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Graduate Thesis Edition

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THE GEORGETOWN PUBLIC POLICY REVIEW (ISN 1083-7523) 2011-12 VOL. 17, NO. 1.

Editor's Remarks

With this volume, the staff of the *Georgetown Public Policy Review* takes an unprecedented step in publishing the inaugural Graduate Thesis Edition. We do so in order to showcase the phenomenal work of recent Georgetown Public Policy Institute (GPPI) alumni, who each completed a quantitative thesis in partial fulfillment of the Master of Public Policy degree at Georgetown University.

Each year, the powerful combination of GPPI's challenging coursework, dedicated faculty advisors, and student talent produces outstanding original research in the form of a thesis. The Graduate Thesis Edition is reserved for those theses that showcase superior policy analysis and particularly thoughtful writing.

This volume begins with the work of David P. Cooper, who explores intergenerational mobility and the persistence of economic status in the United States. With the use of ordinary least squares (OLS) and quantile regression models, Cooper concludes that socioeconomic mobility in the US is even lower than was previously thought and suggests a variety of policies to promote the American dream.

Providing an international perspective, we present author Kate Anderson Simons' complex research on armed conflict and early childhood outcomes in Ethiopia and Perú. Simons employs OLS regression techniques to find that children exposed to conflict may suffer from language disadvantages that have lifelong ramifications.

Shifting back to the US, R. Brent Wisner provides an interesting legal-based analysis on the politics of enforcement, specifically how the Department of Justice (DOJ) enforces the Federal Civil False Claims Act (FCA). Wisner specifies an OLS regression to find support for two policy recommendations aimed at reducing the effect of politics on enforcement.

Turning to education policy, Emilie C. Saleh examines the achievement gap between immigrant and native students in the US. Using OLS regression techniques that reveal a persistent achievement gap between immigrant and native student groups, Saleh argues that ignoring this gap may have important effects on the integration of immigrants and, in turn, US economic growth.

A final international study by Yasmein Asi investigates the impact of bed net ownership and use on malaria prevention for Liberian Children. Asi uses a logistic regression to find that insecticide-treated bed net (ITN) use reduces the risk of malaria for Liberian children under the age of five, but that the effect is weaker for mere ITN ownership. Asi concludes with detailed policy recommendations for bolstering ITN use.

Finally, our staff had the privilege of sitting down with economist Donald Marron, Director of the Tax Policy Center and former acting Director of the Congressional Budget Office (CBO). Among other insights, Professor Marron, who taught at GPPI until last year, shares his thoughts on why a strategy of short-term stimulus and long-term austerity may be best, but politically difficult to accomplish. Marron's ability to communicate complex economic concepts with eloquence is refreshing.

In sum, each author not only contributes to his or her research field, but also opens valuable avenues for future study. We cannot thank authors Cooper, Simons, Wisner, Saleh, and Asi enough for working with us throughout the publication process for this inaugural issue. It is our hope that this particular volume sets a precedent for publishing valuable student theses for years to come.

I would also like to extend the same gratitude toward the members of the GPPI community who contributed to our efforts this year, including our faculty advisor, Robert Bednarzik, and the faculty members who nominated theses, Gillette Hall, Ward Kay, Andreas Kern, Adam Thomas, and Andrew Wise.

I am most grateful to have worked with a remarkable group of peers to carry on the *Review's* thoughtful contributions to public policy discourse. Each and every member of the *Review* was vital to our astounding progress this year, which includes unprecedented blog traffic, first-ever policy forums, and spectacular fundraising events. This publication is the result of the particular dedication of Matt Doyle, Richard Harris, Kathryn Short, and each member of our exceptional print and interview editing teams.

Finally, I would like to extend special thanks to the Executive Team: Richard Harris, Kathryn Bailey, Luca Etter, Kathryn Short, Christina Moore, Matt Doyle, Jennie Herriot Hatfield, and Sarah Orzell. Their leadership, initiative, and dedication to excellence inspired me at every turn over the past year.

Congratulations, all, on another exceptional year.

Warmest regards,

Editor-in-Chief

Unlocking The American Dream:

Exploring Intergenerational Social Mobility and the Persistence of Economic Status in the United States

By David P. Cooper

David P. Cooper completed the Master of Public Policy at the Georgetown Public Policy Institute in 2011. This thesis was submitted in partial fulfillment of the degree requirement. Andreas Kern, PhD, served as adviser. David also holds a BA in English and Government from Georgetown University.

ABSTRACT

The United States has long been thought of as the "land of opportunity," where economic success is within reach for anyone who is willing to work hard. However, recent research into the transmission of economic status across generations has challenged this perception, showing that an individual's long-run earnings can be explained in large part by the relative socio-economic status of his or her parents. This paper explores this relationship in greater depth, looking at some of the contributing factors to economic mobility and examining whether the relative importance of these factors varies with income. I use forty years of data from the Panel Survey of Income Dynamics (PSID) to measure the persistence of economic status across generations and the role that education, race, religious preference, and father's labor force participation play in affecting the economic mobility of males. In addition to measuring economic mobility at the mean, this paper also uses quantile regression to see how the intergenerational correlation of income and its causes vary across the income distribution. Consistent with previous research, I find that the intergenerational earnings correlation is strongest when the son's income is low and becomes weaker as income increases. However, in contrast to previous research, I find that the effect of education in improving children's long-run earnings may have become larger for the wealthy than for the poor or middle class. I also identify significant effects for race and religion in the transmission of economic status, as well as a possible negative relationship between fathers' extended hours at work and their sons' long-run earnings.

I. INTRODUCTION

The United States has long been thought of as the "land of opportunity," where economic success is within reach for anyone who is willing to work hard. Yet this perception mainly comes from anecdotal tales and aspirational rhetoric, and there has been fairly limited empirical study into whether the US actually exhibits the socioeconomic mobility that these aphorisms imply. As early conflicting analyses have slowly been resolved, the growing consensus is that the US is not nearly as mobile a society as was previously thought. Researchers have found that, on average, roughly 40 percent of an individual's long-run earnings can be explained by the economic position of their parents. For any society that seeks to provide true equality of opportunity, this level of intergenerational correlation in earnings has potentially worrisome implications. Individuals have no choice as to the family into which they are born, and yet this act of chance may be one of the primary determinants of long-run economic success.

If public policy is to be used to alleviate disparities in economic opportunity, researchers and policymakers need to know more about how economic status is transmitted from one generation to the next. Direct empirical research into these questions has been limited. Only in the last several decades have researchers begun to test the different ways parental income or socioeconomic status influences child economic outcomes. This paper continues this research by investigating how the "transmission channels" of economic status—the genetic, cultural, environmental, and experiential contributors to long-run socioeconomic status—vary for individuals of different races, different religions, and different levels of income. Using the latest release of the Panel Study of Income Dynamics, I use traditional ordinary least squares (OLS) regression methods to establish a baseline model of the parent-child economic relationship. I then employ quantile regression to explore how the factors contributing to intergenerational economic outcomes vary at different levels of the income distribution.

"...the growing consensus is that the US is not nearly as mobile a society as was previously thought."

II. BACKGROUND AND LITERATURE REVIEW

Most research exploring parent-child economic outcomes is based upon the classic theoretical framework of human capital investment put forward most prominently by Gary Becker (1967). Becker's model postulates that parents make rationally-calculated investments in the human capital of their children—in the form of education, healthcare, nutrition—that eventually determine the child's success in the labor market. Parents with greater earnings or wealth are able to make larger such investments than parents of more limited means, thus making children born to wealthy parents more

likely to become wealthy themselves (Becker 1967; Becker and Tomes 1986).

Yet despite this theoretical foundation, early researchers found only weak correlations between parents' economic status and the long-run earnings of their children: most estimates found a correlation of earnings from fathers to sons of no more than 0.2, meaning no more than 20 percent of a son's long-run earnings can be explained by his father's level of earnings (Behrman and Taubman 1985; Sewell and Hauser 1975; or Becker and Tomes 1986).

But few of these initial analyses tracked the long-term economic outcomes of both individuals and their offspring. Further, these early studies were later shown to suffer from measurement error and under-representative samples that biased downward the correlation estimates between parents' income and offspring income. These issues led researchers to conclude that mobility in the United States was far more dynamic than it actually was (Solon, 1992). Since then, a number of large, longitudinal surveys have matured to a point where offspring of the original cohort can be treated as unique adult observations in the dataset, allowing researchers to directly observe the economic outcomes of both parents and children. The most frequently used of these is the University of Michigan's Panel Survey of Income Dynamics (PSID). This long-running survey has tracked a cohort of roughly 5,000 US families since 1968, with annual, and later biannual, surveys of every family member. Most estimates generated from the PSID of the intergenerational elasticity of income fall in the range of 0.34 to 0.54, with some of the more robust model specifications by Hertz (2002), Grawe (2004), and Lee and Solon (2009) generating average elasticities of 0.42, 0.47, and 0.44, respectively. These results indicate that for every dollar earned by a father in the US, we expect roughly another 40 cents in earnings for that father's son.

In order to understand what facilitates the father-son earnings correlation, Roemer (2004) provides a theoretical framework that postulates four "transmission channels" through which parents influence children's economic outcomes: 1) provision of social connections; 2) formation of beliefs and skills in children through family culture and investment; 3) genetic transmission of ability; and 4) formation of preferences and aspirations in children. Bowles and Gintis (2002) provide the first empirical test of this framework, explaining how the intergenerational correlation coefficient can be decomposed into the various components theorized to contribute to the persistence of economic status. For example, they theorize that the effect of an individual's "circumstances"—i.e. the conditions into which he or she is born—can be classified into three categories: environmental effects, genetic effects, and wealth effects. They estimate that, with an intergenerational correlation of 0.41, environmental factors contribute 0.20 of this correlation, genetic factors contribute 0.09, and the direct effect of wealth is 0.12.

"This paper seeks to expand upon these previous findings...to examine how the transmission of socioeconomic status in the United States changes at different points on the economic spectrum."

There is also the possibility that factors contributing to economic mobility for some social classes may differ from those of others. It may be more valuable to examine intergenerational correlations—and the mechanisms behind them—not at the average across the entire population, but rather at discrete income levels or for distinct population subsets. Eide and Showalter (1999) make the first contribution in this endeavor, using the quantile regression techniques described by Koenker and Bassett (1982) to calculate the intergenerational elasticity of income and a measure of the relative importance of education in the intergenerational transmission at different percentiles of the children's long-run income distribution.

This paper seeks to expand upon these previous findings by using the most recent PSID data to examine how the transmission of socioeconomic status in the United States changes at different points on the economic spectrum. Specifically, I follow up on the work of Eide and Showalter (1999), Bowles and Gintis (2002), and Hertz (2006) to assess how the intergenerational elasticity of income and the relative importance of education in the transmission of economic status change across the income distribution. I also test several other hypothesized transmission channels of economic status and assess how their effects might also change for different income classes.

III. METHODS

The basic model commonly used in intergenerational studies is of the following form:

$$lnY_c = \alpha + \beta lnY_p + \varepsilon_i \qquad (1)$$

where Y represents income or earnings, c denotes the child, and p is the parent. In this specification, β expresses the percentage change in the child's long-run earnings predicted by a percentage change in the parent's long-run earnings.

My analysis first uses the basic intergenerational model to measure the direct effect of parent income on child income. Income is measured in both generations using a three-year average of the respondent's income from ages 35 to 50. Using a multi-year average makes the estimate less susceptible to measurement error or single-year changes in the business cycle. Similarly, measuring the respondents' income during the "prime earning" years of life provides a better estimate of "lifetime" earnings (Lee and Solon 2009).

After establishing a basic model of intergenerational earnings correlation, I examine the specific transmission mechanisms through which economic status persists across generations. In

addition to the income measures in my initial model, subsequent specifications incorporate controls for race, religion, the child's years of education, the number of children in the parent's household, and a quadratic term measuring the deviation of the father's average weekly hours of work from the mean weekly hours of work. This final variable is designed to capture the effect—if any—that a parent's additional hours at work may have on their children's long-run earnings.

Finally, to better understand how each factor may have a different effect for individuals of different socioeconomic backgrounds, I use quantile regression to explore how the magnitudes change at different points on the income distribution. In the context of intergenerational mobility, quantile regression can show how the predicted income of a child at a particular centile of the income distribution changes with a change in the income of that child's parents. This relationship can be expressed by the equation:

$$Y_{c,n} = a_n + \delta_{Yp,n} Y_p \qquad (2)$$

where $Y_{c,n}$ represents the income of the child at the nth centile of the income distribution, and a_n and $\delta_{Yp,n}$ represent the separate intercept and slope coefficient of parent income's effect on child income at the nth centile of the child's income distribution. Using this method, an intergenerational correlation coefficient can be determined for any level of the son's earnings distribution.

IV. DATA

This paper follows the example of the most recent intergenerational studies in using the PSID. The dataset used for this paper consists of 1,424 individuals across 35 rounds of data collection from the PSID between the years 1968 and 2007. The full PSID study contains data on a larger sample of respondents; however, not all observations could be included for this study. First, observations from the full PSID are included in the sample only if they reported labor income earned between the ages of 35 and 50. Second, the dataset contains only observations listed as male heads of households. This is primarily due to the structure of the PSID survey design, which only collected data on male heads of households in its early years. While the survey was expanded include to income spousal information by 1970, the data is still structured around the household head. Some researchers have found this advantageous for examining intergenerational earnings correlations, as the omission of female respondents would preclude biases in the results due to male-female disparities in workforce participation (Corak 2004).

Finally, analysis is limited to those pairings of fathers and sons that both have at least 3 years of income information. Restricting the dataset in this way changes some of the demographic characteristics of the sample. Religious composition and the distribution of children in the household remains relatively constant both before and after observations

with missing income data are dropped. Racial/ethnic composition change more noticeably, with the proportion of white respondents growing by roughly seven percentage points, from 58.22 percent of the full sample to 65.10 percent in the paired father-son data. This corresponds to a slight drop in the number of black respondents, from 33.92 percent down to 31.39 percent of the sample, and a more pronounced decrease in the number of Hispanic and Asian respondents, from 3.58 percent down to 1.62 percent, and 0.90 percent to 0.21 percent, respectively.

This drop in the proportion of Hispanic and Asian respondents is an unfortunate consequence of the unique data requirements of this type of study. For the purpose of examining intergenerational changes and relative magnitudes of socioeconomic transmission channels, the sample is still valuable; however, conclusions about racial and ethnic differences may warrant further research with a more diverse sample.

Table 1 lists the descriptive statistics for observations used in the intergenerational model. At an inflation-adjusted value of $53,190.04 for fathers and $53,495.25 for sons, the paired observations have higher income levels than the larger US population; in 2007, mean income for males in the US was $47,137. Indeed, the mean income values for the paired subsample are noticeably higher than even for the larger PSID dataset—$40,788.67 for fathers and $48,000.36 for sons.[1] We can speculate that wealthier families may have stronger ties to social and professional networks that facilitate easier tracking by the survey's administrators. Moreover, the data requirements of multiple years of income data precludes *ex ante* those respondents who have struggled to maintain employment, whose mean incomes would likely be considerably lower than the paired father-son subsample.

While this deviation from the larger US population again speaks to the difficulty of maintaining a truly representative multi-generational dataset, the more interesting observation is that the inflation-adjusted incomes for fathers and sons are virtually identical. After adjusting for inflation, not only is there no change in mean income between the generations, the median income appears to have declined: from $46,091.44 in the fathers' generation to $41,760.90 in the sons'.

Table 2 reports the distribution of the sons' mean labor income by the race of the household head for the paired father-son observations used in the intergenerational model. To highlight particular differences with the larger PSID dataset, the table includes the distribution of the sons' mean income for the larger set of all sons, ages 35 to 50.

[1] A comparison of descriptive statistics for both the paired subsample and the larger PSID dataset can be found in the appendix of Cooper's full thesis on the *Georgetown Public Policy Review* website, www.gppreview.com.

Table 1. Descriptive Statistics – Paired Father & Son Observations

Principal Variables of Interest:	Observations	Min.	Max.	Median	Mean	Std. Dev.
Son's Annual Labor Income	1,424	744.31	749,600,00	41,760.90	53,495.25	53,560.29
Father's Annual Labor Income	1,424	109.14	446,553.10	46,091.44	53,190.04	39,563.74
Mother's Annual Labor Income	1,114	49.68	169,114.30	11,754.80	15,316.12	14,294.47
Son's Average Weekly Work Hours	1,424	2.73	76.84	42.10	42.23	10.32
Father's Average Weekly Work Hours	1,424	0.46	94.42	42.56	43.97	10.14
Mother's Average Weekly Work Hours	1,106	0.08	73.93	24.10	23.42	13.24
Son's Years of Education	1,415	6.00	17.00	13.00	13.44	2.10
Number of Children in Parent Family[1]	1,372	0.00	9.00	2.00	2.92	2.05

Note: Labor Income and Work Hours for each observation are recorded for multiple years, 1968-2007, when the respondent was between the ages of 35 and 50. For this reason, descriptive statistics of each individual year are omitted.
[1]Average number of children calculated during years when head of household is between ages 35 and 50.

Table 2. Distribution of Sons' Labor Income by Race

	Paired Father-Son Observations				*Full Data Set*			
Race	N	Percentage	Son's Mean Income	Std. Dev.	N	Percentage	Son's Mean Income	Std. Dev.
White	927	65.10%	$63,679.11	61,073.11	4450	58.22%	$57,779.34	54,714.34
Black	447	31.39%	$31,966.80	31,966.80	2593	33.92%	$32,135.31	20,379.63
American Indian	8	0.56%	$35,969.68	35,969.68	53	0.69%	$35,818.03	24,770.00
Asian	3	0.21%	$139,804.20	139,804.20	69	0.90%	$70,378.54	38,990.17
Hispanic	23	1.62%	$63,349.31	63,349.31	274	3.58%	$38,426.38	42,317.34
Other	11	0.77%	$48,969.85	48,969.85	154	2.01%	$46,351.74	55,049.72
NR / DK	5	0.35%	$30,934.04	30,934.04	49	0.64%	$40,917.72	30,741.23
(missing)	-	-	-	-	2	0.03%	$21,680.13	1,762.27
Total:	1424	100.00%	$53,495.25	51,798.79	7644	100.00%	$48,000.36	42,112.61

Note: Calculations based upon PSID data for years 1967-2007 for male heads of households reporting at least three years of labor income earned between the ages 35 and 50.

Table 3 shows the distribution of sons' mean income by religious preference for the paired father-son subsample. While there was again some bias toward wealthier respondents in the paired subsample, the overall distribution of religious preferences between the full sample and the paired father-son subsample is considerably more consistent than the racial distribution.

Table 4 shows the distribution of the number of children in each household during the father's prime earning years and the mean labor income for each family size; the numbers are fairly consistent across both the full data set and the paired sub-sample.

Table 3. Distribution of Sons' Labor Income by Religious Affiliation

Religion	N	Percentage	Son's Mean Labor Income	Std. Dev.
Baptist	337	23.67%	$38,548.78	23,245.55
Methodist	95	6.67%	$53,981.60	63,651.63
Episcopalian	12	0.84%	$97,270.14	75,850.00
Presbyterian	40	2.81%	$70,229.64	53,533.11
Lutheran	61	4.28%	$57,373.48	32,046.68
Bahai/Mormon	5	0.35%	$71,388.28	15,969.56
General Protestant	48	3.37%	$51,770.94	29,003.26
Catholic	225	15.80%	$64,973.60	43,360.73
Jewish	33	2.32%	$119,864.60	115,993.20
Other Non-Christian, Muslim	6	0.42%	$101,849.30	172,955.20
Other/Atheist /Agnostic /DK	481	33.78%	$49,457.76	61,344.95
Greek/Russian Orthodox	1	0.07%	$50,467.52	-
(missing)	80	5.62%	$58,931.93	39,541.89
Total:	1424	100.00%	$53,495.25	47,507.71

Note: Calculations based upon PSID data for years 1967-2007 for male heads of households reporting at least three years of labor income earned between the ages 35 and 50.

Table 4. Distribution of Sons' Labor Income by Number of Children in Father's Family

Average Number of Children	N	Percentage	Son's Mean Labor Income	Std. Dev.
No children	53	3.72%	$54,596.51	54,662.22
1 child	315	22.12%	$58,891.08	58,891.08
2 children	338	23.74%	$65,265.21	63,460.55
3 children	272	19.10%	$54,325.08	58,049.78
4 children	130	9.13%	$41,754.76	22,993.58
5 children	100	7.02%	$37,410.55	23,839.10
6 children	66	4.63%	$38,714.64	40,134.71
7 children	32	2.25%	$34,577.69	23,363.00
8 children	28	1.97%	$24,940.58	14,288.64
9 or more children	38	2.67%	$34,816.16	30,208.74
(missing)	52	3.65%	$53,506.96	47,894.69
Total	1,424	100.00%	$53,311.03	50,207.24

Note: Calculations based upon PSID data for years 1967-2007 for male heads of households reporting at least three years of labor income earned between the ages 35 and 50.

V. ESTIMATION RESULTS

A) OLS Estimation

The OLS results for the basic intergenerational model are presented in Table 5. Column 1 describes strictly the effect of the log of the father's average labor income on the log of the son's average labor income. The results indicate a highly significant intergenerational income elasticity of 0.417. Without controlling for any other factors, every one percent increase in the father's long-run income leads to a 0.417 percent increase in the son's long-run income, meaning roughly 40 percent of a child's long-run income is predicted by the income of their parents. This result is consistent with recent research in this field (Hertz 2002; Grawe 2004; and Solon 2009).

Column 2 is the model controlling for the son's years of education. Once again, the results are highly significant and show a noticeable drop in the independent effect of father's income on son's income, down to 0.27. Eide and Showalter (1999) observe a similar decrease in the independent effect of the father's income from 0.34 to 0.24 when controlling for the son's level of education.

The model in Column 3 adds an additional control for the number of children in the father's household (each additional sibling to the sons in the model). This model indicates a significant, negative effect, predicting that for each additional child in the father's household we expect a decrease in the son's long-run earnings of 1.9 percent. According to Becker's hypothesis (1983), this effect is essentially the diluting of the parents' human capital resources as they are divided among a greater number of children.

Hertz (2002) speculates that the economic mobility of children may also be influenced by work habits they observe in their parents—that children of homes where parents spend long hours in the labor market might exhibit a stronger work ethic and thus greater economic mobility. He models this possibility using indicator variables for household heads who work 2,000 to 3,000 hours annually and more than 3,000 hours annually, yet finds no significant effects. The model in Column 4 tests this same hypothesis, but contains controls for the deviation of the father's average weekly number of work hours from the mean number of work hours, and a quadratic term to allow for a change in the direction of the effect. When holding the father's income constant, we find that additional hours of work beyond the weekly mean of forty has a small, decreasing negative effect upon the son's long-run income. Although the coefficient on the linear component of this variable is not individually significant, a joint test of the linear and quadratic variables does indicate a significant effect ($F(2, 1357)=3.96$, $p=0.019$). The magnitude of this effect is so small that that we cannot draw major conclusions from these findings; however, the sign of the effect, and its persistence

"The additional hours beyond the mean that parents spend in the labor market may not instill a stronger work ethic in their children, but, instead, may actually have negative consequences."

across further specifications, suggests a different interpretation from Hertz's initial speculation. The additional hours beyond the mean that parents spend in the labor market may not instill a stronger work ethic in their children, but, instead, may actually have negative consequences as each additional hour of work represents one fewer hour available for the parent to engage in the child's development.[2]

It is also interesting to note that omitting the labor-hours variable in Models 1, 2, and 3 places a noticeable downward bias on the father's income coefficient. In the model in column 3, the coefficient on the log of the father's income predicts that a one percent increase in the father's income will lead to a 0.255 percent increase in the son's income. Yet in Column 4, after controlling for the father's average weekly work hours, a one percent increase in the father's income now predicts a 0.30 percent increase in the son's income. This apparent bias may speak to the same effect of

[2] See Phillips (2002) for a summary of related literature.

Table 5. OLS Results of the Intergenerational Model with Controls for Son's Years of Education, Siblings, and Father's Weekly Work Hours

Dependent Variable: Log of Son's Income Predictor	Model 1	Model 2 Includes Education	Model 3 Includes Number of Children	Model 4 Includes Father's Work Hours
Log of Father's Income	0.417***	0.272***	0.255***	0.300***
	(0.025)	(0.025)	(0.026)	(0.035)
Son's Years of Education		0.147***	0.146***	0.143***
		(0.009)	(0.010)	(0.010)
Number of Children in Household			-0.019*	-0.016*
			(0.010)	(0.010)
Deviation of Father's Weekly Work Hours from Mean				-0.003
				(0.002)
Deviation of Father's Work Hours Squared				0.000***
				(0.000)
Constant	6.166***	5.711***	5.961***	5.509***
	(0.265)	(0.248)	(0.281)	(0.361)
N	1,424	1,415	1,363	1,363
Adjusted R^2	0.165	0.295	0.297	0.300

Note: *** p < 0.01; ** p< 0.05; *p<0.10. Calculations based upon PSID data for years 1967-2007 for male heads of households reporting at least three years of labor income during the years when they were ages 35 to 50. Standard errors in parentheses.

additional hours spent at work rather than at home. Children born to fathers making more money for the same hours of work will be better off than those working additional hours to earn the same income. These findings are suggestive, but they are far from conclusive.

Table 6 shows the OLS results for the intergenerational model with indicator variables for both race and reported religion.

The model with controls for race shows significant negative effects for the individual coefficients on the black and Hispanic indicators. Overall, the full set of race variables are jointly highly significant ($F(6, 1353)=10.03$, $p<0.0001$). It is interesting to note how dramatically the independent effect of the father's income variable decreases after controlling for race. At 0.30 in the basic human capital model shown in Column 1, the coefficient on father's income drops to 0.202 in the model with racial controls. On one hand, this drop can be viewed as a good thing, as it indicates that when race is held constant, there may be greater economic mobility than the basic model suggests. Unfortunately, it also implies that race is clearly an important mitigating factor in intergenerational outcomes.

The large, significant, negative coefficients on the black and Hispanic variables, contrasted with the large positive coefficient on the Asian variable, underscore this fact. With a value of 0.544 in the racial model, or 0.644 in the model controlling for race and religion in Column 4, the coefficient on the Asian variable indicates that Asian sons are predicted to have a mean income that is between 72 percent and 90 percent larger than the mean income of white sons.[3] Although Asian respondents may have significantly larger mean incomes, the magnitude of this difference is skewed by the small number of Asian respondents in the paired father-son subsample with an unrepresentative mean income.

Still, with these subsample characteristics in mind, it is particularly noteworthy that the coefficient on the Hispanic indicator is significant and shows a large negative effect. Like the Asian subsample used in the model, the Hispanic father-son pairs have a much larger mean income than the full data set: $63,349.31 in the paired subsample versus $38,426.38 in the full data set. Yet, after controlling for education, work hours, and the number of children in the father's household, the coefficient on the Hispanic variable indicates that Hispanic sons have incomes 22 percent lower than white sons, holding their father's income equal. For black respondents, the

"...there may be greater economic mobility than the basic model suggests. Unfortunately...race is clearly an important mitigating factor in intergenerational outcomes."

[3] The percentage differences are calculated for each regression coefficient using the formula. See Wooldridge (2009), p. 233 for further details.

effect is even more pronounced: with a coefficient of -0.344, black sons typically have incomes 29 percent lower than white sons with equivalent parental incomes. As noted before, the proportion of minority respondents in the sample is small—particularly for Hispanic and Asian respondents—making it difficult to investigate why such racial disparities in economic mobility exist. Nevertheless, these results reinforce previous findings that such disparities do exist and are worthy of further investigation with more representative data sets.

Theoretically, religion may play a similar role in the transmission of economic status. As Bowles and Gintis (2002) explain, "economic success is influenced not only by a person's traits, but also by characteristics of the group of individuals with whom the person typically interacts." Religious affiliation can influence economic mobility through the provision of social and job networks, but also in more nuanced ways, such as increasing conformity to particular social norms and practices that may or may not be consistent with greater economic success (Borjas 1995; Durlauf 2001). After controlling for race, the coefficients on the Baptist, Protestant, Catholic, and Jewish indicator variables all showed a significant, positive effect upon the log of son's income. The largest of these effects is for Jewish sons, who are predicted to earn 25.7 percent more than atheist or agnostic sons with fathers of equivalent income. Similarly, Catholic sons earn 20.6 percent more than atheist or agnostic sons, while Protestant and Baptist sons earn 21.5 percent and 9.6 percent more, respectively.

The fact that these four religious affiliations have a positive effect could demonstrate a larger, general positive effect of religious participation. On a basic level, religious communities are incubators of social capital (Smidt 2003). They can provide sources of additional education for children—such as Sunday School or Hebrew classes—and can expand job networks. Additionally, religious communities often provide the type of extended social safety net that can safeguard members against crises and income shocks that may endanger children's long-run economic potential (Cnaan 1999).

B) Quantile Estimation

Regression techniques that estimate effects at specific points on the income distribution can be more useful in exploring how social mobility changes at different positions on the socioeconomic ladder.

Table 7 reports the OLS and quantile regression estimations of the intergenerational income elasticity at

"The fact that these four religious affiliations have a positive effect could demonstrate a larger, general positive effect of religious participation... religious communities are incubators of social capital...they can provide sources of additional education for children."

Table 6. OLS Results of Intergenerational Model with Controls for Race and Religion

Dependent Variable: Log of Son's Income Predictor	Model 1	Model 2 Includes Race Variables	Model 3 Includes Religion Variables	Model 4 Includes All Variables
Log Father's Income	0.300***	0.202***	0.261***	0.183***
	(0.035)	(0.037)	(0.036)	(0.037)
Years of Education	0.143***	0.140***	0.139***	0.138***
	(0.010)	(0.010)	(0.010)	(0.010)
Number of Children in Household	-0.016*	0.004	-0.014	0.004
	(0.010)	(0.010)	(0.010)	(0.010)
Deviation of Father's Weekly Work Hours from Mean	-0.003	-0.000	-0.001	0.001
	(0.002)	(0.002)	(0.003)	(0.002)
Deviation of Father's Work Hours Squared	0.000***	0.000	0.000**	0.000
	(0.000)	(0.000)	(0.000)	(0.000)
Black		-0.332***		-0.320***
		(0.048)		(0.051)
Hispanic		-0.253*		-0.309**
		(0.140)		(0.141)
Asian		0.544		0.644*
		(0.384)		(0.384)
Baptist			0.006	0.092*
			(0.048)	(0.049)
Lutheran			0.155*	0.099
			(0.093)	(0.092)
General Protestant			0.188*	0.195*
			(0.103)	(0.102)
Catholic			0.217***	0.187***
			(0.055)	(0.055)
Jewish			0.233*	0.229*
			(0.132)	(0.130)
Constant	5.509***	6.638***	5.897***	6.788***
	(0.361)	(0.391)	(0.375)	(0.396)
N	1,363	1,363	1,363	1,363
R^2	0.300	0.324	0.308	0.329

Note: *** p < 0.01; ** p< 0.05; * p<0.10; Race dummy "white" and religion dummy "Other, Atheist, Agnostic, No religion" omitted as reference group. Calculations based upon PSID data for years 1967-2007 for male heads of households reporting at least three years of labor income during the years when they were ages 35 to 50. Standard errors in parentheses. Only significant coefficient results shown; controls for additional race and religion values not displayed.

Table 7. Quantile Regression Results of Baseline Intergenerational Model

Dependent Variable: Log of Son's Income

Predictor	OLS	Quantile						
		0.05	0.10	0.25	0.50	0.75	0.90	0.95
Log Father's Income	0.417*** (0.025)	0.633*** (0.141)	0.519*** (0.076)	0.491*** (0.050)	0.455*** (0.041)	0.406*** (0.041)	0.384*** (0.079)	0.245*** (0.076)
Pseudo-R^2	0.17	0.1	0.09	0.09	0.09	0.10	0.08	0.07
N	1,424							

Note: *** p < 0.01; ** p< 0.05; * p<0.10; Race dummy "white" and religion dummy "Other, Atheist, Agnostic, No religion" omitted as reference group. Calculations based upon PSID data for years 1967-2007 for male heads of households reporting at least three years of labor income during the years when they were ages 35 to 50. Standard errors in parentheses. Only significant coefficient results shown; controls for additional race and religion values not displayed.

the 5th, 10th, 25th, 50th, 75th, 90th, and 95th percentiles of the income distribution in the son's generation.[4] All of the estimates are statistically different from zero at the 1 percent level. The results clearly show a decreasing trend in the effect of the father's income as the son's income level increases, with a coefficient on the father's log income of 0.63 at the 0.05 quantile, declining all the way to 0.25 at the 0.95 quantile.

These results are consistent with previous estimations that found a declining trend in the intergenerational income elasticity from 0.77 for the 0.05 quantile down to 0.19 at the 0.90 quantile (Eide and Showalter 1999; Grawe 2004). These findings reinforce the hypothesis that the persistence of economic status is stronger for those at the bottom of the income distribution than for those at the top. Put differently, it suggests that each additional dollar for a poor father has a stronger positive effect upon the long-run income of his child than each additional dollar's effect on the long-run income of a rich father's son.

Table 8 reports the OLS and quantile estimation results for four separate quantile regressions. The first model is the baseline intergenerational income elasticity model previously reported. Model 2 adds a control for the son's years of education. Model 3 adds the number of children in the father's household. Model 4 contains the quadratic term for the deviation of the father's weekly work hours from the mean. The results are reported in this fashion to allow comparisons between the strength of the intergenerational income elasticity in Model 1 and its effects in subsequent models across the conditional distribution of the son's income. As with the OLS results, changes in the magnitude of the coefficient on father's income, after controlling for additional factors, reflect the relative importance of each of these factors in the transmission of economic status.

[4] Because the quantile regression models used throughout this paper are all estimated on the conditional distribution of son's income, the terms "percentile" and "quantile" are used interchangeably to refer to the different levels of son's income.

Looking first at Model 2, we once again see a highly significant, declining effect of father's income as the son's income level increases. The magnitude of this effect after controlling for education, however, changes dramatically at all income levels. At the 5th percentile, the coefficient on the father's income drops from 0.633 in Model 1 to 0.363 in Model 2, a nearly 43 percent change. The drop at the 90th percentile is even more pronounced, falling from 0.384 in Model 1 to 0.180 in Model 2, a 53 percent change. All other quantile estimates of the father's income coefficient are reduced in Model 2 by roughly a third. This is consistent with the reduction that occurs in the OLS model, a 34.8 percent drop, as well as with previous research (see Eide and Showalter 1999).

Interestingly, the magnitude of son's level of education appears to have a somewhat parabolic shape across the distribution, going from 0.155 and 0.157 respectively at the 5th and 10th percentiles, down to a low of 0.124 at the 50thpercentile, then back up to highs of 0.159 and 0.182 at the 90th and 95th percentiles. This effect is significantly different from zero at the 1 percent level in all cases.[5] This result is noticeably different from Eide and Showalter's (1999) observation that the son's years of schooling have the largest effect at the 10th percentile, and the smallest at the 75th percentile.

Whereas Eide and Showalter could interpret their results as evidence that education is more valuable at the bottom of the income distribution, the findings above suggest that education becomes relatively more valuable at the tails of the distribution and most valuable at the top. It is possible that changes in the income distribution from the time of their study—their paper employs PSID data of the father's generation in the years 1968-1970 and the son's generation in years 1984-1991—may account for this change. An increasing concentration of US wealth in the upper percentiles—consistent with this paper's previously noted increased income inequality — combined with unequal wage growth over the last two decades, may be driving this difference in results.

The basic interpretation that education has become more valuable at the top of the income distribution than at the median is potentially unsettling; such differences can only serve to further stratify the distribution of income. For a useful comparison, similar to Eide and Showalter's (1999) paper, consider the differences in log earnings for individuals at the 90th and 50th percentiles of income for those who have completed college versus those who have only completed high school.

"...we once again see a highly significant, declining effect of father's income as the son's income level increases. The magnitude of this effect after controlling for education, however, changes dramatically at all income levels."

[5] This difference in magnitude was significant between the 90th and the 25th, 50th, and 75th percentiles, as well as between the 95th and the 25th, 50th, and 75th percentiles.

The 50th percentile of log earnings for college graduates is 11.17, and for high school graduates it is 10.46—a difference of 0.65 points. At the 90th percentile, the log of earnings for college graduates is 11.94, while for high school graduates it is 11.17—a difference of 0.77 points. This simple comparison highlights the effect described in the quantile results: the four years of college for sons at the top of the income distribution correlates with a larger increase in income than it does for sons at the median income. If this trend continues, it will only further expand the already broadening gap in distribution of income in the US.

Model 3 controls for the number of children in the father's household to capture the effect of each additional sibling on the observed son's long-run earnings. In the quantile estimation, the coefficient on this variable is significant only at the 50th and 75th percentile of sons' income, although, at all levels of income, the effect is negative and of roughly the same magnitude. The addition of this variable into the model does reduce the magnitude of the father's income coefficient in all but the 5th percentile, but only by a small percentage. For children born into wealthier families, the financial burden of an additional child may be negligible. For children who are born into less affluent families and who still achieve high levels of income, the impact of additional siblings on the amount of resources available to each child is simply not a significant factor in their eventual economic success.

"The basic interpretation that education has become more valuable at the top of the income distribution than at the median is potentially unsettling; such differences can only serve to further stratify the distribution of income."

For sons born into poverty who ultimately remain at the lower levels of the income distribution, the additional tax credits and income support measures that are granted for each additional child in low-income families may offset some of the decrease in resources available to each child. Another possible explanation is that sons at the lower levels of the income distribution may lack suitable access to higher education, i.e., the cost of post-secondary education may have been prohibitive for them from the start. If this is the case, then the added challenge to that child's parents of meeting those costs when an additional child is born is never a significant factor. At the 50th and 75th percentile of the sons' income distribution, however, the cost of each additional child in the father's household may have a more substantive impact. Particularly in the context of education costs, the possibility of private schooling or college for a child may be significantly diminished with an increasing number of siblings.

Model 4 includes the linear and quadratic controls for the deviation of the father's weekly work hours from the mean. The quantile coefficients add some interesting nuance to the OLS

Table 8. Quantile Regression Results of Intergenerational Models with Controls for Son's Education Level, Number of Children in Father's Household, and Deviation of Father's Weekly Work Hours

Dependent Variable: Log of Son's Income

Predictor	OLS	Quantile						
		0.05	0.10	0.25	0.50	0.75	0.90	0.95
Model 1: Baseline Specification with only Father's Income								
Log Father's Income	0.417***	0.633***	0.519***	0.491***	0.455***	0.406***	0.384***	0.245***
	(0.025)	(0.141)	(0.076)	(0.050)	(0.041)	(0.041)	(0.079)	(0.076)
Pseudo-R²	0.17	0.1	0.09	0.09	0.09	0.10	0.08	0.07
N	1,424							
Model 2: Specification with Son's Years of Education								
Log Father's Income	0.272***	0.363***	0.339***	0.336***	0.312***	0.270***	0.180***	0.166***
	(0.025)	(0.117)	(0.067)	(0.048)	(0.034)	(0.045)	(0.036)	(0.040)
Years of Education	0.147***	0.155***	0.157***	0.136***	0.124***	0.132***	0.159***	0.182***
	(0.009)	(0.031)	(0.025)	(0.015)	(0.009)	(0.010)	(0.013)	(0.020)
Pseudo-R²	0.295	0.14	0.13	0.14	0.17	0.19	0.21	0.21
N	1,412							
Model 3: Specification with Number of Children in Father's Household								
Log Father's Income	0.255***	0.364**	0.329***	0.312***	0.296***	0.262***	0.169***	0.156***
	(0.026)	(0.160)	(0.079)	(0.058)	(0.045)	(0.047)	(0.045)	(0.043)
Years of Education	0.146***	0.145***	0.154***	0.131***	0.123***	0.129***	0.156***	0.178***
	(0.010)	(0.035)	(0.027)	(0.013)	(0.010)	(0.011)	(0.014)	(0.020)
Number of Children in Household	-0.019*	-0.021	-0.030	-0.018	-0.019**	-0.019*	-0.024	-0.023
	(0.010)	(0.037)	(0.025)	(0.011)	(0.009)	(0.011)	(0.017)	(0.020)
Pseudo-R²	0.297	0.14	0.13	0.15	0.17	0.19	0.21	0.22
N	1,363							
Model 4: Specification with Father's Weekly Work Hours								
Log Father's Income	0.300***	0.145	0.234**	0.278***	0.327***	0.305***	0.344***	0.302***
	(0.035)	(0.165)	(0.098)	(0.050)	(0.034)	(0.029)	(0.048)	(0.085)
Years of Education	0.143***	0.174***	0.157***	0.130***	0.121***	0.134***	0.138***	0.169***
	(0.010)	(0.031)	(0.024)	(0.011)	(0.009)	(0.009)	(0.013)	(0.019)
Number of Children in Household	-0.016*	-0.043	-0.027	-0.022*	-0.018**	-0.018*	-0.026**	-0.010
	(0.010)	(0.036)	(0.024)	(0.012)	(0.008)	(0.010)	(0.012)	(0.020)
Deviation of Father's Weekly Work Hours from Mean	-0.003	0.013	0.011	0.004	-0.004	-0.010***	-0.009***	-0.006
	(0.002)	(0.011)	(0.008)	(0.006)	(0.004)	(0.003)	(0.003)	(0.005)
Deviation of Father's Work Hours Squared	0.000***	-0.000	-0.000	0.000	0.000*	0.000**	0.001***	0.001**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Pseudo-R²	0.30	0.15	0.13	0.15	0.17	0.20	0.23	0.23
N	1,363							

Note: *** p < 0.01; ** p< 0.05; * p < 0.10. Results calculated using quantile estimation based upon PSID data for years 1967-2007 for male heads of households reporting at least three years of labor income during the years when they were ages 35-50. Standard errors generated using bootstrapping with 100 repetitions.

results. Although the linear term in the OLS regression is not significant at standard levels, the quantile estimation reports highly significant effects for both the linear and quadratic terms at the 7th and 90th percentiles. Both terms are jointly significant at the 50th and 95th percentiles. In these cases, the results show a small, decreasing negative effect of roughly -0.01, which can be interpreted as a reduction of roughly 1 percent in the son's income resulting from each additional hour his father spends at work each week.

"For children who are born into less affluent families and who still achieve high levels of income, the impact of additional siblings on the amount of resources available to each child is simply not a significant factor in their eventual economic success."

As noted in the OLS results, this negative coefficient implies that, all else being equal, sons whose fathers spend additional hours in the workplace are predicted to achieve lower long-term earnings than their peers whose fathers earned the same income with fewer hours of work. According to the quantile estimation, this effect applies particularly to sons at higher levels of the income distribution, which may be more demonstrative of selection issues than a causal relationship. Sons who achieve high levels of income, yet whose fathers worked longer hours than their peers, may have simply come from less affluent backgrounds. In other words, the son whose father earns the same level of income for less work is coming from a more privileged starting position.

The other important result to note from Model 4 is the change in strength of the father's income coefficient. In the 50th through 95th quantiles, the addition of the work hours variable causes the coefficient on the log of fathers' income to rise dramatically, in some cases more than doubling in magnitude. For example, the coefficient on the father's income variable in Model 3 at the 90th quantile is 0.169. After controlling for the father's weekly work hours in Model 4, this coefficient rises to 0.344, an increase of 104 percent. Only at the 5th, 10th and 25th percentiles does the coefficient on the father's income variable decrease with the addition of the father's work hours variable. Given that the other variables in the model—son's years of education and the number of children in the father's household—remain relatively unchanged, this suggests two possible conclusions: 1) For sons at the bottom of the income distribution, there are other omitted factors that are still more important in explaining these individuals' eventual economic position; and 2) for children at the top of the income distribution, their parents' level of income is a particularly important factor, especially when the parents' hours of work are held constant.

Finally, Table 9 presents the quantile estimation results for the regression predicting son's log income, with controls for father's log income, the

son's years of education, the number of children in the father's household, the father's weekly work hours and indicator dummies for race and religious preference. Only variables with significant results are shown. After controlling for race and religion, we again see similar trends in the magnitude of the father's income as observed in Model 4, with a high value of 0.257 at the 95th percentile and a low of 0.08 at the 10th percentile, although this value is not statistically significant. The effects for son's years of education, the number of children in the father's household, and the father's weekly work hours remain relatively unchanged.

Of the racial indicators, the coefficient on the black variable remains negative and highly significant at all levels of income, although it does diminish in strength through the middle of the distribution when compared to the tails. The coefficient has its strongest negative value of -0.4 at the 5th percentile and its weakest negative effect of -0.25 at the 50th percentile. This may reflect a growing black presence in the American middle class, although black Americans are clearly still disadvantaged at the highest and lowest levels of income. As noted in the OLS results section, the significant, large positive effects shown for Asians are likely driven by a lack of adequate Asian participants in the sample.

The positive effect of religious participation observed in the OLS estimation remains significant only at the lower end of the son's income distribution. This is consistent with the theory that religious communities may provide some level of social insurance for families at the lower end of the income distribution that might otherwise fall into deeper levels of poverty.

VI. CONCLUSION

The results presented in this paper confirm what an increasing number of researchers have concluded: socioeconomic mobility in the US is significantly lower than was previously thought and individuals' long-run economic position remains closely tied to the economic status into which they are born. Avoiding the use of a specific set of calendar years, and comparing the individual earnings of both fathers and sons at equivalent points in the lifecycle, I find an intergenerational correlation of income consistent with previous findings that, on average, roughly 40 percent of a son's income can be predicted by the income of his father. More importantly, I find that the intergenerational correlation of earnings is considerably stronger at lower levels of the income distribution, just as earlier research has also concluded. This phenomenon is only likely to grow stronger as income inequality in the US continues to expand.

"...socioeconomic mobility in the US is significantly lower than was previously thought and individuals' long-run economic position remains closely tied to the economic status into which they are born."

Table 9. Quantile Estimation of the Log of Son's Income by Father's Income, Son's Education, Number of Siblings, Father's Weekly Work Hours, Race, and Religion

Dependent Variable: Log of Son's Income

Predictor	OLS	Quantile						
		0.05	0.10	0.25	0.50	0.75	0.90	0.95
Log Father's Income	0.183***	0.082	0.122	0.247***	0.204***	0.203***	0.243***	0.257***
	(0.037)	(0.143)	(0.087)	(0.061)	(0.050)	(0.038)	(0.059)	(0.080)
Years of Education	0.138***	0.137***	0.124***	0.119***	0.121***	0.135***	0.135***	0.143***
	(0.010)	(0.035)	(0.022)	(0.016)	(0.009)	(0.009)	(0.014)	(0.022)
Number of Children in Father's Household	0.004	-0.021	-0.004	0.006	0.004	-0.000	-0.001	0.003
	(0.010)	(0.034)	(0.027)	(0.015)	(0.011)	(0.008)	(0.016)	(0.022)
Deviation of Father's Weekly Work Hours from Mean	0.001	0.016	0.013*	0.002	-0.001	-0.008***	-0.007*	-0.009*
	(0.002)	(0.010)	(0.008)	(0.005)	(0.003)	(0.002)	(0.004)	(0.005)
Deviation of Father's Work Hours Squared	0.000	-0.000	-0.000	0.000	0.000	0.000*	0.000**	0.000**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Black	-0.320***	-0.397**	-0.355***	-0.253***	-0.248***	-0.255***	-0.234***	-0.310***
	(0.051)	(0.200)	(0.133)	(0.082)	(0.068)	(0.049)	(0.072)	(0.094)
Hispanic	-0.309**	-0.646	-0.687	-0.326	-0.279	0.167	0.031	-0.091
	(0.141)	(0.890)	(0.772)	(0.260)	(0.205)	(0.256)	(0.160)	(0.170)
American Indian	-0.208	-0.155	-0.447	-0.141	-0.205	-0.062	-0.307**	-0.479***
	(0.237)	(0.657)	(0.599)	(0.552)	(0.342)	(0.234)	(0.125)	(0.118)
Asian	0.644*	1.992***	1.555***	0.947***	0.565***	0.333***	-0.026	-0.250
	(0.384)	(0.531)	(0.413)	(0.266)	(0.173)	(0.122)	(0.120)	(0.156)
Baptist	0.092*	0.416**	0.267*	0.094	0.035	0.024	-0.093	-0.080
	(0.049)	(0.210)	(0.148)	(0.078)	(0.048)	(0.044)	(0.070)	(0.098)
Methodist	-0.021	0.349**	0.079	-0.131	-0.072	-0.069	-0.104	0.019
	(0.075)	(0.176)	(0.133)	(0.105)	(0.063)	(0.075)	(0.113)	(0.148)
Lutheran	0.099	0.588*	0.347**	0.143	0.097	0.060	-0.076	-0.123
	(0.092)	(0.320)	(0.144)	(0.139)	(0.093)	(0.079)	(0.097)	(0.177)
Mormon	0.365	1.182***	0.761*	0.239	0.482	0.348	-0.063	-0.235
	(0.382)	(0.442)	(0.389)	(0.348)	(0.326)	(0.291)	(0.291)	(0.299)
Protestant	0.195*	0.743***	0.438***	0.232*	0.143	0.074	-0.078	-0.142
	(0.102)	(0.180)	(0.133)	(0.134)	(0.111)	(0.082)	(0.092)	(0.101)
Catholic	0.187***	0.598***	0.410***	0.177**	0.188***	0.088*	0.016	-0.047
	(0.055)	(0.175)	(0.104)	(0.072)	(0.038)	(0.047)	(0.075)	(0.119)
Jewish	0.229*	0.702***	0.323	0.031	0.138	0.205	0.734*	0.561
	(0.130)	(0.252)	(0.217)	(0.238)	(0.101)	(0.210)	(0.423)	(0.427)
Pseudo-R^2	0.329	0.20	0.18	0.18	0.20	0.23	0.26	0.27
N	1,363	1,363	1,363	1,363	1,363	1,363	1,363	1,363

Note: *** $p < 0.01$; ** $p < 0.05$; * $p < 0.10$. Results calculated using quantile estimation based upon PSID data for years 1967-2007 for male heads of households reporting at least three years of labor income during the years when they were ages 35-50. Standard errors generated using bootstrapping with 100 repetitions.

As one would expect, education continues to have a strong, positive effect on children's long-run economic prospects. However, in contrast to previous research, I find that the effect of education may be shifting to benefit those at the top of the income distribution more than those at the bottom or in the middle class. Given the aforementioned trends in income inequality, this finding has particularly disturbing implications. If an additional year of education has a stronger positive effect for a child at the top of the income distribution than one at the median, then this can only further widen the income gap. Furthermore, if this result is a consequence of differences in the quality of education available to different income classes, the phenomenon will only reinforce itself. Without conscious policies to make high-quality education available to all income groups, education will not serve to level the playing field, but rather will exacerbate existing differences in economic mobility such that the rich and the poor will be "playing" on two completely separate fields.

Attempts to identify how racial factors might contribute to economic mobility are less conclusive, although they show that black children in America continue to be at a disadvantage to their white counterparts, even when their father's incomes are equivalent. Similar trends may exist for Hispanic children as well. Unfortunately, the models employing racial indicators are limited by a lack of suitable data, and even with a more representative data set, this approach may not provide major insight into why race has such a strong effect upon economic mobility.

Although previous research has noted religion's possible role in the transmission of economic status, the results presented here add some nuance to this relationship. In cases where religious affiliation has a significant effect upon long-run incomes, this effect is largely limited to individuals at lower levels of the income distribution. This could indicate the role of some religious communities as providers of an extended social safety net outside the traditional family structure. Far from being conclusive, this finding could also be an interesting focus for future research.

Finally, my analysis of how fathers' average time spent at work might affect sons' long-run income shows a potentially interesting effect. It is not a shocking idea that fathers who have to work extra hours to achieve a comparable level of income may be losing hours to spend on their children's development. Yet, as many Americans struggle to identify a suitable balance of time spent in labor versus leisure, the idea that additional time spent at work may have a statistically observable, detrimental effect upon children's long-run outcomes would have important implications for parents and policymakers. Still, the effect observed in this study is too small and not robust enough across different model specifications to arrive at any definitive conclusions.

Ultimately, these findings cannot serve as a prescription for individual economic success; perhaps the American dream cannot be unlocked so much as it can be promoted. In this spirit, the findings of this research can be used to inform policy formation and prioritization so that it better promotes equality of economic opportunity. Policies that strengthen education for the lower and middle classes, that seek to reduce racial disparities, that recognize the role of religious participation and family size on economic outcomes, and that are cognizant of parents' time spent in the workplace can all serve to manifest greater intergenerational mobility.

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Armed Conflict and Early Childhood Outcomes in Ethiopia and Perú

By Kate Anderson Simons

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Experts unanimously agree that armed conflict is harmful to children. However, few studies exist that examine the link between armed conflict and language and cognitive development in the early years. This paper uses the Young Lives data from Perú and Ethiopia to analyze the relationship between armed conflict and child outcomes in early language and cognitive development, using two standardized measures, the Peabody Picture Vocabulary Test (PPVT) and the Cognitive Development Assessment-Quantitative (CDA-Q), both administered at or near age five. The results show that, after holding a variety of child, family, and community factors constant, living in a region of the country that has experienced war more recently is associated with lower receptive language (PPVT) scores in Perú, while intensity of the conflict is associated with lower PPVT scores in Ethiopia. Preschool attendance and family wealth are strong predictors of higher PPVT scores. These findings suggest that children living in conflict or post-conflict situations are particularly vulnerable to language disadvantages that could impact opportunities throughout life. Therefore, early childhood development should be prioritized in conflict-affected areas, with a special emphasis on high-risk populations to ensure that coming generations of rural and poor children are given opportunities to thrive.

I. INTRODUCTION

An estimated one billion children under the age of eighteen live in a country affected by armed conflict, and approximately 300 million children younger than age five live in conflict-affected areas (UNICEF 2009a). The consequences of armed conflict are widespread. Children can experience war firsthand through witnessing violence, being injured or killed in combat, or being recruited as a child soldier. If a child is fortunate enough to live in an area outside the immediate vicinity of the conflict, a family member such as a parent or older sibling may leave to fight in the war. This can potentially cause a decrease in family income, loss of a family member, or an increase in family stress. Even if the child's family remains intact during the conflict, the state will likely use all available resources to fight the war and cut back on education, social, and health services. These factors lead to what Marshall & Gurr (2005) call the "conflict-poverty trap," whereby political instability leads to a breakdown of state-provided services, which in turn leads to increasing poverty and further instability.

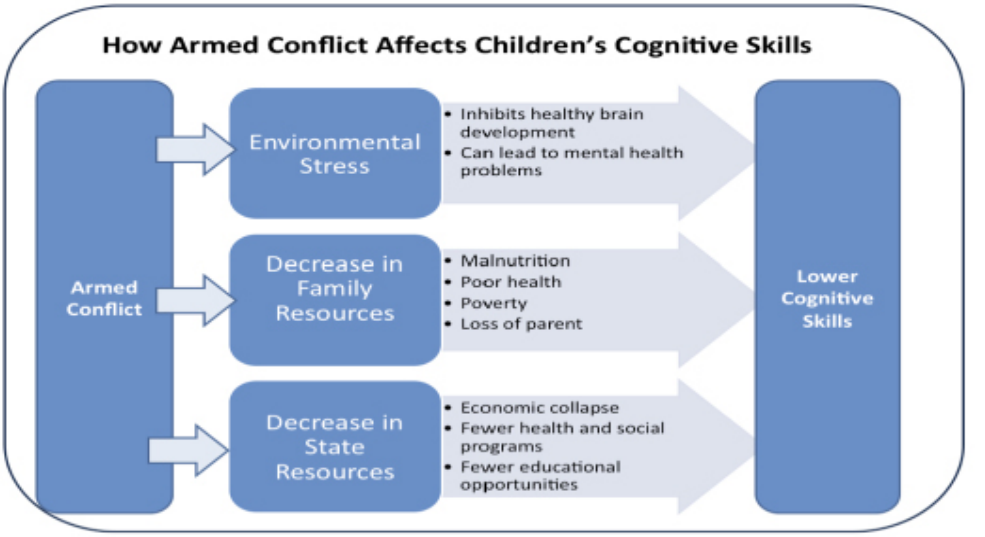
"Do children living in conflict-affected areas exhibit lower levels of language and cognitive development? While war is undoubtedly damaging to all children and adolescents, it is possible that the youngest children experience the most irreversible consequences of these atrocities."

The United Nations Children's Fund (UNICEF) acknowledges, "The impact of armed conflict on children remains difficult to fully ascertain. The information available is patchy, and it varies in both specificity and accuracy" (UNICEF 2009a 18). Children are renowned for being resilient to negative events early in life, but how far does this resiliency extend? Using data from the Young Lives Project, this paper will address the following question: Do children living in conflict-affected areas exhibit lower levels of language and cognitive development? While war is undoubtedly damaging to all children and adolescents, it is possible that the youngest children experience the most irreversible consequences of these atrocities. How are the youngest children faring in wartime and in the wake of armed conflict? This question has important policy implications for humanitarian relief and continuity of social protection during conflict. If these negative early experiences do indeed impact child cognitive development, donors and humanitarian relief programs should focus on strategies to ameliorate this damage.

II. CONCEPTUAL MODEL AND HYPOTHESIS

Low levels of early language and cognitive ability can have lifelong consequences (Currie & Thomas 1999; Hanushek & Woesmann 2009). Child development is a complex, dynamic process determined by a variety of genetic and environmental factors, with the first five years of life being

Figure 1: Conceptual Model



critical to later development. When a child lives under conditions of extreme adversity, the short-term physiological and psychological adjustments that allow him or her to survive can cause a range of health and developmental problems later on (Thompson 2001). Armed conflict also brings a host of negative externalities for the citizens of a country (UNICEF 2009a; UNESCO 2011). Figure 1 shows the conceptual relationship between armed conflict and child cognitive outcomes.

Given this conceptual relationship, I hypothesize that living in regions where there has been recent conflict has a significant negative impact on child language and cognitive development. Therefore, I predict that the more recently an armed conflict occurred in a region, the lower said children will perform on language and cognitive development assessments, holding child, family, and community factors constant. I also predict that the intensity of a conflict is associated with language and cognitive development, with children who live in regions with more intense conflicts scoring lower on measures of language and cognitive ability.

III. BACKGROUND

Large-scale data on language and cognitive development is limited in developing countries, especially countries affected by conflict. Therefore, to examine the relationship between conflict and cognitive development, it was necessary to find high-quality research studies on children in countries where conflict occurred recently. The Young Lives data set—a longitudinal study of children in poverty—offers comprehensive child- and family-level data from Ethiopia,

India (Andhra Pradesh), Perú, and Vietnam. Two of these countries, Ethiopia and Peru, experienced armed conflict during the past fifteen years.[1] The conflict in these two countries varied by region, with active conflict occurring in some regions but not in others. This allows for analysis of the relationship between child development and conflict within each country. General statistics on Ethiopia and Perú, including data on recent conflicts, are described below.

"The under-five mortality rate is 109 per 1,000 births and 20 percent of Ethiopian infants are born with low birth weights. Educational attainment in Ethiopia is among the lowest in the world. Only 36 percent of adults and 50 percent of youth are literate."

Ethiopia

In Ethiopia, children and families face multiple challenges in early childhood and beyond. Children in Ethiopia consistently score low on a range of developmental indicators and child outcomes (World Bank 2010; UNESCO 2010). In 2005, 78 percent of Ethiopians lived on less than $2 USD per day and 39 percent lived on less than the international poverty line of $1.25 USD per day (World Bank 2010). The under-five mortality rate is 109 per 1,000 births[2] and 20 percent of Ethiopian infants are born with low birth weights (UNICEF 2009b).[3] Educational attainment in Ethiopia is among the lowest in the world. Only 36 percent of adults and 50 percent of youth are literate (UNESCO 2010).[4]

Two significant armed conflicts occurred between 1980 and 2007 in the regions where the Ethiopian study children lived. The largest was a border dispute between Ethiopia and neighboring Eritrea (Uppsala Conflict Data Program 2011; Beenher 2005). In 1998, Eritrean troops entered an area under Ethiopian control. Because of deteriorating relations between the two countries, the event triggered an all out war that lasted from 1998 to 2000. A peace accord was signed in 2000; however, the two countries have failed to agree on the demarcation of the border. Between 70,000 and 100,000 lives were lost in this conflict (ICG 2003; Marshall 2010).

Another recent conflict in Ethiopia is the Oromo independence movement. Oromia is the largest region in Ethiopia, and the Oromo ethnic group makes up around half of the Ethiopian

[1] While India has engaged in armed conflict during the past 15 years, notably against Pakistan over the disputed Kashmir region, the Young Lives data focuses on the State of Andhra Pradesh, which has experienced no significant armed conflict since 1947. Source: Uppsala Conflict Database, 2010.

[2] By comparison, the under-5 mortality rate is 6 deaths per 1,000 births in industrialized countries and 65 deaths per 1,000 births across all countries.

[3] This figure can be compared with the world average of 16 percent.

[4] By contrast, the average literacy rates in developing countries are 80 percent (adult) and 87 percent (youth).

population. Led by the Oromo Liberation Front (OLF), the conflict has been ongoing since the rebel group launched an armed struggle for independence in 1973. An estimated 2,000 lives have been lost in this conflict (Marshall 2010).

Perú

In Perú, children fare better than children in Ethiopia. In 2007, 18 percent of citizens lived on less than $2 USD per day and only 8 percent lived on less than $1.25 USD per day (World Bank 2010). The under-five mortality rate in Perú is 24 per 1,000 births and 8 percent of Peruvian infants are born with low birth weights (UNICEF 2009b). Perú has very high literacy rates—90 percent of adults and 97 percent of youth are literate (UNESCO 2010).

In Perú, intrastate conflict has been ongoing since 1965 (Uppsala Conflict Data Program 2011). Two Marxist revolutionary groups, the Sendero Luminoso (or "Shining Path") and the Movimiento Revolucionario Túpac Amaru (MRTA) emerged in the early 1980s, engaging in a violent insurgency that was accompanied by human rights abuses on all sides. From 2000 to 2006 the conflict was dormant, but in 2007 the Sendero Luminoso movement became active again and the struggle continues today. A conservative estimate of lives lost is 30,000, with many civilian casualties (Marshall 2010).

The other recent conflict affecting citizens in Perú was the Perú-Ecuador border dispute of 1995. This dispute primarily occurred in the Amazonas region. Approximately 1,000 battle related deaths occurred during this conflict (Uppsala Conflict Data Program 2011; Marshall 2010).

"The under-five mortality rate in Perú is 24 per 1,000 births and 8 percent of Peruvian infants are born with low birth weights. Perú has very high literacy rates—90 percent of adults and 97 percent of youth are literate."

IV. DATA AND METHODS

Data Source

This paper uses child and family-level data from Young Lives: An International Study of Child Poverty. Young Lives is funded by the UK Department for International Development (DFID). In this analysis, I focus on the younger cohort of this data set. For this cohort, a household survey was conducted when the children were approximately one year old (in 2002) and again when the children were between four and six years old (in 2006-7). Attrition was very low for this cohort: only slightly more than 4 percent in both Perú and Ethiopia dropped out of the study between the two surveys.

The dataset includes standardized child assessment measures, as well as demographic, economic, and community-level data.[5] Households were selected randomly within each

[5] Child assessments were not conducted with 1-year-old children.

sentinel site—a village or community chosen for having high numbers of children living in poverty. The study designers chose sentinel sites to construct a dataset that reflected the regional, cultural, and linguistic makeup of each country.

Measures

Dependent Variable

The dependent variables for this analysis are child language and cognitive scores. Child language was measured by the Peabody Picture Vocabulary Test (PPVT), a standardized assessment of receptive language. The third edition of the PPVT (PPVT-III) was used in Ethiopia. The Spanish version of the PPVT-R, the Test de Vocabulario en Imagenes Peabody (TVIP), was used in Perú.[6] The tests were then translated into each country's main languages by the local team and verified by a local expert before the pilot study conducted prior to the second round of data collection (Cueto, Leon, Guerrero, & Muñoz 2009). Raw scores are used instead of standardized scores for the PPVT because the measure was not normalized in the countries examined in this study. Cognitive ability was measured by the quantitative subscale of the Child Development Assessment (CDA-Q).

All observations conducted under inadequate conditions—assessments with interruptions, lack of flat workspace, or a distracting environment—were dropped from the analysis. A total of 262 observations were dropped from the Ethiopia dataset and 146 observations were dropped from the Perú dataset. In Perú, dropped observations were evenly distributed among the fourteen regions in the study. However, in Ethiopia, assessment conditions in the Oromia region were more frequently reported as inadequate than those from the other regions in the study. The implications of this are discussed in the findings section of this paper.

Independent Variables

Time since conflict: The year of the last armed conflict in the region was determined through a search of multiple conflict databases and reviewed by several regional conflict experts for accuracy.[7] The number of years between the time the Young Lives survey was administered and the last armed conflict were calculated for each child. The variable includes armed conflicts that took place any time between 1980 and 2007.[8]

Recent conflict: Time since conflict is also measured by a binary variable for recent conflict, coded as 1 if there was

[6] The PPVT-III contains 204 possible items and the TVIP contains 125 possible items.

[7] Data on the last conflict were collected from the Uppsala conflict database, Center on Sustainable Peace, Global Security, and the Truth and Reconciliation Commission of Perú reports, and validated by experts in the field of global security.

[8] Regions with no armed conflict during this period were coded as having a last conflict in 1980. The year 1980 was chosen as a floor for this variable to ensure that the period of analysis at least covers the adult lives of the parents of the study children. In the regions with no conflict since 1980, further research identified that no significant conflicts had occurred since 1947. The year 2007 is the ceiling because it the last year in which data were collected for this cohort.

conflict since 1995 and 0 if there was no conflict since 1995.

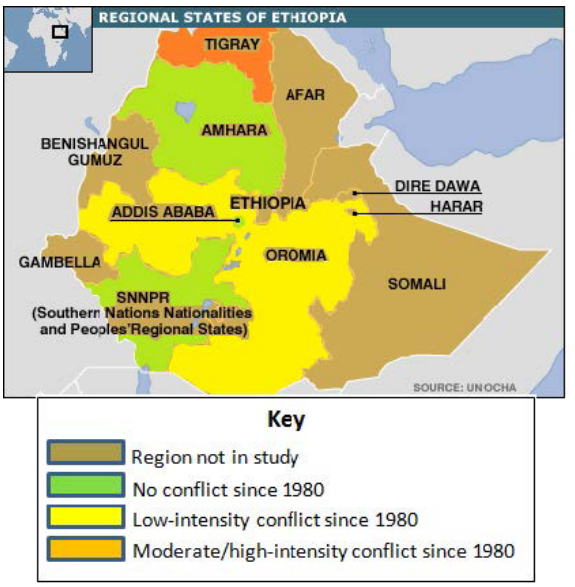
Intensity of last conflict moderate/high: I also considered the intensity of the most recent conflict. For this I consulted Marshall's "Major Episodes of Political Violence" —a list that assigns magnitudes to conflicts on a 1-10 scale based on the societal effects of the conflict (2010). Conflicts associated with the regions in this study ranged from a level 1 (just over the threshold of 1,000 battle-related deaths to qualify for Marshall's list) to a level 5 (the Ethiopia-Eritrea border dispute in 1998-2000).[9] The magnitude represents the impact on the country as a whole; therefore, while each region likely experienced the conflict differently, all regions involved in the conflict are coded at the same level. Among the regions in my sample, all conflicts were coded at a level of 1, 3, or 5. A conflict was considered to be moderate/high if it was a level 3 or above. Regions with no conflict were coded as 0.

Battle-related deaths, total in last conflict (000s): The number of battle-related deaths is another proxy for conflict intensity. Data on battle-related deaths was not accessible by region, so the number of deaths for the entire conflict is used. Data collection for Round 2 was completed in 2007, so I did not consider conflicts occurring after that period.

Figures 2 and 3 show the intensity of conflict across regions in Ethiopia

[9] The highest magnitude of conflict recorded on this scale, which includes all conflicts since 1946, is a level 7. The Ethiopian-Eritrean ethnic conflict that occurred from 1974-1991 and concluded with Eritrean independence was rated a level 6.

Figure 2. Regional Map of Ethiopia Depicting Conflict Intensity



Note: For more information on conflict statistics by region see http://www.younglives.org.uk/our-publications/student-papers/no-time-to-thrive. To view this map in color, see Simons' full thesis at www.gppreview.com.

Figure 3. Regional Map of Perú Depicting Conflict Intensity

Note: These figures were collected from reputable databases on global conflict and security. However, there are conflicting reports for regional-level data on years since conflict and battle-related deaths. The binary variables *recent conflict and intensity of last conflict moderate/high* attempt to capture the conflict variables using more widely accepted assumptions. To view this map in color, see Simons' full thesis at www.gppreview.com.

and Perú for the regions used in this analysis.

The model includes control variables for child age, gender, stunting, weight-for-age, preschool attendance, first language, mother's education, family wealth, and rural residence.

Methods

To understand the relationship between armed conflict and child development, I use an Ordinary Least Squares (OLS) regression model. The dependent variable is child cognitive outcomes, measured by raw scores on the PPVT and CDA assessments. The first independent variable of interest is time since the last conflict—measured both by the number of years since the region where each child lived in was last in conflict, and by a binary variable expressing whether or not there has been conflict in the region since 1995. The second independent variable of interest is the intensity of the last conflict, measured by number

of battle-related deaths and magnitude rating. The theoretical model for this analysis uses OLS regression as follows:

$$childoutcomes = \beta_0 + \beta_1(lastconflict) + \beta_2(conflictintensity) + \beta_3 x_3 + \beta_4 x_4 + \beta_5 x_5 + \varepsilon$$

where "childoutcomes" is child cognitive outcomes, "lastconflict" is a variable measuring the time since the region was last engaged in armed conflict, "conflictintensity" is a variable measuring conflict intensity, x_3 is a vector of child characteristics, x_4 is vector of family characteristics, and x_5 represents community characteristics.

V. RESULTS

Descriptive Statistics

This section describes the descriptive statistics for the dependent and independent variables for Ethiopia and Perú. Table 1 shows the complete descriptive statistics for the sample.

Child Outcomes

The mean PPVT raw score was 21.98 (s.d.=12.56) in Ethiopia and 30.07 (s.d.=8.53) in Perú. This means that on average, children in Ethiopia could correctly identify 22 pictures of progressively more difficult vocabulary

Table 1: Descriptive Statistics

Variable	Ethiopia n=1577				Perú n=1768			
	Mean	Std. Dev.	Min	Max	Mean	Std. Dev.	Min	Max
Assessment scores								
PPVT	21.98	12.56	1	121	30.07	17.78	0	95
CDA	8.41	2.97	0	14	8.53	2.03	0	12
Conflict indicators								
Recent conflict	0.39	0.49	0	1	0.79	0.40	0	1
Years since conflict	17.60	11.38	0	27	8.68	9.70	0	27
Intensity of last conflict moderate/high, (0,1)	0.23	0.42	0	1	0.75	0.43	0	1
Battle-related deaths, total in last conflict (000s)	11.77	20.85	0	100	22.46	12.96	0	30
Child Variables								
Age in months	61.86	3.86	52	75	63.65	4.65	53	75
Female child (0,1)	0.47	0.50	0	1	0.50	0.50	0	1
Stunting (0,1)	0.19	0.39	0	1	0.30	0.46	0	1
Family Characteristics								
Wealth index (0.0-1.0)	0.16	0.13	0.01	0.72	0.52	0.22	0.01	0.98
Mother has at least a primary education (0,1)	0.26	0.44	0	1	0.68	0.47	0	1
Community Characteristics								
Rural (0,1)	0.58	0.49	0	1	0.41	0.49	0	1

words and children in Perú could identify on average 30 pictures. By comparison, the mean PPVT raw score for children of similar ages exiting Head Start (a federally-funded preschool program for low-income children in the United States) is approximately 57 (U.S. Department of Health and Human Services 1998).[10]

The mean CDA-Q score for all children was 8.41 (s.d.=2.52) in Ethiopia and 8.83 (s.d=2.03) in Perú out of 15 total test items. This means that on average, children correctly answered between 8 and 9 questions about quantity (more/less, long/short, etc.).

Conflict Indicators

In Ethiopia, the average number of years since conflict occurred in each child's region was 17.6, with 39 percent of the study children living in a region where there has been conflict since 1995. In Perú, the average number of years since conflict was 8.7 and 79 percent of the children lived in a region experiencing conflict after 1995.

Regression Results

Using Ordinary Least Squares (OLS), I estimated three regression models for each country with PPVT scores as the dependent variable and three regression models for each country with CDA-Q scores as the dependent variable.

PPVT Results for Ethiopia

Table 2 shows the predicted PPVT raw scores for children in Ethiopia and Perú. OLS regression results for Ethiopia show no significant relationship between PPVT scores and time since conflict after controlling for child, family, and community characteristics. However, the intensity of the latest conflict is significantly negatively associated with PPVT scores. Model 3 shows that children living in regions that experienced a moderate to high-level conflict scored 1.2 points lower than children who lived in regions with a low-level conflict or no recent conflict (p=0.09) . Furthermore, Model 1 shows that each 1,000 combat-related deaths were associated with a 0.02 point decrease in PPVT scores (p=0.07), implying that approximately 50,000 combat related deaths were associated with a one-point decrease in PPVT scores.

The assessments obtained under inadequate conditions were not taken into account. This was the case in Ethiopia, where 32 percent of the observations of the Oromia region were not included in the analysis. Omission of these observations may positively bias the coefficient for recent conflict. Furthermore, Oromia is the largest region in the country in terms of population and area. While the Oromo Liberation Front conflict occurred in the Southern and Eastern areas, it is possible that children and families in the North and West areas were not directly affected by it.

The children who were enrolled in preschool at the time or had at least six months in attendance scored 5.8 points higher than children who did not

[10] The mean standard score for 5-year-olds exiting Head Start in 1998 was 93. This corresponds to a raw score of approximately 57.

Table 2. Predicted PPVT Raw Scores

	Ethiopia			Perú		
	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
Conflict in the past 12 years (0,1)	1.364			-2.955*		
	(1.47)			(-2.19)		
Years since last conflict		-0.048	-0.047		0.135†	0.128†
		(-1.38)	(-1.37)		(-1.84)	(-1.80)
Intensity of last conflict moderate/high, (0,1)			-1.192†			6.861***
			(-1.70)			(-4.43)
Battle-related deaths (000s), entire conflict	-0.016†	-0.012†		0.224***	0.235***	
	(-1.84)	(-1.70)		(-5.46)	(-4.38)	
Child Variables						
Age in months	0.709***	0.711***	0.711***	0.937***	0.944***	0.944***
	(8.71)	(8.75)	(8.75)	(-13.40)	(-13.47)	(-13.46)
Female child (0,1)	-0.656	-0.658	-0.658	0.55	0.577	0.577
	(-1.19)	(-1.19)	(-1.19)	(-0.94)	(-0.99)	(-0.99)
Stunting (0,1)	-1.456†	-1.456†	-1.456†	0.046	0.031	0.035
	(-1.84)	(-1.84)	(-1.84)	(-0.06)	(-0.04)	(-0.05)
Weight-for-age z score	0.853**	0.855**	0.855**	2.969***	2.987***	2.987***
	(2.74)	(2.74)	(2.74)	(-8.29)	(-8.29)	(-8.29)
Attended preschool>6months (0,1)	5.841***	5.831***	5.831***	2.903***	2.922***	2.922***
	(5.81)	(5.80)	5.8	(-4.26)	(-4.29)	(-4.29)
First language is country official language (0,1)	-1.974**	-1.998**	-1.998**	0.044	-0.02	-0.007
	(-2.93)	(-2.96)	(-2.96)	(-0.05)	(-0.02)	(-0.01)
Family Characteristics						
Wealth index	13.604***	13.635***	13.633***	23.300***	23.086***	23.099***
	3.60	3.60	3.61	(-11.82)	(-11.72)	(-11.73)
Mother has at least primary education (0,1)	4.322***	4.323***	4.323***	0.092	0.14	0.138
	5.16	5.16	5.16	(-0.13)	(-0.20)	(-0.19)
Community Characteristics						
Rural (0,1)	-2.572***	-2.573***	-2.573***	-7.437***	-7.465***	-7.454***
	(-3.56)	(-3.56)	(-3.56)	(-8.34)	(-8.43)	(-8.41)
Constant	-22.627***	-21.436***	-21.457***	-42.595***	-46.673***	-46.440***
	(-4.31)	(-3.99)	(-3.99)	(-9.17)	(-9.61)	(-9.59)
Observations	1577	1577	1577	1768	1768	1768
R-squared	0.284	0.284	0.284	0.532	0.532	0.532

Note: t-values in parentheses; †p<0.10, * p<0.05, ** p<0.01, *** p<0.001

attend preschool. ($p<0.01$). Children whose first language is Amharic, the official language of Ethiopia, scored 2.0 points lower than children whose first language was not Amharic ($p<0.01$).

Family wealth was also significantly associated with PPVT scores, with children at the top of the scale scoring 13.6 points higher than children at the bottom of the scale ($p<0.01$). Children in the Ethiopian sample who had mothers with primary education scored 4.3 points higher on the PPVT ($p<0.01$). Additionally, children living in rural areas scored on average 2.6 points lower than children living in urban areas ($p<0.01$).

PPVT Results for Perú

In the analysis for Perú, the OLS multivariate regression results show a significant positive association between PPVT scores and time since conflict. Children living in regions where there was a conflict since 1995 scored 3 points lower on the PPVT than children living in regions with no recent conflict ($p=0.03$), as shown in Model 1. Each year since the child's district experienced conflict is associated with a 0.14 increase in PPVT scores ($p=0.07$) as shown in Model 2. For example, a child living in a district that experienced conflict 15 years ago is predicted to score almost 2 points higher than a child living in a region that experienced conflict 1 year ago. Interestingly, conflict intensity is positively associated with higher PPVT scores, with children living in an area with medium- to high-level recent conflict scoring 6.9 points higher than children living in a district with low-level or no conflict ($p<0.01$) as shown in Model 3. This finding between more intense conflict and higher predicted PPVT scores is further discussed in the findings section of this paper.

Children who attended preschool at least six months, or who were enrolled in preschool at the time, scored 2.9 points higher than children who did not attend preschool. ($p<0.01$).

Family wealth was also significantly associated with PPVT scores, with children at the top of the scale scoring 23.3 points higher than children at the bottom of the scale ($p<0.01$). Children living in rural areas scored 7.4 points lower than children living in urban areas ($p<0.01$).

CDA-Q Results for Ethiopia

The OLS regression results depicted in Table 3 show little evidence that CDA-Q scores are significantly associated with the amount of time since a child's district experienced conflict. In Ethiopia, the years since conflict are negatively associated with CDA-Q scores, with each additional year since the region was in conflict corresponding to a 0.02 point decrease in CDA-Q scores ($p<0.01$) in Model 2. This is a small, yet statistically significant result. Children living in a region where there was conflict since 1995 scored on average 0.5 points higher on the CDA-Q than children living in a region where there was no conflict since 1995 ($p=.01$) as shown in Model 1. This result will be discussed in more detail in the next section.

Table 3. Predicted CDA-Q Raw Scores

	Ethiopia			Perú		
	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
Conflict in the past 12 years (0,1)	0.530*			-0.075		
	(2.56)			(-0.29)		
Years since last conflict		-0.021**	-0.020**		-0.006	-0.005
		(-2.70)	(-2.67)		(-0.47)	(-0.46)
Intensity of last conflict moderate to high, (0,1)			-0.414*			0.062
			(-1.98)			(-0.24)
Battle-related deaths (000s), entire conflict	-0.005*	-0.004*		0.008	0.002	
	(-2.32)	(-1.98)		(-0.98)	(-0.22)	
Child Variables						
Age in months	0.096***	0.097***	0.097***	0.103***	0.104***	0.104***
	(-5.20)	(-5.25)	(-5.25)	(-9.57)	(-9.65)	(-9.64)
Female child (0,1)	0.135	0.135	0.135	0.172*	0.167†	0.168†
	(-1.00)	(-1.00)	(-1.00)	(-1.97)	(-1.92)	(-1.92)
Stunting (0,1)	-0.158	-0.160	-0.160	-0.240*	-0.248*	-0.248*
	(-0.81)	(-0.82)	(-0.82)	(-2.03)	(-2.10)	(-2.10)
Weight for age z score	0.210**	0.209**	0.209**	0.132**	0.128**	0.128**
	(-2.60)	(-2.59)	(-2.59)	(-2.81)	(-2.74)	(-2.74)
Attended preschool>6months (0,1)	1.515***	1.513***	1.513***	0.337**	0.335**	0.336**
	(-6.98)	(-6.98)	(-6.98)	(-3.04)	(-3.03)	(-3.03)
First language is country official language (0,1)	-0.294	-0.286	-0.286	-0.304†	-0.319†	-0.318†
	(-1.59)	(-1.55)	(-1.55)	(-1.82)	(-1.93)	(-1.92)
Family Characteristics						
Wealth index	2.488***	2.497***	2.497***	1.740***	1.741***	1.740***
	(-3.38)	(-3.39)	(-3.39)	(-6.12)	(-6.12)	(-6.12)
Mother has at least primary education (0,1)	0.465*	0.462*	0.462*	0.083	0.079	0.08
	(-2.42)	(-2.40)	(-2.40)	(-0.82)	(-0.78)	(-0.78)
Community Characteristics						
Rural (0,1)	-0.651***	-0.653***	-0.653***	-0.169	-0.191	-0.19
	(-3.60)	(-3.60)	(-3.60)	(-1.26)	(-1.43)	(-1.42)
Constant	2.253*	2.754*	2.738*	0.989	1.102	1.097
	(-1.97)	(-2.38)	(-2.37)	(-1.37)	(-1.40)	(-1.40)
Observations	1577	1577	1577	1768	1768	1768
R-squared	0.201	0.202	0.202	0.21	0.21	0.21

Note: t-values in parentheses; †p<0.10, * p<0.05, ** p<0.01, *** p<0.001

The intensity of the latest conflict is negatively associated with CDA-Q scores. Children who live in regions with a medium or high-level conflict scored 0.4 points lower on the CDA-Q than children living in areas with low-level conflict or no recent conflict ($p=0.05$) as shown in Model 3. Each 1,000 battle-related deaths correspond to a decrease in CDA-Q scores by 0.005 points ($p=0.05$) as shown in Model 1.

Two control variables were associated with an increase of one point or more in CDA-Q scores: preschool attendance and wealth. Children who attended preschool for six months or more or were enrolled in preschool at the time, scored 1.5 points ($p<0.01$) higher on the CDA-Q than children who had not attended preschool.[11] Children at the top of the wealth index scored 2.5 points ($p<0.01$) higher than children at the bottom of the index.

CDA-Q Results for Perú

None of the conflict variables (years, intensity level, battle-related deaths) were statistically significantly related to CDA-Q scores for children in the Perú sample in any model.

Only one of the control variables, family wealth, was associated with an increase in CDA-Q scores of more than one point. Children at the top of the wealth index scored 1.7 points ($p<0.01$) higher on the CDA-Q than children at the bottom of the index.

VI. DISCUSSION

The OLS regression results show evidence that PPVT scores are positively associated with the time since a child's district was involved in armed conflict in Perú after controlling for the intensity of the conflict, as well as child, family, and community characteristics. There is evidence for Ethiopia that indicates that children in regions with more intense conflicts have lower PPVT scores than children in regions with no conflict or less intense conflicts. This finding supports my hypothesis that children living in regions affected by conflict have lower levels of language ability as measured by the PPVT. This could be due to several factors: environmental stress, constrained family resources, and limited state resources.

Another explanation for lower language scores is that family dynamics may change during times of hardship. Early language development happens primarily in the home. During times of conflict, parents may simply talk to children less, having more urgent matters to discuss that are not appropriate for children or having less time to spend engaging with the youngest children. Another reason could be that children also acquire language through experiences in the community, and these may be limited when there are external threats like conflict.

[11] Regression results are reported in the following sections using regression Model 1 unless otherwise indicated. The three models yielded similar coefficients for control variables.

There was no evidence that CDA-Q scores were positively associated with the length of time since a child's district was involved in conflict. In fact, there is a small but statistically significant decrease in CDA-Q scores in Ethiopia for each year since the last conflict. Several hypotheses explain why quantitative understanding can increase in conflict-affected areas. Children may be more exposed to work, either as child laborers or through accompanying their parents to work. They may learn quantitative concepts through these activities, such as how many baskets of crops they collect, concepts such as big and small, colors, and patterns. Similarly, conversation in the home may be constrained to resource issues: a parent is gone for six months, there are only two chickens left, or there are fewer men in the village now.[12] It is also possible that the CDA-Q measure itself, containing 15 questions on quantitative knowledge, is not a comprehensive proxy for child cognitive development.

This analysis does not control for policies or programs in the communities that may affect the children's PPVT and CDA-Q scores. There are many government and non-governmental organizations operating in Perú and Ethiopia that target marginalized children and families in emergencies. In 2007, Perú received US $61 million while Ethiopia received US $331 million in official development assistance (ODA) for education (UNESCO 2011). This might explain, for example, why the intensity of conflict is positively associated with

"These results indicate that preschool attendance and household wealth may be important factors to consider when designing ECD programs to mitigate the effects on language development of children living in conflict."

PPVT scores in Perú or why children in Ethiopia whose first language is Amharic have lower predicted PPVT scores.

The control variables with the largest and most consistently significant coefficients in the model are preschool attendance and wealth. Preschool attendance is positively associated with children's PPVT and CDA-Q scores in both Perú and Ethiopia, with larger expected gains in Ethiopia than in Perú. Family wealth is also significantly positively associated with language and cognitive scores in both countries, and is associated with larger gains in PPVT scores in Perú and larger gains in CDA-Q scores in Ethiopia.

These results indicate that preschool attendance and household wealth may be important factors to consider when designing ECD programs to mitigate the effects on language development of children living in conflict.

Policy implications

Three ECD policy implications emerge from these findings: preschool is

[12] These hypotheses are based on the author's experience working with vulnerable children and families and are not necessarily supported by the literature.

an important compensating factor for conflict, family involvement is necessary to improve outcomes, and equity is critical.

Preschool is important
In times of conflict or shortly thereafter, preschool programs should provide a safe place for parents to leave their young children while they work. UNESCO (2011) reports that while ECD programs prepare children for school and mitigate the effects of household deprivation, ECD policies in many developing countries are hindered by inadequate funding, fragmented planning, and inequitable delivery.

"Preschool is an important compensating factor for conflict, family involvement is necessary to improve outcomes, and equity is critical."

While this analysis does not address the importance of preschool quality, it is a dimension of ECD that must be addressed when designing interventions. Access to preschool remains an important issue, especially in Ethiopia where only 25 percent of the sample was enrolled in preschool or had been enrolled at some point for six months or more. A recent study using the urban Ethiopian population of the Young Lives data set also finds a positive relationship between preschool attendance and PPVT and CDA-Q scores (Woldehanna 2011).

Family involvement is necessary
Among the strongest predictors of a child's performance on the PPVT were family indicators such as wealth and maternal education. Stunting and weight-for-age are also characteristics largely determined by health and nutrition practices in the child´s home. Given that so many children in the sample live in rural areas, access to services remains a challenge. Therefore, in addition to preschool programs, ECD interventions must be designed to take place within the home. Several promising models exist now. For example, Janssens and Rosemberg (forthcoming) found evidence that a home visiting program in which visitors involve parents in age-appropriate stimulating activities may improve cognitive gains among young children in the Caribbean.

Equity is critical
Quality preschool and family support programs can only be successful if they reach the children who need them most. This analysis revealed statistically significant gaps between urban and rural children, high and low-income families, and educated vs. non-educated mothers. These gaps cannot be closed if programming only reaches the more urban, wealthy, and educated citizens. While these citizens may still be disadvantaged by industrialized country standards, they do not represent the populations in greatest need of these services. In conflicts that only affect parts of a country, care must be taken to ensure that early childhood programs are delivered in areas of a country that are most affected by conflict.

VII. CONCLUSION

The US government spends $485 million annually on education in conflict-affected fragile states, more than any other bilateral donor (Save the Children 2010). The majority of this assistance is spent in counties that directly align to US policy objectives (Winthrop 2010). In 2008, more than 60 percent of US foreign aid to education in conflict went to Pakistan (US $109 million), Egypt (US $106 million) and Iraq (US $88 million) (Save the Children 2010). In order to reach young children who could benefit the most from these funds, the US will have to ramp up its aid commitments to conflict-affected countries regardless of their alignment to US foreign policy objectives.

One promising development in US policy toward education in conflict occurred earlier this year (February 2011). The US Agency for International Development (USAID) released its Education Strategy 2011, which focuses on three goals for USAID's work in developing countries: improved reading skills, improved capacity in tertiary education and workforce development programs, and increased equitable access to education in crisis and conflict environments. The recommendations in this paper directly address the first and the third goals, while indirectly addressing the second, as children's early development is connected to later development and workforce participation (Hanushek & Woessmann 2007). The USAID strategy document does not explicitly address early childhood development, but includes ECD in the definition of basic education. Therefore, an emphasis on the early years could positively impact all areas of USAID's education strategy.

The results provide preliminary evidence that children in conflict-affected regions experience lower levels of language development in early childhood than their peers in the same country. While further analysis should be conducted using data from other conflict-affected countries, this paper provides a first look at the added strain of conflict on children and families in developing countries. More data on child development in conflict-affected countries is critical for further research on this topic. The Young Lives project provides a rich data set, but is only conducted in four developing countries. Data on conflict at the regional or sub-state level is also very difficult to find, and no data on battle-related deaths could be found at the regional level.

This analysis reiterates the findings of prior research that conflict is detrimental to children's healthy development. In countries experiencing conflict or post-conflict reconstruction, ECD programming is an essential component of humanitarian and development assistance.

"The results provide preliminary evidence that children in conflict-affected regions experience lower levels of language development in early childhood than their peers in the same country."

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Politics of Enforcement:

How the Department of Justice Enforces the Civil False Claims Act

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ABSTRACT

When politicians speak of combating fraud against the government, they score points. Fraud is, after all, bad. Politics should, therefore, play no role in how rigorously the Department of Justice (DOJ) combats governmental fraud. That is the focus of this study—the politics of enforcement. Using multivariate analysis for the years 1987-2008, this study analyzes whether the political party in control of the White House affects the number of claims brought against government defrauders under the Federal Civil False Claims Act (FCA), the nation's primary governmental fraud statute. The results indicate that political orientation is strongly correlated with the DOJ's enforcement of the FCA. Controlling for factors such as the health of the economy, inflation, and government spending, Democratic administrations, on average, file 30 percent more FCA cases than Republican administrations. Accordingly, this study proposes two amendments to the FCA aimed at reducing the effect politics can play on FCA enforcement.

INTRODUCTION

When politicians speak of combating fraud against the government, they score points. Fraud is, after all, bad. Politics should, therefore, play no role in how rigorously the Department of Justice (DOJ) combats governmental fraud. That is the focus of this study—the politics of enforcement.

The Civil False Claims Act (FCA) is the government's primary tool to combat fraud against the government. The DOJ, under the direction of the U.S. Attorney General and the 93 politically-appointed US Attorneys, collects billions of dollars under the FCA every year from government defrauders. The potential correlation between the political orientation of the DOJ and enforcement of the FCA, however, has never been studied. Using multivariate analysis and controlling for other factors, such as the health of the economy, inflation, and government spending, this study uses data collected and released by the DOJ to determine whether the political party in control of the DOJ affects the number of FCA claims brought against government defrauders.

This study is organized into four parts. Part One provides an historical and substantive background on the FCA and reviews previous literature to better understand how this study fits within current scholarship. Part Two describes and details a statistical model aimed at isolating the effect political orientation has on DOJ enforcement of the FCA. Part Three discusses the results of the model when applied to data supplied by the DOJ. Part Four makes policy recommendations on how Congress can amend the FCA to reduce the negative impact politics has on the enforcement of the FCA.

"Fraud is, after all, bad. Politics should, therefore, play no role in how rigorously the Department of Justice (DOJ) combats governmental fraud. That is the focus of this study—the politics of enforcement."

PART ONE: BACKGROUND

The Civil False Claims Act

The FCA is the federal government's most powerful weapon to redress fraud against the government. Since 1986, when the FCA was amended to facilitate FCA prosecution, the DOJ has recovered approximately $28 billion from government defrauders using the FCA (Department of Justice 2010). In recent years, the DOJ has deliberately increased its use of the FCA in an "aggressive, coordinated and sustained effort at the federal level to hold perpetrators of fraud accountable, be they large companies or individuals" (West 2010).

Under the FCA, any person who knowingly submits or causes another to submit a false claim for payment of government funds is liable for triple the government's loss and a civil penalty of $5,000 to $11,000 per false claim (Civil False Claims Act 2009, § 3729). The DOJ oversees enforcement of the FCA, but the statute also

provides for a private enforcement mechanism. Individuals who have specific knowledge or evidence of an FCA violation, known as "relators," can sue the offender in *qui tam* (Civil False Claims Act 2009, § 3730).[1] The *qui tam* provision gives standing to a relator to bring FCA suits on behalf of the government and receive a portion of any recovery. Unlike the government, however, there are limits on who may sue in *qui tam*. A relator must have some special non-public knowledge of the alleged fraud, and the knowledge must be material to prosecution of the fraud.

Before a relator can bring suit, there is a 60-day waiting period in which the DOJ determines if it will intervene in the case (Civil False Claims Act 2009, § 3731). If the DOJ decides it will not intervene, the relator is allowed to litigate the matter in federal court on behalf of the government. The relator receives 25 to 30 percent of any recovery. If, however, the DOJ does intervene, the DOJ "takes over" the case and the relator is limited to 15 to 25 percent of the recovery. As FCA cases typically involve hundreds of millions of dollars, the *qui tam* provisions create a strong incentive for individuals within an offending organization to "blow the whistle" on fraud.

The Issue of Enforcement

At the crux of this study is a concern over whether the Executive branch of the US government ("the Executive") aggressively employs the FCA to combat fraud. A review of the FCA's history reveals a long-standing concern

"In recent years, the DOJ has deliberately increased its use of the FCA in an 'aggressive, coordinated and sustained effort at the federal level to hold perpetrators of fraud accountable, be they large companies or individuals.'"

within Congress about this very issue. The original FCA was born out of the political realities of the Civil War, where fraud against the Union Army was rampant. Reports of artillery shells filled with sawdust and soldiers' boots made of cardboard permeated floor debate in the House of Representatives (US House of Representatives 1863). Shortly before the FCA's creation, a US House of Representatives Committee on Government Contracts declared that "[w]orse than traitors in arms are the men who pretend loyalty to the flag, feast and fatten on the misfortunes of their nation, while patriot blood is crimsoning the plains of the South and bodies of their countrymen are moldering in dust" (*United States ex rel. Marcus v. Hess* 1942). Under the leadership of Senator Jacob B. Howard (R-MI), the original FCA was passed in 1863, and the law was colloquially named "Lincoln's Law" (*Act of Mar. 2, 1863* 1863).

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[1] *Qui tam* comes from the Latin *qui tam pro domino rege quam pro se ipso in hac parte sequitur*, which is translated as "who as well for the king as for himself sure in this matter" (Black's Law Dictionary 1368).

The original 1863 FCA contained many of the enforcement mechanisms still in use today, most notably the *qui tam* provisions. *Qui tam* avoided the trappings of government corruption and directly combated government fraud by putting whistleblowers and relators in a position to profit through enforcement. As described by Senator Howard, "I have based the [*qui tam* provision] upon the old-fashioned idea of holding out a temptation, and 'setting a rogue to catch a rogue,' which is the safest and most expeditious way I have ever discovered to bringing rogues to justice" (Howard 1863).

During World War II, the *qui tam* provisions of the FCA were nearly repealed in the aftermath of *United States ex rel. Marcus v. Hess*. In *Hess*, the defendants pled to a criminal charge of bid rigging under a federal competitive bidding statute.. The plaintiff, who had no direct connection with the fraud in question, copied the government's indictment into an FCA complaint, sued the defendants in *qui tam*, and received a verdict for $315,000.

Hess created a controversy over the *qui tam* provisions in Congress (Beck 2000). In a letter addressed to Congress, Attorney General Francis Biddle declared the *qui tam* provisions "mere parasitical actions, occasionally brought only after law-enforcement officers investigated and prosecuted persons guilty of a violation of law and solely because of the hope of a large reward" (Biddle 1942). In response, the Senate voted to repeal the *qui tam* provisions without much debate (Beck 2000). The House, however, did not vote to repeal the *qui tam* provisions until the following congressional session. When the House bill came before the Senate Judiciary Committee a second time, it was met with fierce opposition from Senator William Langer (R-ND). Senator Langer argued that the Department of Justice had not been aggressive enough in prosecuting FCA claims, and that elimination of the *qui tam* provisions would remove an otherwise independent enforcement mechanism: "With American troops in combat around the globe, it was not politically prudent to appear solicitous of the interests of defense contractors." Senator Langer appealed to a generalized fear that the DOJ was reluctant to pursue government fraud, arguably, the same fear that Senator Howard first appealed to in pushing for the passage of the original FCA (Beck 2000). Senator Langer questioned the DOJ's willingness to aggressively pursue FCA claims without greater expansion: "I ask any Senator to name a case from 1893 until 1942, in which the Attorney General of the United States tried to enforce the statute. From the day the statute went on the books to the present, the Attorneys General,

"Senator Langer argued that the Department of Justice had not been aggressive enough in prosecuting FCA claims, and that elimination of the *qui tam* provisions would remove an otherwise independent enforcement mechanism."

whether Democrats of Republicans, fought it" (Beck 2000). Senator Langer's plea worked and the FCA's *qui tam* provisions were saved.

The FCA's *qui tam* provisions saw another major change in 1986. The atmosphere in Congress was reminiscent of the FCA's enactment during the Civil War, but in place of sensational media stories of sawdust filled artillery shells and cardboard boots, there were the $640 toilet seat cover, the $7,600 coffer maker, and the $437 measuring tape (Keller 1985). Reports of excessive government contractor spending fueled debate in Congress about the DOJ's ability and willingness to combat fraud (Weisskopf 1986). "The American people have lost confidence in their Government's willingness and ability to act effectively against defense contractors. Day after day, they read about cases that are washed under the rug, wiped out….They believe the Government is not on their side" (Metzenbaum 1985). Senator Charles E. Grassley, a Republican from Iowa, publicly questioned the DOJ's willingness to enforce the FCA and, in the tradition of Senators Howard and Langer, proposed drastically expanding the FCA's *qui tam* provisions to ramp-up FCA enforcement (Kurtz 1985). The result was a modernization of the law, and it is this version of the FCA that serves as the baseline statute for the purposes of this study.[2]

The history of the FCA reveals a long-standing tension between Congress and the Executive over the Executive's willingness to rigorously combat government fraud. The willingness of DOJ leadership to aggressively combat fraud is wrought with the potential for political interference. For example, a business-friendly DOJ administration could deliberately, or incidentally, cause a reduction in FCA enforcement by shifting resources away from enforcement or by adopting policies that limit government intervention in *qui tam* cases. This study attempts to better understand the influence of politics on FCA enforcement through the use of econometric analysis to shed light on the relationship between party affiliation and the frequency of FCA enforcement action.

Literature Review

There is a paucity of econometric research on the FCA. The FCA is traditionally a subject relegated to the legal profession and the application of econometric analysis is nonexistent. Literature dealing with the FCA focuses primarily on the substantive law underpinning the statute, case law, and the policy of combating governmental fraud generally. This study, which directly analyzes the efficacy and scope of FCA enforcement using multivariate analysis, is new territory. There is, however, one area of scholarly work that may prove

[2] In 2009, the FCA saw substantial amendment. Most notably, the FCA was expanded to eliminate any presentment requirement, thereby allowing the government to target defrauders submitting false claims via contractors but not directly to the government. In addition, FCA was amended to allow the Attorney General to delegate authority to issue civil investigative demands (CID's).

beneficial in understanding and interpreting the scope of this study—those econometric studies dealing with the effect of politics on the vigor of agency enforcement of other statutes or industries.

There is literature, for example, dealing with how the DOJ enforces antitrust law. Gallo and Chosal (2001) evaluated whether political control of the White House affected the number of antitrust cases filed and pursued by the DOJ. That study used multivariate analysis and controlled for variables relating to the economy. It found that there is no statistical relationship between party control of the White House and Congress and antitrust enforcement by the DOJ. Posner (1970) conducted a similar econometric analysis, and found that political control of the White House does not affect the level of antitrust enforcement in the DOJ. Using data from 1890 through 1974, Lewis-Beck (1979) similarly did not find any significant evidence that Republican control of the Presidency, House, or Senate correlates with the level of DOJ enforcement of antitrust law.

With regard to other agencies, research suggests that political control of the White House does affect enforcement in some cases. Nourayi (1996) found that the president's political party impacts the number of litigation releases, i.e. letters allowing suit to proceed in securities cases, offered by the Securities and Exchange Commission. Hughes (2006) found that party control of the White House affects enforcement by the Environmental Protection Agency. Amacher et al. (1985) used Federal Trade Commission data and concluded that Democratic dominated commissions pursue consumer protection more vigorously with regard to the number of cases filed.

Collectively, previous empirical research on the effects of party affiliation on agency enforcement suggest that robust models investigating this phenomenon should include variables on the political control of the White House, the state of the economy, and the number of enforcement cases filed.

PART TWO: DATA, VARIABLES, THEORETICAL FRAMEWORK, AND MODEL

Theoretical Framework

This study hypothesizes that the political orientation of the president, and therefore the political orientation of the Attorney General, impacts how rigorously the FCA is enforced by the DOJ. In terms of an econometric analysis, the dependent variable therefore needs to be some measure of the DOJ's enforcement of the FCA, while the primary independent variable needs to measure the political orientation of the DOJ. Other factors that may bear upon both the level of DOJ enforcement of the FCA and political orientation need to be controlled for in order to isolate the relationship between political orientation and the DOJ's enforcement of the FCA. These considerations yield the following theoretical model:

Eq. 1: Theoretical Model

Δ *DOJ Enforcement Per Time Period* $= \beta_0 + \beta_1$*Political Orientation of Time Period* $+ \beta_2$*Other Influences During Time Period*$+ \mu$

The Variables

Data on FCA enforcement during the years 1987 through 2008 are analyzed in this study because, during that time period, the FCA was not amended or substantially altered. Five variables are used to conduct this study, with each representing data measured on an annual basis. Together, these five variables control for variation in FCA enforcement based along the substantive dimensions of the FCA.

The Dependent Variable: NewMatters
The variable *NewMatters* reflects the number of new FCA claims filed in the years 1987 through 2008, based on annual FCA statistics released by the DOJ. *NewMatters* includes those cases that originate within the DOJ and those cases that were filed under *qui tam*.

NewMatters is the dependent variable. It serves as a proxy for how forcefully the DOJ is enforcing the FCA. It measures the scope of the DOJ's enforcement of the FCA by tracking the number of FCA matters filed. A drop off in the number of FCA claims pursued suggests the DOJ is less rigorously enforcing the FCA. Conversely, a noticeable increase in FCA claims over previous years suggests more aggressive enforcement.

This study does not use the judgments recovered from FCA enforcement as a measure of DOJ enforcement because judgment amounts do not necessarily capture the intensity of enforcement. Some cases may be worth more than others, but the worth of the case is typically established by a jury, judge, or the attorneys in the case, not the political hierarchy of the DOJ.

Figure 1 suggests there is a strong correlation between political administrations and the number of FCA claims filed. The DOJ was controlled by Republicans from 1986 until 1992, by the Democrats from 1992 until 2000, and then again by the Republicans from 2000 until 2008. The number of *NewMatters* closely follows this cycle, dropping below the trend line for Republicans and rising above it for the Democrats.[3]

The Primary Independent Variable: Party
The primary independent variable is the political orientation of the White House. A dummy variable, *Party*, is used to represent which party controlled the White House, and, by extension the DOJ, for each year of the study. *Party* captures the political orientation of eight separate Attorneys General between the years 1987 and 2008.

The Control Variables: GovtSpend, GDP, and CPI
The first control variable is *GovtSpend*, which reflects the amount spent by the Federal Government in outlays between

[3] The overall up sloping trend is likely the result of overall increases in Government spending and the general expansion of the DOJ.

the years 1987 and 2008 as measured in 1987 dollars, based on published reports by the Executive Office of the President. *GovtSpend* attempts to control for any increase in government fraud attributable to overall increases in government expenditures. It also captures any increase in the DOJ's budget associated with a general increase in government spending.

The upward slope of *GovtSpend* (see Figure 2) may help account for the upward sloping trend of the *NewMatters* data because *GovtSpend* reflects the general expansion of the DOJ during this time, as well as the increased opportunity for government fraud.

Figure 1: *NewMatters* Scatterplot

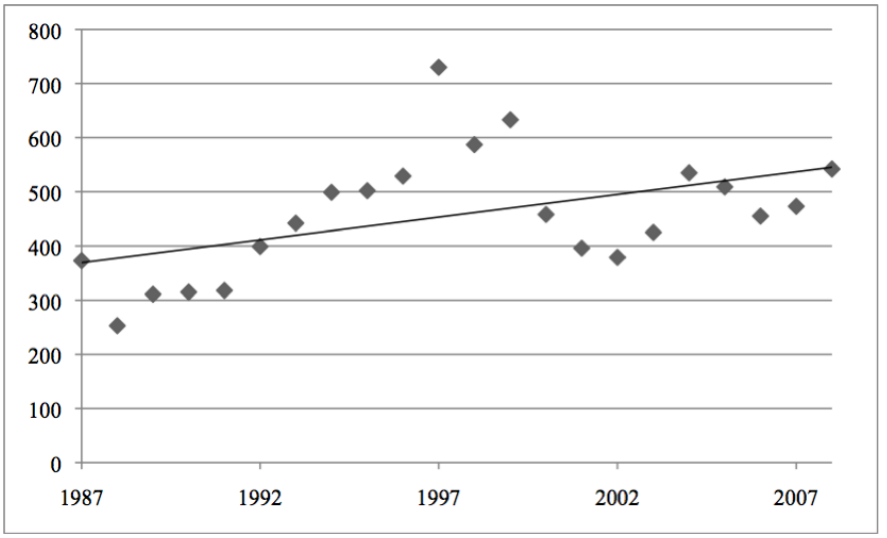
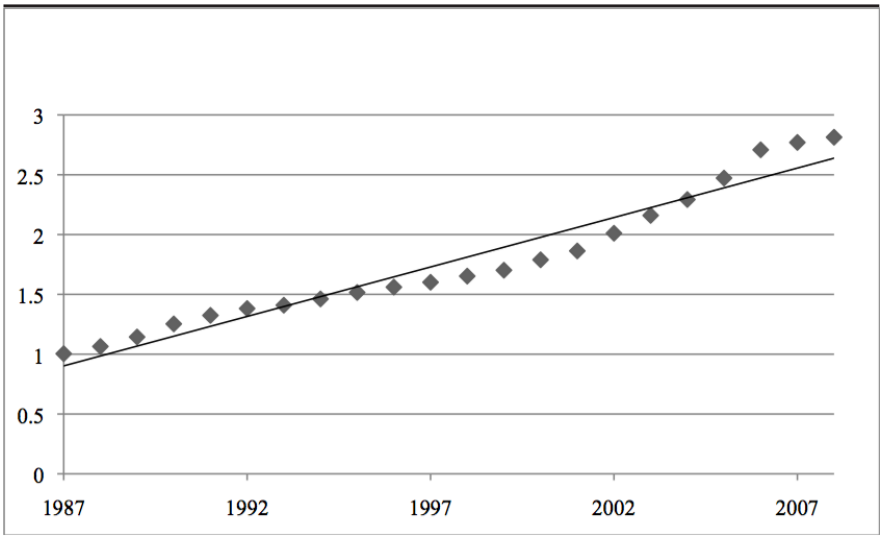


Figure 2: *GovtSpend* Scatterplot (in $ Trillions)



The second control variable is *GDP*, which is short for gross domestic product. Based on data published by the Bureau of Economic Analysis at the Department of Commerce, *GDP* reflects how much gross domestic product increased each year between 1987 and 2008. *GDP* controls for the potential effect the state of the economy may have on the amount of fraud being committed. Arguably, fraud decreases when the economy is poor, and increases when the economy is good because fraud is an opportunistic crime. When the economy is poor, people are more

Figure 3: *GDP* Scatterplot (in percent change)

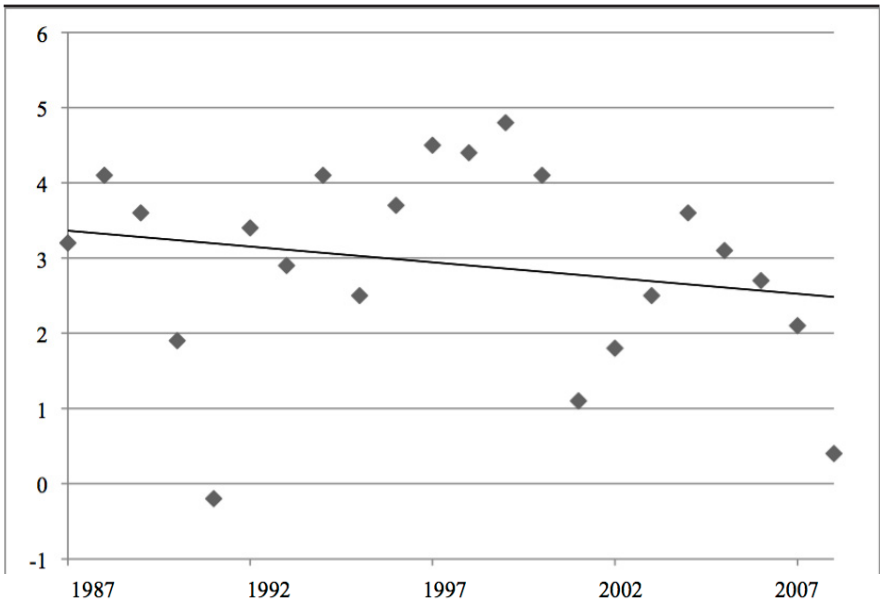
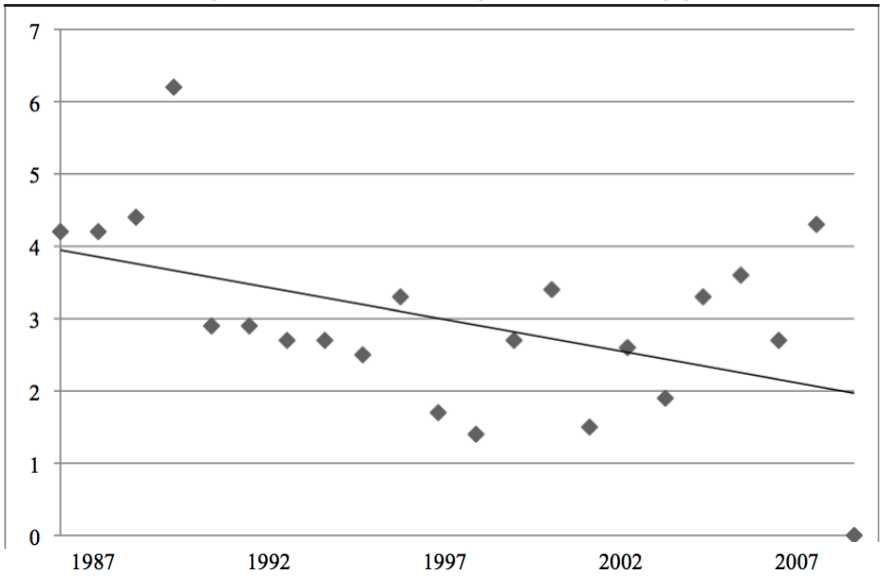


Figure 4: *CPI* Scatterplot (in percent change)



careful with their money, thereby decreasing opportunities for fraud.

The third control variable is *CPI*, which is short for consumer price index. The CPI is based on data published by the Bureau of Labor Statistics at the Department of Labor, and measures increases in prices faced by consumers for each year between 1987 and 2008. *CPI* controls for any effect prices may have on the amount of fraud being committed or the cost of fraud enforcement. *CPI* also helps control for the potential effect inflation has on the number of cases filed by the DOJ.

Summary of Data

Table 1 includes a summary of the variables and their respective descriptive statistics.

The Model

Combining the variables into an empirical model yields the following:

Eq. 2: Model

$$NewMatters = \beta_0 + \beta_1 Party + \beta_2 GovtSpend + \beta_3 GDP + \beta_4 CPI + \varepsilon$$

In this model, *NewMatters* is the dependent variable and serves as a proxy for how rigorously the DOJ enforces the FCA. *Party* is the primary independent variable of interest. If there is a correlation between *NewMatters* and *Party*, the model will yield a positive and statistically significant coefficient on *Party*. Collectively, *GovtSpend*, *GDP* and *CPI* control for other factors that might influence the number of new matters filed or the general level of fraud perpetrated against the government in any given year.

PART THREE: RESULTS

Primary Results

The model indicates there is a statistically significant correlation between the political party in control of the DOJ and the magnitude of FCA enforcement. Holding constant the state of the economy and government spending, 115 more FCA claims are filed each year, on average, when a Democratic administration controls

Table 1: Descriptive Statistics of Variables

Variable	Number	Mean	Std. Dev.[4]	Minimum	Maximum
NewMatters	22	457.4	113.7	253	730
Party (Dummy Variable)	22	0.363	n/a	0	1
GovtSpend (In Billions)	22	1.77	0.553	1.004	2.81
GDP (In percent)	22	2.92	1.33	-0.2	4.8
CPI (In percent)	22	2.95	1.29	0	6.3

[4] In the case of the dummy variable *Party*, standard deviation is not informative, as all observations equal either 1 or 0. The frequency of the variable is as follows: 8 observations = 1 and 14 observations = 0.

the DOJ, over 30 percent more claims a year than when Republican administrations are in control. The coefficient on *Party* is significant at the 99 percent level, meaning that this difference in the number of FCA filing between political parties is not just random variation in the data; it represents a statistically significant pattern between how rigorously different political administrations enforce FCA claims.

The results of the regression are displayed in Table 2. The model resulted in the following equation:

Eq. 3: *NewMatters* Model

NewMatters = 229 + 115.5Party + .1GovtSpend + 26.6GDP - 23.8CPI

Observations

The primary variable of interest (*Party*) is significant at the 99 percent level, and every other independent variable is significant at the 90 percent level or higher. Moreover, the model appears robust. The equation has an F-value of 13.28, which indicates the dependent variables are jointly significant at the 99 percent level, while the equation's R^2 value indicates the independent variables jointly explain over 75 percent of the variation in *NewMatters*. Considering the relatively small sample size of the dataset, the high R^2 value and strong *F*-value confirm that this model is functioning as intended. The model appears to capture and isolate the relationship between political orientation and the number of FCA claims filed by the DOJ.

As expected, there is a strong correlation between the amount of money the government spends and the number of FCA claims filed. When there is more money being spent, there are more opportunities for fraud and, thus, more opportunities for enforcement. The coefficient on *GovtSpend* indicates that, on average,

Table 2: Regression Results

Variable	Coefficient	Std. Error	T-Value
Intercept	229.87	84.38	2.72
Party	115.50***	38.20	3.03
GovtSpend	0.10*	288.50	3.49
GDP	26.60*	13.22	2.01
CPI	-23.79*	13.04	-1.82
R^2 = 0.7575	F-value = 13.28		

Note: *** p < 0.01; ** p< 0.05; * p < 0.10.

for every additional $10 billion the government spends, one additional FCA claim is filed. This is a significant impact, as for every trillion the government spends, the DOJ files an additional 100 FCA claims.

The *GDP* and *CPI* variables appear to work in tandem. *GDP* and *CPI* are designed to isolate the impact of the general economy on the dependent variable. *GDP* reflects the overall growth rate of the economy, whereas *CPI* reflects the ability of individuals to purchase goods. The results of these variables are not surprising.[5] The coefficient suggests that as the economy grows, the number of FCA claims increase and, conversely, when the economy is poor, people engage in less fraud or are not as readily discovered. Fraud is an opportunistic enterprise, and, when the economy is good, there are more opportunities to engage in it. This logic is supported by the *GovtSpend* coefficient. Thus, it is entirely consistent to see an increase of fraud when the economy is growing. Considering economic growth in this context, the coefficient on *CPI* also follows. An increasing CPI erodes the future value of all goods and investments, including returns from fraud, so the incentive to commit fraud decreases.

"The coefficient suggests that as the economy grows, the number of FCA claims increase and, conversely, when the economy is poor, people engage in less fraud or are not as readily discovered."

The primary limitation of this model is that it lends itself to bias because of its small sample size. To address this issue, two additional tests are conducted. First, a White Test for heteroskedasticity is conducted. The White Test yielded a heteroskedastic-robust result. The test did not yield a significant result or change to the model. Second, collinearity is addressed by testing the variance inflation of the model. Again, the testing does not yield any significant results.

PART FOUR: POLICY RECOMMENDATIONS

In theory, combating government fraud is not a political issue. Democrats and Republicans both dislike fraud and overtly condemn it. The results of this study, however, indicate there is a correlation between the political orientation of the White House and the rigor with which the DOJ enforces the FCA. This correlation is troubling because political ideology should not, in theory, play a significant role in how aggressively the DOJ combats fraud. Accordingly, the following policy recommendations are focused on segregating political appointees from the enforcement of the FCA.

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[5] *GDP* and *CPI* are only significant at the 90% level, but excluding these two variables from the equation does not significantly alter the magnitude or significance of the coefficients of *Party* and *GovtSpend*. Omitting these variables only impacts the R^2 value of the overall model, suggesting that these two variables should be included because they explain variation in *NewMatters* without reducing the efficiency of the statistical test. .

First Recommendation: Expand Ability to Issue Civil Investigative Demands

A valuable tool for investigating potential defrauders under the FCA is the Civil Investigative Demand (CID). The CID provision of the FCA, which was in effect for the entirety of the period under investigation as part of this study, granted express authority to the US Attorney General to demand information from a potential defrauder, including documentary material, answers to interrogatories, and oral testimony (Civil False Claims Act 2009, § 3733).

The DOJ issues CIDs when there is "reason to believe that any person may be in possession, custody, or control of any documentary material or information relevant to a false claims law investigation." As part of FCA cases where the DOJ has intervened, however, a Federal Court will quash the CID and require the DOJ to seek information through traditional discovery if a court proceeding is already underway. Thus, CIDs are only permitted when the government has not yet commenced a civil proceeding (Civil False Claims Act 2009, § 3733). CIDs are, therefore, used before a civil proceeding begins, and before the courts are involved. Because the traditional vanguard of a defendant's rights, i.e. the court, is not involved, the FCA originally vested the Attorney General with the sole authority to issue CIDs. Pursuant to the Fraud Enforcement and Recovery Act of 2009, however, Congress amended the FCA to allow the Attorney General to delegate the power to issue CIDs.

"CIDs are an integral part of FCA enforcement. Uniformly, research suggests government lawyers believe CIDs to be exceptionally helpful in pursing investigations and, ultimately, FCA claims."

In the context of a *qui tam* case, CIDs are permitted even after a "civil proceeding" has commenced because the proceeding is not technically commenced by the government. The DOJ is permitted to issue CIDs to investigate whistleblower cases and use that information to determine whether the DOJ will intervene in the case. As soon as the government intervenes, however, the DOJ is prohibited from issuing additional CIDs for that case. This poses a unique problem for DOJ attorneys, as the FCA only gives the government 60 days to determine whether it will intervene in any case, and it can be difficult to get a CID approved and enforced within that limited window of opportunity.

Nonetheless, CIDs are an integral part of FCA enforcement. Uniformly, research suggests government lawyers believe CIDs to be exceptionally helpful in pursing investigations and, ultimately, FCA claims (Barger et al. 2005). CIDs allow the DOJ to determine whether a potential defrauder is worth the time and energy to pursue long and complex litigation. They also allow the DOJ to uncover defrauders that might have otherwise avoided detection because the

department would have not bothered to go through the long and formal process of bringing an FCA claim in court.

Congress already took an important step in 2009 by amending the FCA to allow the Attorney General to delegate the authority to issue CIDs. Because the Attorney General can delegate CID issuing authority to another senior officer, or even multiple officers, it will facilitate the entire CID process. DOJ attorneys seeking to obtain a CID no longer need to get approval from the very top of the department, but can instead seek CIDs from their local US Attorney or from a designated official in Washington, DC charged specifically with dealing with CIDs. In principle, this delegation should also further insulate the DOJ's FCA enforcement from the political pressures of the Attorney General position. If the Attorney General does not have the political will to sign CIDs, then possibly another senior officer will.

"A sudden change in the ability of DOJ attorneys to issue CIDs may even be more disruptive than having never had the ability in the first place."

On March 24, 2010, Attorney General Eric H. Holder exercised the delegation provisions of the FCA by delegating the ability to issue CIDs to all 93 US Attorneys as well as the Assistant Attorney General for the Civil Division. This decision decentralized the issuing authority of CIDs from the Attorney General to the leadership positions of the various U.S. attorneys' offices. The decision, however, does not resolve the political problems inherent in FCA enforcement. First, a future Attorney General could revoke the delegation of CID issuing authority. A shift of political orientation in the White House could result in shift of the Attorney General's delegation prerogative. A sudden change in the ability of DOJ attorneys to issue CIDs may even be more disruptive than having never had the ability in the first place. Second, all 93 US attorneys, as well as the Assistant Attorney General for the Civil Division, are politically appointed by the president and, arguably, espouse the political beliefs of the White House. Attorney General Holder's delegation, therefore, does not resolve the structural political enforcement issues.

Congress should amend the FCA to allow DOJ attorneys to obtain a CID from the court overseeing an FCA case. Since there would need to be an underlying proceeding, this provision would only apply to *qui tam* cases. Since *qui tam* cases are initially filed under seal before a court, DOJ attorneys seeking to investigate the potential fraud should be able to go to the court presiding over the case and request a CID. Instead of having the Attorney General personally authorize or delegate the issuance of every CID, DOJ attorneys should be able to, independent of the political hierarchy, show sufficient evidence to a federal judge that a CID is needed to explore a potential FCA claim. The DOJ attorney would be required to show

sufficient cause, similar to the criminal law notion of probable cause, before the Judge would issue the CID.

This amendment would facilitate DOJ investigations of fraud. It would remove the ability of the Attorney General to impede FCA enforcement by not issuing CIDs or refusing to delegate CID issuing authority and give aggressive government attorneys the ability to litigate FCA cases as vigorously as they desire. Moreover, the rights of the alleged defrauder would be protected because the CID would only be issued by a federal judge overseeing a sealed *qui tam* case. If the federal judge believes that the DOJ attorney is overstepping his or her grounds in the investigation, it would be within the court's discretion to limit or prohibit the issuance of a CID. This scheme would increase the ability of DOJ attorneys to investigate would-be government defrauders regardless of the political orientation of the White House.

Second Recommendation: Institutionalized Oversight Over Fraud

The history of the FCA reveals a long-standing Congressional distrust of the Executive's inclination to rigorously combat fraud perpetrated against the government, as previously discussed, and this study confirms the political dimension of FCA enforcement. If politics can negatively impact FCA enforcement, there should also be a policy that enables politics to positively impact FCA enforcement. Specifically, Congress should amend the FCA to institutionalize a larger congressional role in the oversight of the DOJ's FCA enforcement by creating an annual reporting requirement.

The reporting requirement would mandate that the Attorney General submit an annual report to Congress detailing the successes and failures of the FCA for the previous year, including information on the number of cases the DOJ intervened or declined to intervene on as well as other relevant FCA enforcement statistics. Every year, a congressional subcommittee would be able to review the Attorney General's report and then have the opportunity to conduct investigations into DOJ activity to ensure that the FCA is being enforced as rigorously as possible. The reporting requirement would put pressure on the Attorney General to enforce the FCA aggressively regardless of the president's political agenda. Drop-offs in FCA enforcement would be noted, and the Attorney General would be required to account for it.

This amendment would also enable consumer groups and researchers to evaluate how the DOJ enforces the FCA. Currently, detailed statistics, such as the number of FCA cases investigated, the average length of investigation, the number of potential relators interviewed, the average

"Congress should amend the FCA to institutionalize a larger congressional role in the oversight of the DOJ's FCA enforcement by creating an annual reporting requirement."

length of litigation, and the percentage of cases settled, disaggregated by industry, are not released to the public. Independent consumer groups and researchers have a difficult time evaluating how effectively the DOJ enforces the FCA based on the very general statistics the DOJ does release. If the DOJ was forced to make detailed statistics available on a public website, it would increase the ability of consumer groups, researchers, and Congress to conduct oversight.

Conclusion

Government fraud is bad. Everyone agrees, and there is little political debate on the matter. This study demonstrates, however, that there is a relationship between the political orientation of the White House and how rigorously the DOJ combats government fraud using the FCA. The Attorney General, a political appointee, has broad discretion and ability to impact how rigorously the DOJ combats fraud. This study reveals that on average, when a Democrat is in the White House, DOJ enforcement of the FCA increases by about 30 percent, holding constant the level of government spending and the state of the economy. This result is troubling because politics should not influence how well the DOJ combats fraud. This study proposes two amendments to the FCA that would broaden the power of individual, i.e., non-political, DOJ attorneys to investigate and pursue FCA claims and increase the prospect of Congressional oversight.

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The Academic Achievement of First and Second Generation Immigrants in the United States

By Emilie C. Saleh

Emilie C. Saleh completed the Master of Public Policy at the Georgetown Public Policy Institute in 2011. This thesis was submitted in partial fulfillment of the degree requirement. Andreas Kern, PhD, served as her adviser.

ABSTRACT

This study examines the academic achievement levels of first and second generation Asian and Hispanic immigrants in the United States. Contributing factors to achievement, such as parental involvement and behavioral characteristics of children, are taken into account in analyzing the effect of being a first or second generation immigrant. In order to conduct this research, I apply a cross-sectional OLS regression to the Early Childhood Longitudinal Study, Kindergarten class of 1998-99 (ECLS-K), provided by the US Department of Education. I use this OLS model to analyze both the achievement gaps present in the US among different ethnic minority groups and how those gaps change over time or between generations. The academic outcomes of the immigrant groups are compared with native groups to identify the largest achievement gaps. The magnitude and significance of the results are reported in the usual fashion and implications for policy are provided.

I. INTRODUCTION

Education and immigration reform are two heavily debated issues that remain at the top of the United States' policy agenda. A key indicator of how to approach education reform involves measuring academic achievement levels of the US student-age population to determine where education is falling short of success. With regard to immigration, capturing the immigrant experience is an essential element of addressing the ever-increasing influx of immigrant populations that enter the US each year. A large part of the immigrant experience can be measured by examining data on the school experience of immigrant children in the US. As the face of immigration and, thus, the student-age population continue to evolve, addressing issues of immigration and education together will continue to offer greater insight into the direction of policy reform needed in both areas.

"As the face of immigration and, thus, the student-age population continue to evolve, addressing issues of immigration and education together will continue to offer greater insight into the direction of policy reform..."

The purpose of this study is to identify the largest achievement gaps among immigrant populations and then examine those gaps according to generation, with particular concentration on first and second generation Asian and Hispanic immigrant students. For this study, a first generation immigrant student is defined as a child who is foreign-born and whose mother is foreign-born. A second generation immigrant student is defined as a child who is native US-born and whose mother is foreign-born. This study focuses on Asian and Hispanic immigrants due to the predominance of immigration to the US from these populations' origin countries. According to 2009 migration statistics, Mexican-born immigrants account for 29.8 percent of all foreign-born individuals living in the US (ACS October 2010). Altogether, Hispanic and Asian countries make up more than 50 percent of origin countries of foreign-born US residents (ACS October 2010). This trend is in stark contrast to that of the 1960s, when European countries accounted for approximately 75 percent of US immigration (ACS January 2010). In recent decades, the number of Latino and Asian immigrants into the US has been steadily growing, while European immigration is on the decline, accounting for only 12.7 percent in 2009 (ACS January 2010). Given the increasing presence of Latino and Asian immigrants in the US, it seems appropriate to focus on these groups when analyzing the academic achievement of US immigrants.

This study departs from current literature by accounting for parental involvement in education, as well as certain child characteristics and behaviors, to further explain academic outcomes. The main objective

behind this research is to gain an in-depth understanding of where the academic achievement of both first and second generation immigrant youths differs and what effect parental involvement and child characteristics have in determining outcomes. The inclusion of parental involvement and child characteristics has potential policy implications for educational reform by offering a new direction for policy initiatives to mitigate current achievement gaps. This study goes beyond merely looking at backgrounds and household structures to examine how the behavioral characteristics of both parents and children may work to address the severity of achievement gaps seen today.

II. REVIEW OF THE LITERATURE

Three main hypotheses dominate the research regarding immigration status effects on academic achievement: straight-line assimilation, accommodation without assimilation, and immigrant optimism. The straight-line assimilation framework predicts that, over time, racial and ethnic minorities will become part of mainstream culture and will blend into the US population (Park 1914). In 1914, Robert E. Park described the immigration experience of assimilation as being broken down into various stages: initial contact between groups, a period of conflict between groups, accommodations made for the minority group, and, finally, assimilation into the mainstream.

"The inclusion of parental involvement and child characteristics has potential policy implications for educational reform by offering a new direction for policy initiatives to mitigate current achievement gaps."

A second school of thought holds that accommodation can be made without assimilation, and that, as a result, immigrant youth may have higher levels of academic achievement than native students (Gibson 1988). For example, Margaret Gibson's research on Punjabi immigrant families in Valleyside, California, revealed that first generation immigrants have high levels of achievement as a result of the "accommodation-without-assimilation" hypothesis. Gibson (1988) also found that while the Punjabi students follow American customs at school, at home, parents discourage them from doing so, and from interacting with their native peers in general.

A third hypothesis is that of "immigrant optimism" (Kao and Tienda 1995). In support of this hypothesis, researchers make the claim that native-born children with foreign-born parents (second generation youth) are likely to academically outperform their native peers as a result of their parents' quest for upward economic mobility in the US, while later generations of immigrants are more likely to be disillusioned by the prospect of moving up the socioeconomic ladder (Ogbu 1991). Additional research has revealed a

prevalence of "immigrant optimism" through a significant difference in parental involvement between foreign-born and native parents, with a heavier weight placed on allocation of time and space for homework among foreign-born parents (Kao and Tienda 1995).

"As diverse immigrant populations become more prevalent in the American education system, it is imperative to apply a deeper examination to the changes in academic achievement."

In sum, researchers have spent considerable time evaluating the relevance of these hypotheses on academic achievement, finding little evidence to support the "straight-line assimilation" hypothesis, but some evidence to support "accommodation-without-assimilation" and "immigrant optimism" theories. While varying hypotheses explain the academic outcomes of different immigrant populations, the use of a macro-level approach to assess what drives student achievement in first, second, and third generation immigrants is necessary to further understand the dynamics of immigrant educational performance. As diverse immigrant populations become more prevalent in the American education system, it is imperative to apply a deeper examination to the changes in academic achievement.

III. ECLS-K DATASET METHODOLOGY

To conduct this research, I use a longitudinal study that focuses on school assessments of students from kindergarten to eighth grade, the Early Childhood Longitudinal Study, Kindergarten Class of 1998-99 (ECLS-K). The participants in the ECLS-K study are children from public and private schools that attended both full-day and part-day kindergarten programs. The participants of the ECLS-K study are a nationally representative sample from diverse socioeconomic and racial/ethnic backgrounds. ECLS-K assessments were made beginning in the fall and spring of kindergarten (1998-99), the fall and spring of first grade (1999-2000), the spring of third grade (2002), the spring of fifth grade (2004), and the spring of eighth grade (2007). Apart from the children, other participants in the study include the children's parents, teachers, and school administrators. The ECLS-K also provides information on school characteristics, childhood school experiences, student behavior and background, and facilities provided for students.

Reading and math assessments were conducted in kindergarten through eighth grade, and science assessments in third, fifth, and eighth grades. Several methods of scoring were used in order to assess and monitor cognitive and social development from kindergarten through eighth grade. For the purpose of this study, I use the standardized assessment scores

(also known as t-scores) in reading, math, and science, which provide norm-referenced measurements of achievement. A high mean t-score for a particular subgroup indicates that the group's performance is high in comparison to other groups. Furthermore, the t-scores provided by the ECLS-K data act as an indicator as to whether an individual or a subgroup ranks higher or lower than the national average.

IV. CONCEPTUAL FRAMEWORK

In general terms, the framework of this model follows previous research on academic achievement of immigrant youth. The model includes controls for family background, such as family structure, as well as total household income, race/ethnicity, gender of the child, and parental education levels. In addition, controls for school characteristics are also included, such as type of school (public, private, or religious), size of school, location, and available facilities, such as libraries, media centers, and computer labs. The framework for this model consists of a cross-sectional OLS regression to measure how certain child characteristics, parental influences, and family resources contribute to academic outcomes through the primary years of education. While the ECLS-K dataset is a longitudinal survey, for the purpose of this study I have chosen to do a cross-section examination of the eighth grade level, which was surveyed in the spring of 2007.

Dependent Variables

Three dependent variables are used for measuring academic outcomes of eighth graders in the sample: reading, math, and science assessment t-scores. The eighth-grade direct cognitive assessment contains items in reading, mathematics, and science. The t-score was chosen as the dependent measure of academic achievement for this study for the reasons listed in the previous section: it provides an estimate of achievement relative to the national population and acts as an indicator as to the extent to which a child or group may rank in comparison to the national average.

Main Independent Variables of Interest

Person dummy variables are included in the model to distinguish between native students and first and second generation immigrants. As defined earlier, I define a first generation immigrant as a child who is foreign-born and whose mother is also foreign-born and a second generation immigrant as a child who is native-born, but whose mother is foreign-born. Native students are the reference group and are defined as native-born students whose mothers are also native-born. I focus on the birthplace of the mother rather than of the father based upon previous research, which suggests that mothers play a more crucial role in managing their children's educational careers than fathers (Kao and Tienda, 1995; Baker and Stevenson, 1986). Additionally, for this study, race/ethnicity has been

divided into five categories: White, Black, Asian, Hispanic, and other, (with other including Pacific Islander, American Indian, Alaskan Native, or more than one non-Hispanic race).

Child Characteristic Variables

The child characteristic variables used for this framework include variables related to school as well as to those outside of school. The in-school characteristic variables consist of whether or not the child enjoys school, which may be an indicator of how well the child is assimilating overall into American school life, and participation in school activities, such as school clubs and sports. Other variables of child characteristics include participation in outside school activities, such as theater or drama classes, and feelings of self-worth, which measure whether or not the child feels proud. I also include a variable on whether or not the child feels alone, which, although not specified, may include loneliness inside or outside of school.

Parental Involvement Variables

The variables used to measure parental involvement include the frequency of parent teacher meetings within the school year, whether or not a parent helps the child with homework, whether or not the parent has high academic expectations for their child (expects child to continue with school after high school graduation), and whether or not grades are important to parents. Another variable used for parental involvement includes whether or not a tutor was obtained to help the child in certain school subjects. This variable was only available for reading and math and, thus, is not included in the estimation for science scores.

Control Variables

A number of control variables that account for socioeconomic status are included in the model, such as total household income and education of the mother and father's household (which ranges from graduating high school or equivalent to obtaining a Ph.D.).

Using the ECLS-K longitudinal survey may bias the estimates on the coefficients in the model for a few reasons. First, the ECLS-K survey oversamples native students. I am able to account for this problem by using proper weights and, therefore, present results using both un-weighted and weighted samples. Second, some initial survey respondents decided not to continue with the survey in subsequent years, and others were added to the survey in later years. This problem is one that cannot be easily remedied and may in fact bias the estimates in the model.

V. SUMMARY STATISTICS

Table 1.1 presents the means and standard errors for variables of interest in the weighted sample. The average reading t-score is 49.61. For math t-scores, the weighted average is 50.21 and for science t-scores, the average is 50.29 for the weighted scores. With regard to race/ethnicity, roughly 6 percent of the sample is of Asian descent and almost 18 percent

Table 1.1:
Dependent Variable: Weighted Reading T-Score

1st Generation Asian Immigrant Child	7.171** (3.611)	6.626* (3.466)	5.808* (3.303)	6.988* (3.763)	4.867 (3.247)	4.839* (2.886)	3.999* (2.171)
2nd Generation Asian Immigrant Child	2.832*** (0.862)	2.506** (0.882)	1.836** (0.812)	2.188** (0.885)	1.696* (0.966)	1.599 (1.019)	0.941 (.1.120)
1st Generation Hispanic Immigrant Child	0.019 (2.229)	-0.065 (2.226)	-1.269 (2.155)	-1.210 (2.494)	-3.028 (2.801)	-3.258 (2.716)	-1.883 (2.593)
2nd Generation Hispanic Immigrant Child	0.342 (1.072)	0.261 (1.051)	-0.872 (0.878)	-0.385 (0.931)	-1.420 (0.935)	-1.715* (0.940)	-2.022** (0.839)
Female		2.346*** (0.534)	2.388*** (0.487)	2.327*** (0.489)	2.504*** (0.535)	1.911*** (0.526)	1.101** (0.504)
Black			-6.937*** (1.832)	-7.175*** (2.089)	-7.846*** (2.245)	-6.852*** (1.539)	-6.079*** (1.903)
Race Other			-1.167 (1.211)	-0.764 (1.230)	-0.978 (1.228)	-0.964 (1.196)	-1.613 (1.173)
Family Income <$25,000/yr				-3.253*** (0.912)	-2.547** (1.135)	-2.666** (1.050)	-1.548 (1.007)
Public School				-1.022 (0.673)	-1.060 (0.713)	-0.956 (0.709)	-1.071 (0.656)
Parent met teacher					-0.087 (1.231)	0.157 (1.215)	-0.199 (1.122)
Grades important to parent					-1.141* (0.670)	-1.269* (0.702)	-1.384** (0.581)
High expectations					3.774*** (0.480)	3.415*** (0.484)	2.853*** (0.465)
Parent helps with HW					2.077*** (0.714)	1.941*** (0.658)	1.172* (0.676)
Child in school sports						-0.242 (0.500)	0.014 (0.476)
Child in drama club						1.816*** (0.493)	1.819*** (0.438)
Child in school clubs						0.979* (0.539)	0.523 (0.521)
Child enjoys school							-0.173 (1.241)
Child likes reading							4.967*** (0.735)
Reading tutor							-8.693*** (1.042)
Child not proud							-1.728** (0.795)
Child lonely							-1.695** (0.806)
R^2	0.1928	0.203	0.2305	0.229	0.2581	0.2512	0.3407

Note: *** p < 0.01; ** p< 0.05; * p < 0.10.

is Hispanic. Of the 6 percent Asian, roughly 0.4 percent of the sample is first generation Asian immigrants with 3 percent of the sample consisting of second generation Asian immigrants. For Hispanic immigrants, a little over 1 percent are first generation immigrants and almost 9 percent are second generation immigrants. Approximately 15 percent of the sample is black and just about 5 percent are included in the race/ethnicity category "other." In the weighted sample, almost 3 percent of the sample is of Asian descent, with 0.15 percent being first generation and 1.8 percent being second generation. Approximately 18.5 percent of the weighted sample is of Hispanic descent, 1.2 percent of which are first generation and 8.6 percent of which are second generation. Using the weighted sample, 17.2 percent is black and 4.3 percent is of the race category "other."

VI. RESULTS

Results for the academic performance of Asian and Hispanic immigrants are presented using full sample child and parent weights, along with cross-sectional weights exclusively used for eighth grade students. Each table of results represents reading t-scores, math t-scores, or science t-scores. Linearized standard errors are already accounted for when using the weighted sample, and differences in results are negligible in all but one model, making heteroskedasticity of minimal concern.

Reading T-Scores

When using the weighted sample of eighth grade students, shown in Table 1.1, the most notable variation is in the reading performance of first generation Asian immigrants. When accounting for all controls, the estimated reading score is 3.999 points higher than that of white natives (with statistical significance), while second generation immigrants are only 0.941 points higher (lacking statistical significance in this case). The estimated reading score for second generation Hispanic immigrants is 2.022 lower than that of white natives, although only the second generation Hispanic estimate is statistically significant.

Math T-Scores

Table 1.2 illustrates the estimated math score results using the weighted sample. According to the coefficient estimate, a first generation Asian immigrant's math score is predicted to be 8.399 points higher than that of a white native, and only 1.583 higher than among second generation immigrants, (although the second generation estimate is not statistically significant). For Hispanic immigrants, the first generation coefficient is statistically significant and the second generation is highly statistically significant at -3.493 points and -1.972 points, respectively. While Hispanic scores remain below white natives, these scores reveal an increase of more than 1.5 points between the first and second generations.

Science T-Scores

According to Table 1.3, both first and second generation Asian immigrants appear to be scoring similarly to white natives in science, with neither

coefficient proving to be statistically significant. The science scores for Hispanic immigrants move in a far different direction than those of Asian immigrants. For second generation Hispanics, the point difference is highly statistically significant with a 3.445-point reduction compared to white native students. These results are striking not only because of the large magnitude of the effect of being a Hispanic immigrant, but also because the effect almost doubles from the first generation to second generation. Furthermore, this effect is compounded if the student comes from a low-income household, reducing their score by an additional 1.705 points. Finally, if that student is a second generation Hispanic child and female, their score is reduced by more than 7 points.

Control Variables

Following the findings of previous research, the control variables, such as household income and parents' education levels, both proved to be highly statistically significant in all cases for math, reading, and science. Additionally, the magnitude of the effect of parental education levels is quite large. A student whose parents graduated from college or received an equivalent degree is likely to have a reading score more than 8 points higher than a student whose parents did not finish high school, and about 5 points higher than a student whose parents only have high school diplomas. The effect of being black proved to be both largely negative and highly significant in all cases. For un-weighted reading scores, a black student is estimated to score 6.079 points lower than a white native student. For math t-scores, black students are estimated to score 4.733 points lower using the weighted sample. Science t-scores appear to have the largest negative effect for black students, with an estimated score 7.378 points lower in the weighted sample than white students. It is evident from the coefficient estimates stated above that native black students are scoring even lower than immigrant Hispanic students across the board in all three subjects.

The female variable in the model is also quite telling with regard to the academic performance of immigrant students. The coefficient estimate on females for reading is 1.101 points higher than for white males. For math and science, the coefficient estimates remain highly statistically significant and negative, although the magnitude of the effect is larger in science at -2.515 points, compared to -1.595 points in math. Therefore, a second generation female Hispanic student in science is estimated to score 5.96 points lower than a white native male in science. Although not as large, the magnitude of the effect in math is still rather large for females, at -3.567 points lower than for Hispanic males.

Parental Involvement and Child Behavior/Feelings Variables

In all cases, a parent having high expectations for his or her child can mitigate the negative effects of being a first or second generation

Table 1.2:
Dependent Variable: Weighted Math T-Score

1st Generation Asian Immigrant Child	7.304* (4.396)	7.495* (4.473)	6.74 (4.333)	7.581 (4.694)	5.965 (4.080)	6.162 (3.955)	8.399** (4.302)
2nd Generation Asian Immigrant Child	2.654** (1.346)	2.769** (1.315)	2.155 (1.341)	2.026 (1.505)	1.161 (1.544)	1.110 (1.545)	1.583 (1.428)
1st Generation Hispanic Immigrant Child	-0.623 (1.588)	-0.594 (1.588)	-1.690 (1.551)	-2.505 (1.655)	-3.562** (1.726)	-3.653** (1.670)	-3.493** (1.759)
2nd Generation Hispanic Immigrant Child	-0.605 (0.724)	-0.577 (0.726)	-1.611** (0.681)	-1.417* (0.747)	-2.245*** (0.767)	-2.213*** (0.786)	-1.972*** (0.693)
Female		-0.820* (0.428)	-0.783* (0.395)	-0.810** (0.403)	-0.962** (0.410)	-1.382*** (0.423)	-1.595*** (0.378)
Black			-6.194*** (0.910)	-5.868*** (1.087)	-6.087*** (1.093)	-5.988*** (1.061)	-4.733*** (1.153)
Race Other			-1.400 (1.319)	-0.780 (1.326)	-0.937 (1.304)	-0.947 (1.233)	0.048 (1.153)
Family Income <$25,000/yr				-2.765*** (0.872)	-2.130** (0.843)	-2.176** (0.847)	-1.360 (0.905)
Public School				-0.621 (0.529)	-0.500 (0.564)	-0.430 (0.576)	-0.713 (0.514)
Grades important to parents					-0.860 (0.596)	-1.049* (0.609)	-0.920 (0.586)
High expectations					3.502*** (0.500)	3.370*** (0.525)	3.193*** (0.505)
Parent helps with HW					0.844* (0.451)	0.831* (0.441)	0.296 (0.417)
Child in school sports						0.318 (0.413)	0.319 (0.410)
Child drama club						1.488*** (0.449)	1.624*** (0.443)
Child in school clubs						0.960** (0.491)	0.958** (0.456)
Child enjoys school							2.123*** (0.668)
Child has math tutor							-5.491*** (0.495)
Child not proud							-2.070*** (0.759)
Child lonely							-2.258*** (0.802)
R^2	0.1832	0.1849	0.2136	0.2054	0.2278	0.2295	0.2985

Note: *** p < 0.01; ** p< 0.05; * p < 0.10.

Table 1.3:
Dependent Variable: Weighted Science T-Score

1st Generation Asian Immigrant Child	2.914	3.359	2.349	3.033	1.830	1.810	2.276
	(2.659)	(2.808)	(2.645)	(3.016)	(2.491)	(2.298)	(2.109)
2nd Generation Asian Immigrant Child	1.626*	1.893**	1.060	1.296	0.839	0.641	0.465
	(0.882)	(0.819)	(0.834)	(0.965)	(1.052)	(1.053)	(1.052)
1st Generation Hispanic Immigrant Child	0.995	1.064	-0.390	-0.638	-1.465	-1.645	-0.911
	(1.531)	(1.513)	(1.507)	(1.671)	(1.936)	(1.920)	(2.051)
2nd Generation Hispanic Immigrant Child	-1.385**	-1.320*	-2.697***	-2.499***	-3.344***	-3.484***	-3.445***
	(0.662)	(0.676)	(0.668)	(0.702)	(0.788)	(0.772)	(.732)
Female		-1.918***	-1.874***	-2.003***	-1.923***	-2.424***	-2.515***
		(0.442)	(0.399)	(0.390)	(0.418)	(0.427)	(0.419)
Black			-7.684***	-7.582***	-7.676***	-7.652***	-7.378***
			(0.954)	(0.742)	(0.782)	(0.843)	(0.821)
Race Other			-3.364***	-3.159***	-3.275***	-3.265***	-3.332***
			(1.010)	(0.992)	(1.036)	(0.954)	(0.893)
Low Income				-2.516***	-1.913**	-1.901**	-1.705**
				(0.778)	(0.787)	(0.766)	(0.752)
Public School				-0.139	-0.042	0.157	0.142
				(0.499)	(0.535)	(0.529)	(0.525)
Parent met teacher					1.037	1.181	1.233
					(1.138)	(1.166)	(1.110)
Grades important to parents					-0.987**	-1.001*	-1.134**
					(0.497)	(0.521)	(0.507)
High expectations					2.210***	1.954***	1.827***
					(0.496)	(0.508)	(0.504)
Parent help with Homework					1.388***	1.307***	1.030**
					(0.438)	(0.435)	(0.430)
Child in school sports						-0.663*	-0.707*
						(0.388)	(0.385)
Child in drama club						1.595***	1.694***
						(0.400)	(0.402)
Child in school clubs						1.384***	1.221***
						(0.440)	(0.432)
Child enjoys school							2.086***
							(0.637)
Child not proud							-2.220**
							(0.909)
Child lonely							-1.039
							(0.821)
R^2	0.1941	0.2072	0.2402	0.2292	0.2433	0.2842	0.2908

Note: *** p < 0.01; ** p< 0.05; * p < 0.10.

Hispanic immigrant. In addition, if parents claimed that grades were very important to them, the scores in reading and science are significantly affected by a reduction of between 0.5 and 1 point. While the magnitude of this effect remains small, the negative sign in front of the coefficients is worth noting for the implications that can be drawn from these results. Parental help with a child's homework has a significant, although somewhat small, positive effect on a child's science score, a 1.030-point increase, as well as a 1.172 positive point effect on reading scores. Therefore, eighth grade students most likely see beneficial results from parental aid when completing science-related homework assignments.

Overall, participating in school activities, such as drama or school clubs, appears to have a positive significant effect on school performance in all three categories. However, the magnitude of the effect ranges from small to medium, between 0.689 to 1.948 points, with the strongest effects of school activity reflected in reading and science scores. For estimated reading scores, if the child likes to read, his or her score is estimated to be 4.383 points higher in the un-weighted sample and 4.967 points higher in the weighted sample. Thus, the negative effect of being a first or second generation Hispanic immigrant, or from being from a low-income household, can be reversed if that student is encouraged to read or personally likes reading. This negative effect can be further reversed if that child also enjoys attending school. Some of the strongest estimated effects with the child behavior/feelings variables are demonstrated if the child claimed to enjoy school and if the child did not feel proud or lonely. If the child claimed to enjoy school, it leads to a 1.655 point statistically significant increase in reading scores, a 2.371 point increase in math scores, and a 2.835 point increase in science scores, using the un-weighted sample. School enjoyment also led to a 2.123 point increase in weighted math scores and a 2.086 point increase in weighted science scores, which are all highly statistically significant.

"In all three measures of achievement, reading, math, and science, Hispanic immigrants in both generations are estimated to perform below white, native students, while Asian immigrants of both generations are estimated to perform higher than native students."

VII. DISCUSSION & CONCLUSIONS

With the use of the ECLS-K longitudinal dataset, this paper has looked at comparative academic achievement levels of Asian and Hispanic first and second generation immigrant students in the United States. In addition, this paper has examined how factors like parental involvement and child behavioral characteristics can affect levels of achievement for both native and

immigrant students. From the results stated above, it is clear that there is a significant gap in achievement levels between Asian and Hispanic immigrants. In all three measures of achievement, reading, math, and science, Hispanic immigrants in both generations are estimated to perform below white, native students, while Asian immigrants of both generations are estimated to perform higher than native students. The results of this study provide a strong case for determining that Hispanic immigrant students in the United States are being left behind academically and that little to no improvement is seen between the first and second generations. While most of the parental involvement variables appear to have a rather small impact on academic outcomes, high academic expectations have the strongest effect. The indicators for child characteristics show mixed results in relation to academic outcomes. However, involvement in drama or school clubs appears to have a small positive impact on achievement nonetheless. This may serve as some indication to push immigrant students toward participation in extracurricular activities, especially clubs like drama, which heavily incorporate reading, memorization, and interaction with peers.

The science outcomes of Hispanic immigrants and blacks—as well as the relatively lower scores of Asian immigrants—are alarming and reveal a broader problem in educational curricula that necessitates a policy remedy. According to the results of the 2009 National Assessment of Educational Progress, known as the Nation's Report Card, only 30 percent of eighth graders performed at or above a level of proficiency in science. This score only worsens by the twelfth grade, when only 21 percent arrive at a level of proficiency. An alarming majority—63 percent of the nation's eighth graders—performed at or above a basic level, with only two percent performing at an advanced level. The results are even worse for racial/ethnic minority students, with 58 percent of Hispanic students scoring below the basic level of knowledge and 71 percent of Black students scoring below. In addition, eighth grade students who qualified to receive free school lunches (due to low incomes) scored, on average, 30 points lower than those who were not eligible (NAEP 2011). An underlying issue with such low national scores in science is that very few students obtain the advanced skills necessary for a possible career in science and technology, and, apart from Asian students, racial and ethnic minorities have an even smaller chance of entering careers in the field of science. The US Secretary of Education Arne Duncan has recently expressed his concern that the current rate of learning in science is not one that will support the US's role as an international leader in the sciences (Armario 2011). According to the former Director of the New York Hall of Science, Alan Friedman: "our ability to create the next generation of US leaders in science and technology is seriously in danger" (Armario

2011). With immigrant populations continuing to account for a large portion of population growth in the United States, it is imperative that US education policy addresses these science achievement gaps in order to ensure that the nation remains among the global leaders in the field of science.

The only area in which Hispanic immigrants show significant improvement is in math scores, reducing the achievement gap by roughly 50 percent by the second generation. The indications of the gaps are profound and offer some insight with regard to the quality of English as a Second Language (ESL) programs, or other variations of bilingual programs for language-minority students that operate in many schools across the US. The purpose of such programs is to integrate students into the American school system through mastery of the English language. As the Ramirez (1991) study shows, with the large variety of bilingual programs offered across schools and the differing forms of implementation, academic results for such programs are varied. Nonetheless, because the increasing rate of Hispanic immigrants entering the country, a case can be made for increasing funding into minority language programs in the United States.

"The long term consequences of ignoring the achievement gaps that exist between white native students and Hispanic immigrants may have long-term effects on the integration of immigrants in US society and overall US economic growth."

The long term consequences of ignoring the achievement gaps that exist between white native students and Hispanic immigrants may have long-term effects on the integration of immigrants in US society and overall US economic growth. Min Zhou has demonstrated that recent employment opportunities for immigrants pay lower wages and allow for less upward socioeconomic mobility (Zhou 1997). Therefore, there are fewer employment opportunities for new immigrants entering the country, which may, in turn, impact the opportunities for the children of immigrants. The effects of coming from low-income households on academic outcomes may be quite large. An immigrant family with limited access to educational resources due to economic limitations, such as lack of access to a computer or books, coupled with the struggles of possible intergenerational conflicts, may have a severe negative impact on the achievement levels of immigrant children. This, in turn, may limit children's opportunities for upward socioeconomic mobility, thus creating a cycle of low wage earnings and achievement. Some economists, such as David Autor, Lawrence F. Katz, and Melissa S. Kearney, have gone as far as to say that the US labor market has become polarized into high wage and low wage jobs with a shrinking middle wage (Autor et al. 2006). Autor, Katz, and Kearney also note that increased "computer capital" has become a substitute for human labor with regard

to certain cognitive and manual tasks, thus driving down the cost of routine tasks performed by both human labor and computer labor (Autor et al. 2006). According to Autor, Katz, and Kearney, because computer capital drives down the price of performing routine tasks, wages get driven down as well, causing a polarization of lower wage jobs (Autor et al. 2006). Other economists attribute the shrinking of middle class wages to outsourcing both blue and white-collar jobs out of the US. In the last two decades, the US has seen a growing share of imports in inputs used in US manufacturing, especially in high-tech manufacturing, such as electronics and computers (Bardhan and Kroll 2003). If the US labor market is indeed becoming polarized toward the upper and lower tails in wages, then parents of families migrating to the US are afforded fewer opportunities to improve their economic situations, unless they already have the skills needed for upper-tailed jobs. This has serious economic implications for limiting not only the growth of the middle class but also overall US economic growth. Improving the academic performance of immigrant children in the US through improved educational policies is therefore essential for ensuring all immigrants have the opportunity to pursue their idea of the American dream.

While this study breaks down achievement levels of immigrants by group and generation, future research should focus on third generation immigrants as well to see if the trends in outcomes continue in the same direction or if changes are seen by the third generation. Furthermore, more research is needed on the academic outcomes of children from low-income homes, especially those of immigrant families. More research in this field is needed to fully understand the variation in scores between white natives and immigrant children of different race/ethnic groups to address the apparent achievement gaps that exist.

"Improving the academic performance of immigrant children in the US through improved educational policies is therefore essential for ensuring all immigrants have the opportunity to pursue their idea of the American dream."

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Malaria Prevention in Liberian Children:

Impacts of Bed Net Ownership and Use

By Yasmein Asi

Yasmein Asi completed the Master of Public Policy at the Georgetown Public Policy Institute in 2011. This thesis was submitted in partial fulfillment of the degree requirement. Robert Bednarzik, PhD, served as her adviser.

ABSTRACT

Malaria eradication has become a hot topic in economic growth and development policy, especially in highly endemic regions, such as sub-Saharan Africa. The malaria burden in Liberia is significant and impacts the health and overall productivity of the country. Although similar studies have been conducted in other sub-Saharan African countries, this study utilizes newly available data collected under the National Malaria Control Program, implemented in 2005, to evaluate the impact of insecticide-treated bed net (ITN) disbursements on reducing the prevalence of malaria in Liberian children under the age of five. ITN use is found to have a significant impact on reducing the risk of malaria for Liberian children under the age of five; however, the effect is less robust for ITN ownership. Implications for policy include bolstering ITN disbursement programs in conjunction with nutrition and malaria social marketing initiatives.

I. INTRODUCTION

As one of the Millennium Development Goals, malaria abatement has been the target of various poverty-reducing campaigns throughout the developing world. Although the disease is both preventable and curable, malaria remains a primary public health concern in developing countries within tropical zones. A high malaria infection rate within a country is a poverty-promoting condition, as malaria can impair childhood growth and adversely affect intellectual development and education opportunities, all of which may ultimately diminish worker productivity (Hotez et al. 2006). The World Health Organization (WHO) estimates that malaria can reduce the gross domestic products (GDP) of countries with high infection rates by as much as 1.3 percent, and can account for up to 40 percent of annual public health expenditures (WHO 2009). Malaria is also associated with various co-infections. It can cause severe anemia, which is associated with impaired physical and cognitive development in children, as well as reduced immunity function and school performance. The effects of malaria can also indirectly put children at a higher risk for HIV infection, as severe anemia often warrants blood transfusions in lesser-developed countries where blood screening is less common (Snow et al. 1999).

"A high malaria infection rate within a country is a poverty-promoting condition, as malaria can impair childhood growth and adversely affect intellectual development and education opportunities, all of which may ultimately diminish worker productivity."

Because of the nature of malaria, children are the most susceptible to fatal infections from the disease. Malarial infections and related diseases account for 20 percent of all childhood deaths in Africa. It is estimated that one African child dies from malaria-related illnesses every 45 seconds. In areas of high transmission, children are most likely to contract serious malaria-related illnesses because they have not formed immunity to the disease, which is developed over an extended period of exposure (WHO 2009).

Malaria in Liberia

Liberia falls within the endemic region of malaria, exposing its population to steady outbreaks of infection throughout the year and high mortality rates from the disease (Snow et al. 2003). The malaria burden in Liberia is heavy, with hospital records indicating that 42 percent of in-patient deaths are attributable to the disease. It is one of the top ten causes of death in all ages of the Liberian population, and accounts for nearly 20 percent of deaths among children under five (Liberia Mortality 2006). In 2000, the Liberian government signed the Abuja Declaration, an agreement made by the African Summit on WHO's Roll Back Malaria initiative. This 2000 summit in Nigeria brought together 44 of the 50

malaria-affected African nations for the common purpose of halving African malaria-mortality by 2010. Signatories pledged to facilitate, implement, manage, and monitor Roll Back Malaria projects, to coordinate efforts with partner states and international organizations, and to improve access to both preventative measures and treatments. Although Liberia signed the declaration in 2000, the country could not implement the policies to roll back malaria until 2005—two years after its crippling civil war had ended.

In 2005, the Liberian Ministry of Health and Social Welfare adopted various policies under the National Malaria Control Program (NMCP) in order to combat the spread and fatality of the disease. The NMCP and its partners have increased the implementation of key interventions in Liberia, such as the distribution of newer combinations of medicinal therapies; long-lasting insecticide-treated mosquito nets; the provision of intermittent, preventative treatments for pregnant women; and the advancement of malaria education programs. The NMCP's targets were in line with those of the Roll Back Malaria Initiative and of the Millennium Development Goals, aiming for a 50 percent reduction of malaria infection by 2010.

While interventions under the NMCP have continued since 2005, data collection in Liberia has remained relatively weak and unreliable. This study utilizes newly available information from the extensive Liberia Malaria Indicator Survey (2009), which provides information on key indicators of malaria. This analysis studies the impact of NMCP reduction strategies on reducing malaria infections in children. Such studies have been conducted throughout Africa, but comprehensive and reliable data on Liberia has only very recently been collected.

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II. ASSESSING THE LITERATURE

Determinants of Malaria in Africa

Numerous studies have examined the connection of malaria to various geographic, socioeconomic, and health indicators. Children under five years of age are considered a high-risk group for infection. Young children have not yet developed a strong immunity to the disease, as immunity builds with more frequent exposure (Bejon et al. 2009). Health status in children is also an important determinant of malaria morbidity and severity. Caulfield, Richard and Black (2004) used pooled global data to find that various nutrient

deficiencies resulted in more deaths attributable to malaria.

Research also indicates that health status is associated with economic resources and access to health care facilities, so there is a logical relationship between malaria and income indicators. Bernard et al. (2008) found that the odds of testing positive on a rapid-diagnostic test for malaria are reduced by more than half for the least poor compared to the poorest households in Tanzania. Poorer households are also less likely to be exposed to malaria intervention strategies, like bed net promotion or distribution campaigns. Further, within a country, some geographic populations are more at risk than others. For example, Holtz et al. (2002) found that rural Malawian children under five years of age without a bed net in their homes are at a higher risk of malaria infection than urban children of the same group without nets in their homes. Rural residents' higher risk for malaria may be partly explained by how their homes are constructed. Sintasath et al. (2005) showed that homes with mud walls places inhabitants at a significantly higher risk for developing malaria, even when controlling for economic status, nutrition levels, and geographic region.

The literature suggests a socioeconomic connection among common malaria indicators. Rural populations are generally poorer, and low economic status can negatively impact nutrition and health status. Socioeconomic status can determine what type of house a family lives in, and can affect access to education and malaria intervention programs. The combination of these factors places children, an already high-risk group, in further peril.

ITNs: A common intervention strategy

Insecticide-treated bed nets (ITNs) have been widely accepted as an effective intervention for malaria prevention. ITNs affect malaria transmission by killing and/or diverting infected mosquitoes away from individual net users and households with treated nets. WHO's Rollback Malaria Partnership and the Millennium Development Goals have popularized ITN intervention programs. Both aim to achieve 80 percent ITN usage among pregnant women and children less than five years of age in Africa (Khatib et al. 2008).

There have been a number of studies evaluating the impact of ITN interventions. ITNs have been shown to prevent approximately one in four infant deaths due to malaria in areas of intense perennial infection (Phillips-Howard et al. 2003). Further, clinical malaria and moderate to severe anemia are reduced by 60 percent in children who resided in households that own an ITN (Ter Kuile et al. 2003). While ITN programs are often targeted at the poorest populations, numerous studies have shown how socioeconomic status can also be tied to bed net ownership and usage. Bernard et al. (2009) found that the poorest households are at the highest risk of malaria infection, but the least likely to own ITNs. Additionally, while households are

the most common unit of analysis in malaria intervention studies, Gu and Novak (2009) found a gap in the number of households owning an ITN and the percentage of the actual population covered by ITNs; meaning that even with a rate of 100 percent bed net ownership at the household level, individual bed net usage within households may remain well below universal coverage.

III. HYPOTHESIS AND DESCRIPTION OF DATA

Hypothesis and Rationale

This study tests the hypothesis that the risk of malaria infection in Liberian children under the age of five is lower for a child who lives in a household that owns a bed net, versus a child who lives in a household without a bed net for sleeping. Previous research has provided the foundation for this hypothesis. As described above, various authors have found that bed net ownership at the household level is associated with reduced occurrence of malaria at the community level in infants and children under the age of two and in young children under the age of five (Hawley et al. 2003; Phillips-Howard et al. 2003; Ter Kuile et al. 2003; Holtz et al. 2005).

Data Description

This study uses data from the Liberia Malaria Indicator Survey (LMIS), designed to collect and monitor information on key indicators of malaria. With guidance from Demographic and Health Survey, the NMCP is responsible for the general management of the survey.

The LMIS was conducted using a nationally representative sample of nearly 4,500 Liberian households between mid-December 2008 and March 2009. The survey spans the entire country, covering greater Monrovia (the capital) and each of the five major geographic regions, with each region including fifteen districts (see exhibit A). Thus, the LMIS sample is spread equally across each of the six regions, not spread proportionally according to regional populations. Equal probability systematic sampling was used to randomly select 4,485 households from 15 rural strata and 16 urban strata created for the survey.

LMIS used two questionnaires, the Household Questionnaire and the Woman's Questionnaire, for all women age 15-49 years within the selected household. The primary purposes of the Household Questionnaire were to identify eligible children aged 6-59 months for anemia and malaria testing, and to identify women eligible for the Woman's Questionnaire. Blood samples were taken from each child within the qualifying household. Rapid diagnostic tests were performed on-site to identify children with malaria and anemia. Response rates for both LMIS questionnaires were relatively high, at 97 percent for households and 98 percent for women (LMIS 2009).

Because the present study seeks to understand the association between malaria in children under five and household bed net ownership, the

Exhibit A

sample of 4,162 households consisting of 22,777 individuals is condensed to 4,055 children under the age of five with recorded malaria test results. There are 551 infants less than six months old who were not eligible for malaria or anemia testing, and two eligible children that did not have recorded test results. These 553 children are excluded from the sample. The sample is split almost evenly between males and females, but is not evenly distributed between urban and rural populations, with 38.5 percent of children residing in urban areas and 61.5 percent residing in rural regions.

Information on the relationship among bed net ownership and other indicators is presented in Table 1. As Table 1 shows, 58.9 percent of urban households own bed nets for sleeping, which is just slightly lower than the 60.5 percent ownership rate found in rural areas. It is interesting to note that most children (59.8 percent) come from households that own a bed net. This is consistent with recent trends that show growth in Liberian bed net ownership since 2005 (NMCP 2009). Further, it appears that households with young children may be more likely to own bed nets. This could be attributed to the nature of malaria intervention programs, as many programs, such as the NMCP, target their campaigns toward vulnerable groups, such as households with young children and/or pregnant women.

Nearly two-thirds (63.4 percent) of the sampled children test positive for anemia, indicated by a hemoglobin level of less than 11 grams per deciliter. A larger share of those testing positive for malaria (72.1 percent) are also anemic. This is consistent with existing literature, which finds that people with malaria are often anemic. The percentage of children with anemia

that also have malaria is 35.5 percent. These data appear to indicate a general malnutrition level in Liberian children between 6 months and five years of age, as anemia rates are more than double malaria rates.

It is also vital to note that, in this study, nearly 60 percent of Liberian households own a bed net, but only 42 percent of households report use of a net. Thus, many Liberian children in this study live in households that own a bed net, but do not use one on a nightly basis. This study finds that nearly 20 percent of children in the study who tested positive for malaria live in households that own bed nets. When comparing this figure with the 13 percent of children who tested positive and live in a household with reported regular net use, it appears that net use may offer a more compelling explanation for malaria outcomes than simply household ownership.

IV. METHODOLOGY

Model

The primary purpose of this study is to analyze key indicators that increase the risk of malaria infection. Consistent with previous studies in the literature that have also analyzed the impact of interventions on malarial infection, multivariate regression is used to control for other factors (Snow et

Table 1: Bed Net Ownership and Key Indicators

Cross-tabulation of child's household bed net ownership by demographic indicator. Frequency and row percents are reported.

Indicator	Household does not own a bed net	Household owns a bed net	Row Total (Row%) (% of total)
Sex of Child:			
Male	807 (39.9)	1,217 (60.1)	2,024 (100.0) (49.9)
Female	821 (40.4)	1,210 (59.6)	2,031 (100.0) (50.1))
Wealth Index:			
Poorer	884 (39.3)	1,364 (60.7)	2,248 (100.0) (55.4)
Wealthier	744 (41.2)	1,063 (58.8)	1,807 (100.0) (44.6)
Place of Residence:			
Urban	642 (41.1)	919 (58.9)	1,561 (100.0) (38.5)
Rural	986 (39.5)	1,508 (60.5)	2,494 (100.0) (61.5)
Column Total (% of total)	1,629 (40.2)	2,428 (59.8)	N= 4,055 (100.0)

Note: Data adapted from NMCP Liberia (2009)

al. 1999; Holtz et al. 2002; Sintasath et al. 2005; Bejon et al. 2009). The dependent variable, malaria, is coded as a dummy variable equaling one if the child tested positive for malaria on a blood smear test, and zero if the test result was negative. Logistic regression is used to predict the probability of malaria infection, given specified key indicator variables. The primary independent variable of interest, household bed net ownership, is also coded as a dummy variable equaling one if the child lives in a home that owns a bed net.

Models 1 through 5 include various control variables, including household indicators for bed net ownership, bed net use, wealth status, place of residence, interaction of wealth status and place of residence, wall material, and roof type. Additionally, measures specific to each individual child are included, specifying age in months, age-squared, gender, hemoglobin levels, result of anemia test, and the interaction of hemoglobin level and use of net. Model 6 includes all variables included in Models 1 through 5, with the exception of the interaction between wealth status and place of residence. Additionally, Model 6 includes dummy variables for each of Liberia's five regions, as divided by DHS, to help understand the variation in risk for malaria among geographic regions. Models 1 through 6 are further outlined in Appendix 1[1].

Table 2 lists and defines each variable included in all regression models, providing a rationale for inclusion and the predicted sign for each coefficient based on the literature. Although all of the variables included in the model are consistent with previous literature on bed net use and malaria infection, some are specified differently than other studies. The bed net indicator used in this study is a dummy variable that specifies whether or not the child's household owns at least one bed net. Understanding that ITN ownership does not necessarily translate into net use, a second bed net indicator is specified. The usage indicator is a dummy variable set equal to one if some or all of the children in the household reportedly slept under an ITN the night before the household survey was completed. These measurements are more simplified than Holtz et al. (2002), which specifies the number of bed nets per household, as well as the type of bed net used.

As discussed previously, various studies have demonstrated a connection between malaria and different geographic, socioeconomic, and health indicators. Health status and nutrition, measured by the child's weight, the presence of key nutrients, or the child's arm circumference, have been shown to affect the intensity of malaria infection in children (Caulfield et al. 2004; Ter Kuile et al. 2003). Data collected in the NMCP does not include these indicators. Thus, the models presented here use hemoglobin levels to indicate health status. Low hemoglobin density in the blood is often associated with anemia as well as vitamin and iron

[1] Appendix 1 can be found in Asi's full thesis at www.gppreview.com.

Table 2: Definition of Specified Variables

Includes predicted direction of the relationship between dependent variable and indicators, and rationale for the prediction.

Model Variable	Variable	Definition	Expected Sign of ß coeff.	Rationale
Y	Malaria	Dummy variable=1 if child's blood smear test returned a positive result for malaria	N/A	N/A
X_{1a}	OwnsNet	Dummy variable=1 if child lives in a household that owns at least one bed net, versus a household with no bed net	_	Bejon (2009); Holtz et al. (2002); Ter Kuile et al. (2003)
X_{1b}	UseNet	Dummy variable=1 if child lives in HH where some or all children slept under a bed net the previous night	_	Bernard et al. (2009) Holtz et al. (2002); Ter Kuile et al. (2003)
X_2	Age	Continuous variable for child's age in months, ranges from 0-59 months	+	Bejon et al. (2009)
X_3	Age^2	Child's age in months, squared	_	Bejon et al. (2009)
X_4	Female	Dummy variable=1 if child is female	_	Sintasath et al. (2005); Noor et al. (2008)
X_{5a}	Hemoglobin	Continuous variable measuring hemoglobin levels in grams/deciliter	_	Caulfield, Richard and Black (2004); Holtz et al. (2002)
X_{5b}	Anemic	Dummy variable=1 if child's hemoglobin levels measure <11 grams/ deciliter	+	Caulfield, Richard and Black (2004); Holtz et al. (2002)
X_6	Poor	Dummy variable=1 if household income falls below the median, as opposed to above the median HH income	+	Bernard et al. (2009)
X_7	Rural	Dummy variable=1 if child's place of residence is rural, versus urban	+	Holtz et al. (2002)
X_8	Poor*Rural	Dummy variable=1 if Poor=1 and Rural=1	+	Holtz et al. (2002); Bernard et al. (2009)
X_9	MudWalls	Dummy variable=1 if primary wall material of child's home is mud, versus all other materials	+	Holtz et al., (2002); Sintasath et al. (2005)
X_{10}	Thatch	Dummy variable=1 if roof of child's home is thatched bamboo or palm	+	Holtz et al., (2002); Sintasath et al. (2005)
X_{11}	Hemoglobin*UseNet	Interaction of nutrition level and use of net	N/A	N/A

Note: All variables adapted from NMCP Liberia (2009)

deficiency. Hemoglobin levels are interacted with bed net use to test whether or not the impact of bed net use on malaria is conditioned on nutrition levels. Although not tested by previous studies, it is logical to suspect that households with inferior diets may understand their increased risk of contracting malaria, and are thus more likely to use a net to prevent infection.

V. RESULTS

As hypothesized, bed net use is associated with a significant reduction in the probability of testing positive for malaria. The regression results and their probability equivalents are reported in Tables 3 and 4, respectively. Of the 4,055 Liberian children under the age of five studied here, 1,266 tested positive for malaria (31.3 percent). As reported in Table 4, children who slept under a bed net the night before their household was sampled have a significantly lower predicted probability of testing positive for malaria (18 percent compared to 36.3 percent) than children who did not sleep under a bed net on the previous night.

When bed net ownership is specified instead of use (Models 1 and 3), the variable is not found to have a significant impact on malaria outcomes. This finding suggests that ownership does not necessarily translate into use—bed net ownership and bed net use on the previous night have an imperfect correlation (0.69). These findings are inconsistent with those of Holtz et al. (2002) and Bejon et al. (2009), who both found bed net ownership to have a significant, negative association with malaria outcomes. Results from the present study suggest that bed net use is, in fact, more important to preventing malaria than simply ownership.

As hypothesized, nutrition status is strongly associated with malaria infection. Children who tested positive for anemia are predicted to have a significantly higher risk of malaria infection (Table 3, Model 4). Specifically, when holding all other variables constant, an anemic child has an 18 percent higher chance of testing positive for malaria when compared to a non-anemic child. Models 4 through 6 specify hemoglobin levels in place of the dichotomous anemia variable. There is a highly significant and negative association between hemoglobin levels in the blood and malaria. As shown in Table 4, a child with the minimum hemoglobin level (4.3g/dL) has a staggering 88.2 percent risk of testing positive for malaria, when holding all other variables constant. Additionally, every one standard deviation (1.42g/dL) change in a child's hemoglobin level from the mean is associated with a 13.7 percent increase or decrease in his or her risk for malaria infection. The relationship between nutrition (indicated here by hemoglobin levels) and malaria prevalence is consistent with Caulfield et al. (2004), who found that the intensity of malaria episodes is strongly and positively associated with nutrient deficiencies in young children.

Additionally, hemoglobin levels are interacted with net use in Models 5 and 6 to test whether or not the impact of the net on malaria is conditioned by the health of the child. The interaction is marginally statistically significant (p=0.20) in Model 5, but more highly significant in Model 6 (p=0.06) where a child's region is specified. Use of a net on the previous night by hemoglobin level has a significant positive association with malaria outcomes; meaning net use becomes less effective at preventing malaria as a child's nutrition level increases. For an average child living under baseline conditions of the study, who slept under a bed net on the previous night, and who has the mean hemoglobin level of 10.4g/dL, the predicted probability of testing positive for malaria is 29.4 percent. If this same child did not sleep under a bed net on the previous night, his risk of malaria nearly doubles.

As expected, there is a significant difference among children living in poor versus not poor, and rural versus urban households. In Model 5, a child living in a poor household has a predicted probability of malaria infection of 33 percent, while a child from a wealthier household has a significantly lower risk of 23 percent. The location of the child's residence is also found to be a significant predictor of infection. Children living in rural regions have a higher chance of testing positive for malaria. The predicted probability of a child testing positive for malaria jumps from 19 percent for an urban resident to 35 percent for a rural resident.

Wealth and place of residence indicators are interacted in Models 3, 4 and 5 to test whether or not the effect of being poor and the likelihood of contracting malaria are conditioned by place of residence. For the rural-poor, the probability of testing positive for malaria is 39 percent, versus 22 percent for urban-poor children.

Additionally, significant regional differences in the risk of malaria are revealed in Model 6. Residents of the South Central, Southeast A, Southeast B and North Central regions are associated with significantly higher risks of malaria, when compared to the baseline group of Monrovia residents. North Central residents have the highest probability of testing positive for the disease, at nearly 48 percent.

Although age is significantly and positively associated with malarial infection, the predicted relationship is not linear. Models 3 through 6 specify an age-squared variable to help understand the nature of the relationship between age in months and malaria. Figure 1 demonstrates the relationship between age in months and the probability of testing positive for malaria in Liberian children less than five years. The graph shows a curvilinear, positive relationship. Thus, the probability of testing positive for malaria increases with age, but at a decreasing rate. These findings are consistent with Bejon et al. (2009), who found that the risk of malaria infection in young children increases with age.

Table 3: Predicted odds ratios of malaria for Liberian children in 2009, 6-59 months

Variable	Model 1 Odds Ratio (z-values)	Model 2 Odds Ratio (z-values)	Model 3 Odds Ratio (z-values)	Model 4 Odds Ratio (z-values)	Model 5 Odds Ratio (z-values)	Model 6 Odds Ratio (z-values)
Use Net	--	0.85	--	0.82**	0.50	0.39*
		(-1.96)		(-2.26)	(-1.27)	(-1.67)
Own Net	0.88	--	0.87	--	--	--
	(-1.62)		(-1.58)			
Female	0.96	0.96	0.97	0.97	0.97	0.97
	(-0.46)	(-0.50)	(-0.38)	(-0.42)	(-0.45)	(-0.44)
Age	1.03***	1.04***	1.11***	1.11***	1.11***	1.12***
	(16.06)	(16.08)	(8.84)	(8.87)	(8.63)	(9.01)
Age^2	--	--	0.99***	0.99***	0.99***	0.99***
			(-5.49)	(-5.52)	(-5.38)	(-5.65)
Poor	1.12	1.10	1.67***	1.67***	1.65***	1.08
	(0.93)	(0.80)	(2.87)	(2.86)	(2.92)	(0.61)
Rural	1.74***	1.75***	2.35***	2.39***	2.38***	1.62***
	(5.84)	(5.87)	(6.88)	(7.02)	(7.02)	(4.79)
Poor*Rural	--	--	0.56***	0.55***	0.55***	--
			(-3.08)	(-3.21)	(-3.21)	
Region§						
North West	--	--	--	--	--	1.21
						(1.02)
South Central	--	--	--	--	--	1.36*
						(1.71)
South Central	--	--	--	--	--	1.36*
						(1.71)
Southeast A	--	--	--	--	--	1.77***
						(3.21)
Southeast B	--	--	--	--	--	2.25***
						(4.44)
North Central	--	--	--	--	--	3.21***
						(7.09)
Mud Walls	1.32**	1.33**	1.26*	1.26*	1.26**	1.21
	(2.30)	(2.35)	(1.88)	(1.88)	(1.96)	(1.58)
Thatch Roof	0.85	0.86	0.90	0.91	0.91	1.00
	(-1.61)	(-1.54)	(-1.02)	(-0.95)	(-0.97)	(0.02)
Anemic	2.53***	2.54***	--	--	--	--
	(11.40)	(11.45)				
Hemoglobin (g/dL)	--	--	0.66***	0.66***	0.63***	0.61***
			(-14.48)	(-14.53)	(-12.77)	(-12.54)
Hemoglobin*Use Net	--	--	--	--	1.08	1.10*
					(1.59)	(1.89)
Model Wald Chi-Square	375.13***	374.46***	445.38***	443.26***	561.31***	510.62***
Pseudo R^2	0.081	0.082	0.111	0.111	0.112	0.131
N	4,055					

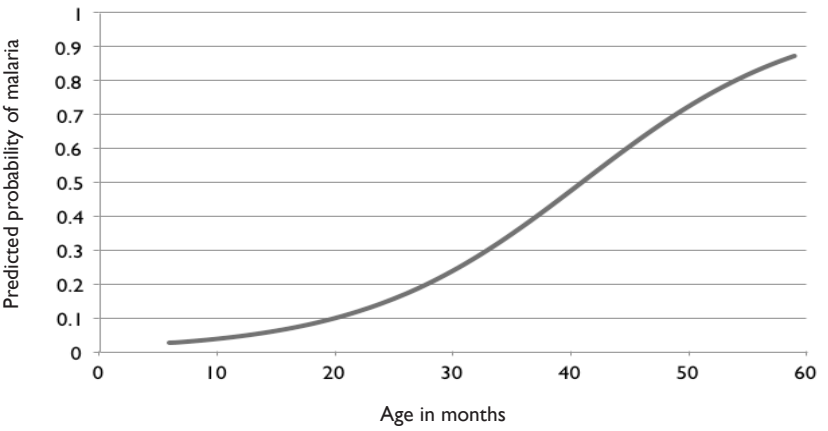
Note: *** p < 0.01; ** p< 0.05; * p < 0.10.
§ Monrovia, the capitol, is the baseline region of comparison.

Table 4: Predicted risk by indicator that Liberian children, 6-59 months test positive for malaria in 2009 (Model 6)

Variable	Frequency/ % of total	Malaria Prevalence by Indicator/ % of total	Risk %
Children in HH Slept Under Bed Net Previous Night?			
Yes	1,687/41.6	546/13.5	18.0
No	2,368/58.4	720/17.8	36.3
Sex of Child			
Male	2,024/49.9	651/16.1	28.0
Female	2,031/50.1	615/15.1	27.4
Age of Child#			
Min	--	--	1.9
Mean	--	--	26.6
Max	--	--	88.1
Wealth Status of HH			
Poor or Poorest	2,248/55.4	796/19.6	26.9
Not Poor	1,807/44.6	470/11.6	28.4
Urban vs. Rural			
Urban	1,561/38.5	373/9.2	22.2
Rural	2.294/56.6	893/22.0	31.5
Region			
North West	574/14.1	147/3.6	31.1
South Central	573/14.1	150/3.7	33.2
Southeast A	834/20.6	251/6.2	37.7
Southeast B	602/14.8	221/5.5	43.3
North Central	1,011/24.9	424/10.5	47.9
Hemoglobin (g/dL)##			
Min	--	--	88.2
Mean	--	--	28.1
Max	--	--	0.5
Wall Material of HH			
Mud Walls	2,573/63.4	904/22.3	29.1
Other Material	1,482/36.5	362/8.9	25.3
Roof Type of HH			
Thatched	1,698/41.9	581/14.3	27.7
Other	2,357/58.1	685/16.9	27.7
N=4,055			

Note:
Ages range from 6 months to 59 months; mean=32.5 months
Hemoglobin levels range from 4.3g/dL to 19.5g/dL; mean=10.4g/dL

Figure 1: Predicted probability that child tests positive for malaria in 2009, by age (6-59 months)



IV. POLICY IMPLICATIONS

Not only do the findings show that bed nets are an effective preventer of malaria in Liberian children under the age of five, they also demonstrate how net use and malaria affect children with varying demographic characteristics. Net ownership alone is not enough. Children living in households that actually used bed nets while sleeping experience significant reductions in malaria prevalence, which highlights the importance of malaria prevention education programs. Although not studied here, a mother's knowledge about malaria and exposure to malaria-prevention messages has been associated with a significant reduction in a child's risk of malaria (Koram et al., 1995).

The dangers of the disease, as well as the effectiveness of regular bed net use, should be made clear. Holtz et al. (2002) recommends combining social marketing of bed nets with cost subsidies or distribution programs, in order to ensure nets will be highly utilized and, thus, most effective. In 2009, the LMIS found that the most common prevention message heard by Liberian respondents is "Malaria kills." Although catchy, this message fails to provide the target audience with information on the symptoms of the disease, its specific adverse health effects, preventative measures to be taken against it, and possible treatments in case of infection. The importance of bed net use and nutrition, especially for groups who are most at-risk, must be incorporated into anti-malaria marketing campaigns.

The risk of malaria in Liberia also varies heavily by region. The most commonly cited reason for a household lacking of a net is low availability. Thus, it appears that in Liberian regions with lower risks of malaria, residents actually had more opportunities to purchase or receive bed nets in 2009, while in more rural regions, where the predicted risk of malaria remains high, bed nets were

not readily available. The gap between malaria risk and net availability demonstrates a failure of the NMCP to ensure broad, indiscriminate access to nets.

Malaria prevention campaigns must also emphasize that everyone is susceptible to infection, but that some groups are at a higher risk. The fact that age has a positive, but decreasing impact on malaria prevalence in all models suggests that parents may tend to take fewer precautions in preventing malaria for older children. Findings from Holtz et al. (2002) support this hypothesis, as children in neighboring Malawi, aged five to fourteen, are less likely to have slept under a bed net on the previous night than children aged 59 months and below. While the severity of malaria symptoms tends to decrease with increases in age and exposure, a bout of malaria is enough to keep a school-aged child at home. With economic indicators for Liberia already so low, the country should do everything in its power to increase school attendance, as it can have implications for human capital accumulation and future growth.

The most compelling finding of the present study is the variation in the effect of bed net use by nutrition levels. Nets are found to be most effective at reducing the risk of malaria for children with already lower hemoglobin levels. So, while bed nets are highly important to prevention, nutritional factors (as measured by hemoglobin levels) can determine their effectiveness. Hemoglobin levels are highly statistically significant in all models, demonstrating how good nutrition can heavily reduce susceptibility to malaria infection. Combined with the fact that more Liberian children tested positive for anemia (63 percent) than malaria (31 percent), these findings highlight the dangers of general malnutrition problems in the under-five population. Thus, a broad-reaching malaria prevention strategy that not only educates and informs, but also works in conjunction with food and hunger programs, is essential to tackling the disease.

V. CONCLUSION

The international community has dedicated itself to combating and eradicating the global malaria burden, especially in the highly endemic regions of Sub-Saharan Africa. Bed nets are an essential component of this policy. This study provides support for the Liberian government to boost its NMCP program by making ITN ownership universal, enhancing anti-malaria marketing campaigns that promote bed net-use, and incorporating nutrition programs into its overarching malaria prevention strategy. Coupled with prevention and treatment education and nutrition programs, bed net interventions can promote a national standard of prevention within a more cognizant, better informed, and healthier Liberian population.

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Interview with Donald Marron:

Challenges for Tax Policy in the Current Economic and Political Environment

By Kathryn Short

In the Fall of 2011, Executive Interview Editor Kathryn Short had the opportunity to sit down with Donald Marron, Director of the Tax Policy Center, a joint venture between the Urban Institute and Brookings. From his official biography: Marron previously served as a member of the President's Council of Economic Advisers, as acting director of the Congressional Budget Office, and as executive director of Congress's Joint Economic Committee. Before his government service, he taught economics and finance at the University of Chicago Graduate School of Business and served as chief financial officer of a health care software start-up. Marron was also a visiting professor at the Georgetown Public Policy Institute. In this interview, he discusses the role of tax policy in job creation, economic development, and long-term growth, as well as the role of politics in arriving at thoughtful solutions.

"...there are people who will tell you that any time you cut tax rates, the economy will grow so much that more tax revenue will come in, and that doesn't seem to be true. But conceptually, it's at least something to think about."

Georgetown Public Policy Review: Let me start with a general question to frame this conversation, and to give some background to readers who may not have tax policy expertise. In thinking specifically about tax policy, what are the most powerful levers for job creation, and what do you think are the most "over-hyped" ones?

Donald Marron: It's always important to distinguish between the short-run and the long-run. In the short run, we have a very weak economy, and what people often characterize as a "Keynesian" way of thinking, makes sense. You can do things to provide some stimulus that will put money in people's pockets, they can spend it, and that will create some jobs temporarily. So on that front, things like cutting the payroll tax seem to make good sense. They do add to the deficit, and so we have a whole set of problems there, in the long run. But I think you can make a good case for pay roll tax cuts, on either the employee side or the employer side.

In the long run, tax policy also matters, but it matters more for the incentives it creates, both for people to work and for people to invest in the capital equipment that businesses use to employ people. So there's a lot to be said for moving toward a tax system that does not place excess burdens on folks who are out there trying to create jobs.

That argument can sometimes get over-hyped, and there are people who will tell you that any time you cut tax rates, the economy will grow so much that more tax revenue will come in, and that doesn't seem to be true. But conceptually, it's at least something to think about.

GPPR: So thinking specifically about some of the tax plans that have come out over the last couple of months, do you think there are any that seem stronger than others or do some elements seem stronger than others?

DM: Again, there's short-run and the long-run. The president came forward with a jobs proposal, which is very much focused on the short-run, the next year or two. I think the idea we have of extending the payroll tax cut is a perfectly logical thing to do, and perhaps extending it to the employer side makes good sense.

For the long-run, we have several presidential candidates out there who have proposed various tax plans. It would be fair to say that when you're running for president, there's a high degree of signaling in the plans you put forward. I don't necessarily mean this to be as bad as it sounds, but the plans don't need to be as connected to reality as the proposals that the President and Congress, if they're serious about legislating, actually have to consider.

GPPR: On the anniversary of the 86 Tax reforms, you quoted one of your colleagues in your blog as saying,

"The Reagan Administration saw that reform would only work if it began with a very specific plan that the White House owned. And President Reagan eventually became its best salesman. My Tax Policy Center colleague Gene Steuerle—who helped write TRA 86—always says the secret to success in Washington is writing the first draft. Put it this way: President Obama's health reform strategy, which left the dirty work to Congress, is not the way to go."

What are some bipartisan measures that you think the white house of 2013 should put into a plan that would allow them to realistically take a leadership role?

DM: There's actually a lot of bipartisan agreement on the broad brush strokes of tax reform. On the corporate side, the vast majority of Republicans, and many Democrats, believe our tax rate is too high. Thirty-five percent really ought to be something that begins with a 2 – 28 percent or 29 percent (and some would even go lower). It's not entirely clear how you accomplish that, but there's a lot of interest in moving that direction for international competitiveness reasons. We could pay for that by reducing some of the tax preferences that currently benefit companies. We talk about it as broadening the base and lowering the rate.

There are a lot of Republicans and Democrats who want to broaden the base and lower the rate on the corporate side. There are a lot of folks who want to do that on the individual side. There's more consensus that it would be beneficial to reduce tax preferences. The president has a proposal to do it in a way that would affect high-income folks, and there's debate and discussion about the revenue that would raise, and how much of it would be used to reduce tax rates, and how much would be used for deficit reduction. I think it's fair to say the parties are not that close together on that relative mix.

We saw in 2010, and into 2011, the Bowles-Simpson commission and the Domenici-Rivlin commission, come up with negotiated, bipartisan plans that both reduce tax preferences and use the money for a mixture of lowering rates and deficit reduction. That seems to be the likely place we'll end up, though it's hard to predict when. Traditionally, tax reform is much easier to do if, at the same time, you're cutting people's taxes. Being in a role where you are doing tax reform and raising people's taxes is a heavier lift.

"Traditionally, tax reform is much easier to do if, at the same time, you're cutting people's taxes. Being in a role where you are doing tax reform and raising people's taxes is a heavier lift."

GPPR: President Clinton came to Georgetown earlier this year to speak about his experiences with economic

recovery and job creation in the 1990s. A number of people are pointing back to the '90s as a nirvana of economic prosperity of job creation. Many people walked away feeling this was overly rosy. Do you think this is a fair comparison? And if so, what are some lessons we should be taking from that time period in terms of tax policy or other policy areas that you think contributed to the economic success and high employment rate?

DM: The 1990s, particularly the late '90s, was a period where there were some good policies being pursued but I think, quite frankly, the American economy got lucky, and therefore, the people in office at that time got lucky. We had this exogenous out-of-the-blue shock of the Internet, which in retrospect proved to be not as bad as the housing bubble, but there was a bubble aspect to it. There was an unsustainable investment boom that came to an end as the new century started. So the bubble was more good fortune at the time than real investment.

This is not really a fully resolved issue, but there was a long-term trend of more and more people entering the labor force that was beginning to tail off, and then began to reverse as we entered the new century. Again, to a certain extent in the '90s, there was the luck of still having that as a tailwind. Whereas now, in the 2000s, we don't have the Internet bubble helping us anymore, obviously the housing bubble didn't work out so well, and we have a lot of significant challenges at the moment. But then there's also this backdrop that some of the long-term increases in people working, entering the labor force, just came to an end.

So it would be nice to go back to the late 1990s but I'm just not sure it's possible.

GPPR: A lot of people have attributed the turn at the beginning of the 2000s to the Bush Tax Cuts. Is that valid?

DM: Linking those to the economic performance in the two time periods is a stretch. If you think about it, both of our most recent presidents, President Obama and President Bush, have been in this situation where they've taken over when things are going bad. Bush took over, and people hadn't completely worked it out yet, but it was the end of the technology bubble, and we were going to have a recession—obviously quite mild by the standards of the one we've had more recently. It was a similar sort of psychological phenomenon: in the year 2000, people were very optimistic about the future. Surpluses as far as the eye could see, people were talking about paying off the entire federal debt, things we now laugh about in retrospect.

Not to say policy doesn't matter, or that policy choices couldn't be better or worse, but I do worry that sometimes

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politicians in Washington are too willing to attribute what happens in the economy overall to decisions they've made—whereas a lot of it is just the economy doing its thing, for better or worse.

GPPR: How would you balance the need for redistribution through taxation (especially since the Earned Income Tax Credit (EITC) has become the largest cash transfer program in the country) with the possibility of efficiency enhancing reforms?

DM: There are a couple pieces to this. In a perfect world, we would start over with our tax code, so that all this debate about expiring tax cuts would be a non-issue. So what do we want the tax code to look like? For me, you would want to get rid of the various tax incentives and preferences that distort people's behavior, like the mortgage interest deduction. Of course you don't want to get rid of it overnight—that would be difficult and cruel for the taxpayer. But it's a dumb policy that in the long run you don't want to have in your tax code. And there are many of those—we don't tax health insurance that you get from your employer. That's insane. We ought to fix that. Again, that doesn't mean we shouldn't have some incentives to get health coverage, but the design of that is incredibly inefficient. So there are a lot of those reforms you would make to simplify the code, make it look more like the economist's ideal.

I support the argument that we ought to move toward taxing consumption and away from taxing income than we traditionally have. If you look internationally and you look historically, any nation, as it gets bigger, tends to rely more on taxing consumption – that's why the rest of the world has value-added taxes. While we don't today, we probably will in the future in one way or another. And that's just as a matter of economic efficiency: if you want to grow the pie, consumption taxes are less distortionary than income taxes.

"And that's just as a matter of economic efficiency: if you want to grow the pie, consumption taxes are less distortionary than income taxes."

Then there are things like the EITC, which you can actually make an efficiency argument for: it's beneficial to encourage low-wage workers to get in the labor force, build up skills, and then they move up. It does seem overall to encourage work, and that's a benefit. And of course it's a vital part of the country's cash transfer system, so I don't see any reason why you couldn't keep things like the EITC and Child Credit. You might redesign them in various ways, as it turns out the EITC isn't that useful for a single man, for example. Conceptually you could make changes like that.

GPPR: Matt Yglesias recently proposed his own radical progressive approach to tax reform. "If it were up to me, the major revenue streams would be a land value tax (like a property tax, but without

the buildings), a greenhouse gas tax, an uncapped payroll tax with a sharply progressive rate structure, and a modest tax on non-land wealth with a generous exemption. As minor revenue sources, you can add excise taxes on alcohol, tobacco, and marijuana plus of course congestion pricing!" What do you think of this approach?

DM: I constantly advocate for a higher gas tax and a higher, or any, carbon tax, just on the classic Public Finance 101 basis—you have an externality, you tax it, you get money, there's no particular reason you have to earmark it to infrastructure or environmental clean-up, it can just be good old-fashioned revenue to the government.

The land value tax: that's an issue that's been around for 200 years. The advocates for the land value tax (in public finance terms, levying a tax on something for which the elasticity is close to 0, so it's basically a pure rent) say that even though it's a really big loss for whoever owns the land the day you implement the tax, it's otherwise a relatively non-distortionary tax. It's harsh on whoever that is that owns the land today—I suppose predominately people who own in New York and San Francisco.

"Greece is a somewhat special case. Greece is a story of a) borrowing too much, and then b) lying about it for many years such that it was suddenly revealed to the world that they had borrowed much more than they had let on."

GPPR: The theme of one of our print journals this year includes an international perspective on job creation. What lessons do you think we can learn from Europe and elsewhere?

DM: Australia illustrates that it's really good to be close to a really rapidly growing, large economy. And historically that's true—if something happens to your economy, it helps if your partners are strong, because then you can get out of your hole partly by exporting. So Australia didn't really have a hole, but they've grown partly by exporting. That's obviously one reason why we're all looking to Europe: next to Canada and Mexico, Europe is our biggest trading partner and it would be nice if they didn't fall off a cliff.

Lessons: Greece is a somewhat special case. Greece is a story of a) borrowing too much, and then b) lying about it for many years such that it was suddenly revealed to the world that they had borrowed much more than they had let on. So they got themselves into a fundamentally unstable fiscal situation, so that there's no way out except through some sort of default. The United States is not Greece yet, and, we all hope, that's not where we're going to be, so we don't want to overplay the Greek story. But obviously it does illustrate that if you get really out of whack, bad things happen to you. And it illustrates that some of the things that governments need to do to get their budgets under control will be unpopular. There's going to be an issue about how you balance those things – we've seen that in the UK as well.

There's this tension between having a weak economy and worrying about your fiscal situation. The weak economy suggests that you shouldn't undertake austerity now, and the fiscal situation says that you need to undertake austerity eventually. That leads to the conventional-wisdom view that countries need to commit to getting their financial houses in order in the future, even as they under take some stimulus today. The challenge is that's kind of the easy thing to say. "I will start dieting tomorrow, as soon as I finish eating this quart of ice cream." It's not clear that it's completely credible, but in the future, that's where we'd like to be.

I always think we in the US should learn more from the rest of the world, and we should learn from what our own states grow through as we watch Illinois and California and others.

Sweden is an interesting example historically. They went through a major financial crisis in the early 1990s, but they responded to it about as well as possible. They still had a build-up of a tremendous amount of federal debt, so in the aftermath of their financial crisis they still had this fiscal challenge to address, and they addressed it logically and rationally. Everyone comes to the table, the burden is shared by everybody. People acknowledged the country couldn't afford quite as generous of entitlement programs as originally intended, but the solution also included raising taxes on the rich and cutting spending on government workers. None of those things are pleasant to talk about, but in a world where you don't have enough money to go around because things are much worse than you originally anticipated, it was an adult, well-framed way of addressing their challenges. Of course Sweden is much smaller, and more homogenous than the US, but there are good examples from around the world of countries that have had debts that are as high and as fast-growing as we have that have found ways to address them forthrightly.

So while it's interesting to talk about Greece, we also ought to talk about the more successful stories.

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GPPR: How do you think the changing global labor market is going to affect everything from our tax policy to our employment policy?

DM: That's a big, big question. The labor market is one of the factors that I think is going to push down corporate tax rates. It seems, independent of the economics, the perception is widely shared enough that it really matters—in order to be competitive, those rates will have to come down. Regulation will be affected as well—anything to keep businesses in the United States.

"It really is tragic to have folks that have been in a career path for 25 years and the world changes, and their skills get devalued, and it's often very hard for them to move into something else."

The hard reality is that advances in information technology make it easier for workers abroad to compete with workers in the US. Traditionally people thought about it as being low-quality manufacturing, but folks overseas are moving up the manufacturing curve. People thought service jobs would stay here, but there are plenty of services you can import—people who read X-rays in India, etc. Now a lot of those things are actually beneficial for us as a society—they make things cheaper, more affordable, etc. But it does create new competition in labor markets.

To the extent that we can, we'd like to have a workforce where people can be flexible. It really is tragic to have folks that have been in a career path for 25 years and the world changes, and their skills get devalued, and it's often very hard for them to move into something else. You can do job training on the back end, you can emphasize general skills on the front end. But to the extent you can, you want a world where people can adjust to the fact that things are changing. Of course, that's much easier said than done.

But the world is going to rapidly change. The US ought to find a way to specialize in things it is particularly well situated to address.

GPPR: Thank you so much, Professor Marron, for your valuable time and insight.

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