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Dear Readers,

This issue of the *University of Toronto Economic Review* carries the journal into its second year. Although nearly all of the *Review's* original editors have graduated and thus left the journal, we believe that this issue builds on the foundation of diligence that they established. Most of the credit is not ours, however, but belongs to the students and instructors who continue to bring enthusiasm and rigour to their work.

Last year, the inaugural issue of the *Review* published work done exclusively by undergraduates at the University of Toronto. This year we maintained our focus on undergraduate work, but sought submissions from universities across North America. We hoped that this expansion would help connect students in Toronto with others across the continent while furthering our mission of publishing undergraduate work. This expansion proved a success, and we plan to continue in the coming years.

In this issue, we have selected four papers that highlight the breadth of topics that students in economics study. First, Matthew Tudball uses data on the *Bolsa Família* program in Brazil to investigate the effect of revealed corruption on those in power. Next, Spencer Koo studies Asian and Hispanic immigrants in the United States, exploring possible causes of differential rates of assimilation and success. Enhua Hu then explains a common problem in traditional microeconomic models, and introduces a novel theoretical solution. Finally, Monika Idzior presents a brief history of the development of modern economics and its conceptions of rational behaviour.

As these works show, researchers in economics continue to expand inquiry, develop models, and challenge assumptions. These are not symptoms of an immature discipline; rather, they are fundamental aspects of any scientific and rigorous field. We are honoured to be a part of this process, and proudly present the second issue of the *University of Toronto Economic Review*.

Editors
Spring 2016

Voter Information and Clientelistic Incentives: Evidence from a Brazilian Quasi-Experiment

Matthew Tudball

University of Toronto

1 INTRODUCTION

Suppose that the corruption of a mayor who has secretly been embezzling funds, forging financial records and taking and giving out bribes is suddenly revealed to the voters of his municipality. There is well-established literature on how voters will respond to such a revelation; they will punish the mayor in the next election. What has not been studied in much detail is how the mayor will respond. Will he try to “clean up his act”, pulling back on corruption and rebuilding his image before the next election? Or will he go deeper into corruption, attempting to buy voters and bribe his party back into office? This paper will attempt to answer those questions by looking at the interaction of two unique Brazilian policies.

The first policy is called Programa de Ficalização por Sorteio Públicos (Inspection Programme for Public Sweepstakes), managed by the Controladoria Geral da União (CGU). With only a couple of exceptions, since July 2003 in each of the 39 public lotteries that have been held in Rio De Janeiro, 50 to 60 of Brazil’s 5,500 municipalities have been randomly selected for audit. Once the municipalities have been selected, a team of competitively paid auditors are sent to each of them to evaluate the local government’s use of federal funds from 2001 onwards, looking for irregularities that may suggest corruption or incompetence. Once completed, the auditors’ reports are posted to the internet and released to the media. The intended outcome of the reports is twofold: to provide evidence for federal prosecutors and to inform voters of the practices of their local governments.

The second policy is called Bolsa Família (Family Allowance), which is a conditional cash transfer (CCT) policy that is funded by the federal government. A CCT is a simple stipend paid directly to a poor family “with strings attached”; that is, the money is conditional on them fulfilling some set of requirements, such as sending their children to school, getting them immunised, etc. Brazil is unique in that fiscal and managerial responsibility for many government services, such as healthcare, education and social welfare, have been devolved to the country’s municipalities, and Bolsa Família is no exception. Although the families supported by Bolsa Família are vetted and then paid directly by the federal government, it is the responsibility of the municipal governments to both produce lists of candidate families and ensure that those families who are selected end up following through with the CCT’s conditions. Municipal governments can also choose to “top up” Bolsa Família by allocating funds to their own CCT programmes. Bolsa Família is interesting because existing literature suggests that it could be being used as a channel for clientelism, where mayors will place more people into Bolsa Família, regardless of their eligibility, as a way of “buying their votes”.

If the existing literature is true, then we should expect that as a mayor’s beliefs over their party’s likelihood of winning the next election change, Bolsa Família coverage and spending in their municipality should change too. Working on this assumption, I examine the effect of Programa de Ficalização por Sorteio Públicos on Bolsa Família. If municipalities whose corrupt mayor has been audited have more Bolsa Família coverage compared to corrupt mayors were not audited, then we have evidence that the mayors’ incentive to buy more votes dominates their incentive to clean up their act. This would represent a potential pitfall of the auditing process that has never before been examined. More generally, it would provide some insight into how politicians respond to an exogenous shock to voter information about their engagement in corruption.

For my estimation strategy, I take advantage of a discontinuity in the incentives of mayors. In the lotteries that have been carried out so far, there have been 243 mayors for whom their reports were released before the 2004 municipal elections, and 800 mayors for whom their reports were released afterwards. For the first set of mayors, the reports will have had an impact on

their electoral outcomes, and therefore would have changed their incentives to engage in clientelism. For the second set of mayors, the reports will have been released too late for them to have had an effect on the election. Using a standard OLS framework with state fixed effects, I compare the effects of corruption and the audits between these two groups. For robustness, I use several indices of both Bolsa Família coverage and the corruption of audited mayors.

The parameters of interest in my model's final specifications are all significant at the 1% level. Among mayors audited after the 2004 election, the model predicts that a 1 percentage point increase in the proportion of audited funds involved in corruption is associated with a 0.03 percentage point increase in the proportion of the municipality's population enrolled in Bolsa Família and a R\$0.03 increase in spending per capita. Among mayors audited before the 2004 elections, on the other hand, the model predicts a 0.07 percentage point decrease in the proportion of the municipality's population enrolled in Bolsa Família and a R\$0.05 *decrease* in spending per capita.

I cannot say with certainty why corrupt mayors tend to pull back on Bolsa Família so strongly after a pre-election audit, but if the existing literature's claims of Bolsa Família as a clientelistic channel are true, then these findings provide strong evidence that Programa de Ficalização por Sorteio Públicos pushes mayor's incentives in a direction that is better for proper democratic governance.

2 CONTEXT AND DATA

2.1 HISTORY AND LITERATURE REVIEW

There are host of problems with providing welfare and social assistance in developing countries. Some of those problems are logistical, stemming from a lack of infrastructure, funding, oversight or managerial ability, and some of those problems stem from incentive misalignments, where "hand-outs" might disincentivise investment in human capital. To work around both sets of problems simultaneously, Mexico introduced the first Latin American CCT policy, PROGESA, in 1997. This policy quickly caught on in Brazil, where in 2003 the government of Luiz Inácio Lula da Silva established Bolsa Família, which combined existing CCT programmes into a consolidated federal entity

with its own ministry, the Ministry for Social Development and War Against Hunger. Bolsa Família began with 3.6 million families enrolled in 2003 to around 13 million by the 2010 federal elections, representing 26% of the Brazilian population.

Zucco (2013) examines the impact of Bolsa Família on Brazilian federal elections in 2002, 2006 and 2010. He used the heterogeneity of similar municipalities in terms of Bolsa Família coverage to test if there was any relative preference for the incumbent party in municipalities with more coverage. He took two distinct approaches to this question. He initially matches municipalities on a vector of relevant characteristics and compares an OLS of incumbent vote share on Bolsa Família coverage only within those matched municipalities. This restricts the assumption of homogeneous treatment effects only within groups of similar municipalities. Using this method, the author finds that in the earlier years of Bolsa Família, a R\$100 increase in annual per capita coverage could lead to as much as a 15% increase in the incumbent's vote share. By 2010, however, this was only 3%. What this may suggest is that the effectiveness of Bolsa Família as a channel for clientelism is decreasing over time, maybe as a product of diminishing returns or that the novelty of the programme is wearing off for voters.

Zucco (2013) also analyses two surveys conducted just before the 2006 and 2010 federal elections, managed by Vox Populi and the Brazilian Electoral Panel Survey respectively. Respondents were asked about their relationship with Bolsa Família, whether they or anyone they knew were receiving coverage, and were also asked about their electoral preferences. These surveys allowed the author to parse out the individual effects of Bolsa Família on electoral outcomes by directly comparing preferences among recipients and non-recipients. For the 2006 respondents, among the poorest voters the effect of Bolsa Família is an almost 35% increase in the probability that they will vote for the incumbent. At the next income bracket up, this effect increases to 45%. The 2010 responses showed a less dramatic but still positive effect, with Bolsa Família coverage representing an almost 30% increase in the probability of a vote for the incumbent. The author uses his findings to suggest that Bolsa Família could be a channel for electoral clientelism, such that municipalities that promote more coverage may be using it as a way to buy votes. The author cannot present any evidence of this hypothesis,

however.

Ferraz and Finan (2008), on the other hand, examine the effect of Programa de Fiscalização por Sorteio Públicos on the electoral outcomes of municipal governments. To generate their data, they go through each of the publicly available audit reports from July 2003 to June 2005 and assign a variable for the number of corruption violations. They restrict their sample to municipalities in which the incumbent mayor is up for re-election. In a similar approach to Zucco (2013), they then regress a dummy for whether the incumbent mayor was re-elected on the number of corruption violations in the report. Because the audit programme is random, the authors assume that their estimates are exogenous to the characteristics of the municipality and the qualities of the mayor. The authors find no average effect of the anti-corruption programme on electoral outcomes; that is, there is no evidence that being audited by itself has any impact on the incumbent's probability of re-election. There is, however, a sharply negative effect on re-election rates as the number of corruption violations approaches 3%, and an audit uncovering no corruption violations has a positive effect on re-election rates.

2.2 DATA

In this section I describe why I chose the data I use and where I collected it from. I limit my data to the last year of the 2001–2004 municipal term for two reasons. The first is that Bolsa Família was very new at that time, having only been implemented toward the end of 2003. Because of this, the difference between the rates of Bolsa Família coverage in similar municipalities can be attributed strictly to the policies of the current mayor. Parameter estimates for a similar analysis extended to the 2005–2008 and the 2009–2012 mayoral terms could capture the enrolment decisions of previous mayors.

The second is that Programa de Fiscalização por Sorteio Públicos was also very new in that period, having been implemented in the same year as Bolsa Família. This did not give the 2001–2004 term mayors much time to adjust their corruption behaviour out of fear of being audited. As Programa de Fiscalização por Sorteio Públicos has become better established over time, it is plausible that mayors have compensated for it, covering up their tracks better or using different methods to embezzle funds. This would

limit the exogeneity of the audit, since not all mayors would respond the same way, perhaps depending on the characteristics of their municipality and the resources available to them. I therefore consider the 2001 – 2004 term the most useful in explaining the effects of the audit on clientelistic behaviour. Because of this, my data is cross-sectional, using only Bolsa Família coverage in 2004, which is the only year in this term for which data is available.

I use the Fundação Instituto de Pesquisa Econômica Aplicada (Institute for Applied Economic Research, IPEA) website to download data on the coverage of Bolsa Família in Brazilian municipalities in 2004. I use two measures of coverage: the percentage of people in the municipality receiving Bolsa Família payments and Bolsa Família spending per capita. As we will see in Section 4, the two measures produce similar predictions. I also use IPEA data for my control variables. I use a vector of 21 municipality characteristics that indicate the municipality’s social and economic status. This vector includes per capita income, over 25 illiteracy rates, the proportion of houses with running water, inequality as measured by the Theil index, etc. (see Table 1 for a full list of the control variables with explanation). All of the control variables were measured in the year 2000. Since the indicators I selected tend to be slow-moving with respect to time, I believe that they provide a fair approximation of the state of the municipality in 2003 and 2004. To control for heterogeneity in the municipality’s “top up” of Bolsa Família, I also control for the proportion of the municipal budget in 2003 and 2004 that is allocated to welfare and healthcare spending.

For the anti-corruption audits, I use data compiled for Brollo (2013). This data outlines the outcomes of the first 29 audits, which covered 2,443 not necessarily unique municipalities. Since I am only interested in the audits that covered the 2001 – 2004 municipal term, I limit the Brollo (2013) sample only to those audits. This reduced the dataset to 1034 audits, 234 occurring before the election and 800 occurring after it.

For each audit, the Brollo (2013) data has a dummy *broad* equal to 1 if there was at least one instance of “broad” corruption and a dummy *narrow* equal to 1 if there was at least one instance of “narrow” corruption. Broad corruption is defined as irregularities that could be interpreted as incompetence rather than corruption. Narrow corruption only includes severe

irregularities that can confidently be attributed to corruption. The data also have two continuous variables: the percentage of audited funds involved in broad corruption and the percentage of audited funds involved in narrow corruption.

3 MODEL

3.1 TREATMENT EFFECT CONDITIONED ON CORRUPTION

I begin my analysis of the anti-corruption audits by examining how the existence and magnitude of corruption affects Bolsa Família coverage between the treatment and control groups, where the treatment is defined as an audit occurring before the election. In the interest of robustness, at this juncture I split my model into two approaches, one using discrete indicators defined by dummy variables for narrow corruption, and one using the continuous percentage of audited funds involved in narrow corruption. I use the indicators of narrow corruption instead of broad corruption because those indicators cut out irregularities that could be attributed to mismanagement or incompetence rather than corruption. The two models are as follows:

$$BF_{ms} = \beta_0 + \beta \mathbf{X}_{ms} + \gamma A_{ms} + \sigma_1 N_{ns} + \sigma_2 (N_{ms} x A_{ms}) + \xi_s + \epsilon_{ms} \quad (1)$$

BF_{ms} denotes an index of Bolsa Família coverage or spending in municipality m in state s . \mathbf{X}_{ms} is a vector of municipality characteristics and A_{ms} is a dummy variable equal to 1 if the mayor's audit report was released before the election and 0 otherwise. N_{ms} is also a dummy, equal to 1 if there was at least one instance of narrow corruption in the audit report, and $N_{ms} x A_{ms}$ is the interacted effect of a corrupt mayor who was audited before the election. ξ_s is a state fixed effect and ϵ_{ms} is the municipality error term.

$$BF_{ms} = \beta_0 + \beta \mathbf{X}_{ms} + \gamma A_{ms} + \sigma_3 NP_{ns} + \sigma_4 (NP_{ms} x A_{ms}) + \xi_s + \epsilon_{ms} \quad (2)$$

NP_{ms} is a continuous variable of the percentage of audited funds involved in narrow corruption and $NP_{ms} x A_{ms}$ is the interaction of the magnitude of narrow corruption with an audit being released prior to the election. Since

the treatment effect is random (an assumption that will be tested in Section 5), we will expect σ_1 , σ_2 , σ_3 , and σ_4 to be unbiased estimates. The main parameter of interest in model (2) is σ_2 , which explains the differential effect of the audit conditioned on the existence of at least one incident of corruption. The main parameter in model (3) is σ_4 , which explains the differential effect of the audit along a continuum of corruption values.

I am also secondarily interested in the parameter estimates σ_1 and σ_3 in model (2) and (3) respectively. These parameters estimate the effect of corruption among unaudited mayors on Bolsa Família coverage before the treatment. In particular, a positive parameter would indicate that corrupt politicians in similar municipalities tend to place more people into Bolsa Família, which is what I expect to see.

4 RESULTS AND DISCUSSION

In this section I present and interpret the results from models (1) and (2), following the order of Section 3.

4.1 TREATMENT EFFECT CONDITIONED ON CORRUPTION DUMMY

Table 1 presents the results of various specifications of model (1). Columns (1) – (2) estimate the conditional treatment effect on the percentage of the population enrolled in Bolsa Família and columns (3) – (4) estimate the same on Bolsa Família spending per capita. In general, the models are a good fit to the data, with the R^2 around 0.6 in the regressions without municipality controls and around 0.75 in the regressions with them.

There are no significant parameters in any specification of the model, and none of the the joint effects of being audited or corrupt are significant. That said, significance notwithstanding, there are some consistencies in the signs of the estimates. As expected, the sign of σ_2 is positive in every model specification, which would indicate that corrupt politicians who were not revealed before the 2004 election place more people into Bolsa Família. The sign of the interacted term σ_2 , on the other hand, is negative every model specification, suggesting that corrupt politicians who were revealed before the election have relatively lower Bolsa Família coverage and spending.

The insignificance of both corruption indices was unexpected, but under

some conditions it could make sense. The insignificance of both σ_1 and σ_2 could be because of the limited way in which this set of regressions defines corruption: by a dummy if at least one incident of corruption was reported. How mayors respond could depend on the voters' prior beliefs about the level of corruption in their municipality. If the audit report reveals that the mayor is less corrupt than the voters expected, then the mayor's response to the report could be relatively small, since the audit has improved his party's expected performance in the next election. If this is the case, then the continuous measure of corruption in Table 2 may be a better indicator, since it varies in the level of corruption. As the level of reported corruption becomes higher, the likelihood that it exceeded voters' expectations increases.

Table 1: Treatment Effect Conditioned on Corruption Dummy

Dependent Variables: Bolsa Família coverage (C) & Bolsa Família spending (S)				
	C	C	S	S
	(1)	(2)	(3)	(4)
Pre-election audit	0.12 (0.18)	0.04 (0.15)	0.1 (0.14)	0.05 (0.11)
Corruption dummy	0.09 (0.16)	0.01 (0.13)	0.08 (0.12)	0.002 (0.1)
Pre-election audit x Corruption	-0.26 (0.37)	-0.18 (0.31)	-0.19 (0.28)	-0.11 (0.23)
Constant	3.34 (0.4)	11.94 (4.79)	2.16 (0.27)	7.8 (3.42)
State Fixed Effects	Yes	Yes	Yes	Yes
Municipality controls	No	Yes	No	Yes
Observations	1034	1034	1034	1034
R Squared	0.62	0.75	0.63	0.77

Robust standard errors are displayed in parentheses. Significantly different from zero at 99 (***), 95 (**), 90 (*) % confidence.

4.2 TREATMENT EFFECT CONDITIONED ON CORRUPTION MAGNITUDE

Figure 1 and 2 present the naive relationship between the continuous variable for corruption and Bolsa Família coverage in the treatment and control groups respectively. Since about 93% of the observations occurred between

0% and 20%, for the purpose of limiting noise I restrict the figure to these observations. There is a slight upward trend in (II) as the magnitude of the mayors' corruption increases and this trend does not appear to be non-linear, but there is little discernible trend in (I). I may need to control for state fixed effects and municipality characteristics before a clear correlation emerges.

Table 2 presents the the results of various specifications of model (2). There were some observations in the Brollo (2013) dataset for which the continuous corruption measure was missing, so I now have 983 observations instead of 1034. The dependent variables are the same as in Table 3, except the measure of corruption is now continuous. In the specifications of the model with municipality controls, σ_1 and σ_3 are positive and significant at the 1% level, with $F(1, 933) = 8.81$ in (2) and $F(1, 933) = 8.65$ in (4). In regression (2), $\sigma_1 = 0.03$, indicating that for mayors whose reports were released after the election, a 1 percentage point increase in the proportion of audited funds involved in corruption is associated with a 0.03 percentage point increase in Bolsa Família coverage. From the baseline average, a mayor for whom 5% of their municipality's audited funds were involved in corruption would have 2.90% more of their population enrolled in Bolsa Família. In regression (4), $\sigma_3 = 0.03$, indicating that a 1 percentage point increase in corrupted funds is associated with a R\$0.03 increase in Bolsa Família spending per capita. Using the same example as before, a municipality with 5% of their funds involved in corruption will spend 4.24% more per capita from the baseline average.

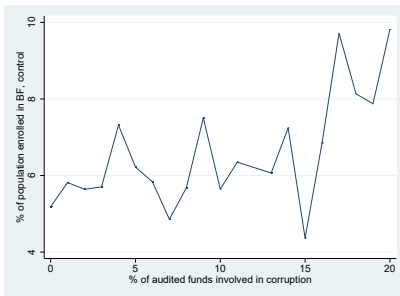


Figure 1

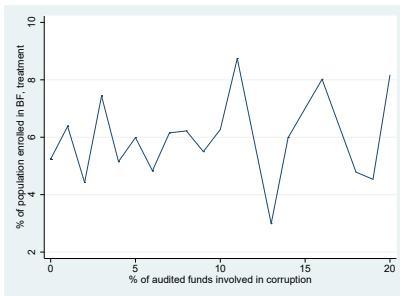


Figure 2

In all specifications of the model, σ_2 and σ_4 are negative and they are significant at the 1% level in both of the regressions with municipality controls, (2) and (4). The 1% significance of the parameters in both of the full models confirms my suspicions from Section 5.1 that the dummy is too restrictive as a measure of corruption. The parameter estimate for σ_2 in (2) is -0.1, indicating that for a mayor whose report was released before the election, a 1 percentage point increase in corrupted funds is associated with 0.07 percentage point decrease in Bolsa Família coverage. From the baseline average, a mayor for whom 5% of their municipality's audited funds were involved in corruption would have 7.49% less of their population enrolled in Bolsa Família. In regression (4), the parameter estimate σ_4 is equal to -0.08, suggesting that a 1 percentage point increase in corrupted funds is associated with a 0.05 percentage point decrease in Bolsa Família spending per capita. Employing the same example as before, the model predicts that such a mayor will spend 7.98% less on Bolsa Família per capita.

We can relate these observations back to the earlier discussion on the competing incentives to either pull back on corruption or engage in more clientelism. The negative sign of the interacted term suggests that mayors audited before the election have less Bolsa Família coverage and spending compared to the baseline average. Mayors whose reports were released after the election, on the other hand, had more Bolsa Família coverage and spending compared to the baseline average. In my sample, then, the incentive to pull back on clientelism after being outed as corrupt strongly dominates the incentive to buy more votes. Contrary to my initial hypothesis, shifting clientelistic incentives is not a pitfall of Programa de Ficalização por Sorteio Públicos, but is rather an added benefit.

Table 2: Treatment Effect Conditioned on Corruption Magnitude

Dependent Variables: Bolsa Família coverage (C) & Bolsa Família spending (S)				
	C (1)	C (2)	S (3)	S (4)
Pre-election audit	0.14 (0.17)	0.15 (0.14)	0.12 (0.13)	0.14 (0.1)
Corruption	0.03** (0.01)	0.03** (0.01)	0.02** (0.01)	0.02*** (0.01)
Pre-election audit x Corruption	-0.07** (0.03)	-0.1*** (0.03)	-0.06*** (0.02)	-0.08*** (0.02)
Constant	3.32 (0.4)	13.87 (4.84)	2.15 (0.28)	9.29 (3.47)
State Fixed Effects	Yes	Yes	Yes	Yes
Municipality controls	No	Yes	No	Yes
Observations	983	983	983	983
R Squared	0.62	0.75	0.64	0.78

Robust standard errors are displayed in parentheses. Significantly different from zero at 99 (***), 95 (**), 90 (*) % confidence.

5 SPECIFICATION AND INTERPRETATION ERRORS

In this section I describe some possible errors in the specification of my model and the interpretation of my parameters.

5.1 RE-ELECTION INCENTIVES

The first potential problem is that I do not control for whether an incumbent mayor is running for re-election or not. We can expect a mayor who is running for re-election to have stronger electoral incentives, since his ego rents (salary, utility from being in power, etc.) over the next municipal term are directly dependent on his electoral outcome. A mayor who is not running for re-election has weaker electoral incentives, although there are still some reasons to perform well; perhaps he wants to place his party's candidate in a good position or ensure favourable ties with the party leadership. It would be important to control for the re-election incentive if the incumbent candidates engage in significantly more clientelism than their non-candidate counterparts.

I do some basic tests for this effect by downloading data from the Tribunal Superior Eleitoral (Superior Electoral Court) website. I use two sets of data for the 2004 municipal elections: the list of candidates who ran and were not elected and the candidate that was elected in each municipality. To check whether the incumbent mayor ran for re-election in 2004, I cross-reference the winner of the 2000 municipal elections with the list of successful and unsuccessful candidates in the 2004 municipal elections. Using this data, I generate a dummy variable *ran* equal to 1 if the winner of the 2000 municipal elections was on the list of candidates in the 2004 municipal elections and 0 otherwise. I then regress both Bolsa Família coverage and spending on this dummy with state fixed effects and municipality controls. The specification could have been made better by including proxies for the closeness of the election, such as the number of candidates or the vote share of the elected candidate, but because of data limitations this was not possible.

Using an F-test, I find that mayors who are running for re-election have more Bolsa Família coverage and spending than those who are not, but this difference is not statistically indistinguishable from 0. Even so, including this effect in my final specification could only help to improve the model's accuracy. I chose not to include it because of data limitations. The triple interacted terms would contain too little data (sometimes less than 10 observations) for the results to be meaningful.

5.2 CORRUPTED AUDITORS

The second problem is that auditors could have been corrupted. If auditors were bribed or coerced into covering up incidents of corruption, then the randomness of the treatment effect would be called into question. It is not easy to observe this, but I did conduct one test to check if there was any cause for concern. I tested to see if municipalities whose mayor was affiliated with the party in power in the federal government had lower average reported corruption than mayors who belonged to other parties. To do this I once again used data from the Tribunal Superior Eleitoral website. I created a dummy variable *affiliate* equal to 1 if the mayor elected in the 2000 municipal elections belonged to the coalition of parties that were elected to federal government in 2002. The limitation of this approach is that it does not account for mayors who stepped down or switched parties between the

municipal elections in 2000 and my period of interest in 2004.

The regressions of affiliate on the corruption parameters used in models (1) and (2) all reported negative but very insignificant parameters. Because of data limitations I could not conduct a more thorough test for corrupted auditors (such as including mayor characteristics), but on the surface there does not seem to be any cause for concern.

5.3 OLS LIMITATIONS AND SPECIFICATION TESTS

The third problem is that the standard OLS framework I employed does not control for the upper and lower bounds on my dependent variables. The percentage of the population enrolled in Bolsa Família is bounded between 0 and 100, and Bolsa Família spending per capita is bounded below by 0. The OLS estimates can predict negative Bolsa Família coverage and spending at certain corruption levels. For example, if 70% of a municipality's audited funds were involved in corruption (which is an amount observed in my sample), the OLS estimate in (4) of Table 3 predicts that a municipality whose mayor was audited before the election will spend R\$-0.12 per capita on Bolsa Família.

I do some preliminary tests to determine if the OLS framework is inappropriate. The sample maximum of Bolsa Família coverage is 11%, which is very far from 100%, and so for the purposes of testing I only consider the lower bound of 0 for both dependent variables. Looking at the histogram for Bolsa Família coverage in Figure 2, we see that the distribution appears to be unimodal with a peak at around 2.5%. The histogram for Bolsa Família spending per capita in Figure 3 shows a similar distribution, with a peak at around R\$2 per capita. There does not appear to be any bunching around the lower bound of 0 in either distribution. In the regression for Bolsa Família coverage there are 3 negative predicted variables and in the regression for Bolsa Família spending there 5 negative predicted variables. Although there are only a handful of meaningless predictions, there may be more appropriate methods that could be looked in to.

In Figure 4 and Figure 5, I check the normality of my residuals in (2) and (4) of Table 3 respectively. The residuals appear to be following a normal distribution, which would suggest that my F- and t-tests are appropriate.

Figure 6 shows a scatter plot of my residuals from (2) of Table 2 plotted

against fitted Bolsa Família coverage, and Figure 7 shows a scatter plot of my residuals from (4) of Table 2 plotted against fitted Bolsa Família spending per capita. Inspection of the two scatter plots confirms that we have heteroscedastic residuals. Other specifications of models (1) and (2), such as one with a quadratic continuous corruption parameter, do little to change the distribution of the residuals over my fitted values, and so I instead use heteroscedasticity-consistent (robust) standard errors throughout my estimations.

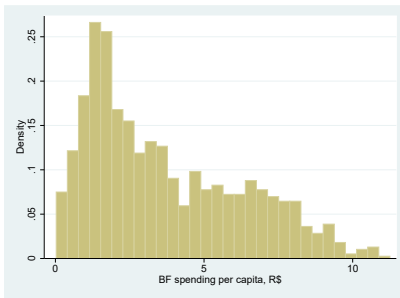


Figure 3

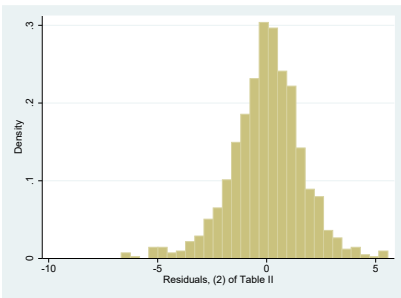


Figure 4

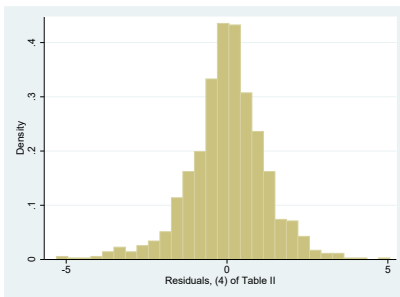


Figure 5

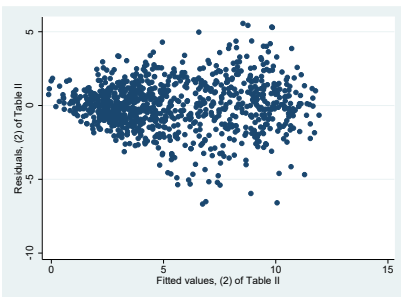


Figure 6

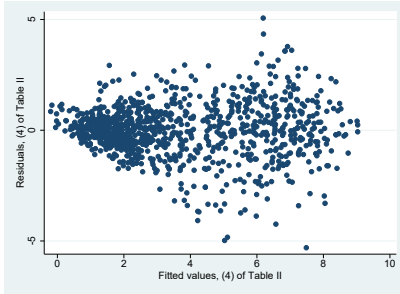


Figure 7

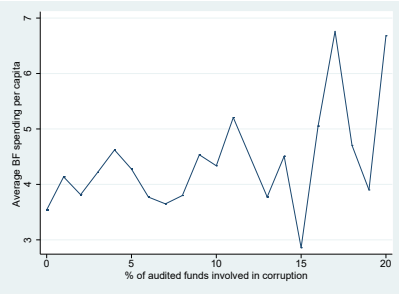


Figure 8

6 CONCLUSIONS

In this paper I examine the interaction between Programa de Ficalização por Sorteio Públicos and Bolsa Família, investigating how the incentive to engage in clientelism shifts when a politician's chances of winning the next election suddenly change. Using Bolsa Família, Brazil's huge conditional cash transfer policy, as a proxy for the magnitude of clientelism in a municipality, I look at what effect a pre-election audit has on the policy's enrolment and spending per capita. All significant at the 1 level, I find that corrupt politicians do tend to place more people into Bolsa Família than the baseline average. But, once those politicians are exposed, they tend to cut back on Bolsa Família enrolment and spending to such an extent that they are below the baseline average. In the context of the existing literature, this provides more evidence that Bolsa Família is being used as a clientelistic channel. More generally, it shows that equipping voters with better information about their politicians not only produces a more efficient selection effect, but induces the politicians themselves to adjust their behaviour in a way that is better for a functioning democracy.

7 APPENDIX

7.1 RE-ELECTION INCENTIVE TABLE

Table 3: Re-election Incentive

Dependent Variables: Bolsa Família coverage (C) & Bolsa Família spending (S)				
	C	C	S	S
	(1)	(2)	(3)	(4)
Re-election dummy	0.12 (0.18)	0.06 (0.14)	0.11 (0.14)	0.05 (0.1)
Corruption magnitude	0.01 (0.01)	0.01 (0.01)	0.01 (0.01)	0.01 (0.01)
Re-election audit x Corruption	0.02 (0.03)	0.03 (0.03)	0.01 (0.02)	0.01 (0.02)
Constant	3.34 (0.38)	13.59 (4.86)	2.17 (0.26)	9.02 (3.49)
State Fixed Effects	Yes	Yes	Yes	Yes
Municipality controls	No	Yes	No	Yes
Observations	983	983	983	983
R Squared	0.62	0.75	0.64	0.78

Robust standard errors are displayed in parentheses. Significantly different from zero at 99 (***), 95 (**), 90 (*) % confidence.

7.2 CORRUPTED AUDITORS TABLE

Table 4: Corrupted Auditors Table

Dependent Variable:	Dummy	Dummy	Continuous
	(1)	(2)	(3)
Affiliate dummy	-0.001 (0.07)	-0.003 (0.32)	0.18 (0.9)
Constant	0.37 (0.02)	-0.53 (0.09)	1.97 (0.27)
Observations	597	597	597
R Squared	0	0	0

Robust standard errors are displayed in parentheses. Significantly different from zero at 99 (***), 95 (**), 90 (*) % confidence.

REFERENCES

- Bohn, Simone.** 2013. "The Electoral Behavior of the Poor in Brazil." *Latin American Research Review*, 48(2): 25–31.
- Bohn, Simone R.** 2011. "Social Policy and Vote in Brazil: Bolsa Família and the Shifts in Lula's Electoral Base." *Latin American Research Review*, 46(1): 54–79.
- Brollo, Fernanda.** 2011. "Why do Voters Punish Corrupt Politicians? Evidence from the Brazilian Anti-Corruption Program." *SSRN Journal*.
- Brollo, Fernanda, Tommaso Nannicini, Roberto Perotti, and Guido Tabellini.** 2013. "The political resource curse." *American Economic Review*, 103(5): 1759–1796.
- Ferraz, Claudio, and Frederico Finan.** 2008. "Exposing Corrupt Politicians: The Effects of Brazil's Publicly Released Audits on Electoral Outcomes *." *Quarterly Journal of Economics*, 123(2): 703–745.
- Ferraz, Claudio, and Frederico Finan.** 2011. "Electoral accountability and corruption: Evidence from the audits of local governments." *American Economic Review*, 101(4): 1274–1311.
- Zucco, Cesar.** 2013. "When Payouts Pay Off: Conditional Cash Transfers and Voting Behavior in Brazil 2002-10." *American Journal of Political Science*, 57(4): 810–822.

Comparing Assimilation and Success Rates: Legal First Generation Asian and Hispanic Immigrants in the United States

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1 INTRODUCTION

Despite representing less than five percent of the U.S. population as compared to the near 17% Hispanic population, Asian-Americans, who are generally looked upon as the “model minority”, have been largely left out of the diversity conversation. Some believe they are no longer looked upon as minorities due to their financial success and are thus not given certain advantages afforded to other minorities (Linshi, 2014).

This paper aims to analyze relatively new, very comprehensive data from the Princeton New Immigrant Survey (NIS) in order to locate the apparent wage gap between Hispanic and Asian immigrants and to isolate the reasons behind said income differences.¹ However, after locating the wage difference and some reasons behind it, many questions still remain: does one race’s propensity to find more financial success in a new country justify programs like Affirmative Action? Or, conversely, since most of the Hispanic immigrants in the survey have resided in the United States for much longer than their Asian counterparts (Princeton University, 2006), does the wage gap represent a failure of the United States’ school system and evidence of overall discrimination?

Putting aside the very complex social and political issues, from an econometric standpoint, this paper’s findings suggest that Asian immigrants not

¹The Princeton NIS covers legal, first-generation immigrants as well as their spouses and children.

only earn more income, but, more importantly, they also benefit from schooling more so than Hispanic immigrants. In fact, the data analysis shows that Asian immigrants earn about six percent more income than Hispanic immigrants per each additional year of education. Additionally, Asian wages increase significantly more than Hispanic wages per each additional year working in the United States. Such clues point to a clear difference with a complex explanation behind it, which makes for economic and policy questions worth exploring.

Unlike previous work, which focus primarily on comparing immigrant wages against the native white and black populations, this paper will focus solely on the comparison between the United States' main immigrant groups: Asians and Hispanics. Currently, there are no other important prior papers that concentrate exclusively on the economic impact and equality between Asian and Hispanic immigrants.

2 OVERVIEW

One of the first major papers discussing the earnings difference between immigrants and United States natives is Barry Chiswick's *The Effect of Americanization on the Earnings of Foreign-born Men* (1978). His influential work suggests the importance of years resided as well as worked in the United States as major factors affecting the wage gap between natives and foreign-born. Ultimately, he asserts that the foreign-born labor force's average wage eventually catches up to the native's average wage, even surpassing it in the long run (Chiswick, 1978). However, at the time of his study, foreign-born United States residents and citizens made up only five percent of the total population, a number which has since been far overshadowed.

Building off of Chiswick's (1978) basic tenets is George J. Borjas paper, *The Economics of Immigration* (1994). His publication introduces the proposed "aging effect", which is the rate at which earnings increase over a life cycle. Combined with Chiswick's assertion that immigrant wages increase the longer one resides and works in the US, Borjas claims that the "aging effect" is greater for immigrant populations as compared to native populations (Borjas, 1994). Similarly to Chiswick, Borjas (1994) studied these effects to compare them to the native white and black populations and to make a con-

tention about the effects of immigrants on those native populations (Borjas, 1994). His regressions on the immigrant wage gap go even further than Chiswick's, and the variables that both identified and pioneered, such as age and years resided in the US, can help explain the difference between differing immigrant groups' wages.

Since Chiswick and Borjas first wrote about broad categorizations of the wage gap, many economists and sociologists have published papers on the earnings gap between more specific groups such as different races, genders, and immigrants. Tienda and Lii (1987) investigated how the size of minority labor markets affects minority wages (separated by group) and white wages. Using data from 1979, they observed that in labor markets with a large share of minority residents, college-educated minorities experienced a significant earnings loss compared to their white college-educated counterparts while poorly educated minorities did not see as large a wage discrepancy with poorly educated whites. More relevant to this paper, Tienda and Lii (1987) discovered that Asians generally had a higher education level compared to Hispanics, and, thus, on average earned a higher wage. Additionally, in areas without a large minority presence, the wage gap between Asians and whites was significantly lower than the gap between other minorities and whites (Tienda and Lii, 1987).

Expanding on these past research endeavors, this paper will seek to find out whether those economic and educational differences exist amongst modern-day legal first generation Asian and Hispanic immigrants. The paper will also make use of the key economic characteristics pointed out by both Chiswick and Borjas to identify the causes of discovered differences.

3 DATA

As briefly mentioned, this paper primarily uses the Princeton New Immigrant Survey (NIS), which offers a comprehensive questionnaire focusing on legal first generation immigrants. Though relatively new, the Princeton NIS (2003 and 2007) is the first nationally representative survey of new immigrants and their children (Princeton University, 2006). This paper will focus on NIS responses from adults between 2003 and early 2004 that covered a well-distributed group of respondents who planned on attaining citizenship.

The main reason behind using the NIS rather than the United States Census is the amount of detail in and accuracy of the survey. Unlike the broad Census, which tends to suffer from nonresponse and potential inaccuracies in the responses, the NIS took place with carefully selected families from different locations around the US, and the focus of the data makes up for the lower number of observations. Additionally, one would expect that if a significant difference was found between Asians and Hispanics in the NIS, which covers mainly middle class families across the board, there would be an even larger discrepancy in the broader Census.

Table 1: Means of Key Productive Characteristics

	Asian	Hispanic	Other
Annual Earnings	\$55,430 (775)	\$24,532 (835)	\$46,006 (947)
Years of Education	14.5 (2186)	10.4 (2235)	15.0 (2153)
Age when immigrated to US	35 (2047)	30 (2092)	34 (1972)
Age at time of survey	38.7 (2191)	38.7 (2243)	37.3 (1952)
English comprehension, scale of 1-4	2.96 (2179)	2.35 (2128)	3.04 (1952)
English speaking, scale of 1-4	2.82 (2179)	2.13 (2127)	2.91 (1955)
Years resided in US	3.44 (2034)	8.84 (2083)	3.25 (1966)
Years worked in US	3.88 (1382)	9.39 (1577)	3.60 (1389)

This table presents summary statistics from the Princeton NIS. The number of responses is in parenthesis under the statistic value.

This paper concentrates several variables which are used in related literature on immigration, including earnings, years of education, age at immigration to the US, language fluency in both speaking and comprehension, age at the time of survey, years resided in the US, and years worked in the US. All the variables from every table only include data for immigrants between “working” ages of 25-60.² These data are organized in three major groups: Asian, Hispanic, and all other immigrants as a control.

As seen in Table 1, there exists a significant wage gap between Asian and Hispanic immigrants. The data is further broken up below by years of education within each group to see if Asians out-earn Hispanics within education-level categories.

Table 2: Mean Earnings per Education Level

Years of Education	Asian	Hispanic	Other
Less than 12	\$20,042 (92)	\$20,035 (409)	\$21,194 (81)
Equal to 12	\$29,454	\$32,150	
	(58)	(131)	(129)
Greater than 12	\$63,139 (624)	\$30,978 (294)	\$51,227 (736)

This table presents summary statistics from the Princeton NIS. The amount of responses is in parenthesis under the statistic value.

Again, in Table 2, we see that the Asian population earns more than the Hispanic one at all levels of education. However, it can be difficult to interpret some of the data due to the low numbers of respondents certain categories. Nevertheless, the number of Asian immigrants with a higher education versus the number of Hispanic immigrants with only a high school diploma or less is significant.

²Major outliers have been removed from the summary statistics and analysis.

4 METHODOLOGY

The commonly accepted approach to analyzing wage gap questions between two or more groups involves multiple stages of regressions. In each subsequent regression, potentially underlying variables are included to identify the major contributing factors to the wage gap. With the log of wage as the dependent variable, a dummy variable represents the various immigrant groups.

Continuing with this method, the first linear regression will be run normally and as an entity-fixed regression by state. Additionally, it will only take into account a dummy variable to distinguish the two groups as well as various demographic characteristics. This regression is a simple base-line to show differences between the groups.

$$\log w_{ij} = \beta_0 + \beta_1 Asian_{ij} + \beta_2 Age_{ij} + \beta_3 Age_{ij}^2 + \beta_4 [Y_{ij}] + \varepsilon_{ij} \quad (1)$$

Here, $\log w_{ij}$ is the log of earnings in dollars for immigrant i and state j , $Asian_i$ is a dummy variable which equals 1 if the individual is Asian and 0 if Hispanic. Age_i is the age, Age_i^2 is age squared since lifetime wage is quadratic, and $[Y_{ij}]$ is a vector term of demographic data.

Next, the same regression will be modified and a vector of economic characteristics of immigrants will be added. After running the regression again both normally and state-fixed, the estimated effects from regression (1) can be compared with those of regression (2).

$$\log w_{ij} = \beta_0 + \beta_1 Asian_{ij} + \beta_2 Age_{ij} + \beta_3 Age_{ij}^2 + \beta_4 [Y_{ij}] + \beta_5 [X_{ij}] + \varepsilon_{ij} \quad (2)$$

The variables in regression (2) are the same as regression (1) with the added vector term, which represents many of the productive characteristics from Tables 1 and 2 such as years of education, English speaking ability, English comprehension, years resided in the United States, and years worked in the United States.

In the last simple regression, the education variable will be pulled out of the economic characteristics vector, and the same normal and entity-fixed regressions will be run, interacting the education and the Asian dummy variables. This will further explain the wage gap by taking into account race

given that immigrant i has a certain level of education.

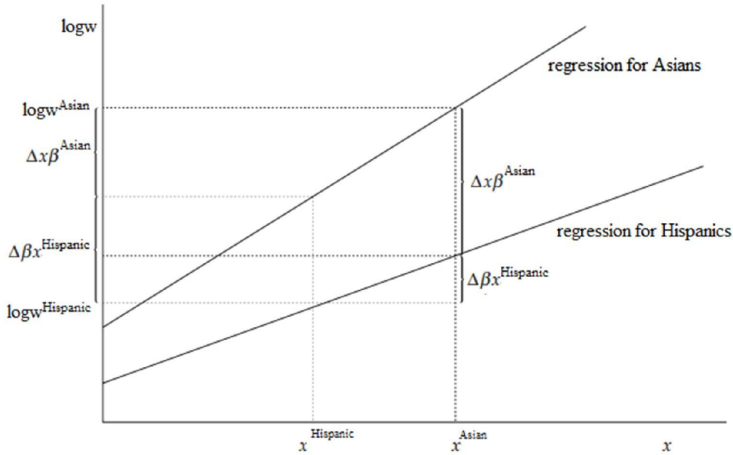
$$\begin{aligned} \log w_{ij} = & \beta_0 + \beta_1 \text{Asian}_{ij} + \beta_2 \text{Edu}_{ij} + \beta_3 \text{Asian}_{ij} x \text{Edu}_{ij} + \beta_4 \text{Age}_{ij} \\ & + \beta_5 \text{Age}_{ij}^2 + \beta_6 [\mathbf{Y}_{ij}] + \beta_7 [\mathbf{X}_{ij}] + \varepsilon_{ij} \end{aligned} \quad (3)$$

The variables here are the same as regression (2) with the added interaction term between Asian and education, which is represented by Edu_i .

The final method used for analyzing differences between groups is the Blinder-Oaxaca Decomposition. The core idea behind this approach is “to explain the distribution of the outcome variable in question by a set of factors that vary systematically with socioeconomic status” (O’Donnell, van Doorslaer, Wagstaff, Lindelow, 2007). In terms of this paper, the Oaxaca Decomposition examines the variations in the log of the wage and seeks to find the causal factors or variables that differ systematically based on race, either Asian or Hispanic. More specifically, the income gap between Asians and Hispanics is decomposed into two parts; first, part that is due to measurable differences in variables, and second, the part that is due to the magnitude of the effect of those variables (O’Donnell, van Doorslaer, Wagstaff, Lindelow, 2007). For example, the measurable, or explained, difference could be the observed higher level of education of Asian immigrants in comparison to Hispanic immigrants. The immeasurable, or unexplained, difference could be a cultural trait for studying more or better work ethic. While the explained results can lead to concrete policy changes that could potentially lead to greater equality in wages, the unexplained results do not give a clear answer. However, knowing the magnitude of the effect for these variables can point policy in the right direction.

To visualize the decomposition, a simplified version of regression (1) is constructed, where x_{ij} is a vector of explanatory variables similar to those used in the previous regressions.

$$\log w_{ij} = \begin{cases} \beta^{\text{Asian}} x_{ij} + e_i^{\text{Asian}} & \text{if Asian} \\ \beta^{\text{Hispanic}} x_{ij} + e_i^{\text{Hispanic}} & \text{if Hispanic} \end{cases} \quad (4)$$



As seen in the figure³, the wage gap can be attributed to both the explained sample means of the x 's (the endowments, E), the unexplained β 's (the coefficients, C), and the interaction between the two (CE) (O'Donnell, van Doorslaer, Wagstaff, Lindelow, 2007).

$$\begin{aligned} \log w_{ij}^{Asian} - \log w_{ij}^{Hispanic} &= \Delta x \beta_{ij}^{Hispanic} + x \Delta \beta_{ij}^{Hispanic} + \Delta x \Delta \beta \\ &= E + C + CE \end{aligned} \quad (5)$$

This shows the individual parts for the explained endowments (E), unexplained coefficients (C), and the interaction between the two (CE). The Oaxaca Decomposition, again, compares the two by combining the interaction term with either the explained or unexplained components (O'Donnell, van Doorslaer, Wagstaff, Lindelow, 2007).

$$\log w_{ij}^{Asian} - \log w_{ij}^{Hispanic} = \Delta x \beta_{ij}^{Hispanic} + x \Delta \beta_{ij}^{Asian} = E + (C + CE) \quad (6)$$

$$\log w_{ij}^{Asian} - \log w_{ij}^{Hispanic} = \Delta x \beta_{ij}^{Asian} + x \Delta \beta_{ij}^{Hispanic} = (E + CE) + C \quad (7)$$

³This graph is modified from one created by O'Donnell, van Doorslaer, Wagstaff, & Lindelow (2007).

By combining different terms, the single equation can take on two different meanings. The first decomposition assumes that Hispanics are paid fairly based on their characteristics, represented by vector x , while Asians earn more with those same characteristics for some unknown reason. The second decomposition assumes the opposite: Asians are paid according to their characteristics, but Hispanics are discriminated against in the work place.

Using Stata's Oaxaca ado-file, it is possible to run a Oaxaca Decomposition to analyze the causes of differences among the immigrant groups.⁴

5 RESULTS

Table 3 only covers the state-fixed regression data for increased accuracy and less potential survey bias. The outputs are very similar to the regular regressions, which indicates that the survey data was sufficiently randomized.

As seen in column (1) of Table 3, under the simplest regression and not controlling for any detailed productive characteristics, being Asian accounts for a 51% increase in income and is statistically significant at the one percent level. Just as Tienda and Lii (1987) found in their research, Asians far outpaced their minority counterparts in terms of income. In fact, all of the basic demographic controls account for a statistically significant impact in the wage discrepancy. Clearly, there is more to earning a higher wage than just race and other demographic statistics as seen by the second regression in column (2) of Table 3.

When the regression includes major productive characteristics, being Asian continues to account for a 35% increase in income and is still statistically significant at the one percent level. Unsurprisingly, English comprehension and speaking ability both contribute greatly to income as well. One must keep in mind that those two data points were measured on a self-rated scale from one to four (with four being best). Since it is not a uniform rating system, it is possible for subjects to incorrectly estimate their respective English skills; however, it is doubtful that one group would skew the results to a serious degree. Nevertheless, given that most of the Hispanic survey takers took the survey entirely in Spanish (Princeton University, 2006),

⁴Jann, DECOMPOSE: Stata module to compute decompositions of wage differentials, 2005.

it is possible that these two characteristics offer greater insight into the productive advantage of Asians as opposed to Hispanics, which will be covered later.

Table 3: The effects of Various Control Variables on Log Wage

	(1)	(2)	(3)
Asian dummy	0.505*** (0.071)	0.353*** (0.070)	-0.515** (0.260)
Age	0.154*** (0.037)	0.083** (0.036)	0.083** (0.036)
Age squared	-0.002*** (0.0005)	-0.001** (0.0004)	-0.001** (0.036)
Gender dummy	0.546*** (0.067)	0.490*** (0.064)	0.486*** (0.065)
Years resided in US		0.035*** (0.009)	0.031*** (0.009)
Years worked in US		0.051*** (0.010)	0.048*** (0.010)
English comprehension skills		0.281*** (0.074)	0.275*** (0.010)
English speaking skills		0.184*** (0.071)	0.197*** (0.071)
Total years of education		0.63*** (0.009)	0.048*** (0.010)
Asian dummy x years of education			0.056*** (0.016)
Observations	2505	1927	1927
R-Squared	0.070	0.317	0.321

Standard errors are displayed in parentheses. Significantly different from zero at 99 (***), 95 (**), 90 (*) % confidence.

From an intuition standpoint, given the sheer amount of resources required to move halfway across the globe versus within the same or connecting continent, it remains plausible that legal Asian immigrants had access to better education growing up. This education would likely include learning English before coming to the United States. These differences are apparent in Table 1. This would give Asians a significant leg up in terms of job opportunities and wages earned. Just as Chiswick (1978) and Borjas (1994) claim,

the longer the immigrant population resides and works in the United States, the better off they become. Simply put, Asians could be several steps ahead of Hispanics due to greater initial education, English language ability, and resources.

Additionally, this theory of better early education is reflected in the United States' immigration policies. Currently, US policy allocates many more visas and permanent resident statuses to skilled workers, investors, and people that hold advanced degrees (Immigration Policy Center, 2014). Since this study focuses on legal immigrants seeking citizenship and the Asians interviewed had resided in the United States for less time and were older at the time of immigration (see Table 1), it is reasonable to assume that they are highly educated or skilled workers. Additionally, they most likely had careers and lives in their countries of origin, which further aided them in finding jobs of equal stature and pay in the United States.

This does not mean that all of the study's Hispanic immigrants were not educated when they arrived. However, based on the data, Hispanic immigrants arrived at a much younger age, and even though they were legal and seeking citizenship at the time of the study, it says nothing about how they got to the United States. Given the proximity and history of Hispanic immigration to the United States, there are most likely many more immigrants of Hispanic origin that came as children or teenagers with little education and less resources who sought legal status after the fact. Given that the average age at the time of the 2003 NIS was about 39 years old (see Table 1), arriving illegally in the 1980s could have been easier than in the present, and so legal status could have been sought between then and the time of survey.

Looking again at Table 3, the effect of total years of education, though statistically significant at the one percent level, is smaller than the effect of characteristics like race and gender. In order to find the magnitude of the effect that more education has on the Asian immigrant population, the Asian dummy variable must be interacted with the education variable as seen in the regression from column (3). This key interaction variable reveals that for each additional year of education, Asians earn six percent more than Hispanics.

This could mean a few things. Firstly, there is a greater focus on edu-

cation in Asian countries so the quality of schooling is better and students attend for more years on average. Secondly, Asians, through some immeasurable characteristics such as work ethic, intelligence, or cultural or family pressure, tend to get more out of schooling than Hispanics, or thirdly, legal Asian immigrants have more resources than legal Hispanic ones in their home countries and, thus, receive a better education including study skills and other immeasurable traits.

At this point, the greatest contributions to a higher wage for Asian immigrants (other than gender and age, which were used just as controls) are education as indicated by the coefficients on years of education and the corresponding interaction terms. In fact, as mentioned above, even English skills can be attributed to a better education. However, it is still difficult to discern exactly why Asians get more out of education from these basic regressions. The Blinder-Oaxaca Decomposition and analysis will reveal more about where exactly the gaps lie and how much of this difference is left unexplained.

In the first step of the Blinder-Oaxaca Decomposition, the Asian dummy variable is removed, and two separate models for each corresponding immigrant group are run. Unlike the simpler regressions from Table 3, which included an Asian dummy variable, Table 4 reveals only a few statistically significant variables.

Table 4 shows the differences between each group independent of the other. The table shows a much larger return to each additional year of education that Asians receive. This could be due to discrimination in US schools against Hispanics, bias in origin nations against Hispanics that tend to emigrate to the United States, or immeasurable traits that cause Asians to get much more use out of their education.

Table 4: The effects of Various Controls for Single Race Groups

	Asian (1)	Hispanic (2)
Age	0.036 (0.055)	0.071 (0.072)
Age squared	-0.001 (0.001)	-0.001 (0.001)
Gender dummy	0.620*** (0.099)	0.507*** (0.116)
Years resided in US	0.035*** (0.011)	0.001 (0.022)
Years worked in US	0.030*** (0.011)	0.098*** (0.024)
English comprehension	0.111 (0.103)	0.262** (0.144)
English speaking skills	0.142 (0.104)	0.171 (0.136)
Total years of education	0.045*** (0.013)	0.104 (0.018)
Observations	692	611
R-Squared	0.219	0.381

This table takes the output from the first part of the Oaxaca Decomposition, which separates the two groups from each other. Values in parenthesis are standard errors.

Significantly different from zero at 99 (***) , 95 (**), 90 (*) % confidence.

The one variable that leads to a greater wage for Hispanic immigrants is years resided in the United States. Despite the data, it is important to keep in mind that, as seen in Table 1, the average number of years resided and worked in the United States is more than double for Hispanic immigrants. Therefore, the small and statistically insignificant magnitude effect of the number of years resided in the US for the Asian model has most likely have risen significantly since the time of the survey according to Chiswick (1978) and Borjas (1994).

Additionally, despite the lower amount of time resided in the United States, the magnitude at which Asians' wages increase per year worked in the US is more than threefold their Hispanic counterparts. Again, these results could suggest discrimination against Hispanic immigrants or advantages for Asians in terms of previous education. Such advantages like resources

and a better school system, would explain why Asians make more money per each additional year of school. A major clue that favors the theory of better previous education and resources is that despite having lived in the United States for much less time, Asian survey takers have a far greater understanding of English than their Hispanic counterparts. Indeed, even though the survey was offered in more than 19 languages, 73% of Hispanic respondents took the survey in Spanish (Princeton University, 2006).

This sets the stage, as discussed in the methodology, to combine and compare the two groups on equal terms. Running the second step of the Blinder-Oaxaca decomposition will separate out the cumulative effects of the two groups and compare Asian wages as if they had the endowments and coefficients of Hispanics. This will reveal how much of the wage gap is explained by their respective endowments, coefficients, and the corresponding interaction terms.

Column (1) of Table 5 shows the overall effect of all of the factors on both groups. There is a clear difference between the cumulative effects of the two groups, which is statistically significant at the one percent level. In other words, when the endowments, coefficients, and interaction terms of Hispanics are applied to Asians, there is a statistically significant decrease of 59.5% in Asian wages. According to the overall effect given in column (1), the effect of replacing the Asian coefficients with Hispanic ones accounts for a decline of 49.7% in Asian wages. This coefficient effect is more statistically significant than the effect of changing the endowment values, which decreases Asian wages by 34%. The interaction term, which is the simultaneous effect of applying Hispanic endowments and coefficients to Asians, is the only factor that favors Hispanic wages. More specifically, it indicates that if Hispanic endowments and coefficients were simultaneously applied to Asians, Asians' wages would actually rise by 24.2%. However, the interaction term is not statistically significant so it can be ignored for the most part. Even though column (4) shows that parts of the interaction effect are significant, those parts have been countered by the insignificance of a majority of the other variables.

Table 5: The Varying Effects of Endowments & Coefficients from the Blinder-Oaxaca Decomposition

	Overall (1)	Endowment (2)	Coefficients (3)	Interaction (4)
Age		0.127 (0.133)	-1.247 (3.295)	0.300*** (0.114)
Age Squared		-0.140 (0.132)	0.575 (1.541)	-0.062 (-0.164)
Gender dummy		-0.019 (0.014)	0.072 (0.097)	0.059 (0.160)
Years resided in US		0.006 (0.131)	0.160 (0.117)	-0.004 (0.006)
Years worked in US		0.565*** (0.143)	-0.276** (0.109)	0.200 (0.146)
English comprehension		-0.199* (0.110)	-0.500 (0.585)	-0.391** (0.155)
English speaking		-0.147 (0.117)	-0.092 (0.541)	-0.115 (0.135)
Years of Education		-0.532*** (0.094)	-0.942*** (0.349)	0.025 (0.147)
Combined effect of Hispanic immigrants	9.473*** (0.054)			
Combined effect of Asian immigrants	10.068*** (0.069)			
Difference between groups	-0.595*** (0.087)			
Endowments' effect on difference	-0.340** (0.144)			
Coefficients' effect on difference	-0.497*** (0.099)			
Interaction's effect on difference	0.242 (0.150)			
Observations	1303	1303	1303	1303

Standard errors are displayed in parentheses. Significantly different from zero at 99 (***) , 95 (**), 90 (*) % confidence.

Next, and most importantly in the Oaxaca Decomposition, columns (2), (3), and (4) show the breakdown of each individual variable's contribution to the effects of the endowments, the coefficients, and the interaction. These values provide further insight into whether the main force behind the wage gap is driven by the explained measured data, the unexplained immeasurable traits, or a combination of both.

Starting with column (2), the statistically significant variables for the endowment effect, or measured data, are years worked in the United States, English comprehension, and total years of education. The data for the num-

ber of years worked in the United States shows a large effect in favor of the Hispanic immigrant income. Specifically, the decomposition states that if Asians had been working in the United States as long as Hispanics have, their income would increase by 56.5%. Intuitively, this result makes perfect sense. According to the analysis presented in both this paper and the works of Chiswick and Borjas discussed earlier the longer an immigrant resides and works in the United States, the more wages he or she will earn. Looking back at Table 1, it is clear that Hispanics have both resided and worked in the US for more than twice as long as their Asian counterparts.

Despite that advantage, Asian income still far outperforms that of the Hispanics. This means that there are other forces working either against Hispanics in the form of discrimination, or in favor of the Asian immigrant population in the form of better work ethic, greater prior resources, or other data not measured in the survey.

Though only significant at the 10% level, English comprehension favors Asian wages by nearly 20%. The decomposition shows that if Asians immigrants from the survey understood English as well as the Hispanic respondents, they would earn 20% less. This is further proof of potentially better education and resources from the Asian survey takers' countries of origin. Despite living and working in the US for much shorter periods of time, they understand English at a higher level. Although not statistically significant, the decomposition shows that they also speak English at a higher level as well.

By far the most important factor is total years of education, which is significant at the one percent level. The measured endowment effect strongly favors Asian immigrant wages. In simple terms, if Asians had the same number of years of education as the Hispanic respondents, their wages would drop by 53.2%. As seen in Table 1, Asians average 4.1 years more of education than Hispanics, which is the difference between a college graduate and a high school diploma. Nevertheless, despite the huge educational disparity, this is not direct evidence of discrimination. Both bias against Hispanics and better prior education of Asians or some other intangible traits could be the root cause of this difference.

Beyond the two major control variables of age and gender, the other insignificant variables are years resided in the United States and English

speaking skills. While years resided is very closely related to years worked in the United States, it is intuitive that one would have to be working and gaining experience to earn a higher income. Residency itself is not a major factor. In terms of English speaking skills, although very closely associated with English comprehension, the difference between the Hispanics' and Asians' ability to speak does not make a statistically significant impact on wages.

In column (3), the statistically significant variables for the unexplained terms, or the magnitude of each variable's effect, are years worked in the United States and total years of education. Significant at the five percent level, the decomposition reveals that if Asians got the same out of each year worked in the United States as Hispanics, their income would decrease by 27.6%. Here, it appears that Asians have much better returns to their income for each year they spend working in the US. The effects that Chiswick (1978) and Borjas (1994) proposed seem to have a much larger effect on the Asian immigrant population.

Though not statistically significant, the coefficient on the number of years resided in the United States intuitively favors Hispanics. On average, they have resided in the US for much longer than the Asian immigrants from the survey, and so they have had more time to settle, find jobs, and advance in their careers. Due to this stability, it makes sense that applying the Hispanic coefficient for years resided on the Asian model would improve Asian wages. Nevertheless, running a Blinder-Oaxaca decomposition on the updated data from the 2007 NIS could prove the current decomposition inaccurate in terms of years resided.

The major significant variable again concerns education. When the Hispanic coefficient, or how much they get out of each year of school, is applied to Asians, Asian wages decrease by a whopping 92.4%, significant at the one percent level. The coefficient effect indicates that the overall quality of the education that Hispanics receive does not compare to that of the Asians. Again, this does not say exactly why Hispanics get much less effectiveness out of each year of education, but it does clearly nudge the conclusion in the general direction of education.

Once again, there are a number of clear possibilities. One could fairly assume that the reason Asians get more return out of each year worked in

the United States is due to better and more effective education that they also get a high return from. Another possibility is discrimination against these Hispanic immigrants in the United States and in their respective countries of origin. In reality, it is most likely a mix of the two factors.

The last component of the difference is from column (4), the interaction effect. Even though variables within the effect are significant, the overall effect is not statistically significant. Because of the lack of significance, it is difficult to say how the combination of the endowments and coefficients applied to the Asian immigrants actually affects the wage gap. Therefore, the interaction effect can be ignored for the most part.

Clearly, the lack of observations hinders this analysis. Having a larger data set or comparing this decomposition using the 2007 NIS could provide more insight into whether the endowment effect of years worked in the United States as well as other values are accurate. By conducting an even more recent survey, the endowment effect of years worked would most likely decrease in favor of Asian wages because both groups have been in the United States for a sufficient amount of time. Another strategy would be to use United States Census data to re-run the Blinder-Oaxaca Decomposition. While it would no longer cover only legal immigrants, it may give a more accurate intuition as to how years worked in the United States affects the two groups, even if one might expect the wage disparity to be even more in favor of Asians.

Ideally, a careful study specifically focused on the education of immigrants, old and new, would be done. The survey must focus on years of education in the country of origin, years of education in the United States, school district within the United States, time devoted to education in the home, attention from parents concerning education, evidence of bullying and discrimination at school in both the country of origin and the United States, and so forth. With these data points in line, it would be possible to more accurately figure out where and why Asians immigrants benefit so much more from the education they receive.

6 CONCLUSION

After identifying clear differences between the Asian and Hispanic first generation immigrants from the Princeton NIS, careful statistical analysis and a Blinder-Oaxaca Decomposition were performed to identify the causes behind the discovered wage gap.

The evidence and analysis showed that the wage gap can be attributed to Asian immigrants' greater amount of education as well as greater return from their time in school. However, the source of the Asian population's success in school cannot be statistically identified as either discrimination against Hispanics or immeasurable traits that improve Asian school performance and, subsequently, wages. In order to accurately guide policy, this question will have to be studied as well.

Nevertheless, this study serves as a start. More surveys and investigations that focus specifically on education must be undertaken. With newly researched data, the question can be re-analyzed to not only provide answers to statistical questions, but also help shape future policy. Rather than arbitrarily giving certain advantages to only select minority groups or filling quotas through Affirmative Action and guess work, the United States can help fix the education system and, in the process, bolster its work force and the lives of its citizens.

REFERENCES

- Black, Dan a., Amelia M. Haviland, Seth G. Sanders, and Lowell J. Taylor.** 2008. "Gender Wage Disparities among the Highly Educated." *Journal of Human Resources*, 43(3): 630–659.
- Borjas, George J.** 1994. "The Economics of Immigration." *Journal of Economic Literature*, 32(4): 1667–1717.
- Chiswick, Barry R.** 1978. "The Effect of Americanization on the Earnings of Foreign-born Men." *Journal of Political Economy*, 86(5): 897–921.
- Cotton, Jeremiah.** 1988. "On the Decomposition of Wage Differentials." *The Review of Economics and Statistics*, 70(2): 236.
- Fairlie, Robert W.** 2003. "An Extension of the Blinder-Oaxaca Decomposition Technique To Logit and Probit Models." 30(873): 305–316.
- Jann, Ben.** 2008. "The Blinder-Oaxaca decomposition for linear regression models." *Stata Journal*, 8(4): 453–479.
- Neumark, David.** 1988. "Employers' Discriminatory Behavior and the Estimation of Wage Discrimination." *The Journal of Human Resources*, 23(3): 279.
- O'Donnell, Owen, Eddy van Doorslaer, Adam Wagstaff, and Magnus Lindelow.** 2008. *Analyzing Health Equity Using Household Survey Data: A Guide to Techniques and Their Implementation*.
- Reimers, Cordelia W.** 1983. "Labor Market Discrimination Against Hispanic and Black Men." *The Review of Economics and Statistics*, 65(4): 570–579.
- Tienda, Marta, and Ding-Tzann Lii.** 1987. "Minority Concentration and Earnings Inequality: Blacks, Hispanics, and Asians Compared." *The American Journal of Sociology*, 93(1): 141–165.

Preference Logic and the Independence Axiom

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1 INTRODUCTION

The paper proceeds as follows. In the first section, we introduce the problem and argue that the independence assumption (IA) has weak foundations in current models. In the second section, we present a standard model of modal preference logic. This model is very flexible and has been shown to be able to express many economic properties such as Nash-Equilibrium, backward inductions, and Arrow's Impossibility theorems, to give a few examples. The third section will focus on some changes, most importantly the addition of a desirability function to the above model to show that it can accommodate for the first case of IA violation. The fourth section shows that the model can account for conditional preference in an explanatory manner.

2 LAYOUT OF THE PROBLEM

In microeconomics, the theory of revealed preference gives a solid foundation for associating observable choices to intrinsic preference orders. Further, we know that given the Weak Axiom of Revealed Preference, a choice function will reveal a rational (transitive and complete) preference order. However, WARP implies the independence axiom. The independence axiom can be stated as such:

If the choice function over $\{a, b\}$ reveals that $a > b$, then it must be that the choice function over $\{a, b, c\}$ cannot reveal that $b > a$.

However, the above can run into some solid counterexamples. Consider

the following:

“You are given the opportunity to purchase one of two paintings by the same painter, one blue and one red. The painter is famous for only having used those two colors in his career and as far as you know, all other of his works are owned by the government so those two are the only privately owned. You vastly prefer the red one over the blue one. However, you receive news that the government plans to auction off a red painting by the 1 same painter. After taking a look, you consider this new painting inferior to the other two. However, you now would rather buy the blue painting over the red painting.”¹

This example is a classic case of a violation of IA, and it is easy to check that it violates WARP. Given the choice over two paintings you prefer the red one. However, when the choice set changes, with the addition of an irrelevant alternative, you then prefer the blue painting. This case is of course not outlandish, there are reasons such as uniqueness of color which reasonably explain this. Therefore, the economists willing to preserve transitivity and completeness of preference orderings while using the method of revealed preference must find a way to explain this.

The paper will analyze the above problem in the following manner. I argue that the problem arises because our consideration of the choice set has been too narrow. Namely, the description of the set of choices has been too crude. The choice sets are described as: red painting, blue painting v.s. red painting 1, red painting 2, blue painting. Such a crude representation fails to capture any further notion of the objects and thus violation of IA comes out of it. A more refined model should be able to take into account explanatory aspects such as uniqueness of the blue painting. However, those notions are qualitative and hard to express in traditional choice sets which range over \mathbb{R}^n ; thus a need for preference logic arises.

¹Peterson, Martin. An introduction to decision theory. Cambridge University Press, 2009

3 STANDARD MODEL OF MODAL PREFERENCE LOGIC

3.1 OVERVIEW

This section of the paper will introduce very briefly a standard preference logic model using modal logic studied mainly by computer scientists and philosophers. This technique is also used in game logics, social choice logics, and to model dynamic preferences.

The seminal work of the field is considered to be Von Wrigh’s “The Logic of Preference”; however, Murakami’s “Logic and Social Choice” has also been influential. Since the 1990’s, the field has seen a revival with a focus on the intersection of decision and preference logic. Boutilier, Van Benthem, Hansson, and Halpern have all been influential, to cite a few important writers.

A great deal of interesting results have been proven in the model. Namely, many theorems in game theory, social choice theory and others have been shown to have counterparts in it. Many logical theorems such as soundness and completeness are also shown to be true in variations of the model. We present here the model in its most basic form.

3.2 MODEL LAYOUT

The model is a 5-tuple of the form:

$$M = \langle W, N, P, \{\preceq_{i \in I}\} V \rangle \quad (1)$$

W is understood as the set possible worlds, each $w \in W$ is described as a subset of P , the states of propositions. Furthermore, any w is a maxcon set, namely that there must be no contradictions and it is a complete description of all relevant information. N is the index set of agents and each of them possess a preference order over W denoted by \preceq_i . Lastly, V is a valuation function which informs us whether some $p \in P$ is true for some $w \in W$.

3.3 SYNTAX AND SEMANTICS

Our model uses the following semantics. Namely any well formed formula is recursively obtained as follows:

$$p \in P | \neg \phi | \phi \wedge \psi | \diamond_i \phi \quad (2)$$

The diamond operator, $\diamond_i \phi$, symbolizes that agent i consider ϕ to be true in some world which is preferred to the current one. Alternatively, its dual $\Box_i \phi$ symbolizes that ϕ is true in all such worlds.

As this is a logical model, there is an axiomatic proof system that is complete and sound for the above semantics. However, it will not be necessary to introduce those for the aims of this paper. Rather, let us show how this model reflects economic theory. W can be taken to be the set of states, thus \mathbb{R}^n . The propositions, $p \in P$ can be taken to be descriptions of worlds. For a state in \mathbb{R}^n , descriptions are limited to quantities of each coordinate. However, within a logical framework, propositions are not quantitatively limited, such as “The car is green”, and other qualitative descriptions are expressible.

In the following sections, we will argue that the lack of qualitative descriptions of states are what gives rise to problematic scenarios of IA.

4 DESIRABILITY FUNCTIONS

4.1 GENERAL

We will now introduce our model and show that it can accommodate for rational revealed preferences while providing an explanation for the problematic scenarios. The model uses a Jeffrey-style desirability function, adapted to decision under certainty.

We first briefly introduce Jeffrey’s framework for decision theory. In short, unlike Savage who accords utility only to outcomes of decisions, Jeffrey accords value to each proposition that is true – the value of an outcomes is thus the sum of value of all true statements under that outcome. Jeffrey refers to this as the “desirability” of a proposition. Jeffrey’s model is employed here as it offers a natural way of working with propositions as description of state of affairs.

The model is a 6-tuple of the form:

$$M = \langle W, N, P, \{C_i\}_{i \in I}, \{Des_i\}_{i \in I}, V \rangle \quad (3)$$

W , P , N , and V have their previously definitions. We have replaced the \succeq_i with a C_i representing a choice function instead. Des_i is a desirability function as introduced in the previous paragraph. Namely, it takes a proposition and particular world where that proposition holds true and tells us how desirable it is to a particular agent. We assume the agent maximizes desirability, and therefore the choice function can be defined as:

If $X \subset W$ then :

$$C_i(X) = \max \left\{ \sum_{k=1}^N Des_i(p_{1_k}, w_1), \sum_{k=1}^N Des_i(p_{1_k}, w_1), \dots \right\} \quad (4)$$

Where $w_i \in X$ and $\forall i$ and p_{i_k} are the true propositions at each w_i

Notice that this choice function will induce a preference order defined as:

$$w_i \succeq w_j \text{ iff } \sum_{k=1}^N Des_i(p_{1_k}, w) \geq \sum_{j=1}^N Des_i(p_j, w') \quad (5)$$

Theorem 1. *The preference order defined above is rational*

Proof. Trivial since \geq is complete and transitive. \square

Now that we have shown that desirability produces choice rule which reveals a rational preference order. Let us see how it can explain the example given in Section 1.

Before the government's announcement is made, the agent is faced with the following:

Choice sets : $\{w, w'\}$

True proposition of w : p = "I own the red painting", p' = "the red painting is unique."

True propositions of w' : q = "I own the blue painting", q' = "the blue painting is unique."

Given that the agent finds owning a red unique painting more desirable than a blue unique painting. She chooses w over w' . Now let us consider her problem after the announcement is made:

Choice sets : $\{w, w', w''\}$

True proposition of w : p ="I own the red painting", $\neg p$ '="the red painting is not unique."

True propositions of w' : q ="I own the blue painting", w' =the blue painting is unique."

True propositions of w'' : r ="I own the new red painting", r' =the new red painting is not unique."

Under this formalization we see that the agent will choose w' if she accords more desirability to possessing an unique blue painting than a non-unique red painting. Notice that here, since the w of the first choice set simply is not the w of the second, our agent's choice will not result in violation of IA.

We see that we are capable of capturing the uniqueness element. Furthermore, what is really key is that the introduction of a choice changes the other choices, something which isn't captured in standard models.

The counterexamples of IA, such as the anchoring effect, usually revolves around changing the choice set in such a way that cannot be captured in quantitative terms. However, this model allows us to capture those subtle, qualitative, changes and show that the choice function is indeed rational. For instance, we can account for the Allais Paradox by illustrating the agent's preference for certainty of a lottery.

Note that the desirability function, under Jeffrey's framework, is not equivalent to an utility function. The utility function ranges over worlds while the desirability function ranges over true propositions of worlds. This makes intuitive sense as showcased above, the uniqueness of a painting is only desirable if the actual world is one where I own the painting. Therefore, although our choice function reveals an ordering over worlds, we have actually not revealed a desirability function over the set of propositions. In contrast to standard economics, where the revealed preference usually reveals an utility function.

5 ON CONDITIONAL PREFERENCE & DESIRABILITY

5.1 GENERAL

We see that the main issue that has been causing trouble is that of conditional preference. Namely, I prefer the red painting over the blue painting only if it is also unique. Furthermore, the independence axiom is violated if we do not take into account that preference of a proposition depends conditionally on other propositions.

Thus our primary goal in this next section is to delineate how our model can account for conditional preferences better than traditional setups. We argue that conditional preferences are always about conditional desirability of propositions rather than worlds. Thus having only a preference ordering over worlds without a way of accounting for desirability of propositions leaves conditional preferences unexplained and unformulated.

Conditional preferences are statements such as “My preference for A is greater/lesser/indifferent depending on whether B is true”. In standard models, preference only range over worlds, so A and B must be worlds. However, that cannot be. Notice that replacing A and B both by worlds would imply that preferences over worlds changes depending on which world the agent is in. However, preferences are taken to be static in standard decision setups so that cannot be true.

We see then that there are three ways to analyze this. Either A and B are both propositions, or one of them is a world while the other is a proposition. First, note that A cannot be a world if we have static preferences by same argument as above. Second note that if B is taken to be a world, then saying that B is true is analogous to saying that all propositions of B are true. Thus whether B is taken as a world or proposition is invariant to formalization. Therefore we see that the most natural way of analyzing conditional preference is to analyze it as conditional desirability of propositions.

Now that we have argued that conditional preference is conditional desirability as it always ranges over propositions, we will move on to show how this concept can be formalized. Particularly, we will show that we can elucidate a network of conditional desirability without taking the agent’s desirability function as given.

5.2 FORMALIZING CONDITIONAL PREFERENCES

If one takes the desirability function as given, then one can trivially derive the conditional relationships between sets of propositions. Furthermore, if one takes the utility function derived from the choice function to satisfy the vNM postulates then a complete dependency relationship can be derived.

We will derive, given a choice function without the desirability function, conditional relationships between any two sets of propositions. Therefore, given any set of propositions which is consistent, we wish to be able to tell how the truthhood of another set of proposition impacts the desirability of the first set.

We introduce some properties of conditional desirability:

- 1) If ϕ 's desirability is independent of the truthhood of ψ then the reverse holds. We denote this by $\phi I \psi$
- 2) If ϕ 's desirability is positively (negatively) affected by ψ 's truthhood, then the reverse holds. We denote this by $\phi P \psi$ ($\phi N \psi$).
- 3) For any world w , can find from each equivalence classes of indifferent worlds E an element $v \in E$ such that $\phi I \psi$ where ϕ is the set of all true propositions of w and similarly for v and ψ .

First, we note that any two sets of propositions whose union produce a contradiction cannot be conditionally correlated. It simply doesn't make sense to say that p is more desirable given that $\neg p$ is true. Any non-distinct sets of proposition must be independent.

Second, any set of proposition can be thought of a world where only those propositions and their logical implications are true. Thus when I say the "desirability of a set of proposition", I really mean the desirability of the world where only those propositions and their logical implications are true.

Lastly, we consider only condition relations between disjoint sets of propositions.

5.3 CONDITIONAL INDEPENDENCE

Now we will derive formally what it means for two sets of propositions to have independent conditional desirabilities. We know that this occurs if the

sum of desirabilities is equal to the desirability of the conjuncts. Since if they are independent then the truthhood of either does not change the desirability of the other

Now we want to derive conditions when it occurs without referring to desirability.

Let ϕ, ψ be two set of propositions represented by u, v worlds. Then we can find ψ' to be independent of ϕ , represented by v' such that $v \sim v'$. Let the worlds w and w' be the worlds derived from $\phi \cup \psi$ and $\phi \cup \psi'$.

Then $\phi I \psi$ if and only if $w \sim w'$.

If ϕ and ψ' are independent then the sum of desirability of ϕ and ψ' is the same as the desirability of $\phi \cup \psi'$. Furthermore if $w \sim w'$ then the desirability of $\phi \cup \psi'$ is the same as that of $\phi \cup \psi$. Lastly we know that ψ' has the same desirability as ψ , so it must be that $\phi I \psi$ is true.

5.4 CONDITIONAL POSITIVE & NEGATIVE DEPENDENCE

To say that ψ and ϕ are positively dependent on each other means that the desirability of the conjunct $\phi \cup \psi$ is greater than the sum of the desirabilities of ψ and ϕ . We now derive this without referring to desirability.

Let ψ, ϕ be two set of propositions represented by u, v worlds. Then can find ψ' independent of ϕ , represented by v' such that $v \sim v'$. Let the world w, w' be the worlds derived from $\phi \cup \psi$ and $\phi \cup \psi'$.

Then $\phi P \psi$ if and only if $w \prec w'$ and $\phi N \psi$ if and only if $w \succ w'$

6 CONCLUDING REMARKS

I mentioned earlier that if the utility function is vNM then this can be derived without needing restraints on conditional desirability.

That can be done by saying that $\phi I \psi$ iff $u(w) + u(w') = u(v)$ where w, w' , and v correspond to $\phi, \psi, \phi \cup \psi$, and similarly for positive/negative dependence.

It is not sure whether the vNM postulate is more or less demanding than the ones we have assigned to conditional desirability. The first two properties of conditional desirability are more or less intuitive. One might think that the third does not hold. However, consider a set of propositions of the form “I am happy to degree x ”. Since x is a variable, this set of

propositions has one proposition from each equivalence classes of indifference sets. Furthermore, it is clear that the desirability of being happy has likely no conditional dependence on the truthhood of other propositions.

What the vNM method allows, however, is to evaluate *degrees* of dependence. Nonetheless, while the two methods have a common problem, neither of them captures the concept of *directionality* of conditional dependence. Clearly, I desire an umbrella if it is raining, but the reverse does not necessarily hold. Yet the two methods do not distinguish between whether uniqueness makes possessing a painting more desirable or whether possessing a painting makes uniqueness more desirable, or both.

One might wonder then, given this problem, what kind of theory could account for *directionality* in conditional dependence. It is problematic for current theories because we only observe the effect of conditional dependence when the two propositions are both satisfied. Thus there is no way to isolate the effect to purely a one way direction. With this note we conclude this paper.

The Economic Man: A Product of the Past

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1 INTRODUCTION

Economics is a discipline that generally classifies as a social science. It focuses on human interactions in the world, with regards to production and consumption. The individuals who are interacting are called economic agents and they make up the focal point of the analysis in the discipline. In order to accurately analyze a human population with minimal error, these agents must have consistent predispositions, with only slight deviations, to allow for an accurate analysis. The concept of *homo oeconomicus* in economics accurately depicts the economic agents in a model of a person with certain assumptions.

The construction of this model is a product of economic history, but since the coining of the term ‘Economics’ is relatively new, one has to find alternate ways of discovering notions of it in the past. In economic history, aspects of the Economic Man can be seen in mercantilist thought, all the way through to classical economics of the nineteenth century. However, each classical economist offers his own contributions to the modern economic construct of the Economic Man. In order to see how this concept came about through economic history, it is only fitting to regard what underlies behaviour as human nature. The assumptions of the self-interested, rational and quasi-utilitarian nature governing *homo oeconomicus* in modern economic thought can be found within ideas of human nature conceived by Adam Smith, Thomas Malthus and John Stuart Mill in classical economic thought.

2 DEFINITION OF THE ECONOMIC MAN

2.1 OVERVIEW

To fully understand the concept of human nature developed in classical economic theory, we must first derive human nature from how it is portrayed in modern economic thought through the concept of *homo oeconomicus*, otherwise known as the Economic Man. The textbook definition of the Economic Man, which is the basis of economic models today, includes widely held basic assumptions about the economic actor. Textbooks portray the Economic Man as an actor who maximizes his utility at the lowest possible opportunity costs (Ragan Lipsey, 2011). The Economic Man is also portrayed as a producer and maximizes his profit at the lowest possible production costs (Ragan Lipsey, 2011). The Economic Man operates primarily based on his own desires, makes decisions based on an array of utility maximizing options, depending on his constraints, and chooses what will satisfy him the most.

In society, the Economic Man interacts based on this set of utility maximizing options, with each individual making decisions based on what brings him the most pleasure. This results in a society where individuals' rationality is at the root of its operation. This is not to say that the egoistic nature of the Economic Man is synonymous with selfishness. *The New Palgrave Dictionary of Economics* states that operating for personal gain may include doing good for others as long as that type of action is favoured by the agent (Hargreaves-Heap, 2008). Thus, this egoistic nature is regarded as the Economic Man's tendency to maximize his own pleasure, whatever that pleasure may be (Hargreaves-Heap, 2008). Referencing the Economic Man's tendency to choose whichever option gives him the most pleasure demonstrates his rationality, underlining the basic assumptions of the Economic Man.

2.2 ADAM SMITH

To understand where this notion of the Economic Man in modern economic thought stemmed from, we must examine the classical economic period from its inception, beginning in the eighteenth century with Adam Smith.

In the mid-eighteenth century, around the time when Smith was in the

process of writing his first work, *The Theory of Moral Sentiments*, Mercantilism was prevalent in society. Mercantilist practice entailed accumulating wealth through acquiring bullion, and the goal of the nation was to export more than import. This encouraged trade and competition among nations, leading to the colonization of other nations by many powerful monarchies. The state also had a large presence in society through heavy government taxation to acquire their proper bullion, through, for example, The Stamp Act of 1765. The competition among colonies and the presence of state intervention mechanisms were the reason for many disputes, resulting in one of the largest nationwide wars of the time — The Seven Years' War, taking place between 1755 and 1764.

In the latter half of the eighteenth century, around the time Smith's *An Inquiry Into the Nature and Causes of the Wealth of Nations* was published, Mercantilism was on the decline and Physiocracy was on the rise. Due to the timeline of events, Smith was able to observe mercantilist practice as well as physiocratic thought, which both influenced his own works. This school of thought owes its existence to the Physiocrats François Quesnay and Anne Robert Jacques Turgot. Quesnay and Turgot's philosophy entailed self-interest and utilitarianism, and their "Rule of Nature" exhibited the need for less state intervention, so that man could be free, which differed from the mercantilist practice at the time. They were against state intervention both in the marketplace as well as in the form of taxation, and believed that land was the source of all wealth. It is this mercantilist practice coupled with the later ensuing physiocratic thought that influenced Smith's views. Like the Physiocrats, he believed in the 'natural order', which entailed the natural relations of man, without state intervention through laws.

Amidst the turmoil of the eighteenth century, Smith continued to develop his views of society. Influenced by his teacher, Francis Hutcheson, who was part of the naturalist school of philosophy, Smith took a humanistic and naturalistic approach, seeing society as intricately connected (Smith, 1999). Smith's main idea regarding human nature is that man was self-interested: "It is not from the benevolence of the butcher, the brewer, or the baker that we expect our dinner, but from their regard to their own interest" (Smith, 1999). He also noted that humans exclusively possess the ability to negotiate for exchange, which is not found in any other species

(Smith, 1999), and he discussed the notion of ‘utility’ for man’s acquired items, stating that man possesses objects that benefit him in some way (Smith, 1963). Smith also saw man as desiring financial prosperity, which requires a lot of work to achieve, but is viewed as something exquisite to have (Smith, 1963). He continues onward by discussing this desire of financial prosperity as motivating individuals in the societal system, thus keeping it active (Smith, 1963). Altogether, Smith’s notion of man is individualistic, with a predisposition of negotiating for exchange. Smith also states that man possesses objects that are useful to him in their own ways, and has a desire to acquire these objects, richness and affluence. Further, he states that this desire for richness and affluence keeps society active.

Smith’s individualistic nature of man in the mid-eighteenth century was reflected in his analysis of society and led to one of the greatest economic theories of his time that is still used today — the theory of the ‘invisible hand’ of the market. Regarding human nature in society, Smith argued that people’s individualistic natures would work together in society and result in societal harmony and ‘self-regulation’ in the market would be “led by an invisible hand to promote an end which was no part of his intention ... by pursuing his own interest he frequently promotes that of the society more effectually than when he really intends to promote it” (Smith, 1994). By focusing on themselves, peoples’ individualistic pursuits will collectively benefit society as a whole.

The Economic Man’s self-interested, quasi-utilitarian and rational nature is evidently seen in Smith’s philosophy regarding human nature. Smith explicitly states that people operate based on their own needs in an exchange economy, which signals self-interest. He follows by saying these needs are fulfilled by purchasing items which have their respective values attributed to them — a different value to every person and item, demonstrating a quasi-utilitarian nature. Within society, Smith has stated that human self-interest is extended to individuals’ operation in a free market, not changing when in society. This shows that the Economic Man’s assumptions remain the same in modern economic societal analysis about multiple actors in a free market — the Economic Man still focuses only on what benefits him. In essence, this construction of man that Smith developed is not too different from the rational agents we base microeconomic analysis on today.

2.3 THOMAS MALTHUS

In the late eighteenth to early nineteenth centuries, during Thomas Malthus' time, conditions had improved relative to those of Smith's time. This was due to the occurrence of multiple revolutions, which brought about increased liberty and change in much of world. America's Declaration of Independence in 1776, the Industrial Revolution in 1785 and the French Revolution that shortly followed in 1789 all brought about radical change in society. Although America's independence from the British Empire, and the dissolution of the French monarchy led to more optimistic conditions, the greatest improvement by far was the creation of the steam engine. This occurred during the Industrial Revolution, drastically changing society since the shift of production from natural power to artificial power enabled mass production, and thus, the age of Industrial Capitalism.

Malthus, in his famous work, *An Essay on the Principle of Population* referred to this period as one of "important changes", and referred to the French Revolution as "destined either to inspire with fresh life and vigour, or to scorch up and destroy the shrinking inhabitants of the earth" (Malthus, 1960). Paralleling the French Revolution, the decline of feudalism in Central Europe resulted in the elimination of common property, which brought about increased migration to England. The decline of feudalism, coupled with the Industrial Revolution led to productivity growth and capitalism. England's thriving economy came with an increased risk of poverty for its population. This is one aspect of history that influenced Malthus' works and led him to focus on population, also serving as an explanation for his views towards the poor.

Despite all of the optimism of the late eighteenth century from the revolutions, Malthus' opinions towards societal issues were very dismal. A discussion with William Godwin about the "future improvement of society" (Malthus, 1960) inspired Malthus' famous 1798 work: *An Essay on the Principle of Population*. Malthus was in opposition to Godwin's optimism towards a Utopian society. He claimed the growing population was the problem, hindering progress towards an advanced society (Malthus, 1960). On individual human nature, Malthus presented two laws of behaviour: "First, That food is necessary to the existence of man. Secondly, That the passion between the sexes is necessary and will remain nearly in its present state"

(Malthus, 1960). This led to his theory of population, whereby the population would surpass the food supply provided by the earth: "Population, when unchecked, increases in a geometrical ratio. Subsistence increases only in an arithmetical ratio" (Malthus, 1960). Malthus further argued that population only grows if there is food, as humans need to eat to reproduce and survive (Malthus, 1960). In regards to controlling this increase in population due to human nature and keeping it equal to the amount of alimentation available, Malthus presented 'vice' and 'misery' as the 'checks' to do so (Malthus, 1960). In successive editions of his Essay, he added on 'moral restraint' as a 'check' to keep the population regulated (Roll, 1961). This demonstrates the dismal nature of his theory, since in essence, acting upon one's human nature leads to unfavourable circumstances, especially among the poor (Roll, 1961).

In society, the effects stemming from acting upon one's human nature differ depending on social class. Malthus was restrictive with regards to who was allowed to act upon these 'passions' freely and claimed that the poor lacked 'moral restraint'. Therefore, these unfavourable circumstances were a 'natural punishment' for them. With regards to these issues, Malthus was also against government intervention to help the 'lower classes', stating that the help of the government may cause inertia among them. Therefore in sum, Malthus viewed human nature as detrimental to people of a certain class. Due to this, his opinions regarding class division are very evident in his works.

Although Malthus' regards human nature from more of a biological perspective, his underlying philosophy still reflects certain assumptions of the modern-day Economic Man. Malthus' views of human nature being the expression of intense emotions, along with the requirement of nourishment, demonstrate the modern-day Economic Man's innate drive for consumption. The Economic Man as a consumer lives with his own needs and preferences, and as a rational being, will choose what he values more depending on his constraints. The Economic Man's rationality, focusing on his constraints, can be compared to Malthus' notion of 'moral restraint'. In modern day thought, certain consumers have tighter constraints, but in the end they choose what they value most while keeping the constraints in mind – they are aware of the resources they have available to satisfy their needs. This

exhibits what Malthus presented, with the upper class knowing how to go about these ‘passions’ in the best way possible.

2.4 JOHN STUART MILL

The nineteenth century marked a period of dominance in the world for the British Empire, otherwise known as the *Pax Britannica*, which significantly differed from the wars and revolutions of the eighteenth century. It also marked a period of scientific advancement and innovation, due to the Industrial Revolution. The Industrial Revolution gave way to many developments such as the invention of the steam engine, leading to the creation of the steam locomotive, which ameliorated transportation and led to population growth. The nineteenth century brought about not only increased scientific discoveries but also liberalism and radicalism with regards to social philosophy. The end of the Enlightenment paved the way for the new philosophies of the Romantic period. This was reflected in John Stuart Mill’s works, which is credited to his father, James Mill, and colleague, Jeremy Bentham – Mill Sr. and Bentham were the leaders of philosophical radicalism. Due to the lower social classes of the Victorian era being politically misrepresented, Bentham and Mill Sr.’s radical views entailed rationalization with respect to law, as well as unanimity among the upper and lower classes (Miller, 2010). It is their philosophical radicalism that influenced J.S. Mill and aided him in the development of his ideas (Miller, 2010).

With respect to humans’ natural predispositions, Mill built on Bentham’s ‘Greatest Happiness Principle’ (Mill 1987) and viewed ‘Utility’ as human nature (Mill, 1987). This concept of ‘Utility’ posited that people act based on what brings them happiness (otherwise known as pleasure) and they refrain from choosing actions that would bring them suffering (Mill, 1987). He also stated that pleasure and absence of suffering are the sole things coveted by man, with certain pleasures being lusted after more than others (Mill, 1987). In essence, Mill viewed man as a person, who by nature, sought to gain personal satisfaction while avoiding anything bringing discomfort.

With regards to society, Mill believed that the ‘utilitarian standard’ was not individualized but rather measured as the collective sum of individuals’ happiness (Mill, 1987). He witnessed society as the collective sum of individuals’ human natures, and that these individual human natures did

not change when one was among others in society (Mill, 1941). This demonstrates a consistency of human nature, according to Mill, as it does not differ depending on one's surroundings.

Eric Roll argues that the construction of the Economic Man can be seen in Mill's definition of 'Political Economy': Mill viewed 'Political Economy' as "concerned with [man] ... solely as a being who desires to possess wealth, and who is capable of judging of the comparative efficacy of means for obtaining that end" (as cited in Roll, 1961). Mill noted that these ways of wanting to acquire wealth entailed "aversion to labour, and desire of the present enjoyment of costly indulgences" (Mill, 1974). His views regarding human nature as 'utilitarian' as well as the way 'Political Economy' approached humans in society can be attributed to the rationality underlying the twenty-first century's 'Economic Man'.

Mill's main contribution of 'Utility' is seen in the quasi-utilitarian Economic Man. His views of human nature – to gain personal satisfaction and avoid suffering – demonstrate the assumptions of the Economic Man. Mill's analysis of 'Utility' in society may be seen in modern economic thought, since in the basic model, each economic actor has his own set of preferences that do not change when he comes in contact with society.

3 CONCLUSION

In conclusion, modern understanding of *homo oeconomicus*, based on nature that is egoistic, logical and practical has its founding elements in the classical economic thought of Adam Smith, Thomas Malthus and John Stuart Mill. Smith's views entailed the nature to do whatever brings oneself pleasure, without regard for others, Malthus viewed human nature as the desire to procreate, possessing a drive for consumption, and Mill presented his views of human nature as based on individual preferences. Together, Smith, Malthus and Mill provide a profound analysis of economics, even if their thought precedes the term. These three classical theorists laid the basis of not only modern economic analysis, but also many of its theories and assumptions.

REFERENCES

- Heilbroner, Robert.** 1999. *The worldly philosophers: Lives, times and ideas of the great economic thinkers*. New York: Simon and Schuster.
- Hollander, S.** 1973. *The Economics of Adam Smith*. Toronto: University of Toronto Press.
- Malthus, T. R., and G. Himmelfarb.** 1960. *On population: Edited and introduced by Gertrude Himmelfarb*. New York: Modern Lib.
- Miller, D.E.** 2010. *Moral, social and political thought*. Cambridge, England: Polity Press.
- Mill, J.S.** 1941. *A system of logic, ratiocinative and inductive: Being a connected view of the principles of evidence and the methods of scientific investigation*. London: Longmans, Green.
- Mill, J.S.** 1974. *Essays on some unsettled questions of political economy*. Clifton: A.M. Kelley.
- Mill, J.S.** 1987. *Utilitarianism*. Buffalo, N.Y.: Prometheus Books.
- Mill, J.S., and S. Collini.** 1989. *On liberty; with the subjection of women*. Cambridge, England: Cambridge University Press.
- Ragan, C., and R. G Lipsey.** 2011. *Economics*. Toronto: Pearson Canada.
- Roll, I.E.R.** 1961. *A history of economic thought*. Englewood Cliffs, N.J.: Prentice-Hall.
- Sandelin, B.** 2008. *A short history of economic thought*. London: Routledge.
- Smith, A.** 1999. *The wealth of nations: Book I-III*. London: Penguin Books.
- Smith, A., and D. Stewart.** 1963. *Works*. Aalen, Netherlands: Zeller.
- Smith, A., & Cannan, E.** 1994. *An inquiry into the nature and causes of the wealth of nations*. New York: Modern Library.
