	(5,539.89)	(5,558.70)	(0.084)
Obstetric/Gynecologic Medicine	-4,872.24	-4,920.70	-4,820.37	-0.076
	(5,674.61)	(5,683.94)	(5,671.43)	-0.081
Certification				
Board Certification	17,085.50***	17,277.49***	17,010.44***	0.272**
	(4,012.66)	(4,009.86)	(4,012.82)	(0.062)

Type of Practice				
Group Practice	23,646.30***	23,982.88***	23,865.87***	0.378**
	(3,675.51)	(3,675.21)	(3,681.17)	(0.055)
HMO	21,806.40***	21,721.31***	22,180.73***	0.407**
	(7,025.37)	(6,977.12)	(7,028.59)	(0.105)
Medical School	10,937.81*	10,897.75*	11,156.57*	0.201*
	(6,178.19)	(6,183.95)	(6,167.24)	(0.090)
Hospital	31,764.23***	31,943.92***	32,053.72***	0.528**
	(5,325.86)	(5,320.56)	(5,335.08)	(0.078)
Other	29,746.30***	30,433.37***	30,525.08***	0.524**
	(6,179.43)	(6,168.59)	(6,203.03)	(0.096)
Time Worked				
Hours	11.51***	11.51***	11.37***	0**
	(1.94)	(1.94)	(1.94)	(0.000)
Ownership in Practice				
Partial Ownership	5,842.05	5,905.83	5,939.45	0.116
	(4,021.82)	(4,025.29)	(4,030.31)	-0.06
Employee	-20,117.24***	-20,226.74***	-20,170.44***	-0.235**
	(4,170.53)	(4,175.96)	(4,177.59)	(0.062)
Independent Contractor	-15,585.50**	-14,960.55**	-15,608.25**	-0.215*
	(6,796.51)	(6,783.31)	(6,811.04)	(0.102)
Visits per week				
Clinical Visits	421.40***	424.78***	421.65***	0.007**
	(37.94)	(38.00)	(37.99)	(0.001)
Hospital Visits	507.39***	506.09***	510.61***	0.008**
	(74.57)	(74.65)	(74.87)	(0.001)
Nursing Home Visits	-93.47	-86.33	-95.51	0.002
	(486.02)	(487.16)	(487.67)	(-0.007)
Types of Reimbursement				
Percentage of Medicare reimbursement	-75.17	-77.88	-78.55	-0.001
	(60.39)	(60.32)	(60.48)	(-0.001)
Percentage of Medicaid reimbursement	-102.96	-100.30	-109.14	-0.001
	(70.76)	(70.77)	(70.62)	(-0.001)
Percentage of prospective payment reimbursement	-21.08	-20.57	-22.45	0
	(57.49)	(57.45)	(57.48)	(-0.001)
Bonus eligibility	11,423.73***	11,531.02***	11,381.09***	0.194**
	(2,431.98)	(2,433.16)	(2,436.59)	(0.036)
Race of patients				
Percentage of Black patients	-351.62***	-353.07***	-354.70***	-0.005**
	(85.37)	(85.43)	(85.56)	(0.001)
Percentage of Hispanic patients	-162.52*	-116.31	-149.38	-0.002

	(94.51)	(92.61)	(94.85)	(-0.001)
Percentage of Asian patients	155.84	110.06	133.06	0.001
	(253.04)	(253.34)	(254.32)	(-0.004)
Race of Physician				
Hispanic physician	-12,879.18	-12,633.30	-15,856.91	-0.243
	(9,325.84)	(9,330.06)	(10,608.27)	(-0.164)
Black physician	-15,494.44	-15,606.62	-9,307.06	-0.16
	(16,134.16)	(16,124.60)	(17,996.63)	(-0.25)
Asian physician	961.05	1,407.19	4,853.01	0.098
	(4,518.23)	(4,514.45)	(5,726.62)	(-0.086)
Other physician	-8,874.96	-9,009.58	-9,061.89	-0.149
	(9,589.75)	(9,639.24)	(9,613.73)	(-0.143)
Language parameters				
Cultural competency training	-7,545.61***	-7,602.71***	-7,553.25***	-0.109**
	(2,484.88)	(2,486.26)	(2,487.69)	(0.037)
Number of non-English languages patients speak	927.04	4,318.88***	1,858.48	0.032
	(1,903.04)	(1,222.74)	(2,216.17)	(-0.033)
Interpreter service	9,155.10**		8,572.26*	0.116
	(4,091.26)		(4,687.82)	(-0.069)
Racial Concordance				
Black physician/patient interaction	227.99	223.64	228.93	0.004
	(409.76)	(409.57)	(408.51)	(-0.006)
Hispanic physician/patient interaction	423.62	400.14	353.96	0.005
	(287.23)	(287.97)	(282.42)	(-0.004)
Asian physician/patient interaction	-219.19	-246.28	-178.81	-0.003
	(414.43)	(413.47)	(424.73)	(-0.006)
Language Concordance				
Black physician, 1 non-English language spoken by patients			-17,115.25	-0.291
			(15,616.70)	(-0.255)
Black physician, 2 non-English languages spoken by patients			-16,845.23	-0.124
			(15,686.68)	(-0.225)
Black physician, 3 non-English languages spoken by patients			-2,715.59	-0.027
			(15,013.29)	(-0.221)
Hispanic physician, 1 non-English language spoken by patients			16,656.52	0.248

			(12,714.71)	(-0.188)
Hispanic physician, 2 non-English languages spoken by patients			-1,632.02	-0.014
			(17,372.75)	(-0.276)
Hispanic physician, 3 non-English languages spoken by patients			-1,704.97	-0.044
			(14,619.94)	(-0.218)
Asian physician, 1 non-English language spoken by patients			-4,347.11	-0.11
			(7,822.12)	(-0.12)
Asian physician, 2 non-English languages spoken by patients			-11,648.50	-0.115
			(9,830.81)	(-0.143)
Asian physician, 3 non-English languages spoken by patients			-9,424.15	-0.158
			(8,721.80)	(-0.13)
Cut 1				0.186
				(-0.127)
Cut 2				1.206**
				(0.127)
Cut 3				1.903**
				(0.129)
Cut 4				2.416**
				(0.130)
Cut 5				2.856**
				(0.131)
Constant	102,634.87***	103,282.68***	102,434.98***	
	(8,063.64)	(8,078.32)	(8,087.67)	
Observations	4,043	4,043	4,043	
R-squared	0.392	0.391	0.393	

Note: Standard deviations in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 3. Regression results for Hourly Wage

Dependent Variable: Hourly Wage	OLS 1	OLS 2	OLS 3
Experience			
Beginning year of practice after 2005	-19.12***	-19.07***	-19.09***
	(4.28)	(4.28)	(4.31)
Beginning year of practice 2001-2004	-8.34**	-8.33**	-8.33**
	(3.77)	(3.77)	(3.77)
Beginning year of practice 1996-2000	-2.91	-2.92	-2.95
	(3.41)	(3.42)	(3.41)
Beginning year of practice 1991-1995	1.15	1.10	1.05
	(3.74)	(3.74)	(3.72)
Beginning year of practice 1986-1990	-1.50	-1.49	-1.61
	(3.59)	(3.59)	(3.60)
Beginning year of practice 1981-1985	-3.42	-3.48	-3.39
	(3.51)	(3.52)	(3.52)
Beginning year of practice 1976-1980	1.50	1.29	1.37
	(3.79)	(3.80)	(3.80)
Gender			
Male	7.11***	7.18***	7.13***
	(1.77)	(1.77)	(1.78)
Specialty			
Internal Medicine	-26.92***	-26.94***	-26.76***
	(2.29)	(2.29)	(2.31)
Family Medicine	-28.25***	-28.30***	-28.20***
	(2.35)	(2.35)	(2.35)
Pediatric Medicine	-23.30***	-23.52***	-23.45***
	(2.82)	(2.82)	(2.80)
Surgical Medicine	9.64***	9.72***	9.37***
	(2.54)	(2.54)	(2.48)
Psychiatric Medicine	-14.27***	-14.43***	-14.53***
	(3.87)	(3.88)	(3.87)
Obstetric/Gynecologic Medicine	-5.72*	-5.74*	-5.93*
	(3.19)	(3.19)	(3.16)
Certification			
Board Certification	9.38***	9.47***	9.60***
	(2.54)	(2.54)	(2.55)
Type of Practice			
Group Practice	11.08***	11.24***	11.08***
	(2.43)	(2.42)	(2.43)
HMO	10.71**	10.67**	10.71**
	(5.02)	(5.01)	(5.02)
Medical School	-0.72	-0.74	-1.03
	(3.75)	(3.75)	(3.77)
Hospital	14.34***	14.42***	14.25***

	(3.71)	(3.71)	(3.64)
Other	15.98***	16.30***	15.76***
	(4.58)	(4.59)	(4.59)
Ownership in Practice			
Partial Ownership	2.08	2.11	2.06
	(2.52)	(2.52)	(2.53)
Employee	-5.55**	-5.60**	-5.64**
	(2.68)	(2.68)	(2.68)
Independent Contractor	-1.22	-0.93	-1.16
	(5.00)	(4.99)	(5.02)
Visits per week			
Clinical Visits	-0.01	-0.00	-0.01
	(0.02)	(0.02)	(0.02)
Hospital Visits	-0.27***	-0.27***	-0.27***
	(0.03)	(0.03)	(0.03)
Nursing Home Visits	-0.12	-0.11	-0.13
	(0.34)	(0.34)	(0.34)
Types of Reimbursement			
Percentage of Medicare reimbursement	-0.05	-0.05	-0.05
	(0.04)	(0.04)	(0.04)
Percentage of Medicaid reimbursement	-0.08*	-0.08*	-0.08*
	(0.04)	(0.04)	(0.04)
Percentage of prospective payment reimbursement	0.06*	0.06*	0.06
	(0.03)	(0.03)	(0.03)
Bonus eligibility	3.96***	4.01***	4.09***
	(1.51)	(1.51)	(1.50)
Race of patients			
Percentage of Black patients	-0.11**	-0.11**	-0.11**
	(0.05)	(0.05)	(0.05)
Percentage of Hispanic patients	-0.04	-0.02	-0.04
	(0.05)	(0.05)	(0.05)
Percentage of Asian patients	0.22	0.20	0.22
	(0.18)	(0.18)	(0.18)
Race of Physician			
Hispanic physician	3.16	3.27	0.49
	(9.04)	(9.04)	(8.12)
Black physician	-16.34**	-16.39**	-12.20
	(7.62)	(7.62)	(7.64)
Asian physician	3.91	4.11	5.37
	(3.05)	(3.06)	(3.72)
Other physician	-4.91	-4.97	-5.08
	(6.24)	(6.25)	(6.25)
Language parameters			
Cultural competency training	-7.76***	-7.78***	-7.82***

	(1.61)	(1.61)	(1.62)
Number of non-English languages patients speak	-1.17	0.40	-0.69
	(1.11)	(0.71)	(1.27)
Interpreter service	4.25*		4.01
	(2.58)		(2.83)
Racial Concordance			
Black physician/patient interaction	0.36	0.36	0.36
	(0.25)	(0.25)	(0.26)
Hispanic physician/patient interaction	0.08	0.07	0.09
	(0.24)	(0.24)	(0.24)
Asian physician/patient interaction	-0.07	-0.08	-0.02
	(0.29)	(0.29)	(0.30)
Language Concordance			
Black physician, 1 non-English language spoken by patients			-11.16
			(9.77)
Black physician, 2 non-English languages spoken by patients			-7.33
			(11.02)
Black physician, 3 non-English languages spoken by patients			-4.34
			(10.99)
Hispanic physician, 1 non-English language spoken by patients			-2.13
			(6.86)
Hispanic physician, 2 non-English languages spoken by patients			28.91
			(28.48)
Hispanic physician, 3 non-English languages spoken by patients			-0.33
			(8.09)
Asian physician, 1 non-English language spoken by patients			0.13
			(6.01)
Asian physician, 2 non-English languages spoken by patients			-5.87
			(5.66)
Asian physician, 3 non-English languages spoken by patients			-7.22
			(4.78)
Constant	91.27***	91.57***	91.06***
	(5.16)	(5.17)	(5.17)
Observations	4,043	4,043	4,043
R-squared	0.157	0.156	0.159

Note: Standard deviations in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 4. Regression Results for Performance-Based Annual Income

Dependent Variable: Performance based income	OLS 1	OLS 2	OLS 3	Ordered probit
Experience				
Beginning year of practice after 2005	-732.19	-478.67	669.26	0.018
	(10,283.54)	(10,327.33)	(10,416.52)	-0.157
Beginning year of practice 2001-2004	21,948.03**	22,302.93***	21,538.60**	0.361
	(8,518.57)	(8,505.67)	(8,555.83)	(0.130)**
Beginning year of practice 1996-2000	35,018.87***	35,072.85***	34,942.52***	0.535
	(7,602.39)	(7,595.50)	(7,627.38)	(0.116)**
Beginning year of practice 1991-1995	41,173.48***	41,019.74***	42,208.64***	0.649
	(7,924.47)	(7,921.00)	(7,953.64)	(0.119)**
Beginning year of practice 1986-1990	34,591.98***	34,856.44***	35,342.58***	0.568
	(7,530.41)	(7,536.34)	(7,570.47)	(0.114)**
Beginning year of practice 1981-1985	29,396.21***	29,155.25***	29,216.10***	0.46
	(7,973.48)	(7,962.97)	(8,018.31)	(0.122)**
Beginning year of practice 1976-1980	26,482.11***	26,025.41***	26,900.15***	0.432
	(8,363.69)	(8,355.43)	(8,372.23)	(0.125)**
Gender				
Male	32,653.64***	32,877.08***	32,392.72***	0.505
	(4,661.35)	(4,655.76)	(4,703.02)	(0.070)**
Specialty				
Internal Medicine	-59,785.91***	-59,833.51***	-60,272.86***	-0.839
	(6,083.25)	(6,070.80)	(6,110.35)	(0.091)**
Family Medicine	-74,281.40***	-74,269.01***	-74,429.51***	-1.04
	(6,197.25)	(6,200.85)	(6,227.79)	(0.094)**
Pediatric Medicine	-69,814.13***	-70,095.73***	-70,474.41***	-0.989
	(7,580.13)	(7,583.76)	(7,621.42)	(0.116)**
Surgical Medicine	15,274.17***	15,566.10***	15,339.77***	0.226
	(5,467.25)	(5,468.74)	(5,481.77)	(0.081)**
Psychiatric Medicine	-50,422.61***	-50,465.43***	-49,260.11***	-0.686
	(12,564.72)	(12,570.82)	(12,690.45)	(0.194)**
Obstetric/Gynecologic Medicine	6,111.54	6,243.64	6,199.17	0.113
	(8,863.23)	(8,892.81)	(8,871.66)	-0.128
Certification				
Board Certification	14,159.65**	14,311.91**	13,283.23*	0.219
	(7,103.45)	(7,108.83)	(7,078.05)	(0.108)*

Type of Practice				
Group Practice	24,703.94***	25,042.16***	24,806.71***	0.406
	(5,803.58)	(5,799.50)	(5,809.26)	(0.084)**
HMO	21,521.16*	21,579.70**	22,087.00**	0.438
	(11,093.99)	(10,977.94)	(11,084.68)	(0.162)**
Medical School	18,421.16*	18,370.06*	19,683.62**	0.323
	(9,740.70)	(9,750.45)	(9,663.15)	(0.140)*
Hospital	38,084.77***	37,772.37***	36,818.79***	0.593
	(9,288.68)	(9,304.58)	(9,346.62)	(0.134)**
Other	19,154.38	19,326.55	20,244.82	0.338
	(13,265.42)	(13,218.50)	(13,549.41)	-0.201
Time Worked				
Hours	8.41***	8.53***	8.22***	0
	(3.14)	(3.14)	(3.13)	(0.000)**
Ownership in Practice				
Partial Ownership	-1,763.04	-1,587.76	-2,174.50	-0.009
	(6,278.71)	(6,281.25)	(6,308.90)	-0.092
Employee	-19,778.38***	-19,923.79***	-19,852.11***	-0.26
	(6,527.01)	(6,535.52)	(6,570.93)	(0.095)**
Independent Contractor	-2,948.39	-2,363.93	-4,309.55	-0.071
	(15,075.5)	(15,041.10)	(15,129.74)	-0.222
Visits per week				
Clinical Visits	523.03***	524.70***	525.77***	0.008
	(58.63)	(58.60)	(58.69)	(0.001)**
Hospital Visits	634.18***	628.14***	646.94***	0.01
	(117.16)	(117.06)	(117.64)	(0.002)**
Nursing Home Visits	-413.79	-384.38	-384.93	-0.001
	(710.72)	(711.93)	(707.76)	-0.011
Types of Reimbursement				
Percentage of Medicare reimbursement	-22.53	-23.51	-23.27	0
	(95.86)	(95.61)	(96.73)	-0.001
Percentage of Medicaid reimbursement	-220.27*	-218.07*	-231.44*	-0.003
	(130.71)	(130.89)	(130.19)	-0.002
Percentage of prospective payment reimbursement	-37.61	-35.29	-50.41	-0.001
	(103.40)	(103.19)	(103.26)	-0.002
Bonus eligibility	9,672.68**	9,888.00**	9,540.23**	0.153
	(3,937.05)	(3,940.91)	(3,960.96)	(0.058)**
Race of patients				
Percentage of Black patients	-458.85***	-459.99***	-450.72***	-0.007
	(131.10)	(131.30)	(131.03)	(0.002)**
Percentage of Hispanic patients	-15.95	42.31	-4.72	0
	(158.35)	(155.20)	(159.08)	-0.002

Percentage of Asian patients	441.40	389.41	458.97	0.005
	(399.62)	(401.00)	(402.34)	-0.006
Race of Physician				
Hispanic physician	3,119.60	2,999.55	7,962.55	0.159
	(14,561.16)	(14,702.53)	(15,389.46)	-0.223
Black physician	-21,604.74	-21,970.28	-15,347.38	-0.21
	(22,383.23)	(22,109.45)	(24,073.11)	-0.332
Asian physician	4,727.74	4,475.13	3,681.38	0.074
	(7,061.64)	(7,054.36)	(8,697.03)	-0.131
Other physician	5,666.73	4,974.89	5,538.71	0.097
	(17,786.27)	(17,919.55)	(17,925.98)	-0.241
Language parameters				
Cultural competency training	-6,580.38*	-6,600.58*	-6,996.09*	-0.101
	(3,965.43)	(3,968.16)	(3,985.85)	-0.059
Number of non-English languages patients speak	-782.69	3,050.75*	-105.44	0.006
	(2,948.99)	(1,830.18)	(3,384.92)	-0.05
Interpreter service	10,136.09		8,579.57	0.121
	(6,198.24)		(6,921.32)	-0.103
Racial Concordance				
Black physician/patient interaction	437.44	435.69	366.16	0.006
	(590.81)	(585.56)	(574.94)	-0.008
Hispanic physician/patient interaction	-54.95	-79.27	-361.67	-0.006
	(490.55)	(495.57)	(467.47)	-0.007
Asian physician/patient interaction	-1,162.42	-1,149.79	-1,203.85*	-0.017
	(716.14)	(713.98)	(716.80)	-0.011
Language Concordance				
Black physician, 1 non-English l anguage spoken by patients			-22,620.40	-0.448
			(23,649.74)	-0.346
Black physician, 2 non-English languages spoken by patients			-2,374.43	0.031
			(25,947.59)	-0.344
Black physician, 3 non-English languages spoken by patients			6,448.10	0.071
			(20,569.66)	-0.3
Hispanic physician, 1 non-English language spoken by patients			27,022.82	0.342
			(21,726.50)	-0.309
Hispanic physician, 2 non-English languages spoken			8,553.77	0.221

by patients				
			(26,864.56)	-0.517
Hispanic physician, 3 non-English languages spoken by patients			-41,573.30*	-0.505
			(22,729.34)	-0.327
Asian physician, 1 non-English language spoken by patients			5,165.05	0.017
			(12,622.84)	-0.193
Asian physician, 2 non-English languages spoken by patients			-12,884.42	-0.165
			(14,419.97)	-0.207
Asian physician, 3 non-English languages spoken by patients			10,638.25	0.136
			(13,740.43)	-0.197
Cut 1				0.133
				-0.214
Cut 2				1.14
				(0.213)**
Cut 3				1.883
				(0.215)**
Cut 4				2.435
				(0.217)**
Cut 5				2.852
				(0.219)**
Constant	100,985.74***	101,270.95***	102,340.73***	
	(13,886.29)	(13,895.33)	(13,914.47)	
Observations	1,802	1,802	1,802	
R-squared	0.375	0.374	0.378	

Note: Standard deviations in parentheses
*** p<0.01, ** p<0.05, * p<0.1