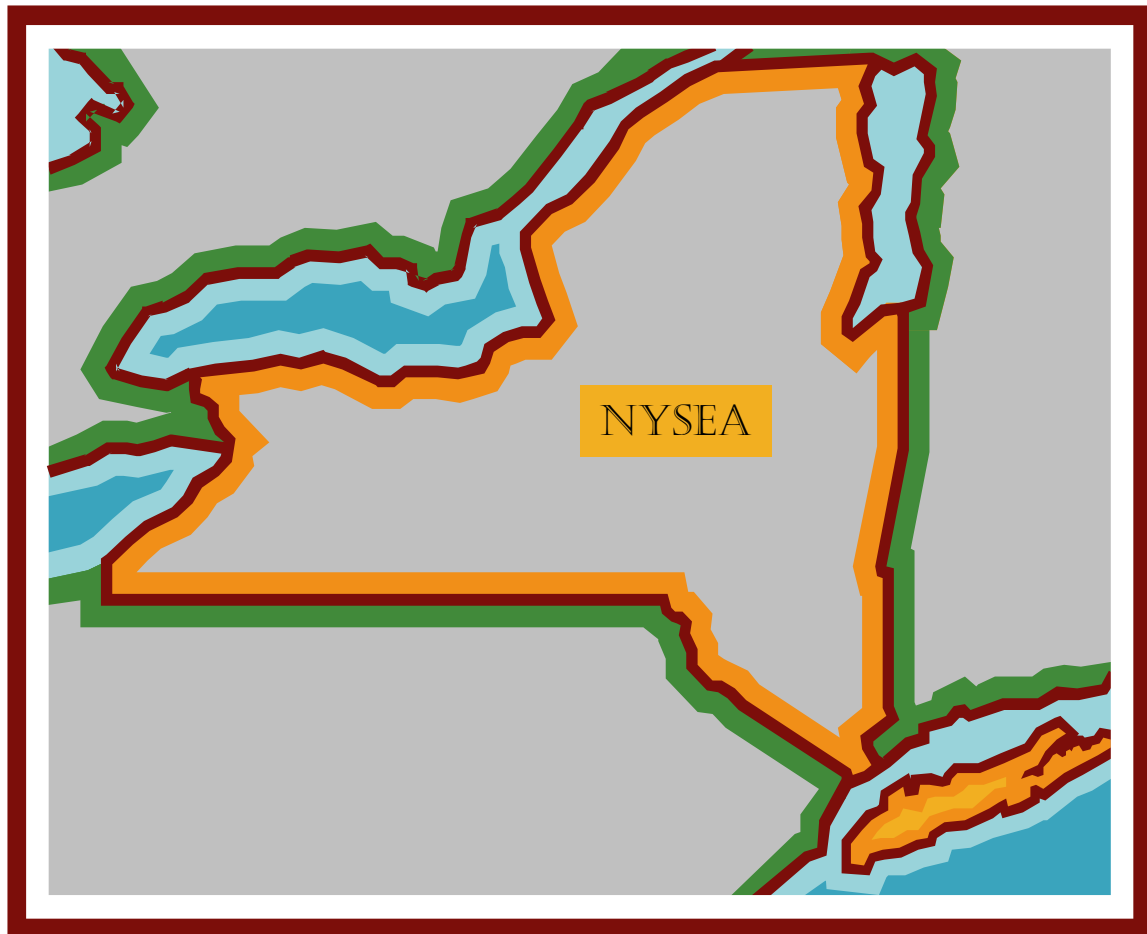


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EDITORIAL

The *New York Economic Review* is an annual journal, published in the fall. The *Review* publishes theoretical and empirical articles, and also interpretive reviews of the literature. We also encourage short articles. The *Review's* policy is to have less than a three month turnaround time for reviewing articles for publication.

MANUSCRIPT GUIDELINES

1. Please submit three copies of a manuscript.
2. All manuscripts are to be typed, double spaced and proofread. Prepared on a IBM PC/compatible computer in Microsoft Word format, the computer disk should be submitted in addition to the three hard copies.
3. All charts and graphs *must* be reproduction quality (Microsoft Word or Excel).
4. Footnotes should appear at the end of the article under the heading of "Endnotes."
5. Citations in the text should include the author and year of publication, as found in the references, in brackets. For instance (Marshall, 1980).
6. A compilation of bibliographic entries should appear at the very end of the manuscript under the heading "References."

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Estimating the Marginal Value of Agents in Major League Baseball

Tyler Wasserman* and Rodney Paul**

Abstract

As advanced statistics are incorporated into baseball salaries, it may fundamentally change the role of the player agent as it relates to value. We aim to estimate the marginal value of player agents, given that advanced statistics allow for ease of comparison across players based upon both offensive and defensive attributes. Specifically, we construct a regression model to determine what an agent adds to player salaries above and beyond their client's Wins Above Replacement (WAR). After accounting for WAR, age, and other factors, we find considerable differences in the marginal value of player agents for both hitters and pitchers.

I. INTRODUCTION

In 2003, Michael Lewis published *Moneyball: The Art of Winning an Unfair Game*, which forever changed the finances and economics of baseball. It began a movement towards using advanced statistical analysis to determine the value of baseball players, in order to build a roster that will win the most games at the lowest cost. The Moneyball movement has resulted in a multitude of new statistics that try to narrow a player's value down to one number that represents his marginal revenue product, or his individual contribution to the team's success.

While we would expect that player production would be the major driver of salary, an additional part of the salary process is the role of player agents in salary negotiations. In this research, we try to isolate the impact that these agents, some more well-known than others, have on their clients' salaries, independent from the player's marginal contributions on the baseball diamond. Specifically, we attempt to identify what role, if any, a player's agent plays in salary negotiations, given the wide advances in and general industry acceptance of advanced statistical measures of player performance.

Unlike deals with the players associations in the NBA and NFL, Major League Baseball agent commissions are not standardized. We were not privy to the exact percentage that is earned by each agent, however, it is estimated that commissions are approximately five percent¹ and competition keeps these commission fees in a tight range.

If modern baseball statistics capture the true worth of a player on the field and this is agreed upon by both team management and the player (and his agent) it would appear that the agent would not have as much of a role in determining salary as the agent did in the past. When statistics were assumed to only

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capture part of a player's value and the agent could argue for more money based upon factors statistics could not reveal, the agent may have had more power to influence salary than in the current statistics-obsessed baseball world. If both parties measure the marginal contributions of a player on the field by Wins Above Replacement (WAR), it would seem that agents would have a difficult time capturing additional salary dollars for their clients.

In this research, we construct an empirical model to test for the marginal value of player agents. Through regression analysis, we use the present value of a player's salary per year as the dependent variable and regress that on that player's WAR in the previous season, his age, if the player re-signed with his previous team, the number of years remaining until free agency, the timing of the signing in the offseason, and dummy variables for each player's agent. If the player agent offers his client value beyond the player's performance on the field, the dummy for the individual agent should be positive and significant. If the agent does not offer additional value or takes less than what the player is truly worth, the agent variables will either be statistically insignificant or take a negative value. Beyond testing if agents have any value beyond WAR, this analysis will attempt to identify the best agents for bringing value to players above and beyond their on-field contributions.

This research proceeds as follows. Section II presents a literature review on player salary studies. Section III explores if there is a relationship between particular agents and the best players in baseball. Section IV presents the regression model and results for the impact of agents on players' salaries. The final section concludes the paper.

II. LITERATURE REVIEW

The main focus of this paper, estimating the marginal value of player agents, has not been studied in the literature surrounding baseball salaries. That said, there are various studies of baseball salaries in different frameworks that have influenced the approach of this study and the variables used in our regression models.

The origins of economic studies of sports, in general, and baseball, in particular, date back to the work of Rottenberg (1956). His work on various elements of the sports industry and his investigations into the labor market for Major League Baseball began the process of identifying the unique characteristics of the sports industry and continues to this day.

The research by Scully (1974) expanded upon the origins of the literature began by Rottenberg (1956) and investigated the link between performance and salary in Major League Baseball. He found that performance plays a key role in explaining salary, but also showed that racial discrimination existed for Major League Baseball players during the time period of this study. Black players with similar statistical performances on the field were shown to earn lower salaries than their white counterparts.

Studies of possible racial discrimination in the Major League Baseball labor market continued. Using the openly available data on workers' (players') salaries in this field compared to other labor markets, studies of discrimination attempted to identify how and why discrimination may take place within this

market. Christiano (1986) found discrimination against black baseball players in a similar fashion to what was found by Scully (1974). His follow-up study, however, using data from ten years after his original study, found that this racial bias had been eliminated as the race variable was no longer found to be statistically significant (Christiano, 1988). Raimondo (1983) also found that racial biases did not appear to have a significant impact on salaries in his study of race and free agency in baseball. He discovered that bargaining power, not race, appeared to explain salary differences between players. Palmer and King (2006) found that Major League Baseball players are fairly compensated for their on-field contributions, and are not discriminated against by race. Using newer statistics like slugging percentage and runs created per game to represent a player's on-field performance, in addition to other factors, they did not find statistical evidence of racial discrimination.

The possibilities of arbitration and free agency in the Major League Baseball labor market in the 1970s (1970 for arbitration and 1975 for free agency) spawned a variety of studies to estimate their impact on salaries. Sommers and Quinton (1982) examined the first set of free agents to estimate the amount of salary increases that occurred due to the opening of player movement within the marketplace. Kahn (1993) used a sample of player data that included both arbitration and free agency and found that both contributed to increases in player salaries. In addition, Kahn (1993) discovered that free agency led to an increase in contract duration and arbitration created a "winner's curse" as it relates to teams signing players available for arbitration. Stone and Pantuosco (2008) compared baseball player salaries across three eras and found that their empirical model explained salaries in two of the three time frames, with the only exception being the early arbitration/free agency period where variance in salaries under these new conditions led to less explanatory power of performance and related variables in their model.

Recently, Link and Yosifov (2012) studied the relationship between player salaries and contract duration. They investigated whether Major League Baseball players are willing to forego extra monetary returns on their performance in exchange for job security. In other words, they found that players are willing to take smaller per-year salaries in exchange for longer term contracts.

III. THE RELATIONSHIP BETWEEN PLAYER PERFORMANCE AND AGENT SELECTION

Before proceeding with testing for the monetary value of a player agent in baseball, we wanted to establish that there is substantial variation in both the average and standard deviation of WAR for the players that the most prominent agents represent. We wanted to be certain that the top agents do not have all of the highest-WAR players and the lesser agents have all lower-value-WAR players, with little variation.

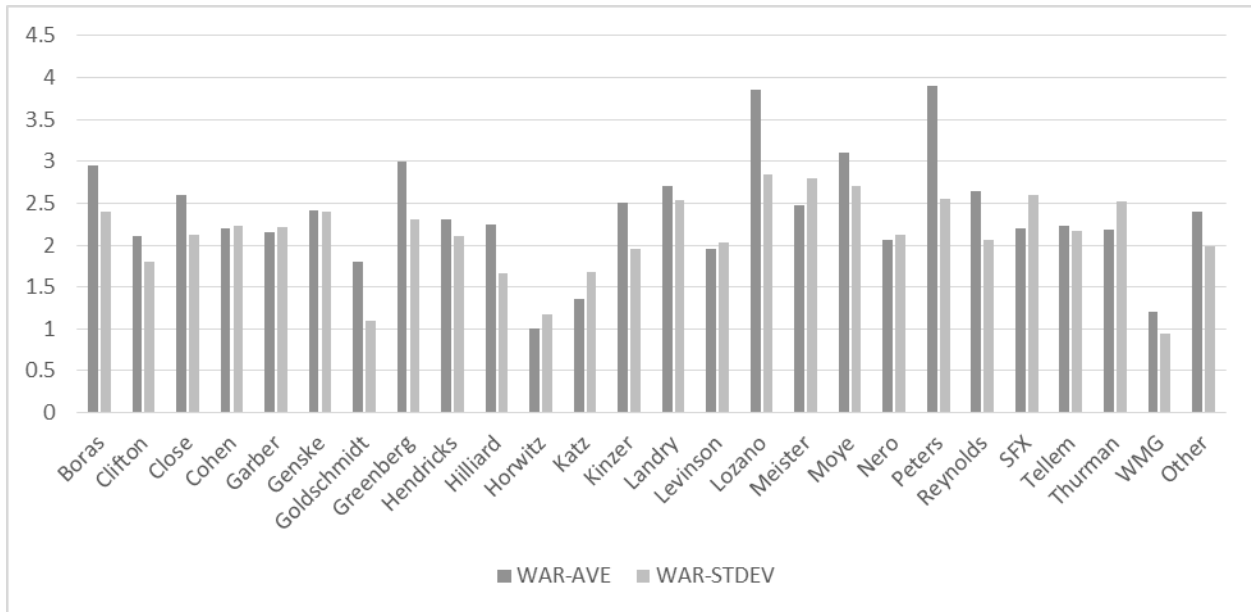
We first establish the agents that negotiated nine-or-more contracts over the course of our sample. Agents who negotiated fewer than nine contracts are included in the overall sample, but do not receive their own dummy variables in our study due to the relative infrequency of their signed contracts in the years we studied. A list of each of the agents that met the threshold of nine-or-more contracts are listed in table I below with the number of contracts they negotiated during the sample period.

Table 1: Number of Contracts Negotiated by Individual Agents 2002-03 to 2011-12

Agent	Number of Contracts Negotiated in Sample	Agent	Number of Contracts Negotiated in Sample
Boras, Scott	58	Landry, Greg	16
Clifton, Gregg	12	Levinson, Sam & Seth	52
Close, Casey	21	Lozano, Dan	18
Cohen, Paul	13	Meister, Barry	18
Garber, Bob	10	Moye, Michael	11
Genske, Greg	22	Nero, Alan	17
Goldschmidt, Eric	10	Peters, Brian	13
Greenberg, Peter	12	Reynolds, Larry	11
Hendricks, Randy & Alan	23	SFX	12
Hilliard, Steve	11	Tellem, Arn	11
Horwitz, Dan	16	Thurman, Rick	9
Katz, Adam	14	Wasserman Media Group	12
Kinzer, Paul	13	Others	326

To illustrate that there is variability across both agents and individual players represented by agents (in terms of WAR), Figure 1 shows the average and standard deviation of WAR for each contract include in our data set. It can be seen that average WAR does vary across agents, but most seem generally around the same level. In addition, there appears to be substantial variation of the WAR of players represented by each agent, as the standard deviations are relatively large across the sample.

Figure 1: Average and Standard Deviation of WAR by Player Agent



A simple regression using WAR as the dependent variable with dummies for each prominent agent as independent variables revealed only four agents where the average WAR differed from the sample with statistical significance at the 5 percent level or below. These agents were Horwitz, Katz, and Wasserman Media Group (WMG) on the negative side and Lozano on the positive side. Therefore, we will proceed

with the assumption that the top (lesser) agents do not simply have all of the top (lesser) talent and will move forward to test what agents, if any, bring value to their clients above and beyond their WAR value.

IV. REGRESSION MODEL OF PRESENT VALUE OF PLAYER SALARY

Given the goal of estimating the marginal value of agents to players' salaries, we specify a regression model with the present value, per year, of the player's salary as the dependent variable. Using over 700 contracts signed during the Major League Baseball offseasons from 2002-03 to 2011-12, the present value of each contract was calculated for each player and is used as the measure of a player's monetary worth per year. The interest rate used in the present value calculation is directly taken from the collective bargaining agreement in Major League Baseball, which states that the interest rate is "equal to the total of the prime interest rate in effect at the J.P. Morgan Chase Bank on the immediately preceding November 1, plus one percent, rounded to the nearest full percentage point." The full regression model is shown as equation 1 below:

$$(\text{Present Value of Player Salary per year})_i = \beta_0 + \beta_1 \text{WAR} + \beta_2 \text{Age} + \beta_3 \text{Age}^2 + \beta_4 (\text{Re-Sign}) + \beta_5 (\text{Years to Free Agency}) + \beta_6 (\text{Closer}) + \sum \beta_i (\text{Year Dummies}) + \sum \beta_j (\text{Offseason Monthly Dummies}) + \sum \beta_k (\text{Agent Dummy Variables}) + \varepsilon_i \quad (1)$$

To explain the differences in the present value of salaries of players in Major League Baseball, estimation of player talent is extremely important. If a player is paid a high salary, it may simply be due to the fact that he is a productive player, having nothing to do with his agent or other factors. WAR is used as a measure of player performance for both pitchers and non-pitchers and relates to that player's performance above and beyond a replacement player who could fill his spot on the roster. It is expected that WAR will be positively related to salary as the most talented players are expected to also be the highest-paid players in the sport.

Wins Above Replacement (WAR) is calculated through a series of equations that capture offensive and defensive production for position players and pitchers. These are scaled so that position players and pitchers can be compared along the same scale. The WAR calculation we use in this study is directly taken from www.fangraphs.com, a popular and influential baseball analytics website. A full definition, including the equations behind the calculations, is shown on the website. To summarize, WAR for position players consists of three measurements that capture hitting performance, base running performance, and defensive proficiency. Statistical measures of these attributes are calculated and a positional adjustment is made based upon what position is played by the player. These calculations are then compared to a minor leaguer/waiver wire player, which is termed "replacement level". The calculations form a value in terms of runs scored and runs are then transformed into wins where ten runs is equal to one win. As an example, in 2014 Mike Trout of the Los Angeles Angels led Major League

batters with a WAR of 8. He provided 8 more wins on the baseball diamond than a replacement level talent available to the team through their minor league system or waivers.

The calculation for WAR for pitchers first involves the calculation of FIP, Fielding Independent Pitching, which assumed that performance on batted balls in play is the league average. Pitchers are therefore rewarded for strike outs (where the ball is not batted in play) and are punished for home runs, walks, and hit by pitches. The calculation is scaled to bring FIP in line with the traditional measure of pitching, Earned Run Average. FIP is then converted into runs and runs are converted into wins. This measure is compared to “replacement level” and allows for comparisons of overall worth for both hitters and pitchers.

In order to isolate the impact that agents have on their clients' salaries, we must also account for other factors in addition to players' WAR. These independent variables include age, age squared, whether the player is re-signing with his previous team, dummy variables for the offseason in which the contract was signed, dummy variables for the month in which the contract was signed, and the amount of time the player has until reaching free agency in years (allowing us to account for both contract extensions signed by players who are not free agents, as well as free agent signings).

Age is an important factor towards how players are paid. Younger players are more desirable since there is greater potential for better future performance. On the other end of the age scale, older players are more likely to experience injuries and are more susceptible to their skills declining. Therefore, both age and age squared are included in the regression model to account for the non-linear nature of this variable.

The re-sign variable is binary in nature taking a value of one when the player re-signed with the same team he played with the previous season. The variable takes a value of zero if he signs with a new team. This variable will allow for an investigation of discounts or premiums that may happen to occur when players choose to sign contracts with their present club.

The amount of time a player has until reaching free agency allows us to compare contract extensions signed by players who are under team control to free agent contracts, as players who are able to sell their services to all 30 teams rather than just one team will have significantly more leverage, and thus, receive higher pay. Therefore, the expected sign on this independent variable is negative.

A dummy variable is included to account for pitchers who are closers. In the modern era, closers are specialists who typically pitch in the 9th inning when their team is leading and the game is close. These specialists accumulate a statistic called saves during the season. In the baseball analytics community, saves are generally thought to be an overrated stat and the measure of player value, WAR, does not include saves in its calculation. If team management values saves, however, they may be willing to pay more for these specialist pitchers. Therefore, the dummy variable should capture if these players are paid above and beyond their WAR value. To be considered a closer, we specified that a pitcher must have saved 10-or-more games in any season of their Major League Baseball career before they signed the contract in question.

The sample covers a ten year time period, so we must include dummy variables for each time period included, as the overall landscape and economy of baseball, as well as the country as a whole, has changed over this period. Given increases in baseball revenues and corresponding increases in player salaries, yearly dummies later in the sample are expected to have a positive and significant effect on the present value of player salaries.

Dummy variables for the months after the conclusion of a season account for the different stages of baseball's offseason. Key offseason dates include events such as the Winter Meetings, at which virtually every team, agent, and baseball media member are gathered in one place during December, as well as last-minute signings before Spring Training in February.

The last set of independent variables is dummy variables for baseball agents. Agents who had ten-or-more contracts signed during the sample are individually included in the model of the combined sample of hitters and pitchers. For individual regression models using only hitters or pitchers, individual agents are included if they signed at least nine contracts during the sample period. All results are compared to the "other" category of agents, or agents who were involved in player contract signings fewer than nine times during the sample. These variables are the main focus of this study as we aim to determine which agents, if any, bring value to their clients above and beyond (or below) their talent as measured by WAR.

The sample size includes over 700 contracts signed between the 2002-2003 offseason and the 2011-2012 offseason. All of the contract data was collected using Baseball Prospectus's contracts pages, as well as Pro Sports Transaction's baseball transaction database. Additional information about players and their contracts was collected using Baseball Reference online encyclopedia.

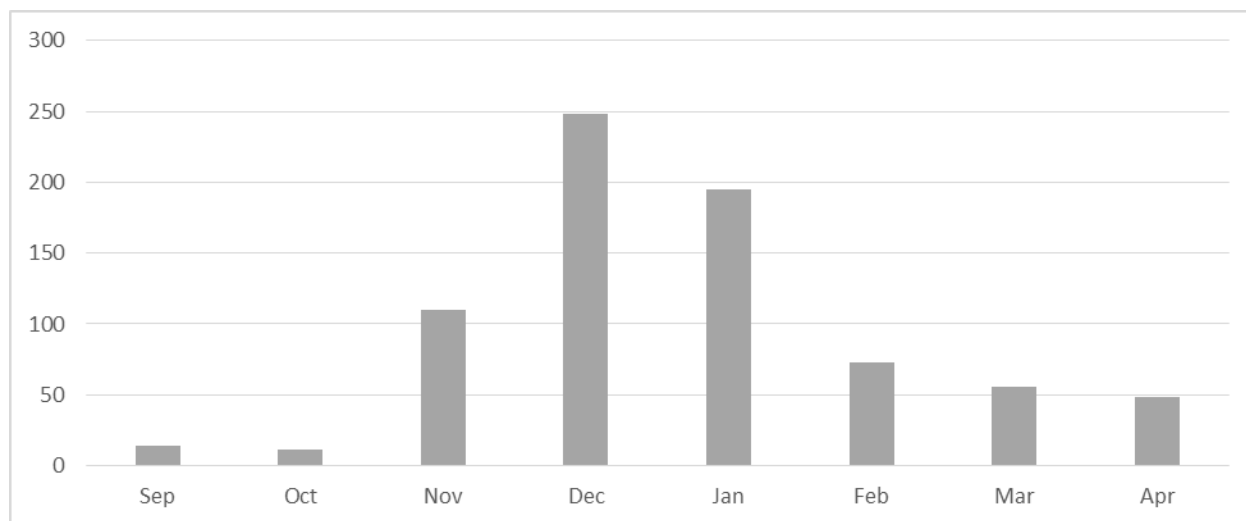
Summary statistics for the variables in our sample are shown in table 2 below. For each variable, the mean, median, and standard deviation of the variables are presented.

Table 2: Summary Statistics

Variable	All Players	Hitters	Pitchers
PV Salary Per Year – Mean (millions)	5.1883	5.0276	5.3751
PV Salary Per Year – Median (millions)	4.0080	3.7736	4.1460
PV Salary Per Year – St. Dev. (millions)	3.9781	4.1105	3.8161
WAR- Mean	2.3955	2.6093	2.1472
WAR – Median	2.0000	2.2000	1.6000
WAR – St. Dev.	2.1513	2.2495	2.0060
AGE – Mean	30.7884	30.5183	31.1023
AGE – Median	31.0000	30.0000	31.0000
AGE – St. Dev.	4.3942	4.1616	4.6361
Years to Free Agency – Mean	0.8469	0.9110	0.7841
Years to Free Agency – Median	0.0000	0.0000	0.0000
Years to Free Agency – St. Dev.	1.3705	1.4551	1.2806

To give a visualization of when offseason signings typically occur, figure 2 shows the number of signings, by month, during baseball's offseason. As can be seen in the figure, the majority of signings occur in December and January.

Figure 2: Baseball Player Signings by Month



Regression results are shown in Table 3. Three regression model results are shown. The first set of results uses the complete sample. The second set of results is for the restricted sample of only hitters, while the third set of results is for the sample of only pitchers.

For each independent variable, its coefficient and t-statistic are shown. The t-statistics presented use Newey-West HAC-consistent standard errors and covariances given initial concerns about heteroskedasticity and autocorrelation.

Table 3: OLS Regression Results – Impact of Independent Variables on Player Salaries

Dependent Variable: Present Value per Year of Player Contract

Variable	Full Sample	Only Batters	Only Pitchers
	Coefficient (T-Stat)	Coefficient (T-Stat)	Coefficient (T-Stat)
Constant	1.9430 (0.3624)	-4.1575 (-0.4560)	-0.5363 (-0.0787)
WAR	1.4036*** (22.1772)	1.3089*** (15.7909)	1.5627*** (17.1426)
Age	-0.7560 (-0.2309)	0.3144 (0.5440)	0.1291 (0.3265)
Age^2	0.0001 (0.0241)	-0.0059 (-0.6414)	-0.0034 (-0.5861)
Re-sign	0.7929*** (2.8453)	0.9351*** (2.5998)	0.6081 (1.4264)
Years to Free Agency	-1.0338*** (7.0360)	-0.9877*** (-5.2751)	-1.0716*** (-5.1337)

Closer	0.9689*** (3.7155)		0.7076** (2.2931)
2003-2004	-0.1758 (-0.3689)	-0.1463 (-0.2605)	-0.5643 (-0.5451)
2004-2005	0.7701* (1.7296)	1.0832** (2.4322)	0.1727 (0.1784)
2005-2006	0.8701** (2.0583)	1.3204*** (3.5421)	0.1047 (0.1151)
2006-2007	2.2927*** (5.0633)	2.4585*** (5.9210)	1.9509** (1.9702)
2007-2008	2.1826*** (4.2767)	2.1599*** (3.6942)	2.1640** (2.0879)
2008-2009	2.1971*** (5.2585)	2.3038*** (4.8492)	1.9088** (1.9661)
2009-2010	2.1348*** (4.5386)	1.7013*** (3.3920)	2.5806** (2.5619)
2010-2011	2.1135*** (5.2394)	2.1065*** (4.6111)	2.0166** (2.1109)
2011-2012	2.2970*** (5.1879)	1.9581*** (4.0883)	2.5198*** (2.6252)
Oct	0.3479 (0.3796)	0.0302 (0.0256)	0.4264 (0.3256)
Nov	0.2028 (0.4103)	0.0793 (0.0932)	0.5539 (0.7637)
Dec	0.4791 (1.0716)	0.2413 (0.3278)	0.5341 (0.7384)
Jan	-0.3766 (-0.8538)	-0.5778 (-0.7790)	-0.4477 (-0.6362)
Feb	-0.1293 (-0.2461)	0.0725 (0.0787)	-0.6947 (-0.8591)
Mar	0.9072 (1.6227)	1.1566 (1.2402)	0.6250 (0.8578)
Apr	0.9841 (1.6081)	1.4163 (1.4167)	0.6598 (0.7561)
Boras, Scott	1.7724*** (4.0817)	1.7833*** (2.7429)	1.8256*** (3.2939)
Clifton, Gregg	1.7298** (2.2972)		1.7733** (2.1765)
Close, Casey	0.7062 (0.8066)	0.7941 (0.7733)	
Cohen, Paul	0.8122 (1.0937)		
Garber, Bob	-0.8841* (-1.6956)	-1.3312** (-2.4071)	
Genske, Greg	1.5211** (2.1996)	1.7482* (1.7810)	0.8537 (1.0595)
Goldschmidt, Eric	-0.7160** (-1.9881)	-0.3192 (-0.4611)	
Greenberg, Peter	-0.0233 (-0.0280)	-0.0955 (-0.1085)	
Hendricks, Randy & Alan	0.9079 (1.5500)		1.3270** (2.2919)
Hilliard, Steve	1.3179 (1.5153)		
Horwits, Dan	0.2662 (0.5604)		0.6724 (1.3070)
Katz, Adam	0.1175 (0.2538)	0.0650 (0.0670)	

Kinzer, Paul	0.6518 (0.9899)		
Landry, Greg	1.8042* (1.8495)		0.2730 (0.4371)
Levinson, Sam & Seth	-0.0143 (-0.0448)	-0.0670 (-0.1802)	-0.2103 (-0.3842)
Lozano, Dan	1.1736 (1.5263)	1.3852* (1.8414)	
Meister, Barry	0.4483 (0.7963)		0.1212 (0.2015)
Moye, Michael	1.1142* (1.7276)		
Nero, Alan	-0.0214 (-0.0265)	-0.9179 (-0.8131)	0.4418 (0.5120)
Peters, Brian	0.7482 (0.8160)	0.9015 (0.7738)	
Reynolds, Larry	-0.4608 (-0.4607)		
SFX	-0.5428 (-0.9800)		
Tellem, Arn	0.4601 (0.7312)	0.5681 (0.7425)	
Thurman, Rick	2.6160** (2.0346)		2.4980** (1.9814)
Wasserman Media Group	-0.9534*** (-3.4103)	-0.9231 (-1.5405)	
R ²	0.6024	0.5824	0.6490
Adjusted R ²	0.5762	0.5444	0.6137

*-notation denotes statistical significance with the following levels of statistical significance:

*-10 percent, **-5 percent, and ***-1 percent.

As seen in the results above, WAR¹ has a large, positive, and statistically significant effect on the present value of a player's salary per year. This is as expected, as it is only logical that the single most important factor determining how much a player will be paid would be his on-field production. For each Win Above Replacement, players receive an additional \$1.4 million dollars in present value terms.

Looking beyond a player's skill and production, we see other expected results, including statistical significance at the 1 percent level for the years to free agency variable. The longer a player is under the control of his team when signing a new contract, the less leverage he has in negotiations, and thus, the less he will be paid. Players who have zero years left until free agency have an open market for their services, giving them the most leverage and thus, the highest salaries.

The dummy variables for the years in the results are all in comparison to the 2002-2003 offseason. The economics of Major League Baseball improved due to increases in television rights and attendance. This gave teams more money to spend on salaries for players. A large increase in salaries was seen in the 2006-2007 offseason. Player salaries continued to increase past 2007-08, but at a constant rate. This could be partially attributed to the overall downturn of the economy, showing that despite some media reports, Major League Baseball was not completely recession-proof. The limited data here that may

relate would show that in this regard, the recession did plateau the growth of MLB player salaries, but did not bring a decline.

A surprising result is the re-sign variable, which shows that there is a positive, statistically significant relationship between a player's salary, and re-signing with his previous team. This is in direct contrast to the often-discussed "hometown discount," in which a player in theory would take a lower salary in order to remain with his current team where he is already living and comfortable. This could be a function of players negotiating with their current employer first, and the teams overpaying in order to discourage the player from seeking any other offers. It could also be due to players giving their former team a final chance to top another team's offer before signing, resulting in the former team overcompensating. Alternatively, a team's fans may value the player more than fans of other teams would. This love of certain home team players may result in fans' higher willingness to pay for tickets and merchandise, which increases the overall value of the player to the team and, hence, the team's willingness to sign and pay this player.

The dummy variable for closers was found to have a positive and significant effect on pitchers' salaries. The ability to successfully finish games (in close and pressured situations) is rewarded in terms of additional dollars in contracts for closers. This skill, ignored in the calculation of WAR for pitchers, is valued by team management. These results suggest that computations of overall player value, such as WAR, may need to reconsider saves as a statistic to include in its computation.

Moving on to the primary focus of this study, the estimated marginal value of player agents² in Major League Baseball are summarized in figure 3 below.

Figure 3: Marginal Value of Major League Baseball Agents



Scott Boras is known as baseball's preeminent agent. Allegedly, some teams are unwilling to negotiate with him because of his shrewd negotiating skills. He represents a wide variety of players, from superstars hitting free agency to role players going through arbitration. The data presented suggest that Boras, in fact, lives up to this reputation. Boras has the second highest coefficient of all the agents included (agents with at least 10 contracts signed in the sample are included as variables), and was found to be statistically significant at the 1 percent level. The overall sample regression results suggest that the "Boras Effect" may be worth as much as \$1.77 million per year for player contracts, certainly justifying the percentage of salary fee that a player would have to pay him for his negotiating services.

As previously mentioned, one of Boras's well-known tactics is to wait out the market and sign contracts in January or even February. Rarely does a Boras client sign at the winter meetings or earlier. While our results suggest that signing at the winter meetings is most likely to be the time to earn the greatest salary, Boras is a master of waiting until the time is right for his clients, by measuring the interest that teams have in his clients and evaluating the overall market. He often advises his clients not to sign contract extensions prior to reaching free agency, believing he will be able to maximize their value on the open market. He has represented some of baseball's best players like Alex Rodriguez, Greg Maddux, Manny Ramirez, Prince Fielder, and Mark Teixeira.

The only agents in our sample to outperform Boras were Rick Thurman and Greg Landry. Rick Thurman's performance is the most impressive in the sample, worth over \$2.5 million per year with statistical significance at the 5 percent level. Thurman only represents pitchers, with his clients in this sample including starting pitcher Tim Lincecum, and closers Trevor Hoffman, and Brian Fuentes. Of the nine contracts he has signed, only three have been in free agency, making Thurman a good fit for pitchers who have a desire to gain long term financial flexibility by signing extensions with their current team.

Thurman has done terrific work for Tim Lincecum, setting a record for someone entering into his first year of arbitration eligibility, signing a two year contract which paid \$10 million followed by \$13 million. After that contract expired, entering into Lincecum's final season of arbitration, he landed another two year extension paying him \$18.5 million followed by \$22 million. These are very high salaries for players to earn in their arbitration eligible seasons.

The regression results suggest that Greg Landry is worth \$1.8 million per year, with statistical significance at the 5 percent level. His results, however, are driven by a small number of signings on the hitter side during the sample. He did not have enough contracts to qualify in our hitters-only regression model and when we look at pitchers only, his results are negative and statistically insignificant.

Landry had two high-profile clients in starting pitcher Roy Halladay and first baseman Ryan Howard, both All-Stars for the Philadelphia Phillies. Halladay could contribute to Landry's negative coefficient for pitchers, because in all three contracts he has signed for Halladay, he has agreed to take less money to sign an extension with his current team before reaching free agency. This result may not fully reflect the

impact of Landry, if he was listening to his client's desires to lock in long-term financial security, avoid the distraction of an expiring contract, and stay with his current team.

Howard, on the other hand, could boost Landry's overall results to the coefficient approaching \$2 million. Landry has negotiated two large, record-setting extensions for Howard with the Phillies, that don't seem to be justified based on his WAR from the seasons prior to the extensions (3.0 and 4.6, respectively). He had been a very productive player, but not worth the large contract extensions that Landry was able to negotiate for him. Landry has not shown nearly as much versatility as Boras, and these Ryan Howard contracts are the likely source of his high marginal value estimation.

Gregg Clifton is next on the list, with a coefficient of about \$1.7 million that is statistically significant at the 5 percent level. The relationship is similar when we look at pitchers alone. Clifton does not have enough contracts signed for batters to qualify for the results for hitters alone. His primary clients have been pitchers Tom Glavine, Mark Mulder, Bronson Arroyo, and outfielder Luis Gonzalez, which shows he has the ability to work for elite players like Glavine and Gonzalez, or more average players like Mulder and Arroyo. He has been very versatile in having them sign early or late in the offseason, and in both signing extensions and reaching free agent markets. Evidently, Clifton has a great ability to read the market and adjust his strategies to fit each specific client.

Greg Genske has a coefficient of about \$1.5 million with statistical significance at the 5 percent level. Of his 19 contracts signed, six of them have been with the Yankees and Red Sox, who are both known to be very willing to spend significant money on player contracts. This shows that Genske most likely either has a good working relationship with their front offices, or, more likely, he has leveraged a strategy of keeping the Yankees and Red Sox very involved in his negotiations, resulting in these two teams being willing to overpay for his free agents. Genske also seems to specialize in representing hitters, where his relationship with salaries is statistically significant at the 10 percent level and worth about \$1.75 million, whereas with just pitchers his coefficient is around \$0.6 million and not statistically significant. The only elite player he represents is Yankees pitcher CC Sabathia, which makes his results for hitters even more impressive.

On the other hand, Eric Goldshmidt was found to earn statistically less for his clients (over 0.7 million per year in present value terms) with statistical significance at the 5 percent level. Looking at the contracts he has signed, he does not have any big-name clients, which could send a negative signal to the marketplace about the clients who employ him. Additionally, many of his clients' contracts were signed early in the offseason, before the winter meetings. He had eleven clients in the sample overall, nine of which were free agents. Of those nine, six were signed in November. This early signing strategy appears to play a part in the significantly lower salaries the players he represents earn.

Looking at results for hitters only, Boras and Genske stand out yet again. However, Dan Lozano also has a coefficient of approximately \$1.4 million with statistical significance at the 10 percent level. Lozano's best skill may be his ability to recruit clients who are truly all-star caliber and elite level players,

including first basemen Albert Pujols and Joey Votto, outfielder Carlos Beltran, and third baseball Alex Rodriguez.

Lozano has shown a great ability to both sign favorable contract extensions as well as free agent contracts. One of his most impressive contracts was a long-term contract extension that kept Joey Votto with the Reds through 2023. Lozano was able to negotiate this contract three years before Votto was due to become a free agent. He also negotiated a \$100 million contract extension for Albert Pujols with the Cardinals, also three years before Pujols would become a free agent, followed by a \$250 million free agent contract with the Angels after the previous extension expired.

In 2007, Alex Rodriguez had an opt-out clause in his contract with the New York Yankees and was represented by Scott Boras, who advised him to opt out of the contract so that he could secure a longer-term, higher-paying deal, even though the Yankees threatened to end all negotiations with Rodriguez if he did so. After Rodriguez opted out and the Yankees left the negotiating table, Rodriguez fired Boras and hired Lozano, who helped to not only bring the Yankees back to the table to negotiate a contract for Rodriguez, but secured a record setting \$275 million contract for him over ten seasons (with the possibility of it reaching \$305 million based on bonuses for setting home run records), showing remarkable ability to negotiate favorable terms on a contract which the Yankees initially proclaimed they wanted no part of.

In the pitchers-only regression results, Randy and Alan Hendricks joined Boras, Clifton, and Thurman as having statistically significant positive returns for their clients. Randy and Alan Hendricks were shown to generate over \$1.3 million dollars in additional revenue for their clients, with statistical significance at the 5 percent level.

Overall, after establishing our cut-off points for inclusion in the sample, eight agents were found to have a statistically significant influence on player salaries. In the hitters-only sample, four agents were found to have statistically significant results, while four agents were found to have statistically significant results in the pitcher-only sample. The other agents who had enough signed contracts to qualify, were not found to significantly contribute to their clients' salaries beyond the "other" category of agents over the sample of our data.

In addition to the results shown above, we ran the model with interaction dummies between the individual agents and the Years to Free Agency and Re-sign variables, respectively. The rationale behind this is that some individual agents may discourage players from signing prior to free agency and/or from re-signing with their current team. If either or both of these are the case, then the interaction dummies will capture which agents tend to behave in these respective fashions.

The other independent variables were kept in the model and the regression was run with all interactions between agents and the variables of interest. The regression results, without all of the interaction dummies, are shown in the appendix. The overall results are nearly identical with respect to signs on the coefficients and levels of statistical significance. In nearly all of the cases, the overall magnitude of the coefficients is about the same as the model shown earlier. Some interaction dummies

were statistically significant, however. The agents who had statistically significant results with respect to the interaction dummy with Years to Free Agency and/or Re-sign are shown in Table 4 below.

Table 4: Agents where the Interaction Dummies with Years to Free Agency and Re-sign were Statistically Significant

Agent	Interaction Variable with Years to Free Agency	Dummy	Agent	Interaction Variable with Re-sign	Dummy
Katz, Adam	3.6442*** (4.6521)		Clifton, Gregg	-3.4441*** (-2.5906)	
Kinzer, Paul	-0.8375** (-2.3303)		Cohen, Paul	3.6686* (1.8859)	
Nero, Alan	1.0249** (2.5260)		Goldschmidt, Eric	-1.9052*** (-2.7318)	
Reynolds, Larry	0.8520*** (2.9236)		Katz, Adam	-2.1286*** (-2.9588)	
Tellem, Arn	-0.8132** (-2.4044)		Levinson, Sam & Seth	-2.0289*** (-3.0097)	
Wasserman Media Group	0.9382*** (4.9543)				

The results show that some individual agents discourage or encourage reaching free agency before signing and/or re-signing with their current team. Katz, Kinzer, Reynolds, and the Wasserman Media Group were all shown to have interaction dummies with Years to Free Agency with positive and significant results. This implies that these agents command a greater salary for their clients when they sign well before they reach free agency. The opposite results were found for Kinzer and Tellem, whose clients that signed before reaching free agency appeared to sign at a discount, all else equal.

In relation to the interaction dummy variables between the agent and the Re-sign variable, four agents were found to earn fewer dollars for their clients by not re-signing with their former team. Clifton, Goldschmidt, Katz, and Sam and Seth Levinson were all found to have negative and significant results in relation to this interaction dummy. Positive and significant results were found in the case of players who had Paul Cohen as an agent. It appears that Cohen's clients were able to earn higher salaries when they re-signed with their former team.

V. CONCLUSIONS

Baseball statistics and analytics have progressed to a point where there is a measure of overall player performance that appears to be generally accepted within the industry. This measure is Wins Above Replacement (WAR). Using a formula that accounts for performance variables for both hitters and pitchers, WAR translates statistics into runs and runs into wins. This allows for a comparison across all players in Major League Baseball in terms of how many wins they contribute to their teams.

Given these advances in statistical measurement of overall player performance, this research aimed to investigate the marginal value of a player's agent in Major League Baseball. When baseball statistics

were not as advanced, it was logical to assume that certain player agents might have been better at describing a player's value and being able to convince team management to pay their clients more. Now that both sides of the negotiating process, the team and the agent, are armed with the same information about overall player value, we wanted to test if any player agents bring value above and beyond their clients' on-field performance.

After establishing that there does not appear to be a strong relationship between the best players (top WAR) and the top agents, we estimated a regression model using the present value per year of players' salaries as the dependent variable. Controlling for Wins Above Replacement, age of the player, whether they resigned with their current team, the years until free agency, and monthly and yearly dummy variables for our ten-year sample, it was found that a few agents earn their clients additional dollars beyond their performance, while others were found to earn fewer dollars for their clients than the rest of the agents representing baseball players.

For the overall sample of all players, both hitters and pitchers, six agents were found to generate additional salary for their players. These agents were: Scott Boras, Gregg Clifton, Greg Genske, Greg Landry, Michael Moye, and Rick Thurman. Three agents were found to have negative and significant effects on salary: Bob Garber, Eric Goldschmidt, and the Wasserman Media Group. Some agents were found to only have significant impacts on their clients' salaries when the samples were restricted to hitters-only or pitchers-only groupings.

When considering player performance (WAR), it appears that only a few agents make significant differences for their clients when it comes to salary negotiations in Major League Baseball. When successful, however, especially in the cases of Scott Boras, Greg Landry, and Rick Thurman, their services appear to contribute between 1.7 and 2.6 million dollars a year in present value terms for their clients.

With more information on player performance freely available, and recognized by players, agents, and team management, it is logical that distributions of player salaries around performance variables would have less variation as the distribution would tighten around the performance variables' mean. Even with this statistical evolution in recent years, however, some agents appear to be able to transcend these measurements for their clients and earn additional salaries beyond what would be expected. Although our results suggest some possible reasons for these premier agents being able to generate higher than expected salaries for their clients, further research into how and why they are able to achieve this is necessary to better understand and identify their skills and techniques in earning additional millions for their clients.

ENDNOTES

1. We also tried model specifications with different lags of WAR, but the regressions revealed essentially the same results.
2. Due to four agents (Horwitz, Katz, Lozano, and Wasserman Media Group) having statistically different set of clients with respect to WAR for their players, an alternative regression was run excluding these four agents. The results were essentially the same with respect to the sign, statistical significance, and magnitude of the coefficients on the independent variables. Interested readers can contact the authors for more details.

REFERENCES

- Christiano, K. J. 1986. "Salary Determination in Major League Baseball: The Effect of Race." *Sociology of Sport Journal*, 3: 144-153.
- Christiano, K. J. 1988. "Salaries and Race in Professional Baseball: Discrimination 10-years Later." *Sociology of Sport Journal*, 5: 136-149.
- Kahn, L. M. 1993. "Free Agency, Long-Term Contracts, and Compensation in Major League Baseball: Estimates from Panel Data." *The Review of Economics and Statistics*, 75(1): 157- 164.
- Lewis, M. 2003. *Moneyball: The Art of Winning an Unfair Game*. W. W. Norton & Company, Inc., New York, New York.
- Link, C. R. and Yosifov, M. 2012. "Contract Length and Salaries Compensating Wage Differentials in Major League Baseball." *Journal of Sports Economics*, 13(1): 3-19.
- Palmer, M.C. and King, R. H. 2006. "Has Salary Discrimination Really Disappeared from Major League Baseball?" *Eastern Economic Journal*, 32(2), 285-297.
- Raimondo, H. J. 1983. "Free Agents' Impact on the Labor Market for Baseball Players." *Journal of Labor Relations*, 4(2): 183-193.
- Rottenberg, S. 1956. "The Baseball Players' Labor Market." *Journal of Political Economy*, 64(3): 242-258.
- Scully, G. W. 1974. "Pay and Performance in Major League Baseball." *American Economic Review*, 64(3): 915-930.
- Sommers, P. A. and Quinton, N. 1982. "Pay and Performance in Major League Baseball: The Case of the First Family of Free Agents." *Journal of Human Resources*, 17(3): 426-436.
- Stone, G. and Pantuosco, L. J. 2008. "Estimating Baseball Salary Equations from 1961-2005: A Look at Changes in Major League Compensation." *International Journal of Sport Finance*, 3(4): 228-238.

Appendix: Regression results with Interaction Terms

Variable	Full Sample
Constant	3.8379 (0.6956)
WAR	1.3912*** (20.6394)
Age	-0.2096 (-0.6167)
Age^2	0.0021 (0.4140)
Re-sign	1.4628*** (3.4221)
Years to Free Agency	-1.1773*** (-6.8889)
Closer	1.0696*** (3.8900)
2003-2004	-0.2671 (-0.5080)
2004-2005	0.5017 (0.9914)
2005-2006	0.7729* (1.7653)
2006-2007	2.2461*** (4.6407)
2007-2008	2.2079*** (4.1106)
2008-2009	2.0905*** (4.7262)
2009-2010	1.9232*** (3.8041)
2010-2011	1.9743*** (4.5272)
2011-2012	2.2039*** (4.7323)
Oct	0.6424 (0.6596)
Nov	0.3713 (0.6754)
Dec	0.6542 (1.2015)
Jan	-0.1915 (-0.3789)
Feb	0.1189 (0.1967)
Mar	0.9429 (1.4934)
Apr	1.1922 (1.7264)
Interaction Dummies – Agent and Years to Free Agency	Yes
Interaction Dummies – Agent and Re-sign	Yes
R-squared	0.6291
Adjusted R-squared	0.5748

*-notation denotes statistical significance with the following levels of statistical significance: *-10 percent, **-5 percent, and ***-1 percent.

Statistically significant findings for the interaction terms are noted in a separate table in the body of the paper. For full results, including the statistically insignificant interaction variables, please contact the authors.

Immigrants Financing Immigrants: A Case Study of a Chinese-American Rotating Savings and Credit Association (ROSCAs) in Queens

Xiaoyu Wu* and Teresa D. Hutchins*

ABSTRACT

This paper extends the literature on the functioning of ROSCAs by presenting a case study of one bidding ROSCA among Chinese immigrants. The association functioned efficiently as a financial intermediary. The primary reason for borrowing was to pay for fees associated with arriving in the USA illegally. We calculate the cost of capital and compare it to mainstream rates. We find that ROSCAs provide more favorable rates. We confirm the importance of social connectedness to the operation of informal financial arrangements. We argue that ROSCAs are a viable alternative to formal financing rather than an inferior method of intermediation.

1. INTRODUCTION

The prevalence of Rotating Savings and Credit Associations (ROSCAs) over time, across cultures and throughout different stages of economic development is a testament to the spontaneous initiative of economic agents. Financial intermediation whether institutionalized in complex financial contracts or agreed to by a handshake between neighbors is pervasive in countries with primitive capital markets and in societies with sophisticated financial alternatives. Many disciplines have written about ROSCAs. Sociologists have analyzed the complex social dynamics underlying the emergence of such lending and borrowing entities. Economists have examined the efficiency of the operation of credit associations. While the approaches may differ, the fields complement each other because a ROSCA may be Pareto Optimal because of the underlying social dynamics. The efficiency of the financial intermediation of ROSCAs, predicated on the sociological element, is highlighted by this paper which presents a case study of a ROSCA that was operated in Queens, New York by Chinese immigrants.

The uniqueness of this case study is that it contains a complete record of the functioning of a ROSCA. Since ROSCAs largely exist in less developed countries or among immigrants in developed countries, hard data are often impossible to acquire. This study broadens the literature by providing financial transactions data for the entire duration of a ROSCA. The findings verify previous incomplete research, and they introduce new reasons for participation in ROSCA's.

This paper will use the conventional definition of ROSCAs first articulated in 1964 by Shirley Ardener as "an association formed upon a core of participants who agree to make regular contributions to a fund which is given, in whole or in part, to each contributor in rotation" (Ardener, 1964, pp. 201). There are a

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number of features common to all ROSCAs. The association has a finite life span dependent upon the number of payment cycles. For example, if participants make five monthly payments, the ROSCAs would exist for five months. There is also a leader of a ROSCA. This individual originates the association, and facilitates the transactions. The leader generally takes more risk than the other participants and is granted certain advantages. Participants can hold a single membership share or multiple shares, and there is a payment and a payout element for each share. A contribution amount is decided at the outset of the association. Every share makes a payment each cycle and receives the payout once during the life of the ROSCA. To summarize, the key variables universal to all ROSCAs are: the number of participants, the cycle of payments, the role of the leader, the contribution amount, and the one time payout.

Generally ROSCAs fall into two types: random and bidding. In the random or simple association the total payments and the payout are equal for any membership share. For example, if there are five members with a monthly contribution of 100 dollars, then each person would contribute one hundred dollars per month for five months. Each month one of the five members would receive five hundred dollars. The individual to receive the five hundred dollars is chosen randomly. In this system each member contributes and receives five hundred dollars. This arrangement can be thought of as a means of forced savings or inter-temporal transfers. As a result, the random ROSCAs are sometimes referred to as peer lending groups or savings groups.

In the second type of ROSCA, participants have to bid to get the payout. The bid is often defined as a discount one is willing to accept for receiving the payout. In this case, there is also a before and after element. Before an individual receives the payout, he can make a discounted contribution, but after receiving the payout he contributes the full amount in all remaining cycles. For example, if there are five members who agree to contribute one hundred dollars each month, and in the first month one participant wins the payout by offering a bid of twenty dollars, then this winner receives only eighty dollars from each of the other members in exchange for obtaining the funds immediately. The winner has to pay one hundred dollars in full in all later months. Suppose in the second round, the bid is fifteen dollars, then the winner this month gets one hundred dollars from the previous winner and eighty-five dollars from everyone else. A winning bid of ten dollars in the third round means that the winners in months one and two pay one hundred dollars and the other remaining members who have not yet won pay 90 dollars. There is no need to bid in the final round since the member who receives the payout in the last month gets one hundred dollars from all previous winners. Over the course of the association some members pay in more than their payout for the right to obtain the funds early in the life of the ROSCA while others who bid late may receive a payout greater than the total amount they paid in. This type of ROSCA contains elements of borrowing and lending. Note that both the payouts and the payments vary from month to month since the winning bids are generally different and reflect the diverse financial needs of the participants.

One of the most comprehensive analyses of bidding ROSCAs was conducted by Hevener (2006) who worked for the Federal Reserve Bank of Philadelphia. In her paper she categorized the literature on

ROSCAs, described the process of financial intermediation, and reinforced the importance of social capital in the functioning of ROSCAs. The most unique aspect of her paper, however, was an analysis of the functioning of a ROSCA for an Asian community in Philadelphia. Although the data set was incomplete, Hevener calculated the cost of capital and compared it to conventional financial vehicles. Finding the ROSCA rates to be similar to market rates, she made a compelling argument for the importance of ROSCAs in funding small businesses. Hevener concluded the paper with a call for further research on the operation of these associations. This paper seeks to extend this research by presenting information on a completed bidding ROSCA.

Primary data were collected on the operation of one bidding association that ran between May 2007 and October 2012 in Flushing, Queens. The participants were all immigrants from Wenzhou, China. The source of our data was the Chair of the association, who we were able to interview multiple times over an eight-month time period. This paper attempts to extend the literature on the functioning of ROSCAs in immigrant communities by presenting primary data for an association in New York. The data allow us to address the main research question which is how the cost of capital for the participants compares to market rates. The details of the contract, such as the number of shares and the number of participants, clarify the risk structure. The role of the chair, as a participant and as a guarantor is examined as is the relationship between bidders. Evidence of the use of ROSCAs as a financial intermediary is examined by an ex post designation of participants as borrowers or lenders. Finally the motivation of the participants is addressed. This last point has policy implications since Hevener (2006), Light et al. (1996) and Chami and Fischer (1995) have advocated for government support of ROSCAs as a means of promoting financing in low income communities.

The following section reviews the literature on ROSCAs. The background of Chinese ROSCAs in Queens is provided which is followed by a description of the organization of the specific ROSCA under investigation. The data on the bidding outcomes and cost of capital are provided. The paper concludes with a discussion of the motivation of participants, a summary of the major findings of this study and an outline of future research.

2. REVIEW OF THE LITERATURE

The literature on ROSCAs is broad and rich. The theoretical economic literature on ROSCAs was established with two articles by Besley, Coate & Loun (1993, 1994). Both papers focus on the conditions under which utility is improved by participating in ROSCAs. Other researchers emphasize the saving motive for joining ROSCAs. For example, Ambec and Treich (2005) argue that individuals join a ROSCA to put pressure on themselves to be financially prudent. In all of the theoretical literature the importance of having a homogenous group is highlighted.

This is born out by empirical studies. International studies of the operation of credit associations in less developed countries focus on the efficient operation of ROSCAs in Kenya, India and Jamaica (Andersen *et al.*, 2009; Klonner, 2008; Handa and Kirton, 1999). Research on ROSCAs in the United

States has also emphasized the importance of ethnicity. Chotigeat *et al.* (1991) provide a descriptive article on the use of savings associations by Asian entrepreneur immigrants. They delineate the hypothetical reasons for the use of savings associations as opposed to using conventional financial institutions. They identify the factors that keep immigrants from using established lending agencies such as language barriers and lack of collateral, as well as noting the positive reasons to turn to informal savings associations such as cultural traditions and networking. Light *et al.* (1990) have emphasized the cultural aspect of the use of ROSCAs or *kyes*, by Korean immigrants in Los Angeles. Using survey data from Korean entrepreneurs in the garment industry they try to capture the prevalence of *kyes* in business capitalization. Although they are not able to concretely establish the widespread use of *kyes* for financing businesses, they do emphasize the role of embeddedness and social trust in the use of *kyes* in this immigrant population. This notion of connectedness was underscored by Oh (2007) in his analysis of the use of credit associations by Korean owned nail salon employees. Based on survey data he concludes that forced savings is the main motivation, while mutual friendship was the second most cited reason for joining a *kye*. The use of informal credit associations for ethnic groups has also been reported in the popular business press. For example, Meera (2000) reports on the use of ROSCAs called *susu* or *partner* in the Caribbean-American community in NY. He cites the use of this informal finance method in tandem with the use of formal methods for raising capital. As mentioned in the introduction, Hevener (2006) provides a detailed but incomplete analysis of an Asian ROSCA operating in Philadelphia in 2003. These international and domestic studies highlight different aspects of savings associations, but all focus on the cohesiveness of the ethnic groups and their level of secrecy in sharing information with non-members.

3. A CASE AMONG CHINESE IMMIGRANTS FROM WENZHOU

3.1 BACKGROUND

ROSCAs have a long tradition in China with historical data going back at least to the Tang Dynasty starting in 618AD (Shan and Zan, 2002). In modern China, ROSCAs have also been active primarily due to limited access to the mainstream banking system and the unmet demand for loans in rural areas. ROSCAs are especially prevalent in East and South East China such as the Province of Zhejiang and Fujian, where small businesses flourish with a need to raise capital.

Wenzhou is a port city in Zhejiang Province and has been an entrepreneurial community with household industries. People of Wenzhou are highly mobile, skilled at long distance trade and have developed a tradition of out-migration (Liu, 1992). Their traditional reliance on social connectivity and entrepreneurial spirit have led them to strong dependence on private financing. Tsai (2000) finds in her survey that 85 percent of the respondents from Wenzhou took part in bidding ROSCAs called "*Biao Huis*". In the late 1970s and early 1980s, as mainland China opened up, people from Wenzhou managed to legally and illegally immigrate into the USA. Many of them now reside in Queens, New York.

Just as they did in their hometown, these immigrants establish and strengthen their traditional social affinity through their financial linkages in ROSCAs. ROSCAs are used for both saving and borrowing and essentially serve as the financial system for the community. They are similar to mutual savings banks, but with a fixed life expectancy. Our source confirms that most immigrants from Wenzhou take part in ROSCAs. Also according to him, the money raised through ROSCAs is primarily used to pay fees associated with arriving in the USA illegally and obtaining legal status afterwards. This also appears to be a common incentive for borrowing back in China. Tsai (2000) finds that 73 percent of the participants in her survey borrowed money through ROSCAs to pay off individuals who specialized in illegal immigration. Other reasons for borrowing include big purchases such as consumer durables and real estate as well as launching small businesses. Finally, although never explicitly stated, tax evasion could be a motive. Individuals could be hiding their wealth or looking for a tax free investment.

3.2 ORGANIZATION

In the following, we describe and analyze one particular bidding ROSCA using detailed information collected through interviewing the Chair. It was completed without any defaults. The appendix presents the actual contract of this ROSCA, which they named “Families and Friends Mutual”.¹ This contract laid out the rules that participants should follow. It also provided detailed information for the chair person and listed the 66 shares and the names of the 30 participants.

The Chair distributed a hard copy to each registered member before the initial contributions were made. ROSCAs hold a unique place in the American legal system. They are not per se illegal but the contract is not protected by the law. This aspect of the operation of ROSCAs means that the association runs on naked social trust. There are no legally binding contracts, no collateral and no credit checks. The Chair initiates the association and recruits people. He needs to be very careful in terms of who is accepted since the Chair assumes the responsibility for defaulting members. In his own words, the Chair of “Families and Friends Mutual” stated that he would only accept people who (1) come from Wenzhou and are known by the community, (2) have a family here in Queens so that the chance of fleeing with money is minimized, (3) have no observed bad behavior such as addiction to alcohol or gambling, and (4) have never defaulted in any ROSCAs. In this association, a member can have a maximum of five shares. The number of shares one can take is also under the Chair’s discretion. In “Family and Friends Mutual”, there are 30 members for a total of 66 shares. Twenty-two members held more than one share. Six of them took as many as four shares and their monthly non-discounted contribution would be two thousand dollars. Sums that are not insignificant.

The role of Chair is pivotal to the association’s success. This seems to be a common theme of ROSCAs. In their analysis of the operation of ROSCAs in Jamaica, called *partners*, Handa and Kirton (1999) find that the stability of the association is improved if the payments are made to the Chair, who then transfers the proceeds to the winning bidder, rather than when payments are made directly to the winner. They also find that the Chair invests relatively more of his/her income in the partnership than non-

chair members. In many cases, leaders are granted certain advantages. In a Jamaican *partner*, the Chair earns a fee for facilitating the organization. In Families and Friends Mutual, the Chair is entitled to a \$1000 initial contribution from each of the 66 membership shares in the beginning without bidding. He then pays \$1000 to each month's winning member. In other words, the chair receives an upfront payment of \$66,000 and pays it back in 66 \$1,000 monthly installments, thus receiving a zero rate loan. Since the monthly non-discounted contribution is set as \$500 and the Chair contributes \$1000 each month, we could consider that the Chair has two special shares, which we are calling executive shares. The Chair could also have up to three additional regular shares at his will. In our case, the Chair held one regular share, which he executed in the third month. The longer the ROSCA runs, the greater the amount of the interest free loan that the Chair obtains. But recall that the Chair is responsible for defaulting members, this also means the Chair has to take more risk. And thus the Chair needs to carefully assess the benefits and costs and determine the total number of shares he is willing to accept.

Even though theoretically anyone can initiate a ROSCA, people will only be attracted to one chaired by a reputable person since the Chair is responsible for defaults. In addition, a malicious Chair could collect the initial payment and disappear. Participants also need to trust the other members of the organization, i.e., the formation of a ROSCA is a two-way process. Before any contribution is made, a potential participant can drop out or change the number of shares he wants to hold. Increasing or decreasing the number of shares held must be approved by the Chair. This is exactly the reason why the contract needs to be distributed to everyone before the initial contributions are made—members are given the chance to change their mind after they see who is in the consortium. In other words, the two-way choices are not just between the Chair and any member, but among everyone who is involved. The participants engage in transactions with all other members and thus the success of the association depends on the integrity of all. According to our source, in most ROSCAs in Queens, only people from Wenzhou are accepted. These people have all kinds of relationships and connections, both in America and back home in Wenzhou. In “Families and Friends Mutual”, there were four pairs of siblings. In addition, many of the members have the same last name, suggesting that they may come from the same extended family. This is extremely important because a ROSCA must be built on mutual trust. As noted by Landa (1981), the homogeneity of kinship lowers transactions costs among the participants.

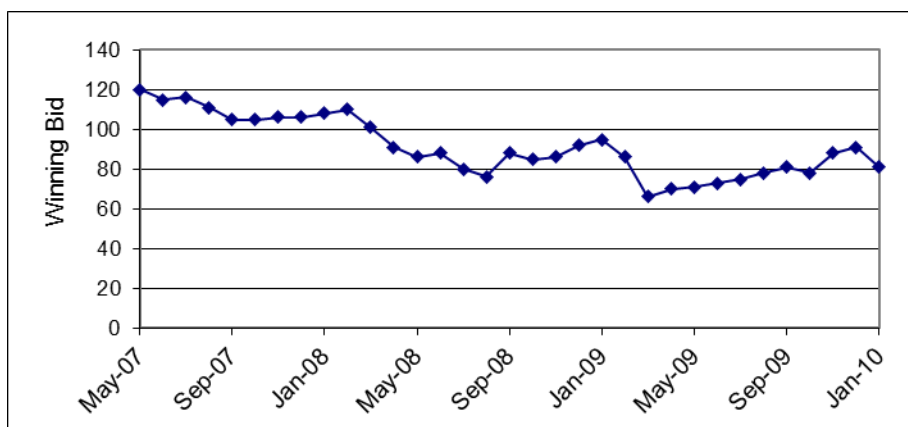
3.3 BIDDING OUTCOMES

Table 1 lists the winning bids in chronological order. Graph 1 depicts the winning bids over time. Winning bids fluctuate throughout all bidding cycles, as the demand for capital varies randomly based on personal needs. But usually bids are higher in the beginning as some members who have urgent borrowing needs compete keenly. The highest winning bid seen in “Families and Friends Mutual” is \$120, bid during the very first month. The lowest bid, equal to the \$45 floor, is seen three times within the last year. The average bid across all months is \$78.80.

Table 1 Winning Bids

Bidding Month	Winning Member	Winning Bid (\$)	Bidding Month	Winning Member	Winning Bid (\$)
1 st	Person 16	120	34 th	Person 11	75
2 nd	Person 16	115	35 th	Person 24	71
3 rd	Person 26	116	36 th	Person 08	72
4 th	Person 16	111	37 th	Person 14	76
5 th	Person 16	105	38 th	Person 14	66
6 th	Person 13	105	39 th	Person 23	61
7 th	Person 15	106	40 th	Person 30	66
8 th	Person 15	106	41 st	Person 05	55
9 th	Person 13	108	42 nd	Person 07	71
10 th	Person 15	110	43 rd	Person 12	75
11 th	Person 15	101	44 th	Person 20	70
12 th	Person 19	91	45 th	Person 09	81
13 th	Person 25	86	46 th	Person 14	73
14 th	Person 14	88	47 th	Person 30	59
15 th	Person 25	80	48 th	Person 23	66
16 th	Person 02	76	49 th	Person 13	56
17 th	Person 18	88	50 th	Person 29	51
18 th	Person 24	85	51 st	Person 21	81
19 th	Person 18	86	52 nd	Person 21	70
20 th	Person 28	92	53 rd	Person 17	48
21 st	Person 12	95	54 th	Person 13	45
22 nd	Person 06	86	55 th	Person 12	71
23 rd	Person 01	66	56 th	Person 07	76
24 th	Person 23	70	57 th	Person 27	86
25 th	Person 04	71	58 th	Person 27	86
26 th	Person 05	73	59 th	Person 27	75
27 th	Person 12	75	60 th	Person 20	70
28 th	Person 11	78	61 st	Person 28	60
29 th	Person 22	81	62 nd	Person 03	55
30 th	Person 22	78	63 rd	Person 25	55
31 st	Person 08	88	64 th	Person 10	45
32 nd	Person 25	91	65 th	Person 19	45
33 rd	Person 09	81	66 th	Person 10	-

Graph 1 Winning Bids over Time



It will be helpful to describe the cash flow for the participants. For a member who won in the n^{th} month with the winning bid b_n ($n=1, \dots, 66$ and $45 \leq b_n \leq 120$), the member paid \$1,000 to the Chair before bidding commences, and paid a discounted contribution from Month 1 to Month $(n-1)$. In the n^{th} month when he won, he received \$1,000 from the Chair, \$500 from all the $(n-1)$ previous winning shares, and $500 - b_n$ from all the remaining $(66 - n)$ shares. In all months that follow, he paid \$500. For example, Person 13 who won in 6th month paid \$1,000 to the Chair in the beginning, and paid \$380, \$385, \$384, \$389, and \$395 in the first five months, respectively. In the sixth month, he won the bid and received \$1,000 from the Chair, \$500 from the first five winning shares, and \$395 from all other shares. After that, Person 13 would pay \$500 each month for this share till the bidding ends. Note that there is no need to bid during the last month since the last share holder will receive \$500 from every share.

We can identify a few aggressive borrowers. The Chair (Person 26) won during the third month with a bid of \$116. In addition to the \$66,000 he obtained with the two executive shares before the bidding commenced, he raised another \$24,000 with his regular share. As one can imagine, the Chair most likely has a strong borrowing incentive. The main benefit of serving as the Chair is receiving the initial contributions without cost. As an economic agent, one probably will not assume the financial risks and the administrative costs of establishing and running a ROSCA unless there is a need for capital. In our case, the Chair seems to need more than what the two executive shares can get him and thus also bids with a regular share. One pair of siblings (Persons 15 and 16) bid aggressively 8 times during the first 11 rounds, raising more than \$180,000. This represents a substantial amount of capital, usable for financing illegal entry into the U.S., investing in a small business or making a real estate purchase. These individuals use all their shares to borrow, whereas other individuals with multiple shares may use some shares for borrowing and other shares for saving.

But how do we exactly define whether an individual borrows or saves with one particular share? An average share saves till it wins the bid, at which time this share borrows, i.e., an average share is both a borrower and a saver. The only exceptions are the shares which win in the first and last rounds, the first one being a pure borrower and the last one being a pure saver. This was noted by Callier (1990), who identified the fact that all but two members of the consortium switch from borrower to lender. To define a share as a saving or borrowing share, we look at the net gain, which is the difference between the total amount received and the total amount paid. This is similar to the technique used by Hevener (2006). For example, Person 1, who wins with his single share in the 23rd round, receives a pot of \$30,662 in that round and pays a total of \$31,344 over time, yielding a net loss of \$682. Thus, Person 1 holds a borrowing share. Table 2 lists the net gain for each ordinary share in chronological order. Note that the Chair holds two executive shares which entitle him to receive \$66,000 before the bidding begins. He pays it back with \$1000 installments for 66 months, and thus the Chair's executive shares break even.

It is intuitive that the earlier a share wins, the more likely it is a borrowing share and similarly, the later a share wins, the more likely it is a saving share. At about the midpoint of the bidding rounds, the shares switch from borrowing to saving. In our sample, this occurs between the 32nd bidding month and the 33rd

bidding month, leaving 32 borrowing shares and 34 saving shares. Not surprisingly, saving or borrowing shares which win around the midpoint usually have a small net gain or loss. This is all illustrated in Table 2.

Table 2 Net Gain and Effective APR

Bidding Month	Winning Member	Net Gain	Effective APR	Bidding Month	Winning Member	Net Gain	Effective APR
1 st	Person 16	-7800	10.53%	34 th	Person 11	608	12.58%
2 nd	Person 16	-7240	9.97%	35 th	Person 24	882	12.13%
3 rd	Person 26	-7073	10.06%	36 th	Person 08	994	10.70%
4 th	Person 16	-6531	9.51%	37 th	Person 14	1022	9.10%
5 th	Person 16	-5943	8.85%	38 th	Person 14	1454	10.13%
6 th	Person 13	-5733	8.84%	39 th	Person 23	1721	10.12%
7 th	Person 15	-5582	8.93%	40 th	Person 30	1713	8.95%
8 th	Person 15	-5370	8.92%	41 st	Person 05	2120	9.58%
9 th	Person 13	-5272	9.14%	42 nd	Person 07	1846	7.73%
10 th	Person 15	-5168	9.37%	43 rd	Person 12	1896	7.21%
11 th	Person 15	-4453	8.28%	44 th	Person 20	2156	7.41%
12 th	Person 19	-3711	7.08%	45 th	Person 09	2065	6.60%
13 th	Person 25	-3264	6.47%	46 th	Person 14	2387	6.97%
14 th	Person 14	-3196	6.68%	47 th	Person 30	2799	7.51%
15 th	Person 25	-2612	5.66%	48 th	Person 23	2791	7.03%
16 th	Person 02	-2252	5.11%	49 th	Person 13	3093	7.26%
17 th	Person 18	-2688	6.63%	50 th	Person 29	3285	7.25%
18 th	Person 24	-2368	6.18%	51 st	Person 21	2937	6.21%
19 th	Person 18	-2245	6.27%	52 nd	Person 21	3253	6.48%
20 th	Person 28	-2349	7.16%	53 rd	Person 17	3679	6.90%
21 st	Person 12	-2300	7.65%	54 th	Person 13	3811	6.80%
22 nd	Person 06	-1714	6.03%	55 th	Person 12	3615	6.21%
23 rd	Person 01	-682	2.45%	56 th	Person 07	3707	6.09%
24 th	Person 23	-718	2.87%	57 th	Person 27	3769	5.94%
25 th	Person 04	-619	2.75%	58 th	Person 27	3941	5.95%
26 th	Person 05	-557	2.80%	59 th	Person 27	4190	6.06%
27 th	Person 12	-489	2.83%	60 th	Person 20	4370	6.08%
28 th	Person 11	-453	3.11%	61 st	Person 28	4560	6.10%
29 th	Person 22	-408	3.45%	62 nd	Person 03	4700	6.06%
30 th	Person 22	-138	1.36%	63 rd	Person 25	4810	6.00%
31 st	Person 08	-332	5.84%	64 th	Person 10	4940	5.95%
32 nd	Person 25	-258	6.71%	65 th	Person 19	5030	5.87%
33 rd	Person 09	254	12.22%	66 th	Person 10	5120	5.79%

Table 2 also shows that there are exclusive borrowers and exclusive savers but the plurality are individuals who have both borrowing shares and saving shares. For example, Person 13 bids quite early and borrows with two of his shares and saves with his two other shares. As stated previously, ROSCAs are essentially the banking system for the community and one participates no matter whether his primary incentive is to borrow or to save. In other words, these immigrants use ROSCAs as their financial instrument the same way as a corner bank is used. There is, however, added pressure on participants to continue in an association to maintain social trust. Standing within the immigrant community is important

and one way to establish this trust is to be an active member in the association, whether or not an individual has a pressing need for funds. Individuals are accumulating social capital, which may in the future translate into financial capital.

As an individual can have multiple shares in one ROSCA, he can also participate in multiple ROSCAs simultaneously. The number of shares one wants to have across all associations depends largely on the manageable monthly cash flow. A member with four shares in “Families and Friends Mutual” needs \$2,000 every month to sustain his membership, which multiplied by the number of ROSCAs he might be in could easily exceed \$5,000 per month. A real example is our source, who had 16 shares in five ROSCAs overlapping for a period and paid \$8,000 monthly. In addition, being in multiple bidding consortiums offers opportunities for arbitrage, i.e., withdrawing money in one where the bids are low and investing in another where bids are high. According to our source, there are people who are smart enough to take advantage of such bid differences. Participants are also able to diversify risks by being in multiple associations. There are risks involved with trusting the chair and the other association members. The tradeoff is that there are also higher transactions cost since the trustworthiness of the other participants has to be established. Given that the community is close knit, the added cost of obtaining information about the other participants is mostly likely less than the benefit of diversification and consequently, individuals participate in multiple associations.

As we would for any financial transaction, the cost of capital needs to be established. Eeckhout and Munshi (2005) and Henever (2006) both discuss calculating internal rates of return within a given bidding ROSCA using cash flow analysis, i.e., for any particular share, the total present value of all payments must be equal to the present value of the pot of money received. Our data encompasses the entire life of the ROSCA, and this enables us to find the internal rate of return for all shares. The initial contribution is usually made some time before the first bidding takes place. For simplicity, let’s assume that the initial contribution is made exactly one month before and we use that as our reference time point. The following equation, which denotes the monthly rate of return as i , captures the cash flow for each regular share and allows us to solve for the cost of capital:

$$-1000 - \sum_{k=1}^{n-1} \frac{(500 - b_k)}{(1+i)^k} + \frac{1000 + 500 \cdot (n-1) + (500 - b_n) \cdot (66-n)}{(1+i)^n} - \sum_{k=n+1}^{66} \frac{500}{(1+i)^k} = 0.$$

The results are shown in Table 2, with the monthly rate converted to an annual percentage rate (APR). Let’s look at Person 16, who bid in the beginning with four shares. He borrowed about \$25,000 with each share at an effective APR of 10.51%, 9.97%, 9.51% and 8.85%, respectively. The borrowing rates kept gradually decreasing over time². These rates compare favorably to the APRs on credit cards today. Saver Person 10, who received the payout in the 64th and 66th month, earned close to 6% annually over the 5 year period starting from May, 2007. This is comparable to the 5-year Certificate of Deposit (CD) rate in 2007 (5.53%). However, the 5-year CD rate has decreased significantly since then—it fell from 5.53% to 1.54% between 2007 and 2012—whereas according to our source, the structure and bidding levels in ROSCAs have remained constant. A bidding ROSCA which started after 2007 would give savers a much higher return than the primary market could offer. Furthermore, participants are not

paying taxes on earned interest. An additional advantage of ROSCAs is that savers are allowed to make incremental contributions to the fund as opposed to having to make a large initial deposit as is required for a CD. This is particularly advantageous for immigrants who often rely on cash payments and live paycheck to paycheck. The literature often suggests that people participate in ROSCAs because they are excluded from the mainstream financial markets due to illegal status, lack of credit history, and/or language barriers. All these may be true, but our data shows ROSCAs could be a superior alternative and a valuable complement to a formal financial instrument. Indeed, our source confirms some members including himself rely on both ROSCAs and conventional financial instruments. For example, funds raised in bidding go to down payments for real estate purchases and remaining balances are financed through mortgages.

4. CONCLUSION AND FUTURE DIRECTION

This paper presents a detailed case study of the operation of a bidding ROSCA among Chinese immigrants from Wenzhou in Queens, New York. Information on the operation of these associations is often difficult or impossible to obtain. Many of the members are new immigrants or illegal immigrants who are very reluctant to provide financial data. Access to the source in this ROSCA was unique since we were able to interview the Chair and received detailed data.

“Friends and Family Mutual” was a highly homogenous institution, whose membership was controlled by the Chair. It operated for five years and raised significant sums of money, with many members having multiple shares. The Chair was responsible for defaults, and as compensation for taking this risk obtained an interest free loan at the beginning of the association. Individuals who bid early and could be considered borrowers paid a reasonable interest rate. The last bidders, who could be considered savers, received interest payments more favorable than market rates. The findings of this case study confirm the broad themes established by previous literature. However, important nuances are noted.

In some segments of the literature ROSCAs are portrayed as a second best alternative to the use of conventional financial vehicles. Individuals are seen as being excluded from capital markets. For example, Light *et al.* (1990) in categorizing this view state that ROSCAs “are only useful among marginal social groups locked out of bureaucratic credit institutions by temporary barriers such as racial discrimination, ignorance, foreign origin”. In fact, according to our source, some participants do have access to mainstream institutions but choose to use ROSCAs. Rather than being an economic backward method of intermediation, the associations are a sophisticated vehicle for a unique segment of the population. In fact, participants paid lower rates on borrowing and received higher rates on saving in comparison to mainstream financial instruments. Moreover, participants do not declare interest earned on their investments, and these investments do not show up in any formal manner. Among homogenous groups ROSCAs can be a viable alternative or a valuable complement to formal financing.

Another unique feature of this case study is that it notes a new motivation for the operation of ROSCAs. Previous research has identified the use of ROSCAs for legal expenditures, while this paper

identifies the use of ROSCAs as a method for financing illegal activities. Financing illegal immigration into the United States and then the subsequent expense of attaining legal status were seen as a main rationale for joining this ROSCA. Research on ROSCAs in China has also found this to be a major motivation in their formation (Tsai, 2000). This also brings into question the role of government in promoting ROSCAs. To the extent that financing illegal immigration is an important reason then as long as illegal immigration exists, ROSCAs will continue to prosper.

The immediate extension of this research is to ascertain if broad conclusions can be inferred from this case. We understand that our results only represent one particular ROSCA. Consequently, data on other ROSCAs are needed, which will allow us to assess how much we can generalize our results. In particular we would like to confirm specifically the use of credit associations to finance illegal activities, and more generally the social motivation for joining. Another important component to the theory that embeddedness allows the associations to flourish would be to chronicle their use in second generation immigrants. As acculturation progresses and the homogeneity of the group declines, does the social cost of group trust increase? Finally we would also like to do a comparative analysis of the parameters of ROSCAs across different immigrant groups. In particular, does the ethnicity of the participants influence the motivation for joining a credit association, the duration of the association, the monetary size of the pot and the role of the chair. This final line of research would help determine whether or not "Family and Friends Mutual" was a solvent homogenous financial intermediary providing competitive substantial funding outside mainstream markets because of its Chinese core or regardless of its national affinity.

ENDNOTES

1. This contract is very similar to the one cited by Tsai (Tsai 2000).
2. The effective APRs for the shares winning around the midpoint can change quite significantly even with small changes in the bid because of the rather small absolute net gain or loss. Consequently these APRs are not very practically meaningful, since they represent a percentage gain or loss on a small amount of capital.

REFERENCES

- Ambec, S. and N. Treich, 2005. "Roscas as Financial Agreements to Cope with Self-Control Problems." *Journal of Development Economics*, 82(1): 120-137.
- Andersona, S., J. Balandb and K.O. Moene, 2009. "Enforcement in Informal Saving Groups." *Journal of Development Economics*, 90(1): 14-23
- Ardenner, S., 1964. "The Comparative Study of Rotating Credit Associations." *Journal of the Anthropological Institute of Great Britain and Ireland*, 94(2): 201-229.
- Besley, T., S. Coate and G. Loury, 1993. "The Economics of Rotating Savings and Credit Associations." *The American Economic Review*, 83(4): 792-810.

- Besley, T., S. Coate and G. Loury, 1994. "Rotating Savings and Credit Associations, Credit Markets and Efficiency." *The Review of Economic Studies* 61(4): 701-719.
- Callier, P., 1990. "Informal Finance: The Rotating Saving and Credit Association—An Interpretation." *Kyklos*, 43(2): 273-276.
- Chami, R. and Fischer, J. 1995. "Community Banking, Monitoring, and The Clinton Plan." *Cato Journal*, 14(3): 493-508.
- Chotigeat, T., P.W., Balsmeier and T.O. Stanley, 1991. "Fueling Asian Immigrants' Entrepreneurship: A Source of Capital." *Journal of Small Business Management*, 29(3): 50-61.
- Eeckhout, J. and K. Munshi, 2005. "Mitigating Regulatory Inefficiency: The Non-market Response to Financial Regulations in India." Selected Working Papers, University of Pennsylvania and Brown University
- Handa, S. and C. Kirton, 1999. "The Economics of Rotating Savings and Credit Associations: Evidence from the Jamaican Partner." *Journal of Development Economics*, 60(1): 173-194.
- Hevener, C.C., 2006. "Alternative Financial Vehicles: Rotating Savings and Credit Associations (ROSCAs)" (Working Paper No. 06-01). Federal Reserve Bank of Philadelphia.
- Klonner, S., 2008. "Private Information and Altruism in Bidding Roscas." *The Economic Journal*, 118 (528): 775–800.
- Landa, J., 1981. "A Theory of the Ethnically Homogenous Middleman Group: An Institutional Alternative to Contract Law." *Journal of Legal Studies*, 10(2): 349-362.
- Light, I., I.J. Kwon and D. Zhong, 1990. "Korean Rotating Credit Associations in Los Angeles." *Amerasia Journal*, 16(2): 35-54.
- Liu, A., 1992. "The "Wenzhou Model" of Development and China's Modernization." *Asian Survey*, 32(8): 696-711.
- Meera, L. 2000. "Pooled Savings Help Jamaicans Build Businesses." *The Wall Street Journal* (October 1, 2000), Eastern Edition, B.1.
- Oh, J.H., 2007. "Economic Incentive, Embeddedness, and Social Support: A Study of Korean-Owned Nail Salon Worker' Rotating Credit Associations." *International Migration Review*, 41(3): 623-655.
- Shan, Q. and J. Zan, 2002. "On "He Hui's" in Rural Areas of Jiangnan in Contemporary China." *Research in Chinese Economic History*, 4: 76-85.
- Tsai, K.S., 2000. "Banquet Banking: Gender and Rotating Savings and Credit Associations in South China." *The China Quarterly*, 161(March): 142-170.

APPENDIX: Distributed Contract of "Families and Friends Mutual"***

This Biao Hui has in total 66 membership shares. The Chair is XXX. The initial contribution is \$1000 and the monthly contribution is \$500. This Biao Hui starts on the first Sunday in May 2007 and ends on the first Sunday in October 2012. Bidding is to be held at 11:00 am on the first Sunday of each month.

FALL 2015

The highest bid allowed is \$150 and the lowest \$45. Please submit bids and make contributions in a timely fashion. Membership is not transferable. Thank you for your cooperation.

Address: XXXXXXXXXXXXXXXXX

Phone: XXX-XXX-XXXX

Flushing, NY, 11XXX

Cell: XXX-XXX-XXXX

1. Person 01	18. Person 12	35. Person 16	52. Person 24
2. Person 02	19. Person 12	36. Person 16	53. Person 24
3. Person 03	20. Person 12	37. Person 16	54. Person 25
4. Person 04	21. Person 12	38. Person 17	55. Person 25
5. Person 05	22. Person 13	39. Person 18	56. Person 25
6. Person 05	23. Person 13	40. Person 18	57. Person 25
7. Person 06	24. Person 13	41. Person 19	58. Person 26
8. Person 07	25. Person 13	42. Person 19	59. Person 27
9. Person 07	26. Person 14	43. Person 20	60. Person 27
10. Person 08	27. Person 14	44. Person 20	61. Person 27
11. Person 08	28. Person 14	45. Person 21	62. Person 28
12. Person 09	29. Person 14	46. Person 21	63. Person 28
13. Person 09	30. Person 15	47. Person 22	64. Person 29
14. Person 10	31. Person 15	48. Person 22	65. Person 30
15. Person 10	32. Person 15	49. Person 23	66. Person 30
16. Person 11	33. Person 15	50. Person 23	
17. Person 11	34. Person 16	51. Person 23	

**In order to maintain anonymity, we use Person 1-30 to replace the names spelt out in the contract.

Issues in the Sustainability of the Medicare Program

Larry Lichtenstein* and Mark P. Zaporowski**

ABSTRACT

This paper examines the impact that the Medicare program has on the allocation of resources in the economy and on the magnitude of future federal deficits in the United States. We discuss the structure of Medicare, review the history of the growth of this program, explain the sources of this growth, and make projections concerning its future. We consider various reforms to Medicare that would reduce the stress that it places on federal government finances and ensure its future survival.

INTRODUCTION

There has been extensive research on the fiscal and generational imbalances that the Medicare program poses. Using generational accounting methods, Gokhale and Smetters (2003) estimated the fiscal imbalance of the federal government to be \$44.2 trillion in 2002. Medicare contributed \$36.6 trillion to this figure. In an update to their 2003 paper, Gokhale and Smetters (2006) find that Medicare's contribution to the fiscal imbalance increased to \$60.9 trillion, largely as a result of the introduction of Medicare part D prescription drug coverage.

Of course, the crisis in Medicare could be alleviated if the program collected more revenue and/or lowered the growth rate of spending. The Affordable Care Act (ACA), passed in 2010, provided health insurance to those previously uninsured and was designed to strengthen Medicare by increasing revenues through increased taxes on high income households and restraining the growth rate of reimbursements¹. Advocates of ACA justify the latter by assuming that changing the incentive structure for health care providers by rewarding them for outcomes rather than the number of procedures performed will reduce the volume of claims per capita. Furthermore, improved efficiency in the delivery of health care services in conjunction with restrained growth in the demand for services will lower the rate of growth in the per unit cost of providing services.

This paper examines the impact that the Medicare program, as it is presently structured, has on the allocation of resources in the economy and on the magnitude of future deficits. We find it likely that the Medicare program will require reforms in the future even after the implementation of ACA. We propose a number of policy reforms that will restrain the fiscal imbalance resulting from the program. After briefly discussing the structure of Medicare and reviewing the history of its growth, we project the program's future expenditures and the potential fiscal imbalance that they create. Finally, we consider various reforms to Medicare that would reduce the stress that it places on federal government finances in order to ensure its future survival.

THE MEDICARE PROGRAM

In 1965, Congress enacted legislation that expanded the Social Security Act to provide health insurance

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coverage for the majority of the 65 and older population. The law was enhanced to provide coverage to younger people with permanent disabilities and those with end stage renal disease in 1972. Medicare is primarily a fee-for-service plan in which the recipient receives care from any physician or hospital that accepts Medicare patients. A detailed description of the structure of the Medicare program and its history can be found in Aaron and Lambrew (2008) and in Kronenfeld (2011).

Before projecting the fiscal imbalance created by the Medicare program, it is instructive to examine the history of its outlays. Medicare expenditures measured in 2014 dollars have risen from \$34.9 billion in 1967 to \$591.1 billion in 2013. The average annual growth rate of expenditures over this time period was 6.34 percent in real terms. Part of this growth was a result of an increasing number of enrollees. The number of Medicare enrollees increased from approximately 20 million in 1967 to more than 52 million in 2013. On average, the number of enrollees has grown by 2.16 percent per year since 1967. Clearly, the lion's share of the growth in expenditures cannot be explained solely by the growth in the number of enrollees but must have resulted from growth in real expenditures per enrollee. Over the period 1967-2013, real expenditures per enrollee increased at an annual rate of 4.09 percent. An important factor contributing to this growth has been the increasing real cost of medical services. In real terms, the relative price of medical goods and services has increased at an annual rate of 1.67 percent. Since the 4.09 percent growth rate in real expenditures per enrollee far exceed the 1.67 percent figure, its growth must have been fueled by an increase in the volume and complexity of medical services performed. Although there is no aggregate data for the volume of medical services provided, there is indirect evidence suggesting it has grown. Technological advances in medicine have made new treatments feasible that were not previously available. Additionally, the share of the Medicare eligible population that is old (age 80 and over) and requires a greater number of medical services, has increased from 19.2 percent in 1970 to 28.3 percent in 2010.

Concerns about the sustainability of the Medicare program are a function of the economy's capacity to support these expenditures. One metric that can be used to evaluate the degree of stress that the program places on government finances is the ratio of Medicare expenditures to GDP. Medicare expenditures as a fraction of GDP over the period 1967-2013 steadily grew from .6 percent in 1967 to 3.5 percent in 2013. An important question concerning the sustainability of the Medicare program is whether in light of the passage of ACA these trends will continue in the future.

THE FUTURE OF MEDICARE

In this section, we project the growth in future Medicare expenditures and Medicare expenditures as a share of GDP. Total Medicare expenditures are the product of the number of enrollees and expenditures per enrollee. We now focus on future projections of each component. The size of the future Medicare eligible population can be predicted with a high degree of confidence. This projection requires an understanding of the size and mortality rates of age cohorts in a given year. These data are well understood by demographers at the Center for Medicare Services (CMS) who have projected the number of Medicare enrollees over the period 2014-2050². CMS projects that the number of enrollees will increase from approximately 54 million in 2014 to almost 93 million in 2050.

Forecasting the growth rate of real Medicare expenditure per enrollee is a difficult exercise in the post-ACA environment. Over the period 1967-2013, the annual growth rate of real Medicare expenditure per enrollee was 4.09 percent. *Ceteris paribus*, the aging of the population combined with technological innovation and the increase in the number of individuals who will become eligible for medical insurance will increase the real demand for medical services. However, if ACA accomplishes its goals, the growth in the demand for health care services will be restrained by a reduction in the number of unnecessary procedures performed by health care providers. Under ACA, it is plausible that the growth in both the relative price of medical services and the volume of procedures performed under Medicare will moderate. Therefore, projecting future Medicare expenditures based on the 4.09 percent historic growth in expenditures per recipient is inappropriate.

Data published by the Dartmouth Atlas Project provides a basis for projecting Medicare expenditures per recipient. Fisher, Bynum and Skinner (2009a) compute real growth rates of per capita Medicare spending from 306 hospital referral regions between 1992 and 2006. The growth rates calculated from this study range in value from 1.63 percent in Honolulu, Hawaii to 6.22 percent in Lincoln, Nebraska. The authors argue that these regional differences cannot be attributed to technology or the quality of care. They conclude that the low cost regions offer more organized and integrated delivery systems of care and have implemented payment reforms that have both improved quality and lowered costs. Proponents of ACA have argued that the future trajectory of costs will be lowered as a result of the aforementioned reforms becoming adopted on a nationwide basis. We begin our analysis with the optimistic projection that future per capita real growth of Medicare expenditures can be lowered to the 1.63 percent rate experienced by Honolulu. These projections appear in Tables 1A and 1B.

Projections are made over the period 2015-2050. We terminate our projections in 2050 since the growth in the number of recipients moderates after that year. The future number of enrollees is taken from the 2014 report of the Medicare trustees. Over the projected time frame, real expenditures per enrollee increase from \$11,354 to \$19,995, a 76.1 percent increase. Total real expenditures increase from \$631.9 billion to \$1.855 trillion, a 193 percent increase. Although there is growth in real expenditures on both an aggregate and per capita basis, this may not create a fiscal imbalance given the anticipated rate of growth in real GDP. It is reasonable to assume that real GDP will grow by 2.45 percent in the future³. In the last two columns of Table 1A, both real GDP and the ratio of real Medicare expenditures to real GDP are projected. Medicare spending consumes 3.54 percent of output in 2015 and increases to 4.46 percent of output in 2050. This represents a 26 percent increase in the Medicare spending to GDP ratio.

Although Table 1A shows the share of aggregate output consumed by the elderly in the form of Medicare spending, it does not show the stress that this spending places on the federal budget. Medicare is financed primarily by premiums that recipients pay, a dedicated payroll tax amounting to 2.9 percent of wage and salary income for low income households coupled with a .9 percent increment for high income filers, a 3.8 percent tax on investment income for high income filers, income generated from the taxation of Social Security benefits, and transfers from the federal budget (from now on referred to as the Medicare revenue shortfall). It is the revenue shortfall that represents the financial stress that this program places on the federal budget. In 2015, for example, the revenue shortfall amounted to \$292.5 billion. This represents approximately 46 percent of Medicare expenditures or 1.64 percent of GDP.

TABLE 1A

**MEDICARE EXPENDITURES AS A SHARE OF GDP
ASSUMING 1.63% REAL GROWTH IN MEDICARE EXPENDITURES PER ENROLLEE
AND 2.45% REAL GDP GROWTH RATE**

YEAR	NUMBER OF MEDICARE ENROLLEES	REAL MEDICARE EXPENDITURES PER ENROLLEE	TOTAL MEDICARE EXPENDITURES (Billions 2014\$)	GDP (Billions 2014\$)	MEDICARE EXPENDITURES AS A SHARE OF GDP
2015	55,651,000	\$11,354	\$631.9	\$17,845.7	3.54%
2016	57,324,000	\$11,539	\$661.5	\$18,282.9	3.62%
2017	59,025,000	\$11,727	\$692.2	\$18,730.8	3.70%
2018	60,761,000	\$11,918	\$724.2	\$19,189.7	3.77%
2019	62,540,000	\$12,113	\$757.5	\$19,659.9	3.85%
2020	64,362,000	\$12,310	\$792.3	\$20,141.5	3.93%
2021	66,210,000	\$12,511	\$828.3	\$20,635.0	4.01%
2022	68,104,000	\$12,715	\$865.9	\$21,140.6	4.10%
2023	69,996,000	\$12,922	\$904.5	\$21,658.5	4.18%
2024	71,832,905	\$13,133	\$943.4	\$22,189.1	4.25%
2025	73,718,000	\$13,347	\$983.9	\$22,732.8	4.33%
2026	75,260,328	\$13,564	\$1,020.8	\$23,289.7	4.38%
2027	76,834,925	\$13,785	\$1,059.2	\$23,860.3	4.44%
2028	78,442,465	\$14,010	\$1,099.0	\$24,444.9	4.50%
2029	80,083,638	\$14,238	\$1,140.3	\$25,043.8	4.55%
2030	81,759,000	\$14,470	\$1,183.1	\$25,657.4	4.61%
2031	82,737,655	\$14,706	\$1,216.8	\$26,286.0	4.63%
2032	83,728,025	\$14,946	\$1,251.4	\$26,930.0	4.65%
2033	84,730,249	\$15,190	\$1,287.0	\$27,589.8	4.66%
2034	85,744,471	\$15,437	\$1,323.7	\$28,265.7	4.68%
2035	86,771,000	\$15,689	\$1,361.3	\$28,958.2	4.70%
2036	87,252,839	\$15,945	\$1,391.2	\$29,667.7	4.69%
2037	87,737,354	\$16,204	\$1,421.7	\$30,394.6	4.68%
2038	88,224,560	\$16,469	\$1,452.9	\$31,139.2	4.67%
2039	88,714,471	\$16,737	\$1,484.8	\$31,902.1	4.65%
2040	89,207,000	\$17,010	\$1,517.4	\$32,683.7	4.64%
2041	89,498,261	\$17,287	\$1,547.2	\$33,484.5	4.62%
2042	89,790,473	\$17,569	\$1,577.5	\$34,304.9	4.60%
2043	90,083,639	\$17,855	\$1,608.5	\$35,145.3	4.58%
2044	90,377,762	\$18,146	\$1,640.0	\$36,006.4	4.55%
2045	90,673,000	\$18,442	\$1,672.2	\$36,888.5	4.53%
2046	91,089,008	\$18,743	\$1,707.3	\$37,792.3	4.52%
2047	91,506,924	\$19,048	\$1,743.0	\$38,718.2	4.50%
2048	91,926,758	\$19,359	\$1,779.6	\$39,666.8	4.49%
2049	92,348,518	\$19,674	\$1,816.9	\$40,638.7	4.47%
2050	92,772,000	\$19,995	\$1,855.0	\$41,634.3	4.46%

TABLE 1B

**MEDICARE REVENUE SHORTFALL AS A SHARE OF GDP
ASSUMING 1.63% REAL GROWTH IN MEDICARE EXPENDITURES PER ENROLLEE
AND 2.45% REAL GDP GROWTH RATE**

YEAR	TOTAL MEDICARE EXPENDITURES (Billions 2014\$)	TOTAL MEDICARE PREMIUMS (Billions 2014\$)	INCOME FROM		REVENUE SHORTFALL (Billions 2014\$)	REVENUE SHORTFALL AS A SHARE OF GDP
			MEDICARE PAYROLL TAXES (Billions 2014\$)	TAXATION OF BENEFITS (Billions 2014\$)		
2015	\$631.9	\$89.3	\$229.6	\$20.4	\$292.5	1.64%
2016	\$661.5	\$93.5	\$244.1	\$22.0	\$301.9	1.65%
2017	\$692.2	\$97.8	\$251.5	\$23.8	\$319.1	1.70%
2018	\$724.2	\$102.3	\$260.1	\$25.6	\$336.1	1.75%
2019	\$757.5	\$107.0	\$267.8	\$27.4	\$355.2	1.81%
2020	\$792.3	\$112.0	\$273.2	\$29.2	\$377.9	1.88%
2021	\$828.3	\$117.1	\$281.5	\$31.1	\$398.7	1.93%
2022	\$865.9	\$122.4	\$287.9	\$33.0	\$422.7	2.00%
2023	\$904.5	\$127.8	\$292.4	\$35.0	\$449.3	2.07%
2024	\$943.4	\$133.3	\$302.4	\$36.2	\$471.4	2.12%
2025	\$983.9	\$139.0	\$312.8	\$37.5	\$494.6	2.18%
2026	\$1,020.8	\$144.3	\$323.5	\$38.7	\$514.4	2.21%
2027	\$1,059.2	\$149.7	\$334.5	\$40.1	\$534.9	2.24%
2028	\$1,099.0	\$155.3	\$346.0	\$41.4	\$556.2	2.28%
2029	\$1,140.3	\$161.1	\$357.9	\$42.9	\$578.4	2.31%
2030	\$1,183.1	\$167.2	\$370.1	\$44.3	\$601.5	2.34%
2031	\$1,216.8	\$171.9	\$382.8	\$45.8	\$616.2	2.34%
2032	\$1,251.4	\$176.8	\$395.9	\$47.4	\$631.2	2.34%
2033	\$1,287.0	\$181.9	\$409.5	\$49.0	\$646.6	2.34%
2034	\$1,323.7	\$187.0	\$423.5	\$50.7	\$662.4	2.34%
2035	\$1,361.3	\$192.4	\$438.0	\$52.5	\$678.5	2.34%
2036	\$1,391.2	\$196.6	\$453.0	\$54.3	\$687.3	2.32%
2037	\$1,421.7	\$200.9	\$468.6	\$56.1	\$696.2	2.29%
2038	\$1,452.9	\$205.3	\$484.6	\$58.0	\$705.0	2.26%
2039	\$1,484.8	\$209.8	\$501.2	\$60.0	\$713.8	2.24%
2040	\$1,517.4	\$214.4	\$518.4	\$62.1	\$722.5	2.21%
2041	\$1,547.2	\$218.6	\$536.1	\$64.2	\$728.2	2.17%
2042	\$1,577.5	\$222.9	\$554.5	\$66.4	\$733.7	2.14%
2043	\$1,608.5	\$227.3	\$573.5	\$68.7	\$739.0	2.10%
2044	\$1,640.0	\$231.8	\$593.2	\$71.0	\$744.1	2.07%
2045	\$1,672.2	\$236.3	\$613.5	\$73.5	\$749.0	2.03%
2046	\$1,707.3	\$241.3	\$634.5	\$76.0	\$755.5	2.00%
2047	\$1,743.0	\$246.3	\$656.2	\$78.6	\$761.9	1.97%
2048	\$1,779.6	\$251.5	\$678.7	\$81.3	\$768.1	1.94%
2049	\$1,816.9	\$256.7	\$702.0	\$84.1	\$774.1	1.90%
2050	\$1,855.0	\$262.1	\$726.0	\$86.9	\$779.9	1.87%

In Table 1B, the revenue shortfall and the revenue shortfall as a percent of GDP are projected. We have assumed that Medicare premiums will amount to 14.13 percent of expenditures, based on CMS data. This value is consistent with the premium policy governed by Medicare legislation. By design, most recipients do not pay premiums for Part A coverage, and pay approximately 25 percent of the cost of Parts B and D coverage. Historically, Parts B and D have accounted for approximately 54 percent of total Medicare expenditures. Through 2023, we use the figures projected by CMS for the revenues generated by Medicare payroll taxes and from the taxation of social security benefits. The growth rate of dedicated real tax revenue streams beyond 2023 is 3.426 percent and is based on CMS data.

The revenue shortfall in each year is the difference between Medicare expenditures and the sum of Medicare payroll taxes, revenue from the taxation of social security benefits and Medicare premiums. We project that the revenue shortfall will increase from \$292.5 billion to \$779.9 billion in 2050. The revenue shortfall as a percent of GDP, however, increases from 1.64 percent in 2015 to 2.34 percent in 2030 where it stabilizes before declining to 1.87 percent in 2050. What is apparent is that if ACA is successful in reining in per capita real expenditures, the Medicare program will be sustainable even with the rather dramatic growth in enrollees over the next 35 years.

The scenario outlined above may be overly optimistic given the headwinds affecting the Medicare program in the near future. An emerging consensus among health care analysts is that ACA will be successful in limiting the annual growth in real per capita Medicare expenditures to less than 3 percent. For example, Urban Institute analysts Holahan and McMorro (2012) project a 2.7 percent annual increase. We replace the optimistic 1.63 percent growth rate in annual per capita expenditures in Tables 1A and 1B by the 2.7 percent rate. These projections appear in Tables 2A and 2B.

In this scenario, real expenditures per enrollee increase from \$11,474 to \$29,152, a 154 percent increase. Total real expenditures increase from \$638.5 billion to \$2.705 trillion, a 324 percent increase. Medicare spending consumes 3.58 percent of output in 2015 and grows to 6.5 percent of output in 2050. This represents an 82 percent increase in the Medicare spending to GDP ratio. In 2015, the revenue shortfall amounts to \$298.2 billion. This represents 46.7 percent of Medicare expenditures or approximately 1.67 percent of GDP. The revenue shortfall increases from \$298.2 billion to \$1.5094 trillion in 2050. Over this period, the revenue shortfall as a percent of GDP more than doubles, increasing from 1.67 percent in 2015 to 3.63 percent in 2050 and doesn't stabilize. The shortfall in inflation adjusted dollars grows at an annual rate of 4.74 percent over this period. To keep the revenue shortfall at 1.67 percent of GDP in 2050, tax revenues must rise by more than \$814 billion in real terms. This tax increase represents approximately 2 percent of GDP in 2050. Deficits of this magnitude may not be sustainable and may require restructuring

TABLE 2A

**MEDICARE EXPENDITURES AS A SHARE OF GDP
ASSUMING 2.7% REAL GROWTH IN MEDICARE EXPENDITURES PER ENROLLEE
AND 2.45% REAL GDP GROWTH RATE**

YEAR	NUMBER OF MEDICARE ENROLLEES	REAL MEDICARE EXPENDITURES PER ENROLLEE	TOTAL MEDICARE EXPENDITURES (Billions 2014\$)	GDP (Billions 2014\$)	MEDICARE EXPENDITURES AS A SHARE OF GDP
2015	55,651,000	\$11,474	\$638.5	\$17,845.7	3.58%
2016	57,324,000	\$11,783	\$675.5	\$18,282.9	3.69%
2017	59,025,000	\$12,102	\$714.3	\$18,730.8	3.81%
2018	60,761,000	\$12,428	\$755.2	\$19,189.7	3.94%
2019	62,540,000	\$12,764	\$798.3	\$19,659.9	4.06%
2020	64,362,000	\$13,109	\$843.7	\$20,141.5	4.19%
2021	66,210,000	\$13,462	\$891.3	\$20,635.0	4.32%
2022	68,104,000	\$13,826	\$941.6	\$21,140.6	4.45%
2023	69,996,000	\$14,199	\$993.9	\$21,658.5	4.59%
2024	71,832,905	\$14,583	\$1,047.5	\$22,189.1	4.72%
2025	73,718,000	\$14,976	\$1,104.0	\$22,732.8	4.86%
2026	75,260,328	\$15,381	\$1,157.6	\$23,289.7	4.97%
2027	76,834,925	\$15,796	\$1,213.7	\$23,860.3	5.09%
2028	78,442,465	\$16,222	\$1,272.5	\$24,444.9	5.21%
2029	80,083,638	\$16,660	\$1,334.2	\$25,043.8	5.33%
2030	81,759,000	\$17,110	\$1,398.9	\$25,657.4	5.45%
2031	82,737,655	\$17,572	\$1,453.9	\$26,286.0	5.53%
2032	83,728,025	\$18,047	\$1,511.0	\$26,930.0	5.61%
2033	84,730,249	\$18,534	\$1,570.4	\$27,589.8	5.69%
2034	85,744,471	\$19,034	\$1,632.1	\$28,265.7	5.77%
2035	86,771,000	\$19,548	\$1,696.2	\$28,958.2	5.86%
2036	87,252,839	\$20,076	\$1,751.7	\$29,667.7	5.90%
2037	87,737,354	\$20,618	\$1,809.0	\$30,394.6	5.95%
2038	88,224,560	\$21,175	\$1,868.1	\$31,139.2	6.00%
2039	88,714,471	\$21,747	\$1,929.2	\$31,902.1	6.05%
2040	89,207,000	\$22,334	\$1,992.3	\$32,683.7	6.10%
2041	89,498,261	\$22,937	\$2,052.8	\$33,484.5	6.13%
2042	89,790,473	\$23,556	\$2,115.1	\$34,304.9	6.17%
2043	90,083,639	\$24,192	\$2,179.3	\$35,145.3	6.20%
2044	90,377,762	\$24,845	\$2,245.5	\$36,006.4	6.24%
2045	90,673,000	\$25,516	\$2,313.6	\$36,888.5	6.27%
2046	91,089,008	\$26,205	\$2,387.0	\$37,792.3	6.32%
2047	91,506,924	\$26,913	\$2,462.7	\$38,718.2	6.36%
2048	91,926,758	\$27,639	\$2,540.8	\$39,666.8	6.41%
2049	92,348,518	\$28,385	\$2,621.4	\$40,638.7	6.45%
2050	92,772,000	\$29,152	\$2,704.5	\$41,634.3	6.50%

TABLE 2B

**MEDICARE REVENUE SHORTFALL AS A SHARE OF GDP
ASSUMING 2.7% REAL GROWTH IN MEDICARE EXPENDITURES PER ENROLLEE
AND 2.45% REAL GDP GROWTH RATE**

YEAR	TOTAL MEDICARE EXPENDITURES (Billions 2014\$)	TOTAL MEDICARE PREMIUMS (Billions 2014\$)	INCOME FROM		REVENUE SHORTFALL (Billions 2014\$)	REVENUE SHORTFALL AS A SHARE OF GDP
			MEDICARE PAYROLL TAXES (Billions 2014\$)	TAXATION OF BENEFITS (Billions 2014\$)		
2015	\$638.5	\$90.2	\$229.6	\$20.4	\$298.2	1.67%
2016	\$675.5	\$95.5	\$244.1	\$22.0	\$313.9	1.72%
2017	\$714.3	\$100.9	\$251.5	\$23.8	\$338.1	1.80%
2018	\$755.2	\$106.7	\$260.1	\$25.6	\$362.7	1.89%
2019	\$798.3	\$112.8	\$267.8	\$27.4	\$390.2	1.98%
2020	\$843.7	\$119.2	\$273.2	\$29.2	\$422.0	2.10%
2021	\$891.3	\$126.0	\$281.5	\$31.1	\$452.8	2.19%
2022	\$941.6	\$133.1	\$287.9	\$33.0	\$487.7	2.31%
2023	\$993.9	\$140.4	\$292.4	\$35.0	\$526.1	2.43%
2024	\$1,047.5	\$148.0	\$302.4	\$36.2	\$560.9	2.53%
2025	\$1,104.0	\$156.0	\$312.8	\$37.5	\$597.8	2.63%
2026	\$1,157.6	\$163.6	\$323.5	\$38.7	\$631.8	2.71%
2027	\$1,213.7	\$171.5	\$334.5	\$40.1	\$667.6	2.80%
2028	\$1,272.5	\$179.8	\$346.0	\$41.4	\$705.3	2.89%
2029	\$1,334.2	\$188.5	\$357.9	\$42.9	\$745.0	2.97%
2030	\$1,398.9	\$197.7	\$370.1	\$44.3	\$786.8	3.07%
2031	\$1,453.9	\$205.4	\$382.8	\$45.8	\$819.8	3.12%
2032	\$1,511.0	\$213.5	\$395.9	\$47.4	\$854.2	3.17%
2033	\$1,570.4	\$221.9	\$409.5	\$49.0	\$890.0	3.23%
2034	\$1,632.1	\$230.6	\$423.5	\$50.7	\$927.2	3.28%
2035	\$1,696.2	\$239.7	\$438.0	\$52.5	\$966.1	3.34%
2036	\$1,751.7	\$247.5	\$453.0	\$54.3	\$996.9	3.36%
2037	\$1,809.0	\$255.6	\$468.6	\$56.1	\$1,028.7	3.38%
2038	\$1,868.1	\$264.0	\$484.6	\$58.0	\$1,061.5	3.41%
2039	\$1,929.2	\$272.6	\$501.2	\$60.0	\$1,095.4	3.43%
2040	\$1,992.3	\$281.5	\$518.4	\$62.1	\$1,130.3	3.46%
2041	\$2,052.8	\$290.1	\$536.1	\$64.2	\$1,162.4	3.47%
2042	\$2,115.1	\$298.9	\$554.5	\$66.4	\$1,195.3	3.48%
2043	\$2,179.3	\$308.0	\$573.5	\$68.7	\$1,229.2	3.50%
2044	\$2,245.5	\$317.3	\$593.2	\$71.0	\$1,264.0	3.51%
2045	\$2,313.6	\$326.9	\$613.5	\$73.5	\$1,299.7	3.52%
2046	\$2,387.0	\$337.3	\$634.5	\$76.0	\$1,339.2	3.54%
2047	\$2,462.7	\$348.0	\$656.2	\$78.6	\$1,379.9	3.56%
2048	\$2,540.8	\$359.0	\$678.7	\$81.3	\$1,421.8	3.58%
2049	\$2,621.4	\$370.4	\$702.0	\$84.1	\$1,464.9	3.60%
2050	\$2,704.5	\$382.2	\$726.0	\$86.9	\$1,509.4	3.63%

the program by either restricting benefits and/or increasing dedicated sources of revenue. As an illustration, we consider four policy adjustments that could be implemented to redress the fiscal imbalances created by the Medicare program given the higher real rate of growth of spending.

POLICY RECOMMENDATIONS

The most straight forward approach to reducing Medicare spending is to limit, by statute, the real growth rate of expenditures per enrollee to 1.63 percent. As is apparent in Tables 1A and 1B, this rate of growth does not produce a fiscal imbalance. How can a 1.63 percent cap on real expenditures per enrollee be achieved? First, one could restrain growth in Medicare reimbursement rates. Physicians that treat Medicare patients receive as payment the reimbursement rate rather than the rate they billed. Lowering the reimbursement rate has the desired effect of lowering expenditures but has the unintended consequence of restricting access to medical providers. It is likely that as reimbursement rates become more austere, fewer medical providers will accept Medicare patients⁴.

Another method of limiting growth could be accomplished by the introduction of panels that act as gatekeepers, restricting access to medical procedures based on a cost-benefit analysis. Approval of procedures suggested by the provider would be based on the recipient's age, health, the magnitude of the enhancement of the recipient's quality of life and the likelihood that the procedure will be successful (e.g. Heart valve replacement for an 85 year old patient that is currently approved may be disallowed). This method of restraining growth would be extremely unpopular as recipients find that procedures would be disallowed that were formerly approved.

A third approach to restraining spending would be to alter the program away from a traditional insurance program where the government acts as the insurer to a program where recipients receive vouchers redeemable for insurance in the open market⁵. If the voucher fails to cover the full cost of the premium, the insuree would be responsible for the difference. The dollar value of the voucher could be means tested with lower income households receiving higher dollar value vouchers. Proponents of a voucher system envision a continuum of market provided plans that vary in the size of deductibles, co-insurance rates, and the scope of their coverage. One advantage of this proposal is that the government can exercise control over outlays by fixing the dollar value of vouchers and limiting growth to the 1.63 percent level. This initiative has significant defects in that recipients may find limited access to medical providers and/or a reduction in the number of approved medical procedures and/or greater out of pocket payments.

An alternative policy initiative is to raise the eligibility age for Medicare. This would have the obvious effect of restraining the number of Medicare enrollees and would offset the increase in conditional life expectancy at age 65 that has occurred since 1968⁶. One would expect political resistance to this reform as a new cohort of individuals would be without government provided health insurance. Nevertheless, we have revised the calculations in Tables 2A and 2B by raising the Medicare eligibility age to 70 years beginning in 2020⁷. The adjustment is gradual in the sense that any individual who was receiving

Medicare prior to 2020 and is under the age of 70 continues to receive benefits. Under this proposed reform, by the year 2024, all non-disabled Medicare recipients would be at least age 70.

Projections of the fiscal impact of increasing the Medicare eligibility age appear in Tables 3A and 3B. These tables are analogs of Tables 2A and 2B. Increasing the eligibility age does reduce Medicare expenditures. By 2050, real Medicare expenditures are reduced by \$628 billion. The Medicare expenditure to GDP ratio is reduced from 6.5 percent to 4.99 percent and the revenue shortfall is reduced by \$539.3 billion. This reform would reduce the revenue shortfall to GDP ratio in 2050 from 3.63 percent to 2.33 percent. Increasing the eligibility age would not eliminate the fiscal imbalance however, since the revenue shortfall steadily grows to almost \$1 trillion in real terms but would go a long way to relieving stress on the federal budget.

Means testing Medicare eligibility is another tool available to policy makers to deal with the fiscal imbalance. We impose an eligibility restriction in 2020 that eliminates high income individuals from participation in the Medicare program. We define high income individuals and married couples as earning income greater than \$50,000 and \$75,000 in 2014 dollars, respectively. Imposing this restriction reduces the size of the Medicare pool by approximately 22.5 percent⁸. Although this restriction is rather stringent, it is necessary to have a meaningful impact on the size of the fiscal imbalance⁹.

Projections of Medicare expenditures and the magnitude of the fiscal imbalance are presented in Tables 4A and 4B. By 2050, means testing benefits reduces real Medicare expenditures by \$580 billion. The Medicare expenditure to GDP ratio is reduced from 6.5 percent to 5.1 percent and the revenue shortfall is reduced by \$498 billion. This reform would reduce the revenue shortfall to GDP ratio in 2050 from 3.63 percent to 2.43 percent. This result is similar to that of restricting eligibility based on age (see Tables 3A and 3B).

The final policy alternative that we consider is doubling the Medicare payroll tax rate on labor income from 1.45 percent on both employer and employee to 2.9 percent and doubling the premium that high income earners pay from .9 percent to 1.8 percent¹⁰. The projection of the fiscal impact of this tax increase is shown in Table 5. Similar to our previous analyses, this policy is imposed in the year 2020. This initiative has no effect on the stream of Medicare expenditures over time. It will however, decrease the revenue shortfall by increasing the dedicated sources of tax revenue. A tax hike of this magnitude would be politically unpopular but would redress the fiscal imbalance. Although real Medicare expenditures increase from \$638.5 billion to \$2.7045 trillion and the ratio of expenditures to GDP rise from 3.58 percent to 6.5 percent, the revenue shortfall to GDP ratio would amount to only 1.88 percent in 2050, its approximate value in 2015.

TABLE 3A

**MEDICARE EXPENDITURES AS A SHARE OF GDP
ASSUMING 2.7% REAL GROWTH IN MEDICARE EXPENDITURES PER ENROLLEE
AND 2.45% REAL GDP GROWTH RATE
RAISING ELIGIBILITY AGE TO 70 YEARS**

YEAR	NUMBER OF MEDICARE ENROLLEES	REAL MEDICARE EXPENDITURES PER ENROLLEE	TOTAL MEDICARE EXPENDITURES (Billions 2014\$)	GDP (Billions 2014\$)	MEDICARE EXPENDITURES AS A SHARE OF GDP
2015	55,651,000	\$11,474	\$638.5	\$17,845.7	3.58%
2016	57,324,000	\$11,783	\$675.5	\$18,282.9	3.69%
2017	59,025,000	\$12,102	\$714.3	\$18,730.8	3.81%
2018	60,761,000	\$12,428	\$755.2	\$19,189.7	3.94%
2019	62,540,000	\$12,764	\$798.3	\$19,659.9	4.06%
2020	60,442,271	\$13,109	\$792.3	\$20,141.5	3.93%
2021	58,410,134	\$13,462	\$786.3	\$20,635.0	3.81%
2022	56,370,747	\$13,826	\$779.4	\$21,140.6	3.69%
2023	54,300,645	\$14,199	\$771.0	\$21,658.5	3.56%
2024	52,222,947	\$14,583	\$761.5	\$22,189.1	3.43%
2025	53,760,505	\$14,976	\$805.1	\$22,732.8	3.54%
2026	55,030,084	\$15,381	\$846.4	\$23,289.7	3.63%
2027	56,458,799	\$15,796	\$891.8	\$23,860.3	3.74%
2028	58,006,001	\$16,222	\$941.0	\$24,444.9	3.85%
2029	59,581,006	\$16,660	\$992.6	\$25,043.8	3.96%
2030	61,378,229	\$17,110	\$1,050.2	\$25,657.4	4.09%
2031	62,643,791	\$17,572	\$1,100.8	\$26,286.0	4.19%
2032	63,977,543	\$18,047	\$1,154.6	\$26,930.0	4.29%
2033	65,300,521	\$18,534	\$1,210.3	\$27,589.8	4.39%
2034	66,542,165	\$19,034	\$1,266.6	\$28,265.7	4.48%
2035	67,540,876	\$19,548	\$1,320.3	\$28,958.2	4.56%
2036	67,833,352	\$20,076	\$1,361.8	\$29,667.7	4.59%
2037	68,224,737	\$20,618	\$1,406.7	\$30,394.6	4.63%
2038	68,758,653	\$21,175	\$1,456.0	\$31,139.2	4.68%
2039	69,439,465	\$21,747	\$1,510.1	\$31,902.1	4.73%
2040	70,218,147	\$22,334	\$1,568.2	\$32,683.7	4.80%
2041	70,769,649	\$22,937	\$1,623.2	\$33,484.5	4.85%
2042	71,079,742	\$23,556	\$1,674.4	\$34,304.9	4.88%
2043	71,164,382	\$24,192	\$1,721.6	\$35,145.3	4.90%
2044	71,078,409	\$24,845	\$1,766.0	\$36,006.4	4.90%
2045	70,897,146	\$25,516	\$1,809.0	\$36,888.5	4.90%
2046	70,749,938	\$26,205	\$1,854.0	\$37,792.3	4.91%
2047	70,703,555	\$26,913	\$1,902.8	\$38,718.2	4.91%
2048	70,752,924	\$27,639	\$1,955.6	\$39,666.8	4.93%
2049	70,934,502	\$28,385	\$2,013.5	\$40,638.7	4.95%
2050	71,229,473	\$29,152	\$2,076.5	\$41,634.3	4.99%

TABLE 3B

**MEDICARE REVENUE SHORTFALL AS A SHARE OF GDP
ASSUMING 2.7% REAL GROWTH IN MEDICARE EXPENDITURES PER ENROLLEE
AND 2.45% REAL GDP GROWTH RATE
RAISING ELIGIBILITY AGE TO 70 YEARS**

YEAR	TOTAL MEDICARE EXPENDITURES (Billions 2014\$)	TOTAL MEDICARE PREMIUMS (Billions 2014\$)	MEDICARE PAYROLL TAXES (Billions 2014\$)	INCOME FROM		REVENUE SHORTFALL (Billions 2014\$)	REVENUE SHORTFALL AS A SHARE OF GDP
				TAXATION OF BENEFITS (Billions 2014\$)	REVENUE SHORTFALL (Billions 2014\$)		
2015	\$638.5	\$90.2	\$229.6	\$20.4	\$298.2	1.67%	
2016	\$675.5	\$95.5	\$244.1	\$22.0	\$313.9	1.72%	
2017	\$714.3	\$100.9	\$251.5	\$23.8	\$338.1	1.80%	
2018	\$755.2	\$106.7	\$260.1	\$25.6	\$362.7	1.89%	
2019	\$798.3	\$112.8	\$267.8	\$27.4	\$390.2	1.98%	
2020	\$792.3	\$112.0	\$273.2	\$29.2	\$377.9	1.88%	
2021	\$786.3	\$111.1	\$281.5	\$31.1	\$362.6	1.76%	
2022	\$779.4	\$110.1	\$287.9	\$33.0	\$348.4	1.65%	
2023	\$771.0	\$109.0	\$292.4	\$35.0	\$334.7	1.55%	
2024	\$761.5	\$107.6	\$302.4	\$36.2	\$315.3	1.42%	
2025	\$805.1	\$113.8	\$312.8	\$37.5	\$341.2	1.50%	
2026	\$846.4	\$119.6	\$323.5	\$38.7	\$364.6	1.57%	
2027	\$891.8	\$126.0	\$334.5	\$40.1	\$391.2	1.64%	
2028	\$941.0	\$133.0	\$346.0	\$41.4	\$420.6	1.72%	
2029	\$992.6	\$140.3	\$357.9	\$42.9	\$451.7	1.80%	
2030	\$1,050.2	\$148.4	\$370.1	\$44.3	\$487.3	1.90%	
2031	\$1,100.8	\$155.6	\$382.8	\$45.8	\$516.6	1.97%	
2032	\$1,154.6	\$163.2	\$395.9	\$47.4	\$548.1	2.04%	
2033	\$1,210.3	\$171.0	\$409.5	\$49.0	\$580.7	2.10%	
2034	\$1,266.6	\$179.0	\$423.5	\$50.7	\$613.4	2.17%	
2035	\$1,320.3	\$186.6	\$438.0	\$52.5	\$643.3	2.22%	
2036	\$1,361.8	\$192.4	\$453.0	\$54.3	\$662.1	2.23%	
2037	\$1,406.7	\$198.8	\$468.6	\$56.1	\$683.2	2.25%	
2038	\$1,456.0	\$205.7	\$484.6	\$58.0	\$707.6	2.27%	
2039	\$1,510.1	\$213.4	\$501.2	\$60.0	\$735.5	2.31%	
2040	\$1,568.2	\$221.6	\$518.4	\$62.1	\$766.2	2.34%	
2041	\$1,623.2	\$229.4	\$536.1	\$64.2	\$793.5	2.37%	
2042	\$1,674.4	\$236.6	\$554.5	\$66.4	\$816.8	2.38%	
2043	\$1,721.6	\$243.3	\$573.5	\$68.7	\$836.2	2.38%	
2044	\$1,766.0	\$249.5	\$593.2	\$71.0	\$852.2	2.37%	
2045	\$1,809.0	\$255.6	\$613.5	\$73.5	\$866.4	2.35%	
2046	\$1,854.0	\$262.0	\$634.5	\$76.0	\$881.5	2.33%	
2047	\$1,902.8	\$268.9	\$656.2	\$78.6	\$899.1	2.32%	
2048	\$1,955.6	\$276.3	\$678.7	\$81.3	\$919.2	2.32%	
2049	\$2,013.5	\$284.5	\$702.0	\$84.1	\$943.0	2.32%	
2050	\$2,076.5	\$293.4	\$726.0	\$86.9	\$970.1	2.33%	

TABLE 4A

**MEDICARE EXPENDITURES AS A SHARE OF GDP
ASSUMING 2.7% REAL GROWTH IN MEDICARE EXPENDITURES PER ENROLLEE
AND 2.45% REAL GDP GROWTH RATE
RESTRICTING ELIGIBILITY BY INCOME**

YEAR	NUMBER OF MEDICARE ENROLLEES	REAL MEDICARE EXPENDITURES PER ENROLLEE	TOTAL MEDICARE EXPENDITURES (Billions 2014\$)	GDP (Billions 2014\$)	MEDICARE EXPENDITURES AS A SHARE OF GDP
2015	55,651,000	\$11,474	\$638.5	\$17,845.7	3.58%
2016	57,324,000	\$11,783	\$675.5	\$18,282.9	3.69%
2017	59,025,000	\$12,102	\$714.3	\$18,730.8	3.81%
2018	60,761,000	\$12,428	\$755.2	\$19,189.7	3.94%
2019	62,540,000	\$12,764	\$798.3	\$19,659.9	4.06%
2020	52,048,976	\$13,109	\$682.3	\$20,141.5	3.39%
2021	53,504,506	\$13,462	\$720.3	\$20,635.0	3.49%
2022	54,992,675	\$13,826	\$760.3	\$21,140.6	3.60%
2023	56,470,645	\$14,199	\$801.8	\$21,658.5	3.70%
2024	57,902,099	\$14,583	\$844.4	\$22,189.1	3.81%
2025	59,359,793	\$14,976	\$889.0	\$22,732.8	3.91%
2026	60,501,514	\$15,381	\$930.6	\$23,289.7	4.00%
2027	61,694,497	\$15,796	\$974.5	\$23,860.3	4.08%
2028	62,935,067	\$16,222	\$1,021.0	\$24,444.9	4.18%
2029	64,218,999	\$16,660	\$1,069.9	\$25,043.8	4.27%
2030	65,561,972	\$17,110	\$1,121.8	\$25,657.4	4.37%
2031	66,273,118	\$17,572	\$1,164.6	\$26,286.0	4.43%
2032	67,029,029	\$18,047	\$1,209.7	\$26,930.0	4.49%
2033	67,807,708	\$18,534	\$1,256.7	\$27,589.8	4.56%
2034	68,588,493	\$19,034	\$1,305.5	\$28,265.7	4.62%
2035	69,349,157	\$19,548	\$1,355.7	\$28,958.2	4.68%
2036	69,590,553	\$20,076	\$1,397.1	\$29,667.7	4.71%
2037	69,887,598	\$20,618	\$1,441.0	\$30,394.6	4.74%
2038	70,228,924	\$21,175	\$1,487.1	\$31,139.2	4.78%
2039	70,595,588	\$21,747	\$1,535.2	\$31,902.1	4.81%
2040	70,955,016	\$22,334	\$1,584.7	\$32,683.7	4.85%
2041	71,129,989	\$22,937	\$1,631.5	\$33,484.5	4.87%
2042	71,299,539	\$23,556	\$1,679.5	\$34,304.9	4.90%
2043	71,456,059	\$24,192	\$1,728.7	\$35,145.3	4.92%
2044	71,593,524	\$24,845	\$1,778.8	\$36,006.4	4.94%
2045	71,698,113	\$25,516	\$1,829.5	\$36,888.5	4.96%
2046	71,916,623	\$26,205	\$1,884.6	\$37,792.3	4.99%
2047	72,150,055	\$26,913	\$1,941.7	\$38,718.2	5.02%
2048	72,389,753	\$27,639	\$2,000.8	\$39,666.8	5.04%
2049	72,638,223	\$28,385	\$2,061.9	\$40,638.7	5.07%
2050	72,877,983	\$29,152	\$2,124.5	\$41,634.3	5.10%

TABLE 4B

**MEDICARE REVENUE SHORTFALL AS A SHARE OF GDP
ASSUMING 2.7% REAL GROWTH IN MEDICARE EXPENDITURES PER ENROLLEE
AND 2.45% REAL GDP GROWTH RATE
RESTRICTING ELIGIBILITY BY INCOME**

YEAR	TOTAL MEDICARE EXPENDITURES (Billions 2014\$)	TOTAL MEDICARE PREMIUMS (Billions 2014\$)	MEDICARE PAYROLL TAXES (Billions 2014\$)	INCOME FROM		REVENUE SHORTFALL AS A SHARE OF GDP
				TAXATION OF BENEFITS (Billions 2014\$)	REVENUE SHORTFALL (Billions 2014\$)	
2015	\$638.5	\$90.2	\$229.6	\$20.4	\$298.2	1.67%
2016	\$675.5	\$95.5	\$244.1	\$22.0	\$313.9	1.72%
2017	\$714.3	\$100.9	\$251.5	\$23.8	\$338.1	1.80%
2018	\$755.2	\$106.7	\$260.1	\$25.6	\$362.7	1.89%
2019	\$798.3	\$112.8	\$267.8	\$27.4	\$390.2	1.98%
2020	\$682.3	\$96.4	\$273.2	\$29.2	\$283.4	1.41%
2021	\$720.3	\$101.8	\$281.5	\$31.1	\$305.9	1.48%
2022	\$760.3	\$107.4	\$287.9	\$33.0	\$332.0	1.57%
2023	\$801.8	\$113.3	\$292.4	\$35.0	\$361.1	1.67%
2024	\$844.4	\$119.3	\$302.4	\$36.2	\$386.4	1.74%
2025	\$889.0	\$125.6	\$312.8	\$37.5	\$413.2	1.82%
2026	\$930.6	\$131.5	\$323.5	\$38.7	\$436.9	1.88%
2027	\$974.5	\$137.7	\$334.5	\$40.1	\$462.2	1.94%
2028	\$1,021.0	\$144.3	\$346.0	\$41.4	\$489.2	2.00%
2029	\$1,069.9	\$151.2	\$357.9	\$42.9	\$518.0	2.07%
2030	\$1,121.8	\$158.5	\$370.1	\$44.3	\$548.8	2.14%
2031	\$1,164.6	\$164.6	\$382.8	\$45.8	\$571.4	2.17%
2032	\$1,209.7	\$170.9	\$395.9	\$47.4	\$595.4	2.21%
2033	\$1,256.7	\$177.6	\$409.5	\$49.0	\$620.6	2.25%
2034	\$1,305.5	\$184.5	\$423.5	\$50.7	\$646.8	2.29%
2035	\$1,355.7	\$191.6	\$438.0	\$52.5	\$673.6	2.33%
2036	\$1,397.1	\$197.4	\$453.0	\$54.3	\$692.4	2.33%
2037	\$1,441.0	\$203.6	\$468.6	\$56.1	\$712.7	2.34%
2038	\$1,487.1	\$210.1	\$484.6	\$58.0	\$734.3	2.36%
2039	\$1,535.2	\$216.9	\$501.2	\$60.0	\$757.0	2.37%
2040	\$1,584.7	\$223.9	\$518.4	\$62.1	\$780.3	2.39%
2041	\$1,631.5	\$230.5	\$536.1	\$64.2	\$800.6	2.39%
2042	\$1,679.5	\$237.3	\$554.5	\$66.4	\$821.3	2.39%
2043	\$1,728.7	\$244.3	\$573.5	\$68.7	\$842.2	2.40%
2044	\$1,778.8	\$251.4	\$593.2	\$71.0	\$863.2	2.40%
2045	\$1,829.5	\$258.5	\$613.5	\$73.5	\$884.0	2.40%
2046	\$1,884.6	\$266.3	\$634.5	\$76.0	\$907.8	2.40%
2047	\$1,941.7	\$274.4	\$656.2	\$78.6	\$932.5	2.41%
2048	\$2,000.8	\$282.7	\$678.7	\$81.3	\$958.1	2.42%
2049	\$2,061.9	\$291.4	\$702.0	\$84.1	\$984.5	2.42%
2050	\$2,124.5	\$300.2	\$726.0	\$86.9	\$1,011.4	2.43%

TABLE 5

**MEDICARE REVENUE SHORTFALL AS A SHARE OF GDP
ASSUMING 2.7% REAL GROWTH IN MEDICARE EXPENDITURES PER ENROLLEE
AND 2.45% REAL GDP GROWTH RATE
DOUBLING PAYROLL TAX RATE**

YEAR	TOTAL MEDICARE EXPENDITURES (Billions 2014\$)	TOTAL MEDICARE PREMIUMS (Billions 2014\$)	INCOME FROM		REVENUE SHORTFALL (Billions 2014\$)	REVENUE SHORTFALL AS A SHARE OF GDP
			MEDICARE PAYROLL TAXES (Billions 2014\$)	TAXATION OF BENEFITS (Billions 2014\$)		
2015	\$638.5	\$90.2	\$229.6	\$20.4	\$298.2	1.67%
2016	\$675.5	\$95.5	\$244.1	\$22.0	\$313.9	1.72%
2017	\$714.3	\$100.9	\$251.5	\$23.8	\$338.1	1.80%
2018	\$755.2	\$106.7	\$260.1	\$25.6	\$362.7	1.89%
2019	\$798.3	\$112.8	\$267.8	\$27.4	\$390.2	1.98%
2020	\$843.7	\$119.2	\$546.5	\$29.2	\$148.8	0.74%
2021	\$891.3	\$126.0	\$563.0	\$31.1	\$171.3	0.83%
2022	\$941.6	\$133.1	\$575.8	\$33.0	\$199.8	0.94%
2023	\$993.9	\$140.4	\$584.8	\$35.0	\$233.7	1.08%
2024	\$1,047.5	\$148.0	\$604.8	\$36.2	\$258.5	1.16%
2025	\$1,104.0	\$156.0	\$625.5	\$37.5	\$285.1	1.25%
2026	\$1,157.6	\$163.6	\$646.9	\$38.7	\$308.3	1.32%
2027	\$1,213.7	\$171.5	\$669.1	\$40.1	\$333.0	1.40%
2028	\$1,272.5	\$179.8	\$692.0	\$41.4	\$359.3	1.47%
2029	\$1,334.2	\$188.5	\$715.7	\$42.9	\$387.1	1.55%
2030	\$1,398.9	\$197.7	\$740.3	\$44.3	\$416.7	1.62%
2031	\$1,453.9	\$205.4	\$765.6	\$45.8	\$437.0	1.66%
2032	\$1,511.0	\$213.5	\$791.8	\$47.4	\$458.2	1.70%
2033	\$1,570.4	\$221.9	\$819.0	\$49.0	\$480.5	1.74%
2034	\$1,632.1	\$230.6	\$847.0	\$50.7	\$503.7	1.78%
2035	\$1,696.2	\$239.7	\$876.0	\$52.5	\$528.0	1.82%
2036	\$1,751.7	\$247.5	\$906.1	\$54.3	\$543.9	1.83%
2037	\$1,809.0	\$255.6	\$937.1	\$56.1	\$560.1	1.84%
2038	\$1,868.1	\$264.0	\$969.2	\$58.0	\$576.9	1.85%
2039	\$1,929.2	\$272.6	\$1,002.4	\$60.0	\$594.2	1.86%
2040	\$1,992.3	\$281.5	\$1,036.8	\$62.1	\$612.0	1.87%
2041	\$2,052.8	\$290.1	\$1,072.3	\$64.2	\$626.2	1.87%
2042	\$2,115.1	\$298.9	\$1,109.0	\$66.4	\$640.8	1.87%
2043	\$2,179.3	\$308.0	\$1,147.0	\$68.7	\$655.7	1.87%
2044	\$2,245.5	\$317.3	\$1,186.3	\$71.0	\$670.8	1.86%
2045	\$2,313.6	\$326.9	\$1,226.9	\$73.5	\$686.3	1.86%
2046	\$2,387.0	\$337.3	\$1,269.0	\$76.0	\$704.7	1.86%
2047	\$2,462.7	\$348.0	\$1,312.5	\$78.6	\$723.6	1.87%
2048	\$2,540.8	\$359.0	\$1,357.4	\$81.3	\$743.0	1.87%
2049	\$2,621.4	\$370.4	\$1,403.9	\$84.1	\$762.9	1.88%
2050	\$2,704.5	\$382.2	\$1,452.0	\$86.9	\$783.3	1.88%

CONCLUSIONS

As our analysis suggests, the future health of the Medicare program is critically dependent on the real growth rate of per capita expenditures. Using historic growth rates of expenditures to project the future is fraught with difficulty given the implementation of ACA. There is a consensus among health care analysts that the passage of ACA will lead to a structural break in the growth rate of real per capita Medicare expenditures from its historic 4.09 percent figure to something less than 3 percent. Recent experience has shown that it is possible to deliver quality health care to the elderly population using state of the art technology while containing the growth of real costs per capita to 1.63 percent. We have made projections based on this growth rate and find that even with the dramatic increase in the number of enrollees over the period 2015-2050 by more than 37 million, the revenue shortfall as a share of GDP is relatively flat, increasing from 1.64 percent to 1.87 percent. In this scenario, the Medicare program as it is currently structured is sustainable.

Under a less optimistic scenario where real per capita expenditures rise by 2.7 percent, we find that the fiscal imbalance generated by the Medicare program calls into question its sustainability without the imposition of significant policy reforms. We have considered four different policy options: restricting by statute the growth rate of real per capita expenditures to 1.63 percent, raising the age of eligibility to 70 years, means testing eligibility, and doubling the Medicare payroll tax rate. Each measure has a significant impact on reducing the fiscal imbalance if not entirely eliminating it. These measures would be unappealing as they either limit benefits to the age 65 and over and disabled populations or increase taxes on the working age population. Medicare is an essential but fragile program. If we are unable to achieve the efficiency gains needed to reduce real per capita expenditures to a level that makes the program sustainable, some type of policy reform must be adopted. Each policy reform that we have considered is severe when viewed in isolation. Perhaps some combination of these policy initiatives where each is less severe can accomplish the goal of reducing the fiscal imbalance with less political opposition.

ACKNOWLEDGEMENTS

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ENDNOTES

1. Under the Affordable Care Act, the Medicare payroll tax has increase by .9% on income above \$250,000 for joint filers (above \$200,000 for single filers). Additionally there is a 3.8% tax on investment income for the aforementioned filers.
2. 2014 Annual Report of the Boards of Trustees of the Federal Hospital Insurance and Federal Supplementary Medical Insurance Trust Funds, July 28, 2014, www.cms.gov/Research-Statistics-Data-and-Systems/Statistics-Trends-and-Reports/ReportsTrustFunds/downloads/tr2014.pdf.
3. 2.45 percent is the average annual rate of growth for real GDP over the past 20 years.
4. Congress recently postponed implementation of the sustainable growth mechanism that was scheduled to reduce payments for physician's services by 24 percent in April 2015, understanding

that a reimbursement rate cut would limit the number of Medicare providers. See Congressional Budget Office, “The 2014 Long-Term Budget Outlook, July 2014, www.cbo.gov.

5. See Wyden and Ryan (2011).
6. See Arias (2014) and *Statistical Abstract of the United States*, 1971.
7. Population projections by age cohort through to 2050 are taken from the U.S. Census Bureau, www.census.gov.
8. The income distribution of the over age 65 population was taken from the Social Security Administration website, “Income of the Population 55 and Older, 2012 – Total Money Income,” www.ssa.gov/policy/docs/statcomps/income_pop55/2012/sect03.pdf.
9. We also considered a \$75,000 and \$100,000 earnings restriction for single and joint filers but this only reduced the size of the Medicare pool by 12.9 percent and therefore had a negligible impact on the fiscal imbalance.
10. These projections are based on the assumption that the aggregate labor supply elasticity is small.

REFERENCES

- 2014 Annual Report of the Boards of Trustees of the Federal Hospital Insurance and Federal Supplementary Medical Insurance Trust Funds, July 28, 2014, www.cms.gov/Research-Statistics-Data-and-Systems/Statistics-Trends-and-Reports/ReportsTrustFunds/downloads/tr2014.pdf.
- Aaron, Henry J. and Jeanne M. Lambrew, 2008, *Reforming Medicare*, Brookings Institution Press, Washington, D.C.
- Arias, Elizabeth, *United States Life Tables, 2009*, National Vital Statistics Reports, U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, Vol. 62, No. 7.
- Congressional Budget Office, “The 2014 Long-Term Budget Outlook, July 2014, www.cbo.gov.
- Fisher, Elliot S., Julie Bynum and Jonathan Skinner, 2009a, “The Policy Implications of Variations in Medicare Spending Growth,” *The Dartmouth Atlas*, The Dartmouth Institute for Health Policy & Clinical Practice, www.dartmouthatlas.org.
- Fisher, Elliot S., Julie Bynum and Jonathan Skinner, 2009b, “Slowing the Growth of Health Care Costs – Lessons from Regional Variation,” *The New England Journal of Medicine*, pp. 849-852.
- Gokhale, Jagadeesh and Kent Smetters, 2003, “Fiscal and Generational Imbalances: New Budget Measures for New Budget Priorities,” Washington, D.C.: American Enterprise Institute.
- Gokhale, Jagadeesh and Kent Smetters, 2006, “Fiscal and Generational Imbalances: An Update,” *Tax Policy and the Economy*, Vol. 20, pp. 193-223.
- Holahan, John and Stacey McMorro, April 2012, “Medicare, Medicaid and the Deficit Debate, Timely Analysis of Immediate Health Policy Issues,” The Urban Institute, www.urban.org.
- Kronenfeld, Jennie J., 2011, *Medicare*, Greenwood, Santa Barbara, California.
- U.S. Department of Commerce, Bureau of the Census, *Statistical Abstract of the United States 1971*, p. 54, www.census.gov.

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Social Security Administration, "Income of the Population 55 and Older, 2012 – Total Money Income," www.ssa.gov/policy/docs/statcomps/income_pop55/2012/sect03.pdf.

U.S. Census Bureau, "U.S. Interim Projections by Age, Sex, Race and Hispanic Origin," Population Projections Branch, www.census.gov.

U.S. Department of Labor, Bureau of Labor Statistics, www.bls.gov.

Wyden, Ron and Paul Ryan, "Guaranteed Choices to Strengthen Medicare and Health Security for All: Bipartisan Options for the Future," December 15, 2011, www.budget.house.gov/bipartisanhealthoptions, www.wyden.senate.gov/bipartisanhealthoptions.

The Determinants of Political Participation

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ABSTRACT

The purpose of the present study is to re-examine the work of Newman et al. (2013) and attempt to determine the factors that affect political participation. Using data from the 2005 Citizenship, Involvement, and Democracy (CID) Survey, results suggest that commuting has no statistically-significant effect on various measures of political participation, including voting. However, it was found that higher income persons who had long commutes were less likely to vote. The factors that had the most significant effects on political participation were level of political interest, homeownership, and educational attainment. The present study's finding regarding commuting contradicts the results of Newman et al. (2013).

INTRODUCTION

In the 2012 general election, 58.7 percent of eligible persons voted. Although this is down slightly from the 2008 election, it is still higher than the voter turnout rate for any Presidential election since 1968. An important issue though is the disinterest in politics in general and elections in particular. Even in an election when the President of the United States is being chosen, less than 60 percent of eligible persons cast a ballot. In off-year elections, this percentage is even lower; in 2010, the voter turnout rate was 41 percent. Even more distressing is the overall lack of interest in politics in general. Compared to other types of political participation, voting is a relatively easy and low-cost form of political participation. Other forms of participation, such as door-to-door canvassing, making phone calls, or contributing money are much more time and resource consuming. Although data on these types of political participation are difficult to obtain, it stands to reason that a very small percentage of U.S. citizens engage in these types of activities.

A recent study by Newman et al. (2013) theorized that the strain of commuting may be reducing a person's ability to engage in political activity. According to the commuter strain theory, certain activities, such as commuting, are more draining or stressful than are other types of activities. Hence, a person who has a long commute is more likely to be emotionally and physically drained than someone who does not have a long commute. The person with the long commute is thus less likely to participate in political activities. Hence, according to this theory, 30 minutes spent commuting drains a person's resources much more than 30 minutes of working. In their study, Newman et al. (2013) tested this theory and found that commuting, especially for low-income persons, is significantly and negatively related to political participation.

The resources theory, which is another theory about political participation, also suggests that competing demands on the resources of citizens result in low political participation (Brady et al., 1995).

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Persons who work long hours or who have numerous demands on their time and money (poor health, many children, etc.) are less likely to vote or engage in other political activity. The difference between this theory and the commuter strain hypothesis is that, in the resources theory, it is assumed that all activities are relatively equal in their drain on political participation.

The present study re-examines this issue and the work of Newman et al. (2013) and looks at the effects of commuting on political participation. Using data from the 2005 Citizenship, Involvement, and Democracy (CID) Survey, results of the present study suggest that, contrary to the Newman et al. (2013) study, commuting in and of itself has no statistically-significant effect on various measures of political participation, including voting. It was found, however, that high income persons who had long commutes were less likely to vote. This result is contrary to the result found in Newman et al. (2013). Other types of political participation, however, were not affected by the interaction of income and commuting. Finally, the factors that had the most significant effects on political participation were the level of political interest, homeownership, and educational attainment. The following sections present the methodology and data used, the results obtained, and some concluding remarks.

EMPIRICAL TECHNIQUE AND DATA

The empirical technique used in this study is based on Newman et al. (2013); Lidstrom (2006); and Schlozman et al. (1994). All three studies used individual-level data and a variety of socioeconomic and demographic control variables. These individual-level variables include such factors as gender, race, age, income, and educational attainment. The present study also uses time spent commuting as an independent variable. The only other study that included a commuting variable was the Newman et al. (2013) study. Finally, a variable denoting political interest is included. The reason for including this variable is because it is assumed that persons who are interested in politics would be more likely to be actively engaged in political activities. Given the above, the following equation is estimated in the present study:

$$Y = \beta_0 + \beta_1 X + \beta_2 \text{COMMUTE} + \beta_3 \text{POLITICAL INTEREST} \quad (1)$$

Y denotes various measures of political participation, such as voting, donating money to political campaigns, and working with a campaign. In addition to these single duty variables, two index variables were constructed. These variables, which are denoted by POLITIC1 and POLITIC2, are the sum of the binary, single duty variables. Although not exact measures of political participation (it is not known how many hours a person worked on a campaign, for example), they provide indicators of the political activity level of an individual; the larger the number, the more politically active an individual is. POLITIC1 is the sum of all of the political participation measures found in the data set used in the present study. POLITIC2 is the sum of the five highest impact political participation activities, such as voting or donating money. Several of the political activities examined in the present study are rather low impact, such as

visiting political websites or displaying a campaign badge. *POLITIC2* was constructed in order to determine if high impact activities have different determinants than low impact activities. Finally, *X* is a vector of socioeconomic and demographic control variables, *COMMUTE* is the time spent commuting daily, and *POLITICAL INTEREST* denotes the person's level of interest in politics. Political participation (dependent) variables are listed in Table 1; explanatory variables are provided in Table 2.

In addition to the variables noted on Table 2, a variable that interacts *COMMUTE* with *INCOME* is used in order to test the theory that the effects of commuting vary by income. This was one of the primary results of Newman et al. (2013). In their study, they found that the political participation of low income persons is more affected by commuting than the political participation of high income persons. This result is tested in the present study.

Finally, it must be noted that, although the length of a commute may be used as a proxy for the stressfulness of a commute, not all commutes are equally stressful. Some longer commutes may be relatively stress free, while some shorter commutes may be extremely stressful, depending upon traffic flows, road conditions, and weather. Hence, although the length of a commute may be an indicator of daily stress, there are many other factors that may contribute to a person's stress that are not captured by this variable, and a commute in and of itself may not be necessarily stressful.

In prior studies, various estimating techniques were employed. Newman et al. (2013) used ordinary least squares (OLS), a maximum likelihood estimation technique, and mean and variance adjusted least squares; Lidstrom (2006) used a logistic regression; Schlozman et al. (1994) used OLS. In deciding which estimating technique to use, it is important to take into account the nature of the dependent variable. For the binary dependent variables, a probit regression is used. Although some prior studies used OLS with binary dependent variables, this methodology is not appropriate and may result in biased results, especially given that OLS requires that the dependent variable be continuous. For the index variables, an ordered probit analysis was used. This methodology assumes that the dependent variable is ordered in a fashion such that a "5", for example, is considered to be of higher value or better than a "1." Hence, given that the index variable measures the level of political participation of an individual, it is appropriate to use an ordered probit analysis.

The data used in the present study are obtained from the same data set that was used in Newman et al. (2013). The Citizenship, Involvement and Democracy Survey (CID) was conducted in 2005 by the Center for Democracy and Civil Society at Georgetown University. Door-to-door canvassing resulted in 1,001 completed interviews. All canvassing was done in the contiguous United States. The response rate was over 40 percent. After deleting cases with missing data, the total number of observations in the sample used in the present study was 317. Although this is a relatively small sample size, there are no other recent surveys that contain data on both commuting and political participation. The only other publicly-available data set that contains data on both commuting and political participation is the General Social Survey (GSS) of 1986. Although the GSS is a much larger data set, it is over twenty years old; hence, the applicability of results obtained from an analysis using the GSS may be limited.

Descriptive statistics for all variables used in the present study are presented on Tables 1 and 2.

Table 1			
Descriptive Statistics of Political Participation (Dependent) Variables			
Variable	Mean	Minimum	Maximum
Voted in 2004 General Election*	0.79	0	1
Contacted politician*	0.252	0	1
Worked for political party*	0.082	0	1
Worked for campaign of candidate*	0.0789	0	1
Displayed campaign badge	0.284	0	1
Signed petition	0.464	0	1
Boycotted products	0.265	0	1
Donated money to political organizations*	0.239	0	1
Visited political websites	0.28	0	1
Forwarded political electronic messages	0.243	0	1
POLITIC1	2.98	0	10
POLITIC2	1.44	0	5

Note: All variables, except the voting variable, are in reference to activities performed within the past year. All single activity variables are included in POLITIC1. Only variables marked with asterisks are included in POLITIC2.

Table 2			
Descriptive Statistics of Explanatory Variables			
Variable	Mean	Minimum	Maximum
Health of respondent (1 if very good or good)	0.79	0	1
Hours worked	42.3	3	90
Age	40.4	18	75
College educated	0.353	0	1
African-American	0.135	0	1
Hispanic	0.088	0	1
Male	0.467	0	1
High Income (1 if income greater than \$100,000)	0.126	0	1
Married	0.533	0	1
Veteran	0.126	0	1
Homeowner	0.675	0	10
Urban residence	0.227	0	5
Commute (minutes)	25.87	0	105
Born-Again Christian	0.356	0	1
Republican	0.324	0	1
Democrat	0.394	0	1
Political interest (1 if very interested or somewhat interested)	0.744	0	1

A few of the more noteworthy statistics are that 79.5 percent of persons in the sample voted in the 2004 general election, the average commute was 25.9 minutes long, and the average number of hours worked per week was 42.3. It is important to note that the percentage of persons voting in this sample is much greater than the percentage of persons voting in the general population. In 2004, approximately 60 percent of eligible persons voted. Hence, it can be assumed that persons included in this sample are more politically active than persons in the general population.

RESULTS

As noted earlier, equation (1) was estimated using a probit regression when the dependent variable was binary and an ordered probit regression when the political participation indices were estimated. Most other studies did not use these estimating techniques. In addition, many other studies used non-continuous variables as explanatory variables but did not recode them into binary dummy variables. The use of discrete categorical variables for factors such as race or political interest is not appropriate. In the present study, discrete variables are recoded into binary dummy variables. Three variables were recoded from multiple discrete variables to binary variables. These include income (recoded 11 categories into 2 categories); political interest (recoded 4 categories into 2 categories); and health of respondent (recoded 5 categories into 2 categories). These re-categorizations were done due to the low number of observations for several of the original categories and in order to reduce the number of explanatory variables required for the regressions.

Ten different individual political activities and two political activity index variables (POLITIC1 and POLITIC2) are examined. As noted previously, POLITIC1 is the sum of all ten political activity dummy variables; POLITIC2 is the sum of only five of those variables. POLITIC2 includes those political participation activities that are considered to be high impact. Finally all regressions were estimated with and without the interaction term INCOME*COMMUTE. This interaction term was used in order to test the robustness of the varying effects of income and commuting on political activity. Given that the results obtained from the regressions that both included and did not include the interaction term were very similar, only the results that include the interaction term are presented in the present study. Results for the regressions without the interaction term are available upon request.

Results are presented in Tables 3 through 6. As can be seen from these results, commuting in and of itself does not have a significant effect on most types of political activity. The only variables for which commuting is significant are "signed a petition" and "forwarded an electronic message with political content." For the more important political activities, such as voting or donating money, commuting is not statistically significant. Regarding the varying effects of income and commuting on political activity, the interaction term INCOME*COMMUTE does not have a statistically-significant effect on most types of political activity. The only political participation variable for which this interaction term is significant is voting, and, in that case, it has a negative effect. Hence higher income persons with longer commutes are less likely to vote than lower income persons with longer commutes. These results refute the

findings of Newman et al. (2013) who found that low income persons with long commutes were less likely to vote than others.

The finding of the present study thus suggest that higher income persons who have long commutes are less likely to vote. This may be due to time constraints or to apathy. Interestingly, income has a positive and significant effect on two political activities: contacted a politician and worked for a campaign. Hence, higher income individuals apparently have the time to engage in certain time-consuming activities, but, if they have a long commute, they are less likely to vote.

Table 3			
Probit Regression Results			
Variable	Dependent Variables		
	Voted	Contacted Politician	Worked for Political Party
Constant	-0.0759	-2.15***	-2.135***
Health	0.453*	-0.0764	-0.1036
Hours worked	-0.0113	0.0105	0.00055
Age	-0.00009	-0.0013**	-0.00069
College educated	0.648***	0.222	0.642***
African-American	0.372	-0.327	0.417
Hispanic	-0.863***	-0.501	0.447
Male	0.114	-0.063	0.146
High Income	0.391	0.856**	0.723
Married	-0.0042	-0.178	-0.595**
Veteran	-0.262	0.199	0.15
Homeowner	0.365*	0.523**	0.00578
Urban residence	-0.061	0.138	-1.067**
Commute	0.0068	-0.0052	-0.0004
Born-Again Christian	-0.0106	0.392**	0.253
Republican	0.584**	-0.536**	-0.35
Democrat	0.135	0.00574	-0.136
Political interest	0.389**	1.044***	0.847**
Commute*High Income	-0.0214*	-0.0044	-0.0014
Chi squared	50.302	61.96	32.31
McFadden Pseudo R ²	0.156	0.172	0.179
Note: Test statistics available upon request.			
10% level of significance = *; 5% level of significance = **; 1% level of significance = ***			

Table 4			
Probit Regression Results			
	Dependent Variables		
Variable	Worked for Campaign	Displayed Badge	Signed Petition
Constant	-3.065***	-2.18***	-0.071
Health	-0.233	0.445	-0.248
Hours worked	0.0115	0.0071	0.00232
Age	0.00229	0.00063	-0.00136**
College educated	0.412*	0.142	0.292*
African-American	0.212	-0.011	-0.73***
Hispanic	0.401	0.144	-0.349
Male	0.176	-0.166	-0.0689
High Income	0.816*	0.546	-0.234
Married	-0.582**	-0.109	-0.127
Veteran	-0.373	-0.344	0.366
Homeowner	0.152	0.403**	0.0165
Urban residence	-0.039	0.477**	0.438**
Commute	0.00407	-0.00678	-0.0078*
Born-Again Christian	0.235	0.169	-0.184
Republican	-0.233	-0.142	-0.496**
Democrat	-0.323	-0.0311	-0.27
Political interest	1.168**	0.869***	0.808**
Commute*High Income	0.00014	0.00035	0.014
Chi squared	31.646	46.18	54.94
McFadden Pseudo R ²	0.18	0.122	.125
Note: Test statistics available upon request.			
10% level of significance = *; 5% level of significance = **; 1% level of significance = ***			

Table 5			
Probit Regression Results			
	Dependent Variables		
Variable	Boycotted Products	Donated Money	Visited Political Websites
Constant	-1.22***	-0.943***	-2.06***
Health	-0.029	-0.309	0.246
Hours worked	-0.0042	-0.0032	0.0108*
Age	-0.00045	-0.0002	0.0002
College educated	0.517***	0.323*	0.337**
African-American	-0.945***	-0.182	-0.454*
Hispanic	-0.76**	-0.174	-0.148
Male	0.399**	0.0056	0.137
High Income	-0.0836	0.552	0.25
Married	-0.292	-0.197	0.048
Veteran	0.272	0.329	-0.39
Homeowner	0.418**	0.219	0.079
Urban residence	0.573***	0.44**	0.132
Commute	-0.00226	-0.00245	-0.0032
Born-Again Christian	-0.169	-0.034	0.118
Republican	-0.41*	-0.21	-0.361*
Democrat	-0.0906	-0.077	0.037
Political interest	0.766***	0.611***	0.892***
Commute*High Income	-0.0254	-0.0078	0.00006
Chi squared	61.529	27.849	42.175
McFadden Pseudo R ²	0.167	0.0797	0.112
Note: Test statistics available upon request.			
10% level of significance = *; 5% level of significance = **; 1% level of significance = ***			

Table 6			
Regression Results			
Variable	Dependent Variables		
	Forwarded Political Emails	POLITIC1	POLITIC2
Constant	-1.91***	0.678**	0.277
Health	0.298	0.043	0.0285
Hours worked	0.0072	0.00213	-0.0016
Age	0.00043	-0.00045	-0.00057
College educated	0.559***	0.463***	0.439***
African-American	-0.239	-0.31*	0.0504
Hispanic	0.294	-0.489**	-0.589**
Male	0.0285	0.0697	0.00534
High Income	0.377	0.523*	0.764***
Married	-0.427**	-0.233*	-0.19
Veteran	-0.626**	-0.012	0.114
Homeowner	0.282	0.282**	0.345**
Urban residence	0.131	0.277*	0.0404
Commute	-0.0116*	-0.0042	0.0009
Born-Again Christian	0.126	0.038	0.116
Republican	0.063	-0.177	-0.009
Democrat	-0.228	-0.0633	0.0744
Political interest	0.863***	0.852***	0.681***
Commute*High Income	0.00263	-0.00766	-0.011
Chi squared	54.59	76.97	63.47
McFadden Pseudo R ²	0.155	0.058	0.0718

Note: Test statistics available upon request. Forwarded Political Emails was estimated using a probit regression. POLITIC1 and POLITIC2 were estimated using an ordered probit analysis. 10% level of significance = *; 5% level of significance = **; 1% level of significance = ***

Regarding the significance of other explanatory variables, hours worked is not statistically significant. Hence, contrary to the resources theory of Brady et al. (1995), working long hours has no effect on engaging in politics. This result is similar to that found by Newman et al. (2013) and Schlozman et al. (1994). The most consistently significant variables in all of the regressions estimated are college educated, political interest, and homeownership. The education result validates the findings of Newman et al. (2013) and Schlozman et al. (1994), and the political interest result supports the findings of Lidstrom (2006). Homeowners are also more likely to be politically active. They are more likely to vote, contact a politician, display a campaign badge, and boycott products. This result is not unexpected given the investments that homeowners have made in their communities and the desire to ensure that their investments are not negatively affected by adverse government policies. Finally, born-again Christians

are more likely to contact a politician, while Republicans are less likely to contact a politician, sign a petition, boycott a product, or visit a political website, but they are more likely to vote.

CONCLUDING REMARKS

The purpose of the present study was to determine if long commutes had negative effects on participation in political activities. Using a model and data set similar to Newman et al. (2013), it was found that commuting in and of itself has no statistically-significant effect on political participation. Results of the present study, however, suggest that high income persons who have long commutes are less likely to vote. It was also found that college-educated persons who are homeowners and who are interested in politics are more likely to be engaged in politics. Newman et al. (2013), who also used a political involvement index variable, had contrary results, especially with regards to the effects of commuting on political involvement. Reasons for this difference may be due to use of different estimating methodologies and the use of discrete categorical variables in the Newman et al. (2013) study.

The results of the present study refute both the resources theory and the commuter strain hypothesis. Neither demands on resources nor long commutes have statistically-significant effects on political participation. In fact, the factors that affect political participation the most are education, homeownership, and interest. Therefore, if society wants an engaged electorate, more resources should be allocated to education and homeownership. The more education a person has and the more invested in the community a person is, the more likely that they will participate in the political process. Clearly, the commuting lifestyle of Americans has no significant effect on civic engagement. Although these results are noteworthy, future research should focus on the construction of a more recent data set regarding commuting and political participation. Data on commuting and political participation are rather rare, and more data on this topic is required in order to determine if changes in commuting behaviors and advances in communication technology have had any significant effects on civic engagement.

REFERENCES

- Brady, Henry, Sidney Verba, and Kay Lehman Schlozman. 1995. "Beyond SES: A Resource Model of Political Participation," *The American Political Science Review*, 89 (2): 271-294.
- Lidstrom, Anders. 2006. "Commuting and Citizen Participation in Swedish City-Regions," *Political Studies*, 54 (4): 865-888.
- Newman, Benjamin, Joshua Johnson, and Patrick Lown. 2013. "The 'Daily Grind': Work, Commuting, and Their Impact on Political Participation," *American Politics Research*, 1-30.
- Schlozman, Kay Lehman, Nancy Burns, and Sidney Verba. 1994. "Gender and the Pathways to Participation: The Role of Resources," *The Journal of Politics* 56 (4): 963-990.

Brownfields Assessments, Cleanups, and Development: How Do We Measure Success?

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ABSTRACT

This paper discusses the current literature on the evaluation of brownfield redevelopment programs and compares that literature to the data that are currently available to the public through the EPA databases, ACRES and CIMC. We examine data from the City of Rochester, New York, which has had a long history of participation in the Brownfield Assistance Program (BAP) and has a history of collecting and maintaining data as required by the EPA. We compare the data that the city and EPA are required to collect to the data that the current literature suggests are necessary for a detailed assessment. This comparison reveals the difficulty in determining the success of the program. The purpose of this paper is to provide a better understanding of the data collection required by the EPA and to identify potential gaps in that data in determining the relative success of the BAP. We find that the current data requirements are insufficient if one of the goals is to assess the potential benefits of the BAP for a large number of sites.

INTRODUCTION

The purpose of this paper is to identify and examine the impact of the Brownfields Assistance Program (BAP) on a specific community, Rochester, New York. According to the EPA, Rochester has approximately 3,875¹ commercial and industrial properties that may have potential environmental issues. Some of these properties fall into the category of brownfields, which are real properties for which expansion, redevelopment, or reuse may be complicated by the potential or actual presence of hazardous substances, pollutants, or contaminants. Under the Brownfields Law (USEPA, 2002), the EPA provides financial assistance to eligible applicants through four competitive grant programs: assessment grants, revolving loan fund grants, cleanup grants, and job training grants.² The City of Rochester provides an interesting study, as the city has been at the forefront of the various brownfields programs initiated by the EPA. Rochester first received Brownfields Revolving Funds in 1995 to identify, assess, and cleanup sites throughout the city, including 15.5 acres in the City's Erie Canal Industrial Park. The City of Rochester has obtained Brownfields grants from the EPA in eight different fiscal years since 1995, and during six different fiscal years between 2003 and 2011 after the "Small Business Liability Relief and Brownfields Revitalization Act," was signed into law. The proactive policy taken by the City of Rochester in addressing brownfields makes the city an outstanding example of how EPA grant

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funding can be leveraged with local and state funds to assess, cleanup, and redevelop properties within the city.

The purpose of this paper is to provide a better understanding of the data collection required by the EPA and to identify potential gaps in that data in determining the relative success of the BAP. This paper is not intended to be a direct evaluation of BAP, nor is it a direct evaluation of the City of Rochester Brownfields Program. Given that the city of Rochester has applied for, and received, numerous grants through the EPA for Brownfields programs, and given the thorough data collection and maintenance by the Rochester Division of Environmental Quality this particular city gives us an opportunity to study the various outcomes associated with the BAP. This paper will first outline and discuss the current literature on brownfield development and suggested measures of success. Second, we will describe the data collected by the EPA through the Assessment, Cleanup and Redevelopment Exchange System (ACRES) and the Clean Up In My Community (CIMC) databases. Third, we will describe the data on property values that are available from the City of Rochester. Finally, we will provide suggestions for future data collection and concluding remarks.

LITERATURE REVIEW

There are several aspects of brownfields that make their existence difficult for policymakers and developers to address. There is no “typical” brownfield location. In the City of Rochester there are sites that include former dry cleaners, former auto repair facilities, former gas stations, former machine shops, and at least one oil refinery dating back to 1887.³ Examining the properties within the City of Rochester helps us to better understand the challenges of addressing these properties not just in Rochester, but in a larger context as well. There are several issues to consider when attempting to manage brownfields: potential liability for new owners/developers, loss of property tax revenue to the governing jurisdiction, the loss of aesthetic value, and potential increases in criminal activities. Given the various challenges and goals of redevelopment the analysis is often necessarily piece-meal rather comprehensive. The objectives of any specific assessment and subsequent clean-up and therefore the measures of success will vary; both the *ex ante* and *ex post* indicators of success will vary by site.

Tam and Byer (2002) design a framework for developing brownfield sites (i.e. contaminated sites) under uncertainty. According to the authors, their approach maximizes the current owners’ net benefits. We will discuss below why the maximization of private benefits will likely lead to an underprovision of public goods, as the private owner is unable to capture some external benefits to the community at large. The level of remediation of a particular site is often determined by the intended use of that site (Janz et al. (1991)). Tam and Byer (2002) provide a seven step methodology for determining the level of remediation and the potential site uses:

- (1) Examine alternative levels of cleanup; investigate the types and sources of possible contamination;
- (2) Identify and analyze remedial actions; determine the contaminant concentrations, the resulting concentrations from alternative remedial actions, and the costs of different actions;
- (3) Characterize the owner’s site use benefits; estimate the financial gain from alternative site uses, e.g. residential or commercial;

- (4) Characterize the owner's liability; estimate both the short term and long term health effects on the site and potentially affected properties;
- (5) Determine the net benefits to the owner; at this point each combination of site use (Gain), remedial action (Cost), and owner liability (Potential cost) are calculated to determine the net benefits;
- (6) Conduct an extreme case analysis for uncertainty; experts provide estimates of the 'best-case' and 'worst case' scenarios to develop a range of potential net benefits;
- (7) Conduct a probabilistic analysis; this step is described as optional and the probability distributions used will depend on past experience or expert opinion.

The seven step process described above has been modified and employed by Schadler et al. (2011) to develop an integrated assessment model, to examine the potential options/outcomes for a remediated property. According to the authors, there are input elements required to implement the model, and these elements are divided between spatial data and non-spatial data. The site-specific spatial inputs are: location and size of site, digital elevation model, depth and thickness of contamination in soil and groundwater, aquifer top and bottom, hydraulic conductivity, distribution of contaminants, and general conditions of the site (social, economic, ecological). The site-specific non-spatial inputs are: contaminant properties, unit cost data for remediation, and general conditions of the site (social, economic, ecological). The option-specific spatial inputs are planned allocation land use options. The option-specific non-spatial inputs are: reference values for the price of clean land, compliance criteria for contaminant concentration, buildings to be deconstructed, and information on site features, attributes and attractions (Schadler et al., 2011). Although this systematic approach is beneficial when analyzing a particular site, the input requirements described above would make it difficult to assess the outcomes from a variety of sites with different underlying, site-specific characteristics. This form of analysis would clearly inform the decision process *prior* to remediation or redevelopment, however when looking back to evaluate the outcomes from a number of sites, for example the fifty sites in Rochester, this decision system may not be applicable, but it does help us to understand the various dimensions that should be considered when determining the "success" of remediation/redevelopment.

Lange and McNeil (2004a) argue that the literature is not clear on how to define a successful brownfield development. To address this gap in the literature, Lange and McNeil designed and conducted a survey of 158 stakeholders covering all ten EPA regions, including property owners, regulators city/county planners and developers to gain a better understanding of how these groups view a successful development. Based on their survey, there are several interesting results to consider when evaluating the success of brownfield redevelopment and not all of them are under the control of policymakers or developers. Some of the important items that are potentially under the control of policymakers and developers include: time to occupancy, time for remediation, number of jobs created, number of jobs per acre, acreage for development, and acreage for green areas. Some of the items that developers and policymakers considered to be important for determining the success of redevelopment that are not under their control include: distance to airport, distance to city center, distance to interstate, water frontage, and distance to rail siding (Lange and McNeil, 2004a). For a specific brownfield site, the differences between those attributes for which developers and policymakers have significant control and those which are out of their control are very important. If the targets for brownfield redevelopment are chosen based on factors such as location or access to infrastructure, policymakers and

developers may get greater returns, but this may mean that those sites with less commercial value remain undeveloped and that may lead to questions of equity and environmental justice.

Lange and McNeil (2004b) employ a logit model to analyze the characteristics of “successful” and “not-so-successful” brownfield developments. Although some useful results come from this analysis, one potential drawback is that the analysis only includes developed sites and does not analyze undeveloped sites. Lange and McNeil (2004b) draw four broad conclusions on how to increase the probability of a successful redevelopment, based on the analysis of 75 brownfield sites. First, banks and lenders must be better educated about the community benefits as well as the liabilities to the banks, owners, and developers. Second, to gain community support developers should include greenspace in the development plan. Third, policymakers should invest in infrastructure improvements in the vicinity of the brownfields to attract developers. Fourth, policymakers and developers should promote developments that assure job creation (Lange and McNeil, 2004b). The conclusions of Lange and McNeil (2004b) provide general guidance on how to evaluate successful developments. However given the public good aspects of potential redevelopments, where developers cannot realize all of the economic benefits that are created, it is clear that development will be underprovided without public involvement and investment.

Beyond the potential economic benefits of brownfield redevelopment several researchers including Garvin and Berens, (1997), Harnik, (2000), De Sousa, (2003), and Doick et al. (2009) have studied the community benefits of greenspaces in urban areas. De Sousa (2003) and Doick et al. (2009) specifically study the challenges of turning brownfields into greenspaces. According to De Sousa (2003), the potential benefits of transforming brownfields to greenspaces include: soil improvement, habitat creation, recreational opportunity enhancement, and economic revitalization of neighborhoods. Greenspaces and parks are clearly public goods which will require significant investments from governments to obtain the efficient level. De Sousa argues that greening projects should be encouraged to revitalize blighted neighborhoods. If however, policymakers and developers are focused on profit maximization these are precisely the projects that are least likely to be undertaken. According to De Sousa, “Greening projects present greater challenges than other forms of redevelopment in justifying end-use and project funding, but are more easily accepted by affected communities” (p. 196). The above line of research demonstrates an understanding of the competing needs and goals of brownfield development and shows that not all of the common or traditional measures of “success,” e.g. job creation and tax revenues, will be appropriate in all cases. Doick et al. (2009) conclude “...there is a gap between measuring outputs as indicators of success and achieving the ‘outcome’ project aims and objectives envisaged” (p. 175).

Nijkamp et al. (2002) and Beinart and Nijkamp (1998) discuss the important role of government in soil remediation. The authors outline several issues that may require government intervention, for example: soil pollution is a risk for humans and ecosystems and soil contamination is a risk for pipelines/networks. For publicly owned land a polluted area is a planning constraint, for privately owned sites a polluted area is a heavy economic burden in terms of asset values and remediation expenditures. Remediation expenditures usually do not offer an increase in productivity but offer at best the possibility of removing a source of risk and a planning constraint. As noted above, the externalities associated with polluted areas may represent a need for government intervention. Given the potential positive benefits associated with soil remediation and

development, contaminant-free land may be thought of as a public good. Consider the well-known Samuelson Rule (1954) for the provision of public goods. The Samuelson Rule demonstrates that the *sum* of the marginal rates of substitution between a public good and private good across all households is equal to the marginal rate of transformation at the efficient level of production. The two typical issues associated with public good provision are free-riding and underprovision. In the case of remediated brownfields the problem is evident. If developers face uncertainty or if they cannot capture the full benefits, both economic and social, of their investments, we are likely to see less development of brownfields. This is particularly a concern when brownfields are being converted to greenspaces or parks, where the benefits are difficult to measure and therefore, the investment is less likely to be undertaken. Given the public good aspect of remediated brownfields, government intervention may be required to ensure that we are maximizing social benefits.

Wedding and Crawford-Brown (2007) develop a systematic method for measuring the indicators of successful brownfield redevelopment within four broad categories: (1) environment and health indicators, (2) financial indicators, (3) social and economic indicators, and (4) livability indicators.

Within the four categories Wedding and Crawford-Brown provide ten indicators, which are weighted based on surveys of experts and developers. Although the goals and indicators considered by the authors are both highly useful and important, there are several potential difficulties in a practical application as much of the data is not available whether through the EPA's ACRES system, CIMC, or readily available government data. Many of the indicators are site specific and include proprietary information, such as water use, internal rate of return, and the number of occupants with outside views. Although the framework provided by Wedding and Crawford-Brown (2007) may help to inform the evaluation of specific sites; it is difficult given the current data collection by the EPA and local governments to use that framework for a retrospective study of a large number of sites, for example, the approximately fifty sites in the City of Rochester.

Another technique for evaluating the success of brownfield redevelopment is through hedonic regression to estimate the impact of brownfields on residential housing prices. This vein of research has a long history in environmental economics and has been used to provide estimates for the willingness to pay for pollution or exposure to pollution reduction. Recent research by Mihaescu and vom Hofe (2012) finds that proximity to brownfield sites reduces the value of homes by approximately twenty percent. Linn (2013) and Gamper-Rabindran and Timmins (2013) follow a similar hedonic regression approach. However in their studies the researchers estimate the change in residential property values as the result of a brownfield site undergoing remediation or clean-up. Both of these studies find that following remediation or clean-up results in a statistically significant increase in the value of residential housing. This avenue of research provides a potentially useful metric for determining the success of brownfield redevelopment. However, the change in residential property values will be only one piece of a larger puzzle. One issue with studies of this type is that they likely represent only a partial estimate of the benefits of brownfield remediation in that they do not account for non-residents' use of the redeveloped property. For example, if a brownfield is converted to a greenspace and draws members from the broader community, those benefits would not appear in the changes of property values. There is also the issue that brownfield sites may differ significantly in both contaminants and concentrations so simply estimating the impact of proximity to a given brownfield site, without allowing for site specific information, may either underestimate or overestimate the willingness to pay depending on both actual

risk and perceived risk. Greater detail regarding the specific characteristics of the brownfield sites in question would help improve the estimates derived from hedonic regression studies.

Finally, there have been studies (Berman and Forrester (2013), Currie et al. (2011), and Litt et al. (2002)) that specifically examine the health impacts of Superfund sites or brownfield sites. These studies can be used to estimate the value of averting costs, or the willingness to pay to avoid potential adverse health impacts associated with brownfields. Litt et al. (2002) find statistically significant evidence that living in closer proximity to highly polluted brownfield sites is correlated with higher rates of mortality. This paper used an innovative approach to develop a brownfield scoring system to identify the sites with the highest levels of the most hazardous pollutants. Currie et al. (2011) find that cleanup at a Superfund site reduces congenital anomalies by twenty to twenty-five percent. The authors point out that a limitation of their study is that it does not account for prior or comingling exposure to toxins which makes drawing general conclusions difficult. Their research identifies an important issue to consider when attempting to measure or judge the success of brownfield remediation and redevelopment. Berman and Forrester (2013) describe a framework for measuring success of a brownfield redevelopment with significant interest in health outcomes. The Agency for Toxic Substances and Disease Registry's (ATSDR's) Brownfields/ Land Reuse Health Initiative has created the ATSDR Brownfields/Land Revitalization Action Model that uses community input to identify issues and outcomes. One question that came from the stakeholders in the community was, "What are the community health benefits?" The authors then outline the data that are needed to measure change, including asthma hospitalizations, lead exposure, and infant mortality. This framework is useful because both the questions and the measurables were generated by community members and other stakeholders.

ACRES AND CIMC DATA

The Assessment, Cleanup and Redevelopment Exchange System (ACRES)⁴ is the EPA database in which all grantees are required to update and provide information to the EPA on the progress of their properties. Each property receiving EPA funding has a profile and the information entered into the system tells the story of how that property progresses through redevelopment (USEPA, 2006). The system tracks redevelopment information and provides performance summaries based on individual cooperative agreements as well as summaries based on entities receiving EPA Brownfields funding. ACRES is owned by the EPA and is used to calculate performance measures. It contains some additional relevant information about the National Brownfields Program and provides this information through a public facing replica, Cleanups in My Community (CIMC).⁵

REQUIRED REPORTING

Through the EPA competitive funding programs recipients accept a set of terms and conditions along with the funding including the requirement to provide information on the property over the course of the grant performance period. One of the conditions is to report property progress information via a Property Profile Form⁶ (PPF), an OMB approved reporting form. ACRES is simply an electronic version of the PPF that simplifies the data entry and allows the information to be stored electronically. It is worth noting that each grantee is responsible for inputting data into the ACRES database which is then approved by each Project

Officer managing the grant. In the early days of the EPA Brownfields program data were inputted centrally, but over time the responsibility shifted back to grantees to input information and for project officers to verify it. Verification of data is a job function of each project officer in the regional offices managing the grants. Given that the project officers are the closest federal employees to the process, the EPA counts on their knowledge and expertise to ensure that the data submitted by the grantee are precise and accurate. As of 2012, there was no requirement to forecast the number of performance accomplishments associated with any particular grant application, but that could be a way for EPA to better assess the expected success of a particular grant, ex ante; and follow up after completion of the award in order to compare expected outcomes with actual accomplishments. .

The ability to comply with this condition is a necessary condition for receiving additional funding in future brownfields grant competitions, so the incentives to comply, while not ironclad, are very strong. However, in a legal sense, the relationship between the EPA and the cooperative agreement recipient ends when the funding is exhausted and the award is closed out. One of the difficulties in tracking the progress of properties through the redevelopment process is the fact that the recipients are no longer legally required to continue to report past the period of performance of the award. The EPA/Recipient relationship is often far shorter than is required to see a property progress through all stages of redevelopment, and creates a problem with lost observations toward the end of the process. The typical periods of performance for brownfields grant awards are two years for Assessment and Cleanup awards, and five years for a Revolving Loan Fund (RLF) capitalization awards. Many grants are extended based on significant progress milestones and other criteria, but not generally on the basis of reporting accomplishment data. These funds are generally considered to be the “but for” funding for these municipally funded projects with the ultimate goal being a safe reuse of the property with a secondary benefit being the economic boost associated with redevelopment. Assessment, construction and reuse planning will take up the majority of the grant period of performance, while full redevelopment of the property and/or final reuse may take much longer. This time lag increases the possibility that final reuse information will go unreported either due to turnover in critical positions at the EPA, within city positions or as a forgotten detail in the process.

DATA CONTAINED IN THE PPF

The PPF requires some basic information about each property that is addressed using brownfields funding: property name, address, ownership, locational coordinates and assigns the property an ACRES ID so that the property can be tracked through the redevelopment process. Additional fields require information that is specific to the type of funding that is used. Assessment funding requires that the type of activity that was funded is within the eligible uses specified in the statute, i.e. Phase I or Phase II Assessment or Cleanup Planning. Cleanup and RLF funding are treated similarly, however, ACRES requests that the assessment information also be added to the record in order to tell a better story about the progress of the property. These data rich sections include information on the types of contaminants identified, cleaned up, or left in place with restrictions put on the end use of the property. In addition to the environmental data that are reported, the EPA requests information about the property history, past uses and potential future uses, funding (other funding sources and amounts) and employment data (construction jobs and future jobs once redevelopment is complete).

OUTCOME BASED DATA

The EPA reports broadly on the number and type of assessments completed; number of acres and properties cleaned up; jobs and dollars leveraged; and total acres made ready for reuse by grant. Each measure is reported on a website and is available to the public under the Government Performance and Results Act.⁷ Unfortunately, these measures are not particularly indicative of the overall success of a redevelopment project and are less useful in the aggregate than when reported on specific projects.

KNOWN DATA ISSUES

1. **Required Reporting Expires** – Because the legal relationship between the cooperative agreement recipient and EPA ends when the period of performance is complete and the award is administratively closed, it's very difficult to gather data on the end of redevelopment projects. This is generally the most valuable data for judging the overall success of a project (leveraged jobs and dollars) and is particularly biased against projects that have received assessment funding because the assessment process takes place earlier in the redevelopment continuum.
2. **Types of Data Collected** – Some of the pieces of information that are collected are very straightforward and lead to high quality input by recipients (i.e. “assessment completed” or “jobs leveraged”), other fields are not as straightforward or require much longer timelines to develop and become reality (i.e. “planned use” or “acres redeveloped”) or require other changes to the property like parceling or multiple story redevelopments. This is of particular concern when it comes to pollutant specific information, either the presence of specific contamination or the fact that concentrations are not part of the PPF. As such, this limits the possible quantification and analysis related to exposure pathways and/or general public health questions.
3. **Required Fields and Hard Coding of the ACRES Database** – In its earliest form, ACRES was a paper process where grant reports were submitted and then converted into electronic records. The first iterations of data to be collected were low-quality due to the lack of data controls, paper submission and then the data entry required to get the data into an electronic form. As ACRES was developed by the EPA and built into a user-friendly data entry portal the quality of data improved significantly. The most recent major upgrades were made in 2011 and 2012 and include many more checks on data within the entry fields. These enhancements include quality checks within the database, hardcoding required fields to have valid data entered in the fields and allowing for records to be flagged for additional review before final processing and virtual entry into the database.
4. **Data Cleanup** – Major efforts were made in 2012 to improve the quality of data within the system in order to address known issues and improve the level of confidence in the data. An example is the use of address information to cross-reference the locational coordinates in order to verify or replace the locational data retained in the property record. While many improvements in data quality were achieved, not all legacy data issues were resolved.

THE CITY OF ROCHESTER, NY DATA

With an understanding of the various dimensions and metrics that have been proposed in the literature to measure the success of brownfields conversion we turn to the publicly available data through the EPA and the Rochester Division of Environmental Quality. The data collected through the EPA's ACRES and CIMC programs help to paint a picture of the funding and outcomes of the various brownfields projects. Table 1 presents data on the brownfield grants received by the City of Rochester from 1995-2011. The total funding received over the period was \$3.73 million. There are several forms of funding available from the EPA: assessment pilots/grants, cleanup grants, revolving loans, and job training grants. Assessment pilots/grants provide funding for a grant recipient to inventory, characterize, assess, and conduct planning and community involvement related to brownfields sites. The purpose of the grant is to assess a site contaminated by hazardous substances, pollutants, or contaminants (USEPA, Grants & Funding, 2013). Cleanup grants provide funding for a grant recipient to carry out cleanup activities at brownfield sites. These funds may be used to address sites contaminated by petroleum and hazardous substances, pollutants, or contaminants. Cleanup grants require a 20 percent cost share, which may be in the form of a contribution of money, labor, material, or services, and must be for eligible and allowable costs (USEPA, Grants & Funding, 2013). Revolving Loan Fund grants provide funding for a grant recipient to capitalize a revolving loan fund and to provide sub-grants to carry out cleanup activities at brownfield sites (USEPA, Grants & Funding, 2013). The application process for each of the funding options is competitive and grantees are selected by the EPA.

Table 1: City of Rochester, NY, EPA Funding, 1995 - 2011

Grant ID	Grant Type	Announce Year (FY)	Hazardous Funding	Petroleum Funding	Job Training Funding	Pilot Funding
BP99242001	Assessment	1995				\$200,000
BL99275401	Revolving Loan Fund	1997				\$350,000
BF97298603	Cleanup	2003	\$200,000	\$200,000		
BF98298403	Assessment	2003	\$140,000	\$140,000		
BF97259406	Assessment	2006	\$200,000			
BF97257506	Cleanup	2006		\$200,000		
BF97249307	Assessment	2007	\$200,000			
BF97254807	Revolving Loan Fund	2007	\$350,000	\$150,000		
BF97249207	Cleanup	2007	\$200,000			
BF97257406	Cleanup	2009	\$200,000			
BF97228701	Cleanup	2009	\$200,000			
BF97219700	Cleanup	2010		\$200,000		
BF97207900	Cleanup	2011	\$200,000			
BF97207700	Assessment	2011		\$200,000		
BF97207800	Assessment	2011	\$200,000			
SUM			\$2,090,000	\$1,090,000	\$0	\$550,000

Source: EPA, ACRES, data collected, 2014

Based on the discussion in the literature review, the first step in redeveloping a brownfield site is to determine the potential types of contaminants and levels at a given site. This step is essential, because the uncertainty associated with potential contamination may represent a significant barrier to private development. The uncertainty associated with potential liability may also inhibit the transfer of property, whether from a government entity to the private sector, or between private parties. The transfer of property may be an important proxy to evaluate the outcome of an assessment, if a site does not require cleanup, the uncertainty of liability to developers has been removed, and there may be a market for the property. It is important to note that many of the brownfield sites in a city such as Rochester may be in less desirable locations/neighborhoods, so the lack of a property transfer may not be entirely related to potential liability, but rather to location and market conditions. As discussed by Lange and McNeil (2004a) successful brownfield development may depend on access to infrastructure, airport, and railroads which are characteristics independent of potential contaminants. For example, the potential contaminants from a gas station with fuel tanks in place in close proximity to an airport and a similar gas station further from the airport could both present the same environmental threats. The former would represent a potentially more valuable redevelopment property despite the similarities in pollutants and risks.

Using the data from the CIMC data, there are twenty-four properties for which the type of contaminant is reported. The information is summarized in Table 2. Eighteen of the twenty-four sites, or seventy-five percent, have some level of petroleum contamination. Petroleum pollution is often found in the soil of brownfield properties. Petroleum contamination can enter the environment through multiple avenues including storage tanks, refineries, and public buildings (USEPA, Basic Information On Petroleum Brownfields, 2013). In addition to potential soil pollution, petroleum can also contaminate groundwater, which may be used for drinking water. Six of the twenty-four sites, or twenty-five percent, have some level of asbestos contamination. Five of the twenty-four sites, or twenty-one percent, have some level of polychlorinated biphenyls (PCBs) contamination. PCBs had a long history of use in the United States as hydraulic fluids and fire retardants among other uses. Long-term exposure to PCBs, through for example drinking water, may lead to immune deficiencies, nervous system disorders, and potentially increased risk of cancer. Fifteen of the twenty-four sites, or sixty-three percent, have some level of volatile organic compound (VOC) contamination. Volatile organic compounds are chemicals such as gasoline, benzene, formaldehyde, perchloroethylene, and others. Volatile organic compounds may cause mild irritation, dizziness, and some are thought to cause cancer in humans (USEPA, Brownfields Profile Glossary, 2013). Six of the twenty-four sites, or twenty-five percent, have some level of lead contamination. Lead exposure may lead to nervous system disorders, particularly in children (USEPA, Learn About Lead, 2013). Eleven of the twenty-four sites, or forty-six percent, have some level of polyaromatic hydrocarbons (PAHs). PAHs are often associated with underground storage tanks for gasoline.

Table 2: Contaminants found on sites requiring cleanup or “unknown”, City of Rochester, NY, 1995 - 2011

Grant Number	ACRES Property ID	Property Address 1	Contaminant Found								
			Petroleum	Asbestos	PCBs	VOCs	Lead	Other Metals	PAHs	Other	
10000002	10113	72 Plymouth Ave									
10000012	60481	465 Chili Ave.	Y								
10000012	60501	2230-2240 Clifford Ave.									
10000012	70061	51 Chili Ave.									
54540363	13177	450-524 Oak Street	Y		Y	Y	Y	Y			BTEX
54540363	13178	1695-1715 Emerson St. (Parcel 3)									
54540363	13181	1040 Jay Street									
54540363	13183	1695-1715 Emerson Street									
54540363	15311	950 & 984 South Exchange Street	Y			Y				Y	
69597346	15173	80-100 Charlotte Street	Y	Y				Y			
69597346	15174	151-191 Mt. Hope Avenue	Y			Y			Y	Y	
69597462	15307	399 Gregory Street	Y		Y	Y	Y	Y			
69597462	15309	175 Hague Street	Y	Y		Y		Y			
69597462	15310	1001Chili Avenue						Y		Y	
69597462	15311	950 & 984 South Exchange Street	Y			Y				Y	
69597462	15312	39 Adelaide Street (385 Adirondack Street)									
69597462	15313	85 Stanton Street	Y	Y							
69597462	19701	110 Colfax Street	Y			Y		Y	Y	Y	Pesticides
69597462	59681	1005 Chili Ave						Y	Y	Y	Unknown
69597462	59701	1021 Chili Ave						Y	Y	Y	Other
69597462	59702	1025 Chili Ave						Y	Y	Y	TBD
69597462	59721	195 Hague Street									
69597462	59722	199 Hague Street									
69597462	98261	1011 Chili Avenue							Y	Y	
69598727	51801	186 Norman Street									
69598727	53601	957 South Clinton Avenue	Y			Y					
69598727	65121	140-142 and 144 Railroad Street									
69598727	65141	280-286 Lyell Avenue and 55 Dewey Avenue	Y					Y	Y	Y	
69598727	74641	1560 Emerson Street									
69598727	92702	900 & 930 Maple Street	Y		Y	Y			Y		
69598727	98121	935-951 East Main Street	Y	Y		Y					
69598727	105121	179-191 West Main Street									
69598727	105122	201-217 West Main Street									
69598727	108445	583 & 593 Hudson Avenue									
69598727	108447	1630 Dewey Avenue	Y	Y		Y					
69598727	108448	80 Excel Drive									
69598729	45561	935 W. Broad Street	Y			Y					
69599046	90622	15 Flint Street	Y	Y	Y	Y	Y	Y	Y	Y	
69599046	128201	24 Seneca Avenue				Y					
69599795	15307	399 Gregory Street	Y		Y	Y	Y	Y	Y		

Source: EPA, CIMC, data collected 2014

The variety and levels of contaminants and the comingling of contaminants, means that it is unlikely that there is a “typical” brownfield site. The strategies and costs for cleaning up contaminants will vary depending upon the type of pollutant and the concentrations and the media affected, e.g. air, soil, or water. As an example, sites contaminated with petroleum may have had different historical uses. According to the EPA (USEPA, 2011) the most common past uses are commercial, industrial, transportation, residential, and open land. There are five potential options for converting a petroleum brownfield property to an alternative use, commercial, public, residential, greenspace, or mixed-use (USEPA, 2009). The level of clean-up will, in-part, be determined by the final use of the property. For example, if the site is to be converted to new residential housing the remediation requirements are more stringent than if the property is converted to a parking lot, where it may be possible to contain the petroleum pollution in place.

The City of Rochester Assessment Bureau collects and maintains data regarding the assessed value, property taxes, zoning, and use of properties within the city.⁸ Using this database we are able to collect data for each of the potential Brownfield sites that have had an assessment, and/or required clean-up. The information is presented in Table 3. According to the data, there are eight sites that are currently owned by the City of Rochester, these sites include two vacant lots, one parking lot, government buildings, and a stadium. The stadium and its adjoining parking lots may be described as a successful Brownfield remediation program. The stadium site covers 450 – 524 Oak Street and according to the CIMC data the site contained multiple contaminants including, petroleum, PCBs, VOCs, lead, other metals, and BTEX. Stadium construction began in 2004, and it was opened to the public in 2006. The construction was financed through a combination of funds from New York State, The City of Rochester and the Rochester Rhinos professional soccer team and the current site is assessed at \$400,000. Although an economic evaluation regarding stadiums is outside the scope of this paper, the facility is one part of a revitalization program for the City. The site is currently exempt from property taxes, which is an opportunity cost, however, the alternative would have been to continue to have undeveloped or underdeveloped properties that would generate little property tax revenue. From a holistic point of view, the stadium represents a successful Brownfield remediation and redevelopment project, i.e. taking properties that contain contaminants, removing the contaminants, and converting the site to a higher value use. In addition to serving as the home to professional soccer, the stadium also hosts a variety of events including high school sports which brings community members to a section of the City which they were not visiting prior to the completion of the stadium.

Table 3: Assessed Values, Taxes Due, and Current Uses of Brownfield Sites (All Information as of May 2014)

Property Address	Property Size (acres)	Ownership Entity	Assessed Value (Thousands of Dollars)	Annual Taxes Due Without Exemptions (Dollars)	Exempt Amount	Unpaid Taxes (Principle and Interest)	Current Zoning/Use
80 -100 Charlotte	0.77	City of Rochester	70,000	2,983	70,000	-	Parking Lot
151-191 Mt Hope	3.95	City of Rochester	206,500	NA	206,500	-	Vacant Lot, Park,
1560 Emerson Street	1.69	Private	745,000	31,997	No Exemptions	17,921	Manufacturing
935 W. Broad Street	0.54	City of Rochester	35,000	NA	35,000	-	Parking Lot
465 Chili Ave.	0.63	Private	110,000	5,339	No Exemptions	14,314	Auto Body
2230-2240 Clifford Ave.	0.14	Private	105,000	4,889	No Exemptions	43,497	Multi-Occupant
51 Chili Ave.	0.12	City of Rochester	10,000	NA	10,000	-	Vacant Lot Residential
450-524 Oak Street	4.71	City of Rochester	400,000	NA	400,000	-	Stadium
1040 Jay Street	1.12	Private	128,700	6,316	No Exemptions	-	Distribution Facility
507 Hague Street	1.91	Private	340,500	15,105	No Exemptions	-	Distribution Facility
504-520 S. Clinton Avenue	0.76	Private	69,100	2,985	69,100	-	Parking Lot
390 South Avenue	1.38	Private	82,200	3,777	No Exemptions	-	Vacant Lot Commercial
120 Portland Avenue	0.66	Private	60,000	4,299	No Exemptions	3,579	Distribution Facility
399 Gregory Street	0.46	City of Rochester	16,000	NA	16,000	-	Parking Lot
175 Hague Street	1.17	Private	265,200	11,738	No Exemptions	51,669	Manufacturing
186 Norman Street	6.4	Private	425,100	20,108	No Exemptions	-	Manufacturing
110 Colfax Street	23.54	City of Rochester	1,250,000	NA	1,250,000	-	Government Buildings
1005 Chili Ave	3.73	Private	372,000	15,638	63,200	-	Distribution Facility
950 & 984 South Exchange Street	0.93	Private	269,900	12,342	No Exemptions	-	Distribution Facility
39 Adelaide Street (385 Adirondack Street)	0.62	Private	355,000	15,568	40,000	-	Manufacturing
85 Stanton Street	0.45	Private	105,000	Exempt	105,000	-	Religious

Table 3 Continued: Assessed Values, Taxes Due, and Current Uses of Brownfield Sites (All Information as of May 2014)

Property Address	Property Size (acres)	Ownership Entity	Assessed Value (Dollars)	Annual Taxes Due Without Exemptions (Dollars)	Exempt Amount	Unpaid Taxes (Principle and Interest)	Current Zoning/Use
195 Hague Street	0.08	Private	28,500	1,128	No Exemptions	-	Single Family Residence
199 Hague Street	0.08	Private	4,000	370	No Exemptions	-	Parking Lot
500 Lee Road	27.92	Private	5,078,400	221,126	No Exemptions	-	Manufacturing
140-142 and 144 Railroad Street	0.44	Private	238,600	10,904	No Exemptions	-	Distribution Facility and Auto Body
280-286 Lyell Avenue and 55 Dewey Avenue	1.47	Private	222,900	14,400	No Exemptions	-	Distribution Facility, Parking Lot
1560 Emerson Street	1.69	Private	745,000	31,997	No Exemptions	17,921	Manufacturing
900 & 930 Maple Street	4.28	NA	470,000	NA	NA	NA	NA
196 Smith Street	5.15	City of Rochester	277,000	NA	277,000	-	Vacant Lot Commercial
935-951 East Main Street	1.23	Private	327,000	15,318	No Exemptions	108,559	Parking Lot, Manufacturing
691 & 711 Exchange Street	3.36	Private	1,277,400	56,653	18,250	-	Manufacturing, Distribution Facility
179-191 West Main Street	0.68	Private	290,000	14,197	290,000	-	Parking Lot
201-217 West Main Street	0.16	Private	835,200	36,464	835,200	-	Office Building
640 Pullman Avenue	0.19	Private	45,000	2,328	No Exemptions	-	Manufacturing
583 & 593 Hudson Avenue	0.45	Private	262,900	11,619	86,065	-	Laundromat
1630 Dewey Avenue	1.06	Private	2,340,000	99,821	2,340,000	-	Health Facility
80 Excel Drive	1.33	Private	550,000	25,100	No Exemptions	-	Manufacturing
480-488 E Main Street	0.16	Private	489,000	16,975	No Exemptions	-	Detached Row Building
15 Flint Street	5.55	Private	40,000	2,959	No Exemptions	25,287	Distribution Facility
24 Seneca Avenue	2.77	Private	350,000	17,350	No Exemptions	1,367,353	Manufacturing
Sum	113.73		19,291,100	731,793	6,111,315	1,650,100	
Mean	2.84		482,278	23,606	359,489	183,344	
Median	1.09		267,550	14,197	86,065	25,287	
Standard Deviation	5.60		866,412	41,576	609,190	445,107	

Source: City of Rochester Assessment Bureau, data collected 2014

The remaining list of privately owned sites is a combination of typical uses found in a city the size of Rochester, NY: office space, manufacturing space, residential, and distribution facilities. The total area for the sites for which data exist is approximately 114 acres. The mean assessed value across all properties, public and private, is \$482,278 with a median of \$267,550 and a standard deviation of \$866,412. The large standard deviation reflects the fact that the collection of sites includes a small parking lot valued at \$4,000 for 0.08 acres, and a manufacturing site valued at \$5,078,400 which covers nearly 28 acres. Reviewing the list of properties that have been a part of the BAP, it becomes even more evident that there is no typical Brownfield site. The sites vary in size with a mean of 2.84 acres, median of 1.09 acres, and a standard deviation of 5.60 acres. The mean annual property taxes without exemptions are \$23,606 with a standard deviation of \$41,576. The total annual property taxes without exemptions for all of the sites are \$731,793. The BAP has been instrumental in providing funding, not just for clean-ups, but also for assessments. As stated previously an important element of the redevelopment of potential sites is the removal of uncertainty. Although the sites may have had an assessment that does not indicate that clean-up is necessary. The removal of uncertainty allows several options for property owners, they can continue with the current use, change use, or sell the property to another entity that may want to develop the site. When there is uncertainty, the transfer of property may be hindered as potential buyers seek to avoid the legal liabilities associated with contaminants and the potentially unknown financial liability associated with remediation.

SUGGESTIONS AND CONCLUSION

This paper demonstrates the current disconnect between the data that are publicly available to perform a large scale assessment of the success of multiple brownfield clean-ups and the data that are necessary as described by the current literature. Although there is some variation in the literature and different researchers have provided a number of criteria for assessing the success of any brownfield revitalization program a consensus seems to be forming around a variety of factors. For example, a combination of the steps involved in a revitalization/remediation program described by Tam and Byer (2002) and the criteria for assessing the success of a revitalization/remediation program outlined by Lange and McNeil (2004a) provide a reasonable and rational framework for judging both the *a priori* potential success and the *ex post* success of any given project. The City of Rochester, NY has been thorough in collecting and maintaining the data required by the EPA, however the data required by the EPA lack the detail necessary for a thorough assessment as prescribed by the current research. It is theoretically possible to analyze each site individually. However the level of information needed to perform such an analysis for over fifty sites makes such a process both costly and inefficient. A more efficient approach would be to have the grantees collect and maintain the type and level of data as outlined by the current literature.

As discussed above in the review of the current literature much of the focus of assessing the success of brownfield programs revolves around both the current use and the potential future use of remediated

sites to generate economic benefits. The focus on economic benefits adds to the potential difficulties in assessing the success of remediation efforts. As De Sousa (2003) argues there is the potential for significant positive externalities associated with converting brownfield sites to greenspaces, however if the focus on revitalization is only related to potential economic benefits this transition to greenspaces may be undervalued. Both the data required by the EPA and the literature must take into account the nonpecuniary benefits and the public good aspects of revitalization. The difficulties in measuring the values and benefits associated with potential positive externalities make their inclusion in the currently required data nearly impossible. However that does not mean that these benefits have zero value. The EPA data should reflect this value or unfortunately there could be many brownfield sites needing remediation that will be overlooked in favor of those where the potential economic benefits are more visible.

The original intent of this paper was to provide an assessment of the success of the brownfield redevelopment program in a mid-sized city with a long history of participation in the EPA's Brownfield Assistance Program. As we collected the publicly available data from ACRES and CIMC with supplementary data from the City of Rochester Brownfields Program, Division of Environmental Quality it became clear that an assessment encompassing over fifty brownfield sites would be impossible. This paper demonstrates that there is a disconnect between the data that must be collected as required by the EPA and the data that the current literature would consider necessary to perform a careful assessment of any remediation program.

There are several steps that can be taken by both the EPA and grantees to improve the quality of the data collected. The currently available data often lists the same property in ACRES and CIMC multiple times based on small differences in how the physical address was inputted. A second reason for the duplication of the properties is likely the result of some sites falling under multiple grants. For example, a site may be included in an assessment grant and included in a separate cleanup grant. In addition to improving the consistency of data collection on individual sites, one of the most important steps must be to improve the consistency of the data between different sites. There are often differences in the level of detail provided in the Property Profile Form for different sites. For example, there are some sites with detailed property descriptions and histories and some sites contain only general characteristics, missing basic information such as the ownership entity. For some sites that have been cleaned up, there are detailed data covering job creation and for others that information is unavailable. The job creation information whether during cleanup or redevelopment, or following redevelopment, is an essential piece of information from a public policy perspective as job creation is often cited by policymakers as an important reason for redevelopment. There are also sites for which cleanup is required following an assessment, however the contaminants field in CIMC is not indicated. Some of the reasons for the gaps in the data available through ACRES and CIMC are described above in the section on known data issues.

We would recommend that the data collection for all sites become more uniform and consistent. One method for achieving more consistent and useful data would be to have the grantee provide information

over a longer time frame than is currently mandated by the EPA. Data should be collected for at least five years after an assessment and five years after a cleanup even if the performance period of the grant has passed. This would provide researchers an opportunity to follow the arc of the property from identification as a potential brownfield site through assessment and through cleanup if necessary. An important time varying variable that would be useful to follow over the arc of the property would be the inclusion of the assessed value of the property and the property taxes due. We would recommend that this data be provided for the five years before the grant and for the five years after the performance of the grant. This would give a ten year period where we could determine the impact of the assessment and remediation on not only the surrounding properties as in a hedonic regression, but also the property itself. A related piece of data that would be useful that unfortunately often comes after the performance period of the grant would be the transfer of property. If we require data to be updated for five years following the grant we would have the opportunity to examine if assessment and remediation has increased the transfer of brownfield or potential brownfield sites, which is a basic measure of success, as uncertainty has been removed. Based on the current literature (Lange and McNeil 2004a) we would also recommend that the EPA and grantees provide additional data to ACRES and CIMC on site specific characteristics. This data should include basic site information such as: distance to airport, distance to city center, distance to interstate, water frontage, and distance to rail siding.

More detailed, uniform, and consistent data will allow for a more detailed evaluation of the brownfield redevelopment program and individual sites. Given the variety of dimensions and metrics found in the literature regarding the success of remediation and redevelopment we would recommend the creation of a brownfield success scoring algorithm. Although estimating regression equations is a common practice and a useful tool in environmental economics, it may be more useful to develop an alternative measurement methodology. With the competing measures of success, including environmental, health, financial, socioeconomic, and environmental justice an important and complex issue would be to determine the appropriate choice of the dependent variable in a regression equation. Rather than focus on standard econometric techniques we would recommend a weighted scoring system. With more detailed site specific data regarding location characteristics, the types and concentrations of contaminants cleaned up, job creation during development and after development, acreage developed, greenspace developed, change in assessed value, and change in property tax revenue a scoring algorithm could be created. With the appropriate data this scoring system would enable researchers to compare remediated brownfield sites both within a given community and between communities. This scoring system would also make it possible to determine the *relative* success of remediation and development, for example reducing or containing a very harmful pollutant by fifty percent may be as valuable to the community as reducing or containing a less harmful pollutant by ninety-five percent. The data that are currently available are a good starting-point, but more detailed information would make it possible to demonstrate both the economic benefits and nonpecuniary benefits of remediation programs.

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ENDNOTES

1. http://cfpub.epa.gov/bf_factsheets/gfs/index.cfm?xpg_id=7547&display_type=HTML.
2. See <http://www.epa.gov/brownfields/laws/2869sum.htm> for a summary of H.R. 2869 which was signed into law by the President on January 11, 2002 and enacted as Public Law 107-118.
3. Descriptions of all Brownfield properties are available from the authors upon request.
4. The ACRES URL is: <https://cfext.epa.gov/acres/index.cfm>
5. The CIMC URL: www.epa.gov/cimc/
6. Property Profile Form - <http://www.epa.gov/swerosps/bf/pubs/index.html>
7. Brownfields Performance Measures - <http://www.epa.gov/brownfields/overview/bf-monthly-report.html>
8. The City of Rochester Assessment Bureau website is available through: <http://www.cityofrochester.gov>

REFERENCES

- Beinat, E. and Nijkamp, P., 1998. "Environmental Rehabilitation." *Studies in Regional and Urban Planning*, 6, 83-102.
- Berman, L. and Forrester, T., 2013. "An Indicator Framework to Measure Effects of Brownfields Redevelopment on Public Health." *Journal of Environmental Health*, 76, 1, 50-55.
- Currie, J., Greenstone, M., and Moretti, E., 2011. "Superfund Cleanups and Infant Health." *American Economic Review*, 101, 3, 435-441.
- De Sousa, C.A., 2003. "Turning Brownfields into Green Space in the City of Toronto." *Landscape and Urban Planning*, 62, 181-198.
- Doick, K.J., Sellers, G., Castan-Broto, V., Silverthorne, T., 2009. "Understanding Success in the Context of Brownfield Greening Projects: The Requirement for Outcome Evaluation in Urban Greenspace Success Assessment." *Urban Forestry & Urban Greening*, 8, 163-178.
- Gamper-Rabindran, S. and Timmins, C., 2013. "Does Clean-up of Hazardous Waste Sites Raise Housing Values? Evidence of Spatially Localized Benefits." *Journal of Environmental Economics and Management*, 65, 345-360.
- Garvin, A. and Berens, G., 1997. "Urban Parks and Open Space." *Urban Land Institute and Trust for Public Land*, Washington D.C.
- Harnik, P., 2000. "Inside City Parks." *Urban Land Institute and Trust for Public Land*, Washington D.C.
- Janz, J.R., Arnold, J.R. Mays, R.H. and Shapiro, R.M., 1991. "Development and Redevelopment of Contaminated Property." *Journal of Urban Planning and Development*, 117, 3, 108-120.

- Lange, D.A. and McNeil, S., 2004a. "Clean It and They Will Come? Defining Successful Brownfield Development." *Journal of Urban Planning & Development*, 130, 2, 101-108.
- Lange, D.A. and McNeil, S., 2004b. "Brownfield Development: Tools of Stewardship." *Journal of Urban Planning & Development*, 130, 2, 109-116.
- Linn, J., 2013. "The Effect of Voluntary Brownfields Programs on Nearby Property Values: Evidence from Illinois." *Journal of Urban Economics*, 78, 1-18.
- Litt, J.S., Tran, N.L., and Burke, T.A., 2002. "Examining Urban Brownfields through the Public Health 'Macroscopic'." *Environmental Health Perspectives*, 110, 183-193.
- Mihaescu, O. and vom Hofe, R., 2012. "The Impact of Brownfields on Residential Property Values in Cincinnati, Ohio: A Spatial Hedonic Approach." *The Journal of Regional Analysis and Policy*, 42, 3, 223-236.
- Nijkamp, P., Rodenburg, C.A., and Wagtenonk, A.J., 2002. "Success Factors for Sustainable Urban Brownfield Development: A Comparative Case Study Approach to Polluted Sites." *Ecological Economics*, 40, 235-252.
- Samuelson, P.A., 1954. "The Pure Theory of Public Expenditure." *Review of Economics and Statistics*, 36 4, 387-389
- Schadler, S, Morio, M., Bartke, S., Rohr-Zanker, R., and Finkel, M., 2011. "Designing Sustainable and Economically Attractive Brownfield Revitalization Options Using an Integrated Assessment Model," *Journal of Environmental Management*, 92, 827-837.
- Tam, E.K.L. and Byer, P.H., 2002. "Remediation of Contaminated Lands: A Decision Methodology for Site Owners." *Journal of Environmental Management*, 64, 387-400.
- USEPA, 2002. Public Law 107 – 118 (H.R. 2869): "Small Business Liability Relief and Brownfields Revitalization Act."
- USEPA, 2006. "Instructions for Completing Brownfields Property Profile Form: General Instructions." EPA Form 6200-03 (9-2006).
- USEPA, 2009. "Agency Petroleum Brownfields: Selecting a Reuse Option." (EPA 510-R-09-004).
- USEPA, 2011. "Opportunities for Petroleum Brownfields," (EPA 510-R-11-002).
- USEPA, 2013 "Basic Information on Petroleum Brownfields," <http://www.epa.gov/oust/petroleumbrownfields/pbbasic.htm>, accessed March 2013.
- USEPA, "Brownfields Profile Glossary," Vocabulary Catalog List Detail - Brownfields profile glossary, <http://www.epa.gov/brownfields/>, accessed March 2013.
- USEPA, "Grants & Funding," http://www.epa.gov/brownfields/grant_info/index.htm, accessed March 2013.
- USEPA, "Learn about Lead," <http://www.epa.gov/lead/learn-about-lead.html#lead>, accessed March 2013.
- Wedding, C.G. and Crawford-Brown, D., 2007. "Measuring Site-level Success in Brownfield Redevelopments: A Focus on Sustainability and Green Building." *Journal of Environmental Management*, 85, 483-495.

Public Housing, Rent Subsidy: A Comparative Panel Analysis on the Effects on Education and Earnings

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ABSTRACT

This study examines the long-term effects of housing assistance programs on education and earnings, using data from the National Longitudinal Survey of Youth 1979 (NLSY-79). Samples of individuals who lived in public housing and individuals who received rent subsidy when young were created. Results of Test of Equality of the Means reveal no statistically significant difference in educational levels between the two groups. Further analysis using panel regression shows that the effects of public housing on wages are not significantly different from the effects of rent subsidies. Similarly, the probit analysis shows the same results for education.

INTRODUCTION

Historically and in the present day, many among the urban poor have difficulty finding affordable housing. To address this problem, the federal government established public housing in 1937 under the U.S Housing Act and, in 1970, created tenant-based rental housing assistance under the Housing and Urban Development Act. Government housing benefits are open ended, which means there are no limits on how long a tenant's stay can be. Usually, individuals stay in subsidized and/or public housing for extended periods of time. In New York City, the average person stays in public housing for 20.7 years (Levitz, 2013).

The original purpose of public housing was to create temporary affordable housing for low-income families until their financial situation improved, allowing them to move into private housing or purchase their own house. Public housing was not intended to be permanent housing. However, the majority of public housing residents do not use public housing temporarily. According to Levitz (2013), "people celebrate almost like lottery winners" when they are given public housing. As permanent housing for the poor, public housing has been criticized by some for perpetuating poverty and promoting crime. In most urban areas, public housing projects are viewed as centers of high unemployment, high teenage pregnancy, high high-school dropout rates and high violence and crime rates. Public housing has also been criticized for promoting the formation of single-parent households. According to Husock (2003) 88 percent of all families in public housing are single-parent households. However, others believe that public housing has been successful in providing affordable housing for the poor and that a few "bad" projects with unsafe conditions like high crime rates, gang activities and drugs have ruined the reputation of all. As Dolbeare reports in his 1983 study, less than 10 percent of public housing

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consists of the monster high-rise projects that come to mind when discussing public housing, and that the successful units are invisible because they blend into their surroundings and look like the homes around them.

In the 1970s the federal government wanted to experiment with a different housing program that wouldn't segregate the poor. Thus, the tenant-based rental housing assistance program known as the voucher systems was created to provide housing subsidy for the poor. Eligible families received cash payments to pay for rent in the private housing sector. The main purpose of the housing subsidy program was to deconcentrate poverty.

This study compares the two housing programs with regard to future educational attainment and earnings of individuals who lived in public housing versus those who lived in subsidized housing when young, using a different data set than previous studies. The individuals in the samples were between 14 and 21 years old in 1979, when first interviewed and were followed until 2010. This study will contribute to the existing research by determining whether there are significant differences between the individuals who lived in the two housing programs in regards to educational attainment and earnings that they achieved in their working life. Furthermore, the study will provide evidence for public policy makers so they can focus on programs that are more effective in helping the poor reach self-sufficiency and reducing their dependence on the government.

The organization of the rest of the paper is as follows: Section 2 provides a literature review; section 3 introduces a conceptual model; section 4 describes the data used; section 5 presents the methodology and data analysis; and section 6 presents the conclusions and recommendations.

LITERATURE REVIEW

The perception that public housing developments are centers of poverty and crime, including drug use and gang violence (Kilewer, 2013), led to the creation of the voucher system in the early 1970s¹. The voucher program allows individuals to select where they want to live; then, the government provides cash payments that can be used to pay their rent. Thus, individuals with low incomes can be integrated into the communities rather than segregated into public housing. The U.S. Department of Housing and Urban Development (HUD) created the Moving to Opportunity² initiative in five urban cities in 1994. This initiative relocated families from public housing, which is often located in high-poverty neighborhoods, to low-poverty neighborhoods through the voucher system. A two-and-a-half year follow up study of New York City families showed that boys who relocated to low-poverty neighborhoods performed better on reading and math standardized tests than boys who remained in high-poverty neighborhoods (Leventhal and Brooks-Gunn, 2003). Leventhal et al. (2005) used the same data from the Moving to Opportunity Initiative and evaluated the effects of the relocation program five years later. Their results showed that adolescents (boys and girls) from families which received housing vouchers achieved significantly lower test scores than their peers who stayed in public housing. This result must be interpreted cautiously because the authors report that in the control group (public housing) the lower functioning adolescents did not participate in the five year interview. HUD released a report in 2011 detailing the results of the Moving to Opportunity initiatives. Their results concur with the results of Leventhal et al. (2005) that the relocation did not improve earnings for adults or educational achievement for youth. Additional research also reports that the voucher system is not necessarily a better option than the public housing system. Families who receive vouchers tend to still live in high-poverty neighborhoods and their children attend the same schools as public housing children. Therefore, children in the voucher system do not

show improvement in academic achievement (Jacob, 2004). Similarly, Wyly and DeFilippis (2010) found no evidence that vouchers promote deconcentration of poverty. They report that vouchers have a stronger link to local poverty rates than all other types of federal low-income housing assistance, including public housing.

Other researchers come to the conclusion that the voucher system is a better policy than public housing. Leung et al. (2012) developed a theoretical general equilibrium model which predicts that public housing reduces labor supply, especially the labor supply for unskilled workers. Additionally, a study by Olsen et al. (2005) found that housing assistance has disincentive effects on market work; thus, housing assistance leads to lower earnings. The voucher system was also found to be preferable to public housing in regards to labor supply (Leung et al., 2012) and voucher recipients earn more money than public housing residents (Olsen et al., 2005). Additionally, a study by Levitt and Venkatesh (2001) using an ethnographic approach found that individuals who lived in public housing in Chicago had unemployment rates much higher than the state unemployment rate. The state unemployment rate at the time was 4 percent and the unemployment rate of the public housing sample was more than 25 percent and one-sixth of these individuals reported no source of income at all.

A study by Schwartz et al. (2010) examined the characteristics of schools serving public housing students and non-public housing students in New York City. They found very little difference in school characteristics regarding quality of teachers, teacher-student ratio, and general resources. But they found significant differences in students' performance on standardized exams. Newman and Harkness (2000), using a PSID-Assisted Housing Database, found that educational outcomes are unaffected by whether a child has ever lived in public housing and the duration of his/her residence. Currie and Yelowitz (2000), also using PSID data found no significant difference between public housing children and other children in grade retention. When the authors used two sample instrumental variables (TSIV) techniques, they found positive effects between children's academic achievement and housing quality. According to a study by Keene and Geronimus (2011) public housing has the advantage of providing social support to residents. According to the study, public housing residents report that neighbors count on each other, watch each other's children, and help each other out on a general basis.

The majority of the existing research shows no differences in educational attainment and earnings between public housing and the voucher system. Additionally, they find no differences in schools' quality and in grade retention between children living in housing projects and other children. Some studies show that public housing reduces the labor supply for unskilled labor and housing assistance in general reduces incentives to work, leading to lower earnings.

CONCEPTUAL MODEL

This paper investigates two research questions:

- (1) Are there differences in future educational attainment between individuals who lived in public housing in 1979 versus individuals who received rent subsidy in 1979 and
- (2) Are there differences in future wages between these two groups

The NLSY-79 data are used. Two samples were created with individuals who lived in public housing in 1979 and individuals who received rent subsidy in 1979. These individuals were followed for three decades and their educational attainment and earnings were extracted in each year that the data are available.

To test whether there are significant differences between the two samples in levels of education, two approaches were used, the t-test and the probit regression. The t-test compares the average years of education per year and indicates if there are significant differences in each year. The second approach, the probit regression, examines the effect of public housing on education, incorporating demographic variables. The dependent variable is whether the individual had a high school degree and the independent variables used are living in public housing in 1979, family income in 1979, gender, race and marital status.

To test whether there are differences in wages between the two samples, the t-test and the panel analysis were performed. The t-test compared the average hourly wages each year and determined if there were significant differences in wages between the two groups. The second approach was a panel analysis with the dependent variable being the hourly wage of each individual in each year. The independent variables used are living in public housing in 1979, age of the individual each year, family income in 1979, educational level each year, gender, race, marital status each year and location each year.

DATA

The NLSY-79 data are utilized for this study. The NLSY-79 data consist of a nationally representative sample of 12,686 individuals who were 14-21 years old when first interviewed in 1979. Individuals were interviewed annually until 1994 and biannually thereafter. The sample for this study consists of people who were living in public housing and people who received rent subsidy in 1979. A total of 708 individuals were living in public housing and a total of 170 received rent subsidy. Individuals who did not participate in interviews after 1990 were dropped from the sample³. The final public housing sample includes 571 individuals. The median age is 17 years with a median grade completed of 10 years. The gender composition is 48 percent male and 52 percent female; 71 percent are black, 18 percent are Hispanic and 11 percent are non-black non-Hispanic. The majority of these individuals were not married in 1979 (91.4 percent). The median family income in 1979 was \$6,083. The median number of siblings was 5 (with a standard deviation of 3). The median mother and father's education was 11 and 10 years of schooling, respectively. The majority of the public housing individuals were living in urban areas (78.5 percent). The rent subsidy sample includes 120 individuals. The median age is 17 years with a median grade completed of 9.5 years. The gender composition is 53 percent male and 47 percent female; 41.7 percent are black, 36.7 percent are Hispanic and 21.7 percent are non-black non-Hispanic. More than 86 percent of these individuals were never married. The median family income in 1979 was \$7,000. The median number of siblings in 1979 was 4 (with a standard deviation of 2.6). The median mother and father's education was 10 years of schooling. The majority of the rent subsidy individuals lived in urban areas in 1979 (86.7 percent). Table 1 summarizes the sample descriptive statistics.

These individuals were followed for 30 years. Data on educational attainment and earnings were extracted for each year that the data were available, starting from 1979 until 2010, the last year that the data are available.

This study compares the highest grade completed and the hourly wage in each year and tests for significant differences between the groups using Test of Equality of the Means. Differences based on gender and race were also examined using the same technique and the results are reported in the Appendix. Panel regression on hourly wages was performed to find the significant factors affecting wages. Additionally, a probit analysis was performed to find if public housing has significant effects on educational attainment.

Table 1: Sample Descriptive Statistics in 1979

	Public Housing	Rent Subsidy
Number	571	120
Age (median)	17	17
Gender		
Male	48.3%	53.3%
Female	51.7%	46.7%
Race		
White	11.0%	21.7%
Black	70.9%	41.7%
Hispanic	18.0%	36.7%
Marital Status		
Never Married	91.4%	86.7%
Married	6.5%	9.2%
Other	2.1%	4.2%
Highest Grade Completed	10	9.5
Mother's Education (median)	11	10
Father's Education (median)	10	10
Number of Siblings (median)	5	4
Family Income (median)	\$6,083	\$7,000
Location		
Urban	78.5%	86.7%
Rural	20.7%	13.3%

ANALYSIS

Test of Equality of The Means

To find out whether there are differences in educational achievements and earnings between individuals in the public housing sample and individuals in the rent subsidy sample, the Test for Equality of the Means regarding hourly wage and highest grade completed was performed. The results are presented in Table 2. According to the t-test, there are no significant differences in educational levels between the two samples.

Table 2: Test of Equality of Means for Educational Levels and Wages

Year	Highest Grade Completed			Hourly Rate of Pay (cents)		
	Public Housing (n=571)	Rent Subsidy (n=120)	t-test	Public Housing	Rent Subsidy	t-test
1979	9.86	9.78	-0.42	74.56 (n=571)	127.40 (n=120)	3.11***
1980	10.43	10.40	-0.16	130.44 (n=539)	170.41 (n=117)	1.78*
1981	10.88	10.76	-0.71	145.55 (n=554)	205.85 (n=117)	2.49**
1982	11.21	11.07	-0.81	266.04 (n=540)	332.49 (n=114)	2.05**
1983	11.42	11.36	-0.34	266.04 (n=540)	350.44 (n=119)	2.63***
1984	11.51	11.49	-0.09	266.04 (n=540)	369.08 (n=115)	3.18***
1985	11.65	11.56	-0.49	338.41 (n=552)	390.85 (n=113)	1.62
1986	11.72	11.49	-1.12	387.96 (n=540)	390.85 (n=113)	0.08
1987	11.77	11.68	-0.42	387.96 (n=540)	524.06 (n=104)	3.51***
1988	11.80	11.76	-0.19	527.67 (n=530)	651.03 (n=108)	2.47**
1989	11.83	11.82	-0.04	527.67 (n=530)	666.75 (n=111)	2.66***
1990	11.91	11.87	-0.20	527.67 (n=530)	650.38 (n=112)	2.40**
1991	11.94	11.94	-0.01	572.69 (n=526)	784.57 (n=109)	3.31***
1992	12.00	12.02	0.08	572.69 (n=526)	659.52 (n=115)	1.67*
1993	12.03	12.04	0.05	791.79 (n=530)	725.35 (n=113)	-0.26
1994	12.04	12.08	0.20	791.79 (n=530)	698.19 (n=110)	-0.35
1996	12.08	12.07	-0.06	791.79 (n=530)	1017.32(n=111)	0.81
1998	12.16	12.16	0.00	791.79 (n=530)	946.17 (n=109)	0.58
2000	12.18	12.23	0.24	1011.38(n=474)	1163.00 (n=91)	1.36
2002	12.22	12.33	0.53	1026.99(n=472)	1504.92 (n=93)	2.87***
2004	12.25	12.22	-0.11	1047.82 (n=469)	1177.80 (n=94)	1.04
2006	12.29	12.30	0.02	1047.82 (n=469)	1423.11(n=100)	2.22**
2008	12.28	12.46	0.73	1164.72 (n=479)	1320.80 (n=98)	1.13
2010	12.35	12.54	0.81	1176.26(n=474)	1506.65 (n=96)	2.06**

*Statistically significant at 90%; **Statistically significant at 95%; ***Statistically significant at 99%

Regarding differences in wages, individuals in the rent subsidy group had greater mean wages than the individuals from the public housing sample, with the exception of two years, 1993 and 1994. This difference was significant for 15 years, 1979 to 1984, 1987 to 1992, 2002, 2006, and 2010. Additionally, differences in educational levels and differences in wages based on gender and race were examined and the results are reported in the Appendix.

Panel Analysis

A panel analysis was performed to evaluate factors affecting wages. Wages are the hourly wage reported in cents. The samples were merged and a public housing dummy variable was created. The dummy variable equals one if the individual is from the public housing sample and equals zero if the individual is from the rent subsidy sample. Wages were assumed to be affected by age, family income, gender, race, education, marital status and location. Age is the age of the individual in the survey year; in the model it is a proxy variable for experience. Family income is the family income in 1979, and is expected to capture socio-economic factors from when the individuals were growing up. Gender is a dummy variable equal to one if the individual is a female. Race is also a dummy variable measuring three races; Hispanic, Black, and non-Hispanic non-Black; the third category is the omitted category. Education is measured by the highest grade completed by the individual. Marital status is a dummy variable measuring three categories; never married, married with spouse present and other; the other category is the omitted category. Location is a dummy variable if the individual lives in a rural or urban area; the rural area is the omitted category.

$$Wages_{it} = \beta_0 + \beta_1 Public\ Housing_i + \beta_2 Age_{it} + \beta_3 Family\ Income_i + \beta_4 Education_{it} + \beta_5 Gender_i + \beta_6 Race_i + \beta_7 Marital\ Status_{it} + \beta_8 Location_{it} + v_{it}$$

where the composite error $v_{it} = a_i + u_{it}$, a_i = unobserved effects and u_{it} = time-varying error.

Unobserved effects also called fixed effects (FE) do not change over time and capture time-constant factors that affect wages. The time-varying error captures unobserved factors that change over time and affect wages.

The data for this analysis are panel data. The same individuals were followed for three decades and data on age, wage, education, marital status and location were collected for each year that the data were available. The panel regression identifiers are the ID (i) that is assigned to each individual in the sample and the Years (t). The data for the panel analysis is unbalanced because of missing values; some individuals did not participate every year. The wage equation was estimated using Panel Least Squares regressions with period fixed effects. Fixed effects assume that unobserved effects are correlated with the explanatory variables. The results are reported in Table 3. Wages are significantly and positively affected by education, family income, being married and living in an urban area. Being female and being black or Hispanic has a strong significant negative effect on wages. Age shows a negative effect on wages

contrary to theoretical expectations. Age is considered a proxy for experience and, as such, it is expected to have a positive effect on wages. The current result shows that individuals in housing assistance programs earn less as they age. A possible explanation may be that low income people work in manual jobs where age has a negative impact on wages. Finally the effects of public housing on wages, after controlling for demographic characteristics, show no statistical differences from the effects of receiving rent subsidy.

Table 3: Panel Least Squares Regression (Period FE)

Dependent Variable: Hourly Wages in cents

Variable	Coefficient	t-statistic
Wages (cents)		
Constant	141.43	0.82
Public Housing=1	4.33	0.14
Age	-13.15	-2.51**
Family Income 1979	0.01	7.99***
Highest Grade Completed	79.77	3.66***
Gender – Female	-248.47	-0.58***
Race		
Hispanic	-132.43	-2.91***
Black	-206.29	-5.14***
Marital Status		
Never Married	-51.72	-1.58
Married	270.93	7.60***
Location - Urban	79.97	2.58***
Periods:24; cross-sections:578; unbalanced panel observacions:12455		
R-squared:	0.11	
F-statistic:	47.58	

*Statistically significant at 90%; **Statistically significant at 95%; ***Statistically significant at 99%

Probit Analysis

A probit analysis was performed to further analyze the effects of public housing and rent subsidy on education. The highest grade completed variable was converted to a dummy variable equal to zero if the individual had less than 12 years of schooling and equal to 1 if the individual had 12 or more years of schooling. The reason for the conversion from a continuous to a categorical variable is because of the assumption that wages may be affected by having, or not having, a high school diploma. The analysis was performed at three different time points after the initial interview: ten, twenty and thirty years later. After controlling for demographic characteristics, the effects of public housing on educational attainment

were not statistically different from the effects of the rent subsidy recipients. This conclusion was consistent in all three decades. Table 4 provides these results.

Table 4: Binary Probit Regression

Dependent Variable: High School Completion

	1990	2000	2010
Variable	Coefficient (z-statistic)	Coefficient (z-statistic)	Coefficient (z-statistic)
High School			
0 if < 12 years of schooling	N=147	N=113	N=98
1 if >=12 years of schooling	N= 432	N=466	N=481
Constant	0.32 (1.21)	0.46 (1.73*)	0.56 (2.04**)
Public Housing=1	0.12 (0.79)	0.09 (0.53)	0.01 [`] (0.04)
Family Income 1979	8.1E-06 (1.05)	2.3E-06 (0.3)	3.5E-07 (0.04)
Gender - Female	0.22 (1.91**)	0.26 (2.12**)	0.24 (1.83*)
Race			
Hispanic	-0.10 (-0.45)	-0.13 (-0.57)	0.05 (0.23)
Black	0.16 (0.83)	0.20 (0.94)	0.25 (1.16)
Marital Status			
Never Married	-0.10 (-0.66)	-0.06 (-0.40)	-0.06 (-0.43)
Married	0.10 (0.56)	0.35 (2.21**)	0.46 (2.73***)
Log Likelihood	-322.47	-277.18	-255.89

*Statistically significant at 90%; **Statistically significant at 95%; ***Statistically significant at 99%

CONCLUSIONS AND RECOMMENDATIONS

This paper examines the lasting effects of housing assistance on individuals' future educational attainment and earnings. Two types of housing assistance that may provide individuals with potentially different experiences early in life were examined; public housing and rent subsidy.

The NLSY-79 data are utilized. Two samples were created and the Test for Equality of the Means was performed. The Test for Equality of the Means revealed the following results:

1. There is no significant difference in educational attainment between the two groups.
2. Individuals in the rent subsidy group had higher mean wages than the individuals in the public housing sample but the difference was not statistically significant in all the periods.

Panel Least Squares regression shows that the effects of public housing on wages are not significantly different from the effects of rent subsidy. Similarly, the probit analysis shows that the effects of public housing on education are not significantly different from the effects of rent subsidy.

The conclusion of this study is that there are no significant differences between the two housing assistance programs in regards to education and earnings, even though the test of the equality of the means indicates that the rent subsidy group had higher mean wages than the public housing group in several years. The demographic composition of the two samples are different which may be the reason for the differences observed in the t-test results. For example, in the public housing sample there are more than 70 percent blacks, and blacks usually earn less than whites.

This analysis shows that the voucher system does not improve educational attainment. People on the voucher system generally rent houses and apartments in poor neighborhoods, and thus attend similar if not the same schools as public housing residents. Additionally, the voucher system was found not to improve earnings, suggesting it is not the answer to the problems presented by public housing: the concentration of poverty with the ills associated with poverty. In order to help people escape poverty, some other measures are necessary. State governments are proposing to raise the minimum wage. Raising the minimum wage will help unskilled labor earn more money, but it may increase their unemployment rates as well. At higher wages, companies may choose to hire fewer workers. A better measure will be to assist low-income individuals in developing skills through technical schools. Skilled labor workers earn higher wages and have lower unemployment rates than unskilled workers because they are not easily replaceable.

This study examined the differences of the two housing programs with regards to education and earnings. Even though the two programs have similar effects on educational attainment and earnings, other factors may differentiate the two programs. For example, the voucher system may improve people's morale and happiness because of living in regular neighborhoods and avoid the stigma of living in the projects and identified as poor.

ENDNOTES

1. The Housing and Urban Development Act of 1970 created the first tenant-based rental housing assistance on an experimental basis. The Housing and Community Development Act of 1974 made it permanent by amending the US Housing Act of 1937 and creating Section 8. Section 8 is a rental subsidy program paid to the owner of the apartment. In 1983 the Housing and Urban-Rural Recovery Act created the Voucher Demonstration, which became a permanent voucher program with the Housing and

Community Development Act of 1987. The voucher program gave individuals a rent voucher and allowed them to select the area they wanted to live in. This program gives individuals the flexibility to live in more expensive housing. The Public Housing Reform Act of 1998 merged Section 8 with the Voucher Program.

2. The Moving to Opportunity (MTO) demonstration was authorized by the U.S. Congress in section 152 of the Housing and Community Development Act of 1992.

3. From the public housing sample, 137 individuals were omitted because they did not participate in interviews after 1990. The reason for the omission was to avoid a missing variables problem. The characteristics of these individuals were reviewed to determine if they were different from the individuals who remained in the sample. Their median age was one year older than the median age of the sample. Their highest grade completed was 10, the same as the sample. Family income in 1979 was \$6,500, \$417 more than that of the sample. The gender composition was 54.7 percent male and 45.3 percent female. The majority were white, 78.8 percent. Almost 80 percent were from urban areas. From the rent subsidy sample, 50 individuals were omitted for the same reason stated above. These individuals had a median age of 18, one year older than the sample. The highest grade completed was 10 years, and family income in 1979 was \$5,500, \$1,500 lower than that of the sample. The gender composition was 44 percent male and 56 percent female. The majority were white, 92 percent and 36.6 percent were from rural areas and 63.4 percent from urban areas. What stands out from the omitted individuals from both samples is that these individuals are older and the majority is white.

REFERENCES

- Currie, Janet and Aaron Yelowitz. 2000. "Are Public Housing Projects Good for Kids?" *Journal of Public Economics*, 75: 99–124.
- Dolbeare, C.N. 1983. "The Low-Income Housing Crisis," in C. W. Hartmann (ed), *America's Housing Crisis*, pp. 29-75. Boston, MA: Routledge & Kegan Paul/Institute for Policy Studies.
- HUD.Gov. Section 8 Tenant-Based Housing Assistance: A look back after 30 years. March 2000. www.huduser.org/portal/publications
- HUD, Office of Policy Development and Research. 2011. "Moving to opportunity for Fair Housing Demonstration Program. Final Impacts Evaluations."
- Husock, Howard. 2003. "Moving out of Public Housing." *Public Interest*. Winter: 89-100.
- Jacob, Brian A. 2004. "Public Housing, Housing Vouchers, and Student Achievement: Evidence from Public Housing Demolitions in Chicago," *The American Economic Review*: 233- 258.
- Keene, Danva E. and Arline T. Geronimus. 2011. "Community-Based Support among African American Public Housing Residents," *Journal of Urban Health*, 88 (1): 41-53.
- Kilewer, Wendy. 2013. "The Role of Neighborhood Collective Efficacy and Fear of Crime in Socialization of Coping with Violence in Low-Income communities," *Journal of Community Psychology*, 41(8): 920-930.
- Leung, Charles Ka Yui, Sinan Sarpca and Kuzey Yilmaz. 2010. "Public Housing Units vs Housing Vouchers: Accessibility, Local Public Goods, and Welfare," Tusiad-Koc University Economic Research Forum, Working Paper 1032.

- Leventhal, Tama and Jeanne Brooks-Gunn. 2003. "The Early Impacts of Moving to Opportunity on Children and Youth" In J. Goering and J. D. Feins (Eds.), *Choosing a Better Life? Evaluating the Moving to Opportunity Social Experiment*. Washington, DC: Urban Institute Press.
- Leventhal, Tama, Rebecca C. Fauth and Jeanne Brooks-Gunn. 2005. "Neighborhood Poverty and Public Policy: A 5-Year Follow-Up of Children's Educational Outcomes in the New York City Moving to Opportunity," *Developmental Psychology*, 41 (6): 933–952.
- Levitt, Steve and Sudhir Alladi Venkatesh. 2001. "Growing Up in the Projects: The Economic Lives of a Cohort of Men Who Came of Age in Chicago Public Housing," *AEA Papers and Proceedings*, 79-84.
- Levitz, Jennifer. 2013. "Housing Agencies Push to Impose Time Limits, Work Requirements." *The Wall Street Journal*, Tuesday, May 7, pp. 1.
- Newman, Sandra and Joseph Harkness. 2000. "Assisted Housing and the Educational Attainment of Children," *Journal of Housing Economics*, 9: 40–63.
- Olsen, O. Edgar, Catherine A. Tyler, Jonathan W. King, Paul E. Carrillo. 2005. "The Effects of Different Types of Housing Assistance on Earnings and Employment." *Cityscape: A Journal of Policy Development and Research*, 8 (2): 163-186.
- Schwartz, Amy Ellen, Brian J. McCabe, Ingrid Gould Ellen, Colin C. Chellman. 2010. "Public Schools, Public Housing: The Education of Children Living in Public Housing," *Urban Affairs Review*, 46(1): 1-22.
- Wyly, Elvin and James DeFilippis. 2010. "Mapping Public Housing: The Case of New York City," *City & Community*, 9(1): 61- 86.

APPENDIX: Test of Equality of Means Based on Gender and Race

Differences in educational levels and differences in hourly wages based on gender and race were examined. The results are reported in Table A1. Educational levels based on gender showed that women have higher educational levels than men. This result was statistically significant in every year with the exception of 1988. Educational attainments based on race showed that whites have higher educational levels than blacks and Hispanics. Blacks have higher educational levels than Hispanics. The F-test was statistically significant in every year, meaning that the mean years of schooling among the races are significantly different. Then, the educational levels based on gender and housing (public housing/rent subsidy) were examined. Results of this test show statistical differences between men and women in public housing and rent subsidy groups in the early years from 1979 to 1984, 1986, and also later in 2002, 2004, and 2010. An interesting observation is that men in the rent subsidy group have higher educational levels than men in the public housing group. Women in public housing have higher educational levels than women in the rent subsidy group up until 2000. In 2008 and 2010, women in the rent subsidy group achieved higher educational levels than women in the public housing group. Table A2 presents these results. An additional Test of Equality of the Means based on race and housing showed that whites in the rent subsidy group have higher educational levels than whites in the public housing sample. Blacks in the public housing group have higher educational attainments than blacks in the rent

subsidy group. Hispanics showed mixed results. The F-test shows statistically significant mean differences in 1979 until 1986 and in 1993. These results are reported in Table A3.

Table A1: Educational Levels by Gender and Race

Year	Men	Women	t-test	Hispanic	Black	White	F-test
1979	9.61	10.08	-3.22***	9.36	9.90	10.37	8.61***
1980	10.25	10.59	-2.55**	10.02	10.48	10.80	5.89***
1981	10.69	11.03	-2.57***	10.43	10.95	11.12	6.03***
1982	11.00	11.36	-2.67***	10.75	11.29	11.38	5.63***
1983	11.24	11.58	-2.42**	10.98	11.50	11.68	5.52***
1984	11.32	11.68	-2.29**	11.12	11.57	11.83	3.86**
1985	11.49	11.78	-1.91*	11.22	11.71	11.97	5.02***
1986	11.55	11.81	-1.68*	11.27	11.74	12.06	4.58**
1987	11.61	11.89	-1.81*	11.34	11.81	12.15	4.95***
1988	11.68	11.90	-1.29	11.43	11.83	12.21	3.79**
1989	11.67	11.99	-1.96**	11.46	11.87	12.25	3.85**
1990	11.76	12.04	-1.74*	11.49	11.96	12.28	4.59**
1991	11.81	12.07	-1.69*	11.60	11.98	12.29	3.34**
1992	11.86	12.14	-1.75*	11.63	12.03	12.45	4.64***
1993	11.88	12.18	-1.90*	11.65	12.06	12.52	5.09***
1994	11.86	12.22	-2.19**	11.69	12.07	12.53	4.28**
1996	11.89	12.26	-2.23**	11.73	12.10	12.56	4.16**
1998	11.97	12.34	-2.25**	11.80	12.17	12.66	4.34**
2000	12.01	12.36	-2.14**	11.87	12.20	12.65	3.56**
2002	12.03	12.44	-2.46**	11.90	12.25	12.73	3.98**
2004	12.00	12.49	-2.78***	11.85	12.27	12.75	4.30**
2006	12.08	12.50	-2.32**	12.01	12.28	12.85	3.57**
2008	12.11	12.51	-2.25**	12.07	12.29	12.83	2.99*
2010	12.14	12.62	-2.77***	12.13	12.38	12.83	2.59*

*Statistically significant at 90%; **Statistically significant at 95%; ***Statistically significant at 99%

Table A2: Educational Levels by Gender and Housing

Year	Men		Women		F-test
	Public Housing	Rent Subsidy	Public Housing	Rent Subsidy	
1979	9.61	9.61	10.09	9.98	3.50**
1980	10.22	10.34	10.62	10.46	2.35*
1981	10.68	10.73	11.08	10.78	2.69**
1982	10.99	11.05	11.42	11.09	2.93**
1983	11.21	11.36	11.64	11.36	2.56*
1984	11.27	11.53	11.73	11.45	2.32*
1985	11.47	11.61	11.84	11.50	1.87
1986	11.53	11.64	11.91	11.32	2.26*
1987	11.58	11.76	11.96	11.59	1.85
1988	11.65	11.83	11.94	11.68	0.90
1989	11.61	11.92	11.99	11.71	1.40
1990	11.72	11.92	12.08	11.80	1.45
1991	11.77	11.98	12.11	11.89	1.31
1992	11.83	12.03	12.16	12.00	1.29
1993	11.84	12.06	12.21	12.02	1.55
1994	11.81	12.09	12.25	12.07	2.00
1996	11.85	12.06	12.29	12.07	1.99
1998	11.92	12.16	12.38	12.16	2.03
2000	11.97	12.19	12.38	12.28	1.72
2002	11.97	12.25	12.44	12.43	2.28*
2004	12.00	11.98	12.48	12.50	2.57*
2006	12.04	12.30	12.54	12.30	2.16*
2008	12.04	12.36	12.50	12.57	1.99
2010	12.08	12.41	12.61	12.70	2.92**

*Statistically significant at 90%; **Statistically significant at 95%; ***Statistically significant at 99%

Table A3: Educational Levels by Race and Housing

Year	Hispanic		Black		White		F-test
	Public Housing	Rent Subsidy	Public Housing	Rent Subsidy	Public Housing	Rent Subsidy	
1979	9.38	9.32	9.94	9.58	10.13	10.96	4.53***
1980	9.97	10.14	10.52	10.16	10.59	11.31	3.37***
1981	10.40	10.52	10.99	10.62	11.00	11.42	3.07***
1982	10.76	10.75	11.32	11.02	11.25	11.69	2.73**
1983	10.95	11.07	11.53	11.30	11.57	11.96	2.48**
1984	11.11	11.16	11.57	11.50	11.74	12.04	1.63
1985	11.21	11.20	11.74	11.52	11.86	12.23	2.29**
1986	11.31	11.18	11.79	11.36	11.97	12.27	2.33**
1987	11.38	11.23	11.84	11.68	12.01	12.46	2.27**
1988	11.48	11.32	11.84	11.70	12.05	12.61	1.85*
1989	11.49	11.39	11.84	11.80	12.09	12.61	1.59
1990	11.52	11.41	11.97	11.86	12.13	12.65	2.11*
1991	11.62	11.57	11.99	11.90	12.14	12.65	1.59
1992	11.62	11.66	12.05	11.92	12.30	12.81	2.12*
1993	11.64	11.68	12.08	11.92	12.36	12.88	2.32**
1994	11.66	11.75	12.08	11.96	12.38	12.88	1.95*
1996	11.72	11.75	12.11	11.96	12.46	12.81	1.80
1998	11.80	11.82	12.19	12.04	12.54	12.96	1.91*
2000	11.85	11.91	12.21	12.14	12.52	12.96	1.58
2002	11.85	12.00	12.25	12.20	12.55	13.15	1.89*
2004	11.92	11.68	12.28	12.22	12.58	13.15	2.01*
2006	11.97	12.11	11.92	11.97	12.65	13.35	2.03*
2008	12.03	12.16	12.30	12.28	12.63	13.31	1.52
2010	12.06	12.29	12.38	12.38	12.65	13.27	1.37

*Statistically significant at 90%; **Statistically significant at 95%; ***Statistically significant at 99%

Wage differences based on gender shows that on average, men earn more than women in all the years. This result is statistically significant in every year with the exception of the first two years. These results are presented in Table A4.

Table A4: Test of Equality of Mean Wages by Gender

Year	Men	Women	t-test	Year	Men	Women	t-test
1979	88.35	79.27	0.70	1991	737.91	485.42	5.30***
1980	148.55	126.85	1.26	1992	697.52	484.66	5.45***
1981	171.69	140.75	1.68*	1993	1023.71	549.07	2.42**
1982	300.39	255.55	1.82*	1994	1008.90	553.88	2.31**
1983	309.46	253.86	2.25**	1996	1102.65	573.08	2.57**
1984	322.88	246.44	3.10***	1998	1079.87	570.35	2.58***
1985	399.26	296.48	4.27***	2000	1191.44	898.32	3.59***
1986	454.30	324.21	4.91***	2002	1244.61	982.92	2.11**
1987	487.04	336.12	5.36***	2004	1201.64	956.18	2.64***
1988	635.14	466.20	4.55***	2006	1296.93	953.66	2.67***
1989	632.22	477.80	3.87***	2008	1328.96	1070.09	2.50***
1990	641.46	461.73	4.68***	2010	1356.77	1123.41	1.94*

*Statistically significant at 90%; **Statistically significant at 95%; ***Statistically significant at 99%

Wages based on gender and housing show no conclusive evidence on whether one group (public housing or rent subsidy) has higher mean wages than the other group. In most years, mean wages of men in the rent subsidy group are greater than the mean wages of men in the public housing group. The same conclusion holds for women but in the later years women in the public housing group earn more than women in the rent subsidy group. Men in public housing earn more than women in public housing. Men in rent subsidy earn more than women in rent subsidy with the exception of the first three years. These results are reported in Table A5. Wages based on race and housing are reported in Table A6. According to the F-test there is a significant difference in the mean wages by race and housing in all years with the exception of 1985, 1986, 1993, 1994, 1998 and 2000. However, there are no consistent trends if one housing program has higher mean wages than the other housing program based on race.

Table A5: Test of Equality of Mean Wages by Gender and Housing

Year	Men		Women		F-Test
	Rent Subsidy	Public Housing	Rent Subsidy	Public Housing	
1979	118.26	81.41	137.84	68.15	3.65**
1980	160.84	145.65	181.20	116.06	1.95
1981	185.55	168.39	230.38	124.15	4.02***
1982	333.10	292.74	331.79	241.06	2.62**
1983	377.66	292.73	318.78	241.06	3.85***
1984	449.74	292.74	274.72	241.06	7.64***
1985	443.65	389.04	322.60	291.65	6.74***
1986	443.65	456.80	322.60	324.51	8.05***
1987	626.87	456.80	404.10	324.51	13.95***
1988	744.12	609.62	538.94	453.38	8.73***
1989	718.20	609.62	608.36	453.38	7.21***
1990	775.20	609.62	506.36	453.38	9.42***
1991	960.89	687.47	580.04	467.12	13.29***
1992	739.73	687.47	572.02	467.12	10.77***
1993	872.32	1059.61	558.98	547.18	2.05
1994	791.46	1059.61	590.29	547.18	1.97
1996	1287.22	1059.61	711.10	547.18	2.32*
1998	1169.82	1059.61	696.21	547.17	2.29*
2000	1428.32	1140.37	879.59	901.53	5.46***
2002	1896.72	1107.64	1121.47	957.18	5.38***
2004	1525.28	1131.42	844.79	976.99	4.16***
2006	1971.71	1131.42	828.79	976.99	6.83***
2008	1610.70	1264.93	1018.81	1079.60	3.19**
2010	2094.98	1197.61	942.33	1158.07	6.82***

*Statistically significant at 90%; **Statistically significant at 95%; ***Statistically significant at 99%

Table A6: Test of Equality of Mean Wages by Race and Housing

Year	Hispanic		Black		White		F-test
	Rent Subsidy	Public Housing	Rent Subsidy	Public Housing	Rent Subsidy	Public Housing	
1979	82.66	100.89	99.06	67.51	257.61	76.84	6.76***
1980	153.69	146.81	135.54	123.85	268.24	147.95	2.18*
1981	197.26	156.02	166.14	138.38	299.72	175.17	2.61**
1982	303.02	299.45	281.08	251.35	487.79	308.65	2.97**
1983	340.14	299.45	307.34	251.35	454.80	308.65	2.72**
1984	432.56	299.45	269.31	251.35	454.87	308.65	4.33***
1985	402.02	360.18	332.54	331.93	471.42	343.50	1.25
1986	402.02	430.62	332.54	370.65	471.42	431.55	1.22
1987	563.54	430.62	440.27	370.65	620.83	431.55	3.99***
1988	851.08	612.11	468.80	496.19	676.26	595.41	5.28***
1989	844.83	612.11	494.89	496.19	700.48	595.41	4.70***
1990	777.97	612.11	500.56	496.19	737.37	595.41	3.87***
1991	879.85	679.66	674.04	536.86	813.29	624.46	3.52**
1992	786.79	679.66	533.00	536.86	684.54	624.46	3.13***
1993	891.74	743.82	544.47	665.88	788.42	1641.02	1.73
1994	756.36	743.82	612.82	665.88	758.87	1641.02	1.66
1996	1409.27	743.82	660.76	665.88	1046.28	1641.02	1.92*
1998	1041.64	743.82	780.09	665.88	1102.46	1641.02	1.75
2000	1251.41	1071.16	989.53	965.65	1342.19	1218.13	1.48
2002	1613.21	1021.43	1313.74	995.64	1746.86	1239.06	2.18*
2004	1126.72	1032.44	912.16	979.50	1804.90	1493.09	4.18***
2006	1027.03	1032.44	947.64	979.50	3079.48	1493.09	8.74***
2008	1424.91	1137.10	926.41	1124.49	1983.52	1503.37	3.23**
2010	1486.33	1205.51	1015.17	1099.67	2392.12	1659.08	5.17***

*Statistically significant at 90%; **Statistically significant at 95%; ***Statistically significant at 99%

REFEREES

1. Mark Gius
2. Jason Hecht
3. Thomas Kopp
4. Sean MacDonald
5. Arindam Mandel
6. Rodney Paul
7. David Ring
8. Jeffrey Wagner
9. Qun Wu

The 67th Annual Conference

of the

The New York State Economics Association

October 10 - 11, 2014

Session 10 **Regional Economics**

8:15 to 9:35

Chair: Paul Bauer (State University of New York, College at Oneonta),
paul.bauer@oneonta.edu

Title: Which Is the Drag on US States Per Capita Incomes: Tropicality or Lack of Civil Rights?

Author: Paul Bauer (State University of New York, College at Oneonta),
paul.bauer@oneonta.edu

Discussant: Abeba Mussa (Presenter), mussaa@farmingdale.edu

Title: Western New York Regional Economic Development Councils Industry Cluster Policy: Old Wine in a New Bottle?

Author: Craig Rogers (Canisius College), rogersc@canisius.edu

Discussant: Paul Bauer (State University of New York, College at Oneonta),
paul.bauer@oneonta.edu

Title: New Revenue for Small and Medium Sized Municipalities in New York State

Author: Laurence Malone (Hartwick College), malonel@hartwick.edu

Discussant: Craig Rogers (Canisius College), rogersc@canisius.edu

Title: Homeownership in American Communities

Author: Abeba Mussa (Presenter), mussaa@farmingdale.edu

Discussant: Laurence Malone (Hartwick College), malonel@hartwick.edu

Session 11 **Environmental Economics**

8:15 to 9:35

Chair: Philip Sirianni (SUNY Oneonta), sirianp@oneonta.edu

Title: Energy Policy and Productivity Growth: Evidence from Chilean Manufacturers from 2001 to 2007

Author: Ruoham Wu (Alabama State University), rwu@alasu.edu

Discussant: Michael O'Hara (Colgate University – Economics), mohara@colgate.edu

Title: Carbon Efficiency of US Colleges and Universities: A Nonparametric Assessment

Authors: Philip Sirianni (SUNY Oneonta), sirianp@oneonta.edu
Michael O'Hara (Colgate University), mohara@colgate.edu

Discussant: John J. Heim (SUNY Albany), jheim@albany.edu

Title: The Effect of Wind Turbines on Home Sales in Madison County, NY

Authors: Michael O'Hara (Colgate University – Economics), mohara@colgate.edu
Steven Evans (Colgate University – student), sevans@colgate.edu

Discussant: Philip Sirianni (SUNY Oneonta), sirianp@oneonta.edu

Title: Electricity Generation Location and Benefits of Cap and Trade CO2

Author: Programs: What benefits can be attributed to RGGI, and who benefits?

Discussant: Todd Metcalfe (Syracuse University), tmetcalf@sy.edu

Ruohan Wu (Alabama State University), rwu@alasu.edu

Session 12

Finance

8:15 to 9:35

Chair: James Murtagh (Siena College), jmurtagh@siena.edu

Title: SPACs in Shipping

Authors: Milos Vulanovic (City University of Hong Kong), vmilos@cityu.edu.hk
Yochanan Shachmurove (Graduate Center and City College – CUNY),
yochanan@sas.upenn.edu

Discussant: A. Melih Kullu (Siena College), mkullu@siena.edu

Title: Transitional Reform of China Banks: Joining into WTO and the New Basel Accord

Authors: Hong-Jen Lin (Brooklyn College, CUNY), hjlin@brooklyn.cuny.edu
Sunil K. Mohanty (Brooklyn College, CUNY), skmohanty@stthomas.edu
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Pai-Chun Ma (Baruch College, CUNY), pai-chun.ma@baruch.cuny.edu

Discussant: James Murtagh (Siena College), jmurtagh@siena.edu

Title: Determinants of US bank failures during crisis

Author: James Murtagh (Siena College), jmurtagh@siena.edu

Discussant: Hong-Jen Lin (Brooklyn College, CUNY), hjlin@brooklyn.cuny.edu

Title: Screening-Monitoring Abilities and Diversification

Author: A. Melih Kullu (Siena College), mkullu@siena.edu

Discussant: Milos Vulanovic (City University of Hong Kong), vmilos@cityu.edu.hk

Session 13

Public Policy

8:15 to 9:35

Chair: Michael Jerison (SUNY Albany), m.jerison@albany.edu

Title: An empirical test of the environmental Kuznets curve for CO2 in G7: A panel cointegration approach

- Authors:** Yusuf Muratoglu (Res. Asst.), yusufmuratoglu@gmail.com
 Erginbay Ugurlu (Assistant Prof.), erginbay@gmail.com
- Discussant:** Alan Lockard (St. Lawrence University), alockard@stlawu.edu
- Title:** Retail Bottle Pricing at the Border: Evidence of Fraudulent Redemptions and Use Tax Evasion
- Author:** Ben J. Niu (St. John Fisher College), bniu@sjfc.edu
- Discussant:** Mark Gius (Quinnipiac University), mark.gius@quinnipiac.edu
- Title:** Lumpy, Irreversible Investment and Taxes
- Authors:** Michael Jerison (SUNY Albany), m.jerison@albany.edu
 Duc Le (National Academy of Social Sciences, Hanoi),
le.thucduc@gmail.com
- Discussant:** Ben J. Niu (St. John Fisher College), bniu@sjfc.edu
- Title:** The Superiority of Inferior Public Services
- Author:** Alan Lockard (St. Lawrence University), alockard@stlawu.edu
- Discussant:** Michael Jerison (SUNY Albany), m.jerison@albany.edu
- Title:** Tax shocks, Monetary Policy and Balance Sheet Changes
- Author:** Andrew Bossie (Barnard College), andrew.a.bossie@gmail.com
- Discussant:** John J. Heim (SUNY Albany), jheim@albany.edu

Session 14

Health Economics

8:15 to 9:35

Chair: Prabal De (Dept. of Economics and Business), pde@ccny.cuny.edu

- Title:** Why are Americans eating out so much?
- Author:** Sebastien Buttet (LIU Post), seba.buttet@gmail.com
- Discussant:** Daniel Parisian (Binghamton University SUNY),
dparisi2@binghamton.edu
- Title:** The Impact of Socio-Economic Factors on Maternal Mortality in Sierra Leone
- Author:** Jusu, Ambrose (State University of New York at Farmingdale),
jusua@farmingdale.edu
- Discussant:** Prabal De (Dept. of Economics and Business), pde@ccny.cuny.edu
- Title:** Minimum Wage and Health
- Author:** Aig Unuigbe (Department of Economics CUNY Graduate Center),
aunuigbe@gc.cuny.edu
- Discussant:** Ambrose Jusu (Farmingdale State College), jusua@farmingdale.edu
- Title:** The Effect of Income on Diabetes After Hurricane Katrina
- Author:** Jang Wook Lee (CUNY Graduate Center), jlee@gc.cuny.edu
- Discussant:** Ambrose Jusu (Farmingdale State College), jusua@farmingdale.edu

Session 15

Finance

8:15 to 9:35

Chair: Thomas Kopp (Siena College), kopp@siena.edu

Title: Changes of Accounting and Internal Control Systems for Small and Medium Enterprises and their Impact on Audit Risk Assessment: Short Overview

Author: Stacy Mirinaviciene (Keuka College), smirnav@yahoo.com

Discussant: Ossama Elhadary (City University of New York), uelhadary@gc.cuny.edu

Title: The Effects of Fiscal Policy Shocks on Stock Market Returns: A Sectoral View

Author: Sinem Buber (The Graduate Center, CUNY), sbuber@gc.cuny.edu

Discussant: Stacey Mirinaviciene (Keuka College), smirnav@yahoo.com

Title: Financial Ratios and Stock Returns on Chinas Growth Enterprise Market

Author: Zhaohui Zhang (Long Island University – Post), zhaohui.zhang@liu.edu

Discussant: Thomas Kopp (Siena College), kopp@siena.edu

Title: Penny Stocks, the Good, the Bad, and the Ugly

Author: Ossama Elhadary (City University of New York), uelhadary@gc.cuny.edu

Discussant: Zhaohui Zhang (Long Island University – Post), zhaohui.zhang@liu.edu

Title: Program Assessment and the Role of the Bloomberg Assessment test

Author: Thomas Kopp, James Murtagh and Anthony Pondillo (kopp@siena.edu)

Discussant: Sinem Buber (The Graduate Center, CUNY), sbuber@gc.cuny.edu

Session 16

Undergraduate Group A1

8:15 to 9:35

Chair: Arindam Mandal (Siena College), amandal@siena.edu

Title: Does “Grade it Now” Option in Aplia Improve Student Learning?

Authors: Martine Malde (LIU Post – undergraduate student), veronica.dolar@liu.edu

Josefine Skold (LIU Post – undergraduate student)

Discussant: William P. O’Dea (SUNY Oneonta), odeawp@oneonta.edu

Title: The Extent of Income Disparities Based on the Intersections of Race, Sex, Sexual Orientation, and Education

Author: Wesley Gross (Colgate University), wgross@colgate.edu

Discussant: Robert Culp (Dalton State College), rculp@daltonstate.edu

Title: When National and Local Policies Clash: How Seattles Increase in Minimum Wage Could Affect EITC Eligibility

Author: Nahiomy Alvarez (Williams College), kna1@williams.edu

Discussant: James Booker (Siena College), jbooker@siena.edu

Title: Determinants of a College Basketball Team’s Revenue

Author: Nils Weddig & Joseph Redding (Siena College), ns12wedd@siena.edu

Discussant: Kristin Jones (Hartwick College), jonesk@hartwick.edu

Title: Poverty, Unemployment, and Inflation Revisited
Author: Cody Couture (Skidmore College), ccouture@skidmore.edu
Discussant: Smita Ramnarain (Siena College), sramnarain@siena.edu

Session 17**Undergraduate Group A2**

8:15 to 9:35

Chair: Della L. Sue (Marist College), della.lee.sue@marist.edu

Title: A Study of Weight Gain amongst American and Norwegian Students attending a Private 4-Year College in the New York Metropolitan Area

Authors: Vanessa C. E. L. Leversen (LIU Post – undergraduate student), veronica.dolar@liu.edu
 Thomas Rebnord (LIU Post – undergraduate student)

Discussant: Della L. Sue (Marist College), della.lee.sue@marist.edu

Title: To Lease or Not to Lease: The Impact of a Fast Growing Practice on the Economy

Author: Emily Roehl (Siena College), em06roeh@siena.edu

Discussant: Jeffrey Wagner (Rochester Institute of Technology), mjwgse@rit.edu

Title: Stock Return Predictability and Risk Structure in Baltic Equity Markets

Author: Rokas Kirlys (Manhattan College), rkirlys.student@manhattan.edu

Discussant: Kpoti Kitissou (Skidmore College), kkitisso@skidmore.edu

Title: Doctor Deficiency: Disparities in Physician Availability in the Baby Business and Birth Outcomes in New York State

Author: Julie Sullivan (Siena College), ja09sull@siena.edu

Discussant: Cynthia Bansak (St. Lawrence University), cbansak@stlawu.edu

Session 20**International Economics**

9:50 to 11:10

Chair: Juan F. Guerra-Salas (Fordham University), jguerrasalas@fordham.edu

Title: External Constraints and Endogenous Growth: Why Didn't Some Countries Benefit From Capital Flows?

Authors: Karine Gente (Aix-Marseille University, CNRS & EHESS), karine.gente@univ-amu.fr

Miguel A. Leon-Ledesma (University of Kent)
 Carine Nourry (Aix-Marseille University, CNRS & EHESS and IUF)

Discussant: TBA

Title: Turkey's Rising Imports From Brics: A Gravity Model Approach

Author: Gonul Dincer (Gazi University, Department of Economics), gonuld@gazi.edu.tr

Discussant: George P. Gonpu (Anisfield School of Business), ggonpu@ramapo.edu

Title: On the Macroeconomic Determinants of Exchange Rate Instability in Liberia

Author: George P. Gonpu (Anisfield School of Business), ggonpu@ramapo.edu

Discussant: Juan F. Guerra-Salas (Fordham University), jguerrasalas@fordham.edu

Title: FDI in Central and Eastern European countries after the fall of Communism: How did the determinants attracting FDI inflows change over the time?

Author: Angela Solikova (Fordham University, Economics),
solikova@fordham.edu
Discussant: Gonul Dincer (Gazi University, Department of Economics),
gnldincer@gmail.com

Session 21

Finance
9:50 to 11:10
Chair: A. Melih Kullu (Siena College), mkullu@siena.edu

Title: Tail Behavior in East Asian Stock Index Returns and Foreign Exchange Rate Movements

Author: Fangxia Lin (New York City College of Technology, CUNY),
fangxial@hotmail.com

Discussant: Xiaoyu Wu (Ramapo College of New Jersey), xwu@ramapo.edu

Title: Cost of Loans and Group Affiliation

Authors: A. Melih Kullu (Siena College), mkullu@siena.edu
Bill Francis (RPI)

Iftekhar Hasan (Fordham University)

Discussant: Fangxia Lin (New York City College of Technology, CUNY),
fangxial@hotmail.com

Title: Impact of Quantitative Easing on Financial Assets: A Comprehensive Study

Author: Joanne Gue (Department of Economics CUNY Graduate Center),
jguo@gc.cuny.edu

Discussant: A. Melih Kullu (Siena College), mkullu@siena.edu

Title: Immigrants Financing Immigrants: A Case Study of a Chinese-American Rotating Savings and Credit Association in Queens

Authors: Xiaoyu Wu (Ramapo College of New Jersey), xwu@ramapo.edu
Teresa D. Hutchins (Ramapo College of New Jersey),
thutchin@ramapo.edu

Discussant: Hong-Jen Lin (Brooklyn College, CUNY), hjlin@brooklyn.cuny.edu

Session 22

Development
9:50 to 11:10
Chair: Maria Micaela Sviatschi (Columbia University), mms2241@columbia.edu

Title: Mexican Finance: Its Economic Impact and Potential Challenges

Author: Mine Aysen Doyran (Lehman College/CUNY), mdoyran@verizon.net

Discussant: Ambrose Jusu (Farmingdale State College), jusua@farmingdale.edu

Title: Violence and Migration: Evidence from Mexico's Drug War

Authors: Sukanya Basu (Vassar College), subasu@vassar.edu

Sarah Pearlman (Vassar College), sapearlman@vassar.edu

Discussant: Maria Micaela Sviatschi (Columbia University), mms2241@columbia.edu

Title: Longitudinal Data Analysis: Entry and Exit of Multidimensional Child Deprivation and Monetary poverty in Developing Countries

Author: Hoolda Kim (Fordham University), hkim71@fordham.edu

Discussant: Mine Aysen Doyran (Lehman College/CUNY), mdoyran@verizon.net

Title: Macroeconomic Policies and Their Impact on Access to Health Care in Sierra Leone

Author: Ambrose Jusu (Farmingdale State College), jusua@farmingdale.edu
Discussant: Sukanya Basu (Vassar College), subasu@vassar.edu

Session 23 **Health Economics**
9:50 to 11:10
Chair:

Title: The Impact of High Deductible Health Plans on Spending, Utilization and Outcomes

Authors: Daniel Wright (Albany College of Pharmacy and Health Sciences), daniel.wright@acphs.edu
 John M. Polimeni (Albany College of Pharmacy and Health Sciences), john.polimeni@acphs.edu

Discussant: Jang Wook Lee (CUNY Graduate Center), jlee@gc.cuny.edu

Title: Some evidence for rational behavior in Cigarette Consumption

Author: Yansong (Student), kaoru66@gmail.com

Discussant: Sara LaLumia (Williams College), sl2@williams.edu

Title: Assessing the Differences in the Utilization of Colonoscopy Screening for Cancer Prevention between US Veterans and Non-Veterans

Authors: Ritu T. Shah (Albany College of Pharmacy and Health Sciences), ritu.shah@acphs.edu
 Wendy M. Parker (Albany College of Pharmacy and Health Sciences), wendy.parker@acphs.edu

Discussant: Sebastien Buttet (LIU Post), seba.buttet@gmail.com

Title: The Impact of Disability on Basic Consumption Expenditures

Author: Navena Chaitoo (Carnegie Mellon University), nchaitoo@andrew.cmu.edu

Discussant: Ritu T. Shah (Albany College of Pharmacy and Health Sciences), ritu.shah@acphs.edu

Session 24 **Macroeconomics**
9:50 to 11:10

Chair: Florence P. Shu (SUNY at Canton, Michigan State University), shuf@canton.edu

Title: Implications of Deposit Rate Deregulation in U.S. to China

Author: Junwei Chen (Department of Economics, Fordham University), jchen122@fordham.edu

Discussant: James P. Stodder (Lally School of Management), stoddj@rpi.edu

Title: The Macro-Stability of Swiss WIR-Bank Credits: Balance, Velocity and Leverage

Authors: James P. Stodder (Lally School of Management), stoddj@rpi.edu
 Bernard Lietaer (Center for Sustainable Resources, UC Berkeley), bernard@lietaer.com

Discussant: John J. Heim (SUNY Albany), jheim@albany.edu

Title: Dynamic Efficiency and Social Security System

Author: Hyeon Park (Manhattan College), hyeon.park@manhattan.edu

Discussant: Florence P. Shu (SUNY at Canton, Michigan State University), shuf@canton.edu

Title: A 44 Equation Econometric Model of the U.S. Economy
Author: John J. Heim (SUNY Albany), jheim@albany.edu
Discussant: Hyeon Park (Manhattan College), hyeon.park@manhattan.edu

Title: General Equilibrium Modeling
Author: Florence P. Shu (SUNY at Canton, Michigan State University),
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Discussant: Erginbay Ugurlu (Hitit University), erginbay@gmail.com

Session 25

Undergraduate Group B1

9:50 to 11:10

Chair: Manimoy Paul (Siena College), mpaul@siena.edu

Title: Pigovian Taxes and Interacting Pollutants
Author: Mariel Doyle (SUNY Oneonta), doylemrc@gmail.com
Discussant: Smita Ramnarain (Siena College), sramnarain@siena.edu

Title: A Political Economy Analysis of Women and Work in the US and Scandinavia
Author: Jacquelyn Toomey (Siena College), ja04toom@siena.edu
Discussant: Kristin Jones (Hartwick College), jonesk@hartwick.edu

Title: The Lipstick Effect: Time series analysis of consumer spending data in the United States from 2000-2013
Author: Ivan Kim Taveras (Farmingdale State College),
ivankimtaveras@gmail.com
Discussant: James Booker (Siena College), jbooker@siena.edu

Title: South Korea and Brazil: Is the Asian Development Miracle Applicable to Latin America's Economic Giant?
Authors: Daniel Menoncin (Siena College), d06tucu@siena.edu
Ademir dos Santos (Siena College), a04doss@siena.edu
Cruz Caridad Bueno, Ph.D. (Siena College), cbueno@siena.edu
Discussant: Robert Culp (Dalton State College), rculp@daltonstate.edu

Title: The Earned Income Tax Credit and Fertility
Author: Wahid T. Khan (Ithaca College), wkhan1@ithaca.edu
Discussant: William P. O'Dea (SUNY Oneonta), odeawp@oneonta.edu

Session 26

Undergraduate Group B2

9:50 to 11:10

Chair: Della L. Sue (Marist College), della.lee.sue@marist.edu

Title: Do prison bars divide families?
Author: Audrey Allen (Siena College), aeallen32@gmail.com
Discussant: Jeffrey Wagner (Rochester Institute of Technology), mjwgse@rit.edu

Title: The Effects of Immigration on Wages from 2010-2010
Author: Angelica Aldana (SUNY Oneonta), aldaa78@suny.oneonta.edu
Discussant: Della L. Sue (Marist College), della.lee.sue@marist.edu
Title: The Effects of Capital and Race on Volunteering and Well-Being in the United States
Author: Rosa Ammon-Ciaglo (Barnard College, Columbia University),
rosakciaglo@gmail.com
Discussant: Kpoti Kitissou (Skidmore College), kkitisso@skidmore.edu

Title: Green Tech High COLLEGE Preparedness Survey
Author: Conor Quinn (Siena College Undergrad), c19quin@siena.edu
Discussant: Cynthia Bansak (St. Lawrence University), cbansak@stlawu.edu

Session 30 Gender Economics

Time and room:

Chair: Cruz Caridad Bueno (Siena College), cbueno@siena.edu

Title: Evaluating the Poverty Status of Single-Parents: Evidence of the Feminization of Poverty

Authors: Ashley Provencher (Siena College), aprovencher@siena.edu
 Audrey Sabatini (Siena College), ae10saba@siena.edu

Discussant: Smita Ramnarain (Siena College), sramnarain@siena.edu

Title: Unpacking female headship in the aftermath of violent conflict

Author: Smita Ramnarain (Siena College), sramnarain@siena.edu

Discussant: Ashley Provencher (Siena College), aprovencher@siena.edu

Title: The Impact of the Great Recession and the American Recovery and Reinvestment Act of 2009 (ARRA) on the Occupational Segregation of Black Men in Comparison to Women

Author: Michelle Holder, (John Jay College of Criminal Justice), michelleholder999@gmail.com

Discussant: Audrey Allen

Title: Using a Multinomial Logit Approach to Understand Justifications for Gender Violence: Evidence from the Dominican Republic

Author: Cruz Caridad Bueno (Siena College), cbueno@siena.edu

Discussant: Michelle Holder

Session 31 Economics Education

12:50 to 2:10

Chair: Della L. Sue (Marist College), della.lee.sue@marist.edu

Title: The Classroom Time Management Spectrum: Finding the Balance

Author: Clair Smith (St. John Fisher College), csmith@sjfc.edu

Discussant: Xu Zhang (Farmingdale State College, SUNY), xu.zhang@farmingdale.edu

Title: Using Audience Response System to Enhance Principles of Economics Classes: Practices and Challenges

Author: Xu Zhang (Farmingdale State College, SUNY), xu.zhang@farmingdale.edu

Discussant: Bilesha Weeraratne (Institute of Policy Studies), bweeraratne@gc.cuny.edu

Title: A quasi-experiment on the effect of e-learning on educational progress and improvement in mathematics in Sri Lanka

Authors: Bilesha Weeraratne (Institute of Policy Studies), bweeraratne@gc.cuny.edu
 Dr. Brian Chin (Asian Development Bank), bchin@adb.org

Discussant: Clair Smith (St. John Fisher College), csmith@sjfc.edu

Title: An Analysis of Student Performance in Principles of Economics Courses

Author: Della L. Sue (Marist College), della.lee.sue@marist.edu

Discussant: TBA

Session 33 Environmental Economics

12:50 to 2:10

Chair: James Booker (Siena College), jbooker@siena.edu

Title: Public Perceptions of Shale Gas Development in New York State: The Role of Media

Authors: James Booker (Siena College), jbooker@siena.edu
Marissa Bianchi (Siena College), mi06bian@siena.edu
Koushik Pernati (Siena College), kr06pern@siena.edu

Discussant:

Title: The Impact of Urbanization on CO2 Emissions in Transition Countries

Authors: Erginbay Ugurlu (Hitit University), erginbay@gmail.com
Graciela Chichilnisky (Columbia University), chichilnisky1@gmail.com

Discussant: James Booker (Siena College), jbooker@siena.edu

Title: Public Perceptions of Shale Gas Development in New York State: The Role of Media

Authors: James Booker (Siena College), jbooker@siena.edu
Sabrina Habib (University of Texas at Arlington), shabib@uta.edu
Sonja Vukovic (Eckerd College), svukovi@eckerd.edu
Sharon Small (Siena College), ssmall@siena.edu

Discussant: Alan Lockard (St. Lawrence University), alockard@stlawu.edu

Title: Improvement of the Regulation of Power Plant Emissions Based on Locational Methods

Authors: Biao Mao (Rensselaer Polytechnic Institute), maob@rpi.edu
Daniel Shawhan (Rensselaer Polytechnic Institute), shawhd@rpi.edu
John Taber (US Federal Energy Regulatory Commission), jtt24@cornell.edu

Discussant: Ray Zimmerman (Cornell University), rz10@cornell.edu

Discussant: Erginbay Ugurlu (Hitit University), erginbay@gmail.com

Session 34 Industrial Organization and Microeconomics

12:50 to 2:10

Chair: Jeffrey Wagner (Rochester Institute of Technology), mjwgse@rit.edu

Title: Do Tax-Exempt Nonprofits Undermine U.S. Business Dynamism?

Author: L. Chukwudi Ikwueze (Borough of Manhattan Community College (BMCC), CUNY), chuikwueze@aol.com

Discussant: Stacey Mirinaviciene (Keuka College), smirinav@yahoo.com

Title: Price Cycles and the Level of Margin in Retail Fuel Markets

Author: Sean P. Isakower (NYS Dept. of Public Service), sean.isakower@dps.ny.gov

Discussant: Jeffrey Wagner (Rochester Institute of Technology), mjwgse@rit.edu

Title: An Empirical Analysis of the Korean Photovoltaic Industry Focusing on Adjustment to External Shocks

Author: Yu-li Ko (Rensselaer Polytechnic Institute), koy2@rpi.edu

Discussant: Sean P. Isakower (NYS Dept. of Public Service), sean.isakower@dps.ny.gov

Title: Fairness versus Efficiency in US Revolutionary War Debt Redemption

Authors: Jeffrey Wagner (Rochester Institute of Technology), mjwgse@rit.edu

Jonathan Stone (First author) (Undergraduate student, RIT Dept. of Economics), ips6895@rit.edu
Discussant: Ranjit Dighe (SUNY Oswego), ranjit.dighe@oswego.edu

Title: A taste for temperance: How American beer got to be so bland
Author: Ranjit Dighe (SUNY Oswego), ranjit.dighe@oswego.edu
Discussant: L. Chukwudi Ikwueze (Borough of Manhattan Community College (BMCC), CUNY), chuikwueze@aol.com

**Session 35 Sports Economics
 12:50 to 2:10**

Chair: Michael McAvoy (SUNY Oneonta), michael.mcavoy@oneonta.edu

Title: Production Functions in Major League Baseball—A Star Input Method
Author: Thomas H. Bruggink (Lafayette College), bruggint@lafayette.edu
Discussant: Ruohan Wu (Alabama State University), rwu@alasu.edu

Title: The Reserve and Labor Exploitation at the Beginning of Organized Baseball: The Case of the 1880s Reds
Author: Michael McAvoy (SUNY Oneonta), michael.mcavoy@oneonta.edu
Discussant: Ambrose Jusu (Farmingdale State College), jusua@farmingdale.edu

Title: Socio Economic factors behind Soccer winning nations
Authors: Manimoy Paul (Siena College), mpaul@siena.edu
 Nils Weddig (Siena College), ns12wedd@siena.edu
Discussant: Michael McAvoy (SUNY Oneonta), michael.mcavoy@oneonta.edu

**Session 36 Finance
 12:50 to 2:10**

Chair: Alex Chung (Norwich U), wchung@norwich.edu

Title: Information Content and Group Affiliation
Authors: A. Melih Kullu (Siena College), mkullu@siena.edu
 Bill Francis (RPI)
 Iftekhar Hasan (Fordham University)
Discussant: Alex Chung (Norwich U), wchung@norwich.edu

Title: Exchange Rate Pass-Through and the Role of Market Shares
Author: Michael Malenbaum (Hunter College), mmalenbaum@gc.cuny.edu
Discussant: A. Melih Kullu (Siena College), mkullu@siena.edu

Title: Skewness on Equity Portfolio Selection: Evidence from the US Stock Market
Authors: Alex Chung (Norwich University), wchung@norwich.edu
 Rong Qi (St. Johns University), rchi_1999@yahoo.com
Discussant: Zhaohui Zhang (Long Island University – Post), zhaohui.zhang@liu.edu

**Session 40 Labor Economics
 2:25 to 3:45**

Chair: Wade L. Thomas (SUNY Oneonta), wade.thomas@oneonta.edu

Title: Medicare Expenditures, Social Security Reform, and the Labor Force Participation of Older Americans

- Author:** Yuanyuan Deng (Stony Brook University), yuanyuan.deng@stonybrook.edu
- Discussant:** Manimoy Paul (Siena College), mpaul@siena.edu
- Title:** The Effect of Degree Attainment on Crime: Evidence from a Randomized Social Experiment
- Authors:** Daniel Parisian (Binghamton University SUNY), dparisi2@binghamton.edu
Alfonso Flores-Lagunes (Syracuse University)
Carlos A. Flores (Cal Poly San Luis Obispo)
Vikesh Amin (Central Michigan University)
- Discussant:** Wade L. Thomas (SUNY Oneonta), wade.thomas@oneonta.edu
- Title:** Redefining the Internship in the Face of Legal Realities and Economic Valuations
- Authors:** Wade L. Thomas (SUNY Oneonta), wade.thomas@oneonta.edu
Magdalena Lorenz, Lecturer of Law (SUNY Oneonta), magdalena.lorenz@oneonta.edu
Wade L. Thomas (SUNY Oneonta), wade.thomas@oneonta.edu
- Discussant:** Sara LaLumia (Williams College), sl2@williams.edu
- Title:** Changes in the Employment Status of the Adult Population during the Great Recession
- Author:** Robert Jones (Skidmore College), rjones@skidmore.edu
- Discussant:** Daniel Parisian (Binghamton University SUNY), dparisi2@binghamton.edu
- Title:** The Added Worker Effect Revisited: Differential Responses by Husbands and Wives
- Authors:** Sara LaLumia (Williams College), sl2@williams.edu
Laura Kawano (U.S. Department of Treasury)
- Discussant:** Robert Jones (Skidmore College), rjones@skidmore.edu

Session 41

Industrial Organization

2:25 to 3:45

Chair: Gayle DeLong (Baruch College), gayle.delong@baruch.cuny.edu

- Title:** The Impact of Minimum Age and Child Access Prevention Laws on Firearm-Related Youth Suicides and Accidental Deaths
- Author:** Mark Gius (Quinnipiac University), mark.gius@quinnipiac.edu
- Discussant:** Gayle DeLong (Baruch College), gayle.delong@baruch.cuny.edu
- Title:** Simply Because We Can, Does Not Mean We Should: A Proposal for Policymakers to Decline Opportunities to Regulate (and Strangulate) 3-D Printing
- Author:** Joseph Storch (University at Albany), joestorch@gmail.com
- Discussant:** Mark Gius (Quinnipiac University), mark.gius@quinnipiac.edu
- Title:** Does eliminating product liability affect market value?
- Author:** Gayle DeLong (Baruch College), gayle.delong@baruch.cuny.edu
- Discussant:** Alan Lockard (St. Lawrence University), alockard@stlawu.edu

Session 42**Public Economics**

2:25 to 3:45

Chair: Erin Crockett (Mount Saint Mary College), erin.crockett@msmc.edu**Title:** Monitoring Corruption in Public Procurement**Author:** Yajun Wang (Stony Brook University, Economics Department),
yajun.wang@stonybrook.edu**Discussant:** Erin Crockett (Mount Saint Mary College), erin.crockett@msmc.edu**Title:** Binding Ulysses to the Mast: Credible Commitment in New York Disaster Relief Policy**Author:** Clair Smith (St. John Fisher College), csmith@sjfc.edu**Discussant:** Michael Jerison (SUNY Albany), m.jerison@albany.edu**Title:** Cognitive Ability and Risk Preference: Evidence from the BLS**Author:** Erin Crockett (Mount Saint Mary College), erin.crockett@msmc.edu**Discussant:** Clair Smith (St. John Fisher College), csmith@sjfc.edu**Session 43****Macroeconomics**

2:25 to 3:45

Chair: Andrew Bossie (Barnard College), andrew.a.bossie@gmail.com**Title:** The Cost of Job Loss during the Recovery from the Great Recession**Authors:** Aaron Pacitti (Siena College), apacitti@siena.edu
Melissa Fichera (Siena College), md02fich@siena.edu**Discussant:** Andrew Bossie (Barnard College), andrew.a.bossie@gmail.com**Title:** Government Investment and the Business Cycle in Oil-Exporting Countries**Author:** Juan F. Guerra-Salas (Fordham University), jguerrasalas@fordham.edu**Discussant:** Aaron Pacitti (Siena College), apacitti@siena.edu**Title:** Can Monetary and Fiscal Policy Stimulate the Economy? Results of Extensive Econometric Testing**Author:** John J. Heim (SUNY Albany), jheim@albany.edu**Discussant:** Juan F. Guerra-Salas (Fordham University), jguerrasalas@fordham.edu**Session 44****Economics Education**

2:25 to 3:45

Chair: William P. O'Dea (SUNY Oneonta), odeawp@oneonta.edu**Title:** Some Approaches to Undergraduate Research in Economics**Author:** Jeffrey Wagner (Rochester Institute of Technology),
jeffrey.wagner@rit.edu**Discussant:** Sean P. MacDonald (New York City College of Technology-CUNY),
smacdonald@citytech.cuny.edu**Title:** Student Evaluations: What is a Chair to Do?**Author:** William P. O'Dea (SUNY Oneonta), odeawp@oneonta.edu**Discussant:** Jeffrey Wagner (Rochester Institute of Technology), mjwgse@rit.edu**Title:** From Local to Global: The Role of Interdisciplinary Field Research in Teaching Environmental Economics**Author:** Sean P. MacDonald (New York City College of Technology-CUNY),
smacdonald@citytech.cuny.edu**Discussant:** Kristin Jones (Hartwick College), jonesk@hartwick.edu

Title: Classroom-Level Test-Based Accountability and Teacher Turnover
Author: Kristin Jones (Hartwick College), jonesk@hartwick.edu
Discussant: William P. O'Dea (SUNY Oneonta), odeawp@oneonta.edu

Session 45

Public Policy
2:25 to 3:45

Chair: Richard Vogel (Farmingdale State College), richard.vogel@farmingdale.edu

Title: The Impact of Super-Storm Sandy on State Tax Revenues and Economic Activity

Author: Richard Vogel (Farmingdale State College),
richard.vogel@farmingdale.edu

Discussant: Robert Culp (Dalton State College), rculp@daltonstate.edu

Title: Impact of Cross-Border Shopping on Sales Tax Revenue: New York State's International Border Counties

Authors: William Peek (Niagara University), wap@niagara.edu
Kristine Principe (Niagara University), kprincipe@niagara.edu
Jay Walker (Niagara University), jwalker@niagara.edu

Discussant: Richard Vogel (Farmingdale State College),
richard.vogel@farmingdale.edu

Title: The Determinants of EPA Budget From 1980-2013

Authors: L. Chukwudi Ikwueze (Borough of Manhattan Community College (BMCC), CUNY), chuikwueze@aol.com
Eugenia Bietry (Fashion Institute of Technology, SUNY),
eb40@caa.columbia.edu

Discussant: William Peek (Niagara University), wap@niagara.edu

Title: The DeFacto Negative Income Tax in the United States: Could a True Negative Income Tax Be Implemented at the Same Cost?

Author: Robert Culp (Dalton State College), rculp@daltonstate.edu

Discussant: L. Chukwudi Ikwueze (Borough of Manhattan Community College (BMCC), CUNY), chuikwueze@aol.com

Session 46

Gender Economics
2:25 to 3:45

Chair: Prabal De (Dept. of Economics and Business), pde@ccny.cuny.edu

Title: Maternal Education and Health Beliefs

Author: Prabal De (Dept. of Economics and Business), pde@ccny.cuny.edu

Discussant: Kpoti Kitissou (Skidmore College), kkitisso@skidmore.edu

Title: Long-term Effects of Temporary Labor Demand: Free Trade Zones, Female Education and Marriage Market Outcomes in the Dominican Republic

Author: Maria Micaela Sviatschi (Columbia University), mms2241@columbia.edu

Discussant: Prabal De (Dept. of Economics and Business), pde@ccny.cuny.edu

Title: Correlates of Wife Beating in Africa

Authors: Kpoti Kitissou (Skidmore College), kkitisso@skidmore.edu

Bong Joon Yoon (Binghamton University), yoony@binghamton.edu

Discussant: Sukanya Basu (Vassar College), subasu@vassar.edu

Session 32

Labor Economics

2:25 to 3:45

Chair: Bilesha Weeraratne (Institute of Policy Studies), bweeraratne@gc.cuny.edu

Title: Do Small Businesses Create More Jobs? New Evidence for New York State from Quarterly Workforce Indicators

Authors: Arindam Mandal (Siena College), amandal@siena.edu
Mankirat Singh (Siena College), m09sing@siena.edu

Discussant: Bilesha Weeraratne (Institute of Policy Studies),
bweeraratne@gc.cuny.edu

Title: Doubles or Nothing: An Analysis of Tournament Entry Choices on the WTA and ATP

Authors: Darius J. Conger (Independent Scholar), dconger@htva.net
Ryan E. Cruze (New Mexico State University), mr.ryancruz@gmail.com

Discussant: Arindam Mandal (Siena College), amandal@siena.edu

Title: Female Domestic Workers in the Middle East: Does Recruitment Through an Agent Minimize Vulnerability?

Author: Bilesha Weeraratne (Institute of Policy Studies),
bweeraratne@gc.cuny.edu

Discussant: Darius J. Conger (Independent Scholar), dconger@gtva.net

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