Economics 270c
Graduate Development Economics

Professor Ted Miguel

Department of Economics

University of California, Berkeley

Economics 270c
Graduate Development Economics

Lecture 6 – February 24, 2009

Macroeconomic growth empirics

Lecture 1: Global patterns of economic growth and development (1/20)

Lecture 2: Inequality and growth (1/27)

The political economy of development

Lecture 3: History and institutions (2/3)

Lecture 4: Corruption (2/10)

Lecture 5: Patronage politics (2/17)

Lecture 6: Democracy and development (2/24)

Lecture 7: War and Economic Development (3/3)

Lecture 8: Economic Theories of Conflict (3/10) – Guest lecture by Gerard Padro

Human resources

Lecture 9: Human capital and income growth (3/17)

Lecture 10: Increasing human capital (3/31)

Lecture 11: Labor markets and migration (4/7)

Lecture 12: Health and nutrition (4/14)

Lecture 13: The demand for health (4/21)

Other topics

Lecture 14: Environment and development (4/28)

Lecture 15: Resource allocation and firm productivity (5/5)

Additional topics for the development economics field exam

-- Ethnic and social divisions

-- The Economics of HIV/AIDS

- Prerequisites: Graduate microeconomics, econometrics

- Grading:
  Four referee reports – 40%
  → Third referee report due in next week, Mar. 3, 2009
  → Second referee report back soon

  Two problem sets – 20%
  Research proposal – 30%
  Class participation – 10%
  No final exam

- All readings are available online (see syllabus)

- Additional references on syllabus

Lecture 6 outline

(1) Overview of democracy and development

       -- Acemoglu, Johnson, Robinson, Yared (2008)

(2) Besley and Burgess (2002)

(3) Ferraz and Finan (2008)

(1) Democracy and development

- Massive literature in economics and political science

- Consider Sub-Saharan Africa's democratization wave since 1991 – will this help / hinder economic growth?

(1) Democracy and development

- Massive literature in economics and political science

- Consider Sub-Saharan Africa's democratization wave since 1991 – will this help / hinder economic growth?

- How do we define a "democracy"?

  -- Holding elections in not enough

  -- Freedom House measure: *"Political rights are rights to participate meaningfully in the political process. In a democracy this means the right of all adults to vote and compete for public office, and for elected representatives to have a decisive vote on public policies"*

(1) Democracy and development

- How do we quantify the extent of democracy? There is clearly a continuum from democracy to autocracy

  -- E.g., the ruling party may manipulate the media, intimidate opposition supporters, interfere with the electoral commission's voter rolls, engage in ballot fraud. Russia today is more democratic than the Soviet Union, but not as democratic as Sweden

(1) Democracy and development

- How do we quantify the extent of democracy? There is clearly a continuum from democracy to autocracy

  -- E.g., the ruling party may manipulate the media, intimidate opposition supporters, interfere with the electoral commission's voter rolls, engage in ballot fraud. Russia today is more democratic than the Soviet Union, but not as democratic as Sweden

- There are have been large aggregate movements in these measures. In the 1970s average levels of democracy fell sharply in Africa and Latin America, and increased again in the late 1980s / early 1990s there, as well as in Eastern Europe. Reversals are possible

(1) Democracy and development

- Political rights/freedoms are critical for human welfare but what impact on economic development?

(1) Democracy and development

- Political rights/freedoms are critical for human welfare but what impact on economic development?

- A trade-off between democracy and development?
  -- Do democracies consume too much? (Cold War)
  -- Redistribute too much? (Persson and Tabellini 1994)

(1) Democracy and development

- Political rights/freedoms are critical for human welfare but what impact on economic development?

- A trade-off between democracy and development?

  -- Do democracies consume too much? (Cold War)

  -- Redistribute too much? (Persson and Tabellini 1994)

  -- Is democracy too unstable in poor countries?

  E.g. Iraq 2001 versus 2005. Huntington (1968):

  "Political participation must be held down, at least temporarily, in order to promote economic development"

  "The most important political distinction among countries concerns not their form of government, bit their degree of government"

(1) Democracy and development

- There are few general answers here: dictatorships may promote the interests of different groups – left-wing versus right-wing governments

- There is no guarantee that dictatorships will lead to more social stability than democracies, where compromises between social groups are (perhaps) more easily debated and resolved

(1) Democracy and development

- In today's lecture we mainly focus on the effects of democracy. But what of the reverse question: does higher income lead to democracy?

- An inherently challenging issue due to both endogeneity (if democracy boosts income, say) and omitted variables

  -- The literature has been quite unsettled and contentious – and politicized

- A new contribution is Acemoglu, Johnson, Robinson and Yared (2008, *AER*), "AJRY"

(1) AJRY (2008)

- They highlight two patterns:

  1. In the cross-section, income and democracy are very highly correlated (figure 1). In fact this is one of the most robust empirical regularities across countries

  2. But changes in income and changes in democracy are weakly correlated (figure 2)
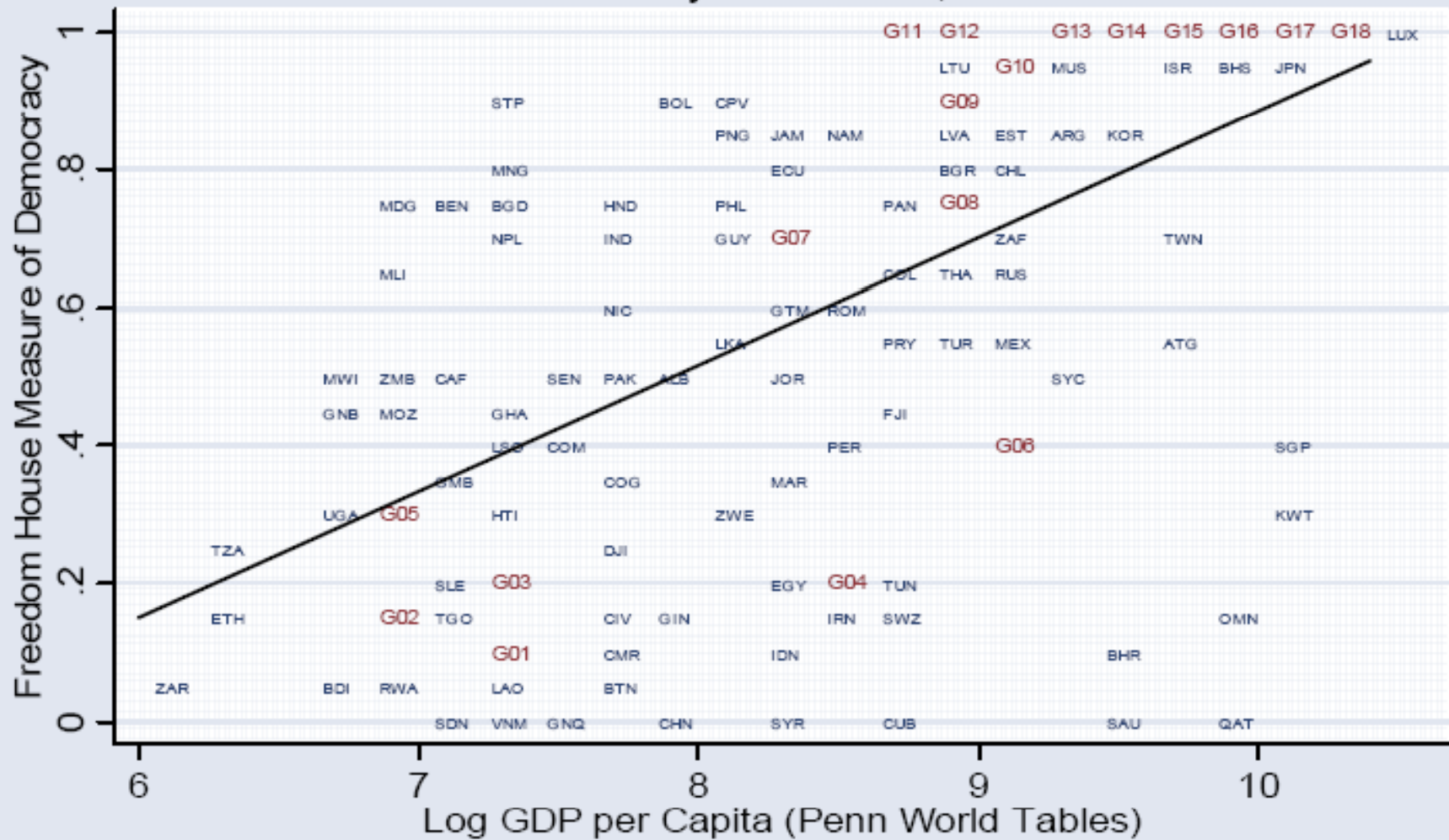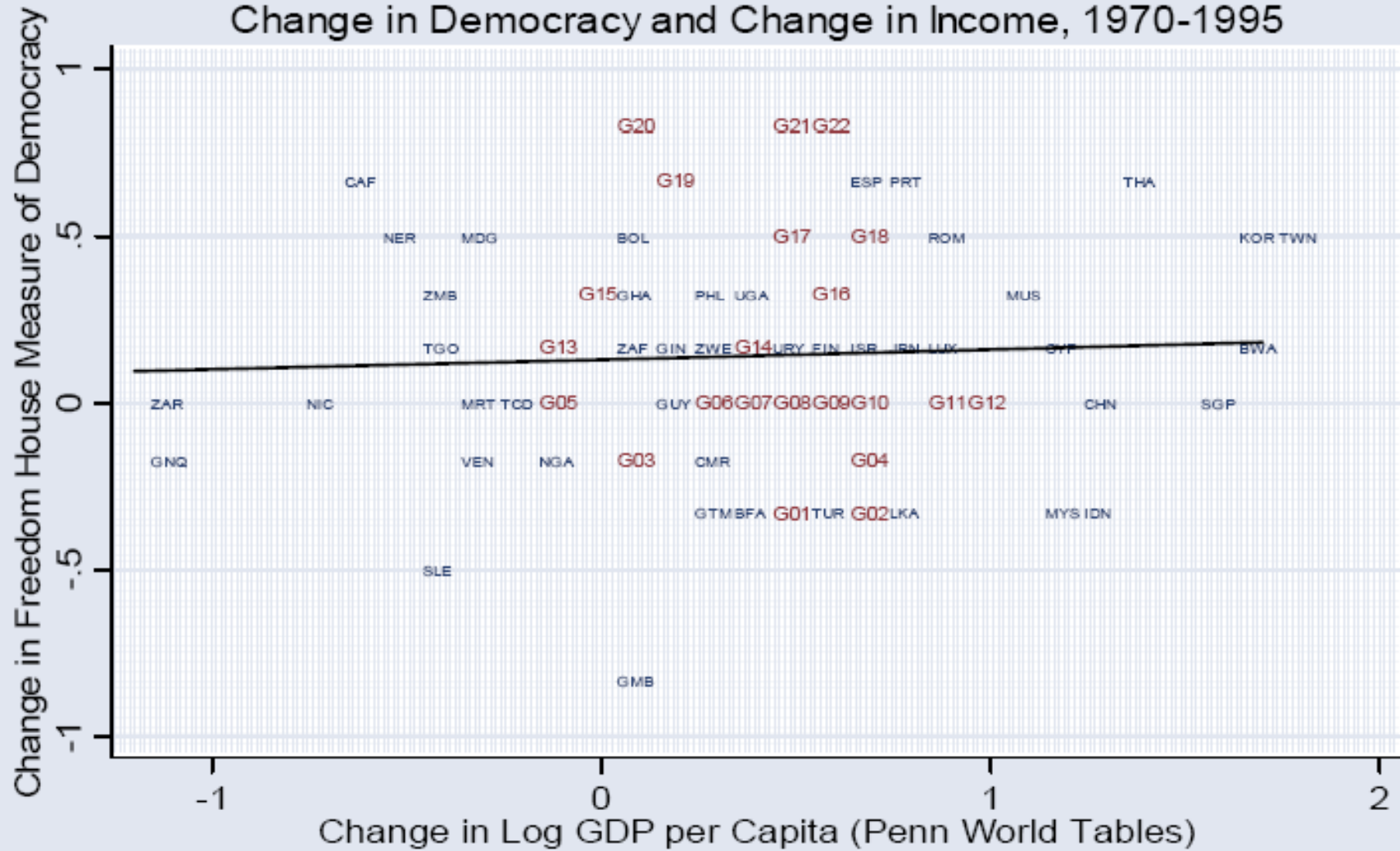
Figure 1

Democracy and Income, 1990s

17

Figure 2

Change in Democracy and Change in Income, 1970-1995

(1) AJRY (2008)

- They highlight two patterns:

  1. In the cross-section, income and democracy are very highly correlated (figure 1). In fact this is one of the most robust empirical regularities across countries

  2. But changes in income and changes in democracy are weakly correlated (figure 2)

- Including country fixed effects (to focus on within country variation) increases standard errors, especially in the IV/GMM specifications (tables 2, 3)

  -- Related issues in the inequality and growth debate

- Could longer-term institutional evolution explain both income growth and democratization?

Table 1
Descriptive Statistics

	All countries	High Income Countries	Low Income Countries
	(1)	(2)	(3)
Panel A			
Freedom House Measure of Democracy$_t$	0.57	0.78	0.36
	(0.36)	(0.30)	(0.30)
Log GDP per Capita $_{t-1}$ (Chain Weighted 1996 Prices)	8.16	9.02	7.30
	(1.02)	(0.56)	(0.53)
Observations	945	473	472
Countries	150	93	98
Panel B			
Polity Measure of Democracy$_t$	0.57	0.79	0.36
	(0.38)	(0.31)	(0.31)
Observations	854	427	427
Countries	136	81	88

Consider the following simple econometric model, which will be the basis of our work both for the post-war and in the 100-year samples:

$$d_{it} = \alpha d_{it-1} + \gamma y_{it-1} + \mathbf{x}'_{it-1}\boldsymbol{\beta} + \mu_t + \delta_i + u_{it}, \tag{1}$$

where d_{it} is the democracy score of country i in period t. The lagged value of this variable on the right-hand side is included to capture persistence in democracy and also potentially mean-reverting dynamics (i.e., the tendency of the democracy score to return to some equilibrium value for the country). The main variable of interest is y_{it-1}, the lagged value of log income per capita. The parameter γ therefore measures the causal effect of income per capita on democracy. All other potential covariates are included in the vector $\mathbf{x}_{it-1}$. In addition, the δ_i's denote a full set of country dummies and the μ_t's denote a full set of time effects that capture common shocks to (common trends in) the democracy score of all countries. u_{it} is an error term, capturing all other omitted factors, with $E(u_{it}) = 0$ for all i and t.[9]

Table 2
Fixed Effects Results using Freedom House Measure of Democracy

	Base Sample, 1960-2000								
	5-year data					Annual data	10-year data		20-year data
	Pooled OLS (1)	Fixed Effects OLS (2)	Anderson-Hsiao IV (3)	Arellano-Bond GMM (4)	Fixed Effects OLS (5)	Fixed Effects OLS (6)	Fixed Effects OLS (7)	Arellano-Bond GMM (8)	Fixed Effects OLS (9)
	Dependent Variable is Democracy								
Democracy $_{t-1}$	0.706	0.379	0.469	0.489		[0.00]	-0.025	0.226	-0.581
	(0.035)	(0.051)	(0.100)	(0.085)			(0.088)	(0.123)	(0.198)
Log GDP per Capita $_{t-1}$	0.072	0.010	-0.104	-0.129	0.054	[0.33]	0.053	-0.318	-0.030
	(0.010)	(0.035)	(0.107)	(0.076)	(0.046)		(0.066)	(0.180)	(0.156)
Hansen J Test				[0.26]				[0.07]	
AR(2) Test				[0.45]				[0.96]	
Implied Cumulative Effect of Income	0.245	0.016	-0.196	-0.252				-0.411	-0.019
	[0.00]	[0.76]	[0.33]	[0.09]				[0.09]	[0.85]
Observations	945	945	838	838	958	2895	457	338	192
Countries	150	150	127	127	150	148	127	118	118
R-squared	0.73	0.80			0.76	0.93	0.77		0.89

22

(1) AJRY (2008)

- Some comments on the empirical results:

  1) Standard errors are wide. Consider an increase of one in log income (from Thailand to Japan). The +2*SE effect that can be ruled out is in column 2 is 2*(0.035)*1 = 0.07 more democracy, roughly from Ethiopia to Tanzania in the 1990s

  2) FE's remove most variation from the (noisy) income measure, likely increasing attenuation bias towards zero

  3) Including lagged dependent variables biases FE regressions unless T$\rightarrow \infty$. But T=5 in the main specification.

  4) Fixes for this problem (Anderson-Hsiao 1982 and Arellano-Bond 1991) essentially use lagged explanatory variables as IV's. But SE's are large, so confidence intervals become even wider

  5) Effects may not be upper bounds (e.g., collapse of USSR)

  6) The IV's used for income – the lagged savings rate, and growth rates in trading partners – raise exclusion concerns, and the long-run panel (1875-2000) again results in large SE's

5.1 Savings Rate Instrument

The first instrument is the savings rate in the previous five-year period, denoted by s_{it}. The corresponding first stage for log income per capita, y_{it-1}, in regression (1) is

$$y_{it-1} = \pi^F s_{it-2} + \alpha^F d_{it-1} + \mathbf{x}'_{it-1} \boldsymbol{\beta}^F + \mu^F_{t-1} + \delta^F_i + u^F_{it-1}, \tag{3}$$

where all the variables are defined in Section 3 and the only excluded instrument is s_{it-2}. The identification restriction is that $\text{Cov}(s_{it-2}, u_{it} \mid \mathbf{x}_{it-1}, \mu_t, \delta_i) = 0$, where u_{it} is the residual error term in the second-stage regression, (1).

We naturally expect the savings rate to influence income in the future. What about excludability? While we do not have a precise theory for why the savings rate should have no direct effect on democracy, it seems plausible to expect that changes in the savings rate over periods of 5-10 years should have no direct effect on the culture of democracy, the structure of political institutions or the nature of political conflict within society.

Nevertheless, there are a number of channels through which savings rates could be correlated with the error term in the second-stage equation, u_{it}. First, the savings rate itself might be influenced by the current political regime, for example, d_{it-2}, and could be correlated with u_{it} if all the necessary lags of democracy are not included in the system. Second, the savings rate could be correlated with changes in the distribution of income or composition of assets, which might have direct effects on political equilibria. Below, we provide evidence that these concerns are unlikely to be important in practice.

(1) The virtues of democracy

- Amartya Sen (1981) *Poverty and Famines: An Essay on Entitlement and Deprivation*

- Stylized fact: no full-blown famines in a democracy

(1) The virtues of democracy

- Amartya Sen (1981) *Poverty and Famines: An Essay on Entitlement and Deprivation*

- Stylized fact: no full-blown famines in a democracy

  (1) Free press: both policymakers and voters have better information

  (2) Elections: more accountability for performance

(1) A tale of two famines

- Post-independence India: no famines
- Pre-independence India: many famines, including the disastrous 1943 Bengal Famine, 1.5-3 million dead

(1) A tale of two famines

- Post-independence India: no famines
- Pre-independence India: many famines, including the disastrous 1943 Bengal Famine, 1.5-3 million dead

  "The vital problems of India are being treated by His Majesty's Government with neglect, even sometimes with hostility and contempt."   -- Lord Wavell

(1) A tale of two famines

- Post-independence India: no famines
- Pre-independence India: many famines, including the disastrous 1943 Bengal Famine, 1.5-3 million dead

  "The vital problems of India are being treated by His Majesty's Government with neglect, even sometimes with hostility and contempt."   -- Lord Wavell

- Communist China: massive famine in 1957-1962 during "The Great Leap Forward", 10-30 million dead

(2) Besley and Burgess (2002, *QJE)*

- An empirical implementation of Sen's ideas across 16 Indian states 1958-1992

- Indian states with more active local media and more competitive local politics respond more effectively to natural disasters (drought, flood)

(2) Besley and Burgess (2002, *QJE)*

- An empirical implementation of Sen's ideas across 16 Indian states 1958-1992

- Indian states with more active local media and more competitive local politics respond more effectively to natural disasters (drought, flood)

- A model of political agency: voters seek to restrain politicians' moral hazard problem

   -- Strong media → information on politician actions

   -- Close elections → higher cost of inaction for politicians

A. Method

Our basic method is to run panel data regressions for states i and years t of the following form:

$$(4) \qquad g_{it} = \alpha_i + \beta_t + \delta s_{it} + \gamma(s_{it})(z_{it}) + \phi z_{it} + u_{it},$$

where α_i and β_t are state and year fixed effects and z_{it} is a vector of economic, political, and media variables that we might expect to affect government responsiveness (g_{it}). This specification allows the right-hand side variables z_{it} to enter both as level terms and interacted with variables that capture the need for state intervention (s_{it}).

In terms of the theory, we think of the variable s_{it} proxying for β—the fraction of the needy population. We will introduce the other variables that Proposition 1 suggests should affect responsiveness as elements of the vector z_{it}.

TABLE II
SHOCKS AND RESPONSES IN INDIA: 1958–1992

	Food grain production	Public food distribution	Public food distribution	Flood damage	Calamity relief expenditure	Calamity relief expenditure
	(1)	(2)	(3)	(4)	(5)	(6)
Drought	−24.72			−3.510		
	(2.33)			(3.43)		
Flood	4.475			6.207		
	(0.65)			(3.20)		
Food grain production		−0.027			0.009	
		(3.55)			(1.60)	
Flood damage			0.035			0.141
			(0.79)			(4.82)
State effects	YES	YES	YES	YES	YES	YES
Year effects	YES	YES	YES	YES	YES	YES
Number of observations	460	512	524	480	507	523
Adjusted R^2	0.84	0.71	0.69	0.18	0.19	0.27

TABLE III
Determinants of Government Activism

	Public food distribution			Calamity relief expenditure		
	(1)	(2)	(3)	(4)	(5)	(6)
Food grain production	−0.024 (2.51)	−0.026 (2.67)	−0.024 (2.43)			
Flood damage				0.149 (4.67)	0.146 (4.72)	0.144 (4.57)
Newspaper circulation		97.19 (3.37)	97.82 (3.60)		39.84 (2.34)	38.63 (2.25)
Turnout			−0.115 (1.612)			0.015 (0.52)
Political competition			5.671 (3.11)			0.753 (0.70)
Election dummy			2.497 (2.35)			−0.032 (0.07)
Log state income	3.617 (0.69)	5.678 (1.07)	2.705 (0.51)	−2.258 (0.72)	−1.724 (0.54)	−2.417 (0.78)
Ratio of urban to total population	130.47 (2.37)	71.82 (1.37)	62.14 (1.20)	−20.02 (0.97)	−45.54 (1.89)	−42.70 (1.77)
Population density	−18.42 (0.82)	−34.03 (1.76)	−36.04 (1.95)	−9.588 (1.56)	−17.85 (2.61)	−17.29 (2.59)
Log population	−43.96 (2.94)	−46.23 (2.96)	−49.59 (3.18)	−10.86 (1.16)	−9.249 (0.99)	−12.25 (1.30)
Revenue from center	0.079 (1.88)	0.044 (1.13)	0.053 (1.41)	0.019 (0.43)	0.006 (0.14)	0.009 (0.19)
State effects	YES	YES	YES	YES	YES	YES
Year effects	YES	YES	YES	YES	YES	YES
Number of observations	476	474	471	491	489	486
Adjusted R^2	0.75	0.76	0.77	0.27	0.28	0.28

TABLE III
DETERMINANTS OF GOVERNMENT ACTIVISM

	Public food distribution			Calamity relief expenditure		
	(1)	(2)	(3)	(4)	(5)	(6)
Food grain production	−0.024 (2.51)	−0.026 (2.67)	−0.024 (2.43)			
Flood damage				0.149 (4.67)	0.146 (4.72)	0.144 (4.57)
Newspaper circulation		97.19 (3.37)	97.82 (3.60)		39.84 (2.34)	38.63 (2.25)
Turnout			−0.115 (1.612)			0.015 (0.52)
Political competition			5.671 (3.11)			0.753 (0.70)
Election dummy			2.497 (2.35)			−0.032 (0.07)
Log state income	3.617 (0.69)	5.678 (1.07)	2.705 (0.51)	−2.258 (0.72)	−1.724 (0.54)	−2.417 (0.78)
Ratio of urban to total population	130.47 (2.37)	71.82 (1.37)	62.14 (1.20)	−20.02 (0.97)	−45.54 (1.89)	−42.70 (1.77)
Population density	−18.42 (0.82)	−34.03 (1.76)	−36.04 (1.95)	−9.588 (1.56)	−17.85 (2.61)	−17.29 (2.59)
Log population	−43.96 (2.94)	−46.23 (2.96)	−49.59 (3.18)	−10.86 (1.16)	−9.249 (0.99)	−12.25 (1.30)
Revenue from center	0.079 (1.88)	0.044 (1.13)	0.053 (1.41)	0.019 (0.43)	0.006 (0.14)	0.009 (0.19)
State effects	YES	YES	YES	YES	YES	YES
Year effects	YES	YES	YES	YES	YES	YES
Number of observations	476	474	471	491	489	486
Adjusted R^2	0.75	0.76	0.77	0.27	0.28	0.28

35

TABLE IV
NEWSPAPERS AND RESPONSIVENESS

	Public food distribution				Calamity relief expenditure		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Food grain production	0.019 (0.98)	−0.000 (0.00)	−0.021 (2.15)	0.011 (0.56)			
Flood damage					0.063 (2.58)	0.144 (4.46)	0.085 (3.95)
Newspaper circulation	146.84 (4.52)	152.34 (3.96)			19.41 (1.31)		
Newspaper circulation * food grain production	−0.444 (3.11)	−0.412 (2.53)					
Newspaper circulation * flood damage					1.677 (2.83)		
English newspaper circulation			54.64 (0.61)	91.63 (0.68)		42.97 (0.86)	47.76 (0.96)
Hindi newspaper circulation			−14.34 (0.29)	−157.43 (1.18)		3.515 (0.10)	−19.33 (0.52)
Other newspaper circulation			118.88 (3.45)	168.02 (3.88)		42.14 (2.30)	20.35 (1.35)
English newspaper circulation * food grain production				−0.229 (0.36)			
Hindi newspaper circulation * food grain production				0.542 (1.09)			
Other newspaper circulation * food grain production				−0.605 (2.84)			
English newspaper circulation * flood damage							−5.683 (1.70)
Hindi newspaper circulation * flood damage							2.410 (1.29)
Other newspaper circulation * flood damage							1.964 (3.16)

36

TABLE IV
NEWSPAPERS AND RESPONSIVENESS

	Public food distribution				Calamity relief expenditure		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Food grain production	0.019 (0.98)	−0.000 (0.00)	−0.021 (2.15)	0.011 (0.56)			
Flood damage					0.063 (2.58)	0.144 (4.46)	0.085 (2.95)
Newspaper circulation	146.84 (4.52)	152.34 (3.96)			19.41 (1.31)		
Newspaper circulation * food grain production	−0.444 (3.11)	−0.412 (2.53)					
Newspaper circulation * flood damage					1.677 (2.83)		
English newspaper circulation			54.64 (0.61)	91.63 (0.68)		42.97 (0.86)	47.76 (0.96)
Hindi newspaper circulation			−14.34 (0.29)	−157.43 (1.18)		3.515 (0.10)	−19.33 (0.52)
Other newspaper circulation			118.88 (3.45)	168.02 (3.88)		42.14 (2.30)	20.35 (1.35)
English newspaper circulation * food grain production				−0.229 (0.36)			
Hindi newspaper circulation * food grain production				0.542 (1.09)			
Other newspaper circulation * food grain production				−0.605 (2.84)			
English newspaper circulation * flood damage							−5.683 (1.70)
Hindi newspaper circulation * flood damage							2.410 (1.29)
Other newspaper circulation * flood damage							1.964 (3.16)

37

TABLE V
Newspapers and Responsiveness: Instrumenting with Ownership Data

	Public food distribution	Public food distribution	Newspaper circulation	Calamity relief exp	Calamity relief exp	Newspaper circulation
	(1)	(2)	(3)	(4)	(5)	(6)
Food grain production	−0.023	0.055	0.000			
	(2.10)	(2.45)	(0.70)			
Flood damage				0.144	0.051	0.000
				(4.40)	(1.23)	(0.62)
Newspaper circulation	321.26	408.04		109.21	75.03	
	(2.36)	(3.14)		(2.66)	(1.87)	
Newspaper circulation * food grain production		−0.683				
		(4.73)				
Newspaper circulation * flood damage					1.758	
					(1.89)	
Share of newspapers owned by individuals			0.023			0.011
			(1.21)			(0.65)
Share of newspapers owned by public joint stock companies			−0.139			−0.127
			(1.09)			(1.05)
Share of newspapers owned by private joint stock companies			−0.028			0.002
			(0.37)			(0.03)
Share of newspapers owned by societies or associations			0.081			0.070
			(2.39)			(2.32)
Share of newspapers owned by political parties			−0.927			−0.912
			(5.19)			(5.39)

TABLE VI
POLITICS AND RESPONSIVENESS

	Public food distribution			Calamity relief expenditure		
	(1)	(2)	(3)	(4)	(5)	(6)
Food grain production	0.041 (0.90)	−0.032 (3.13)	−0.026 (3.01)			
Flood damage				−0.175 (1.63)	0.222 (3.39)	0.161 (3.50)
Newspaper circulation	98.73 (3.62)	93.55 (3.46)	99.49 (3.63)	34.97 (2.14)	36.07 (2.22)	37.95 (2.23)
Turnout	0.085 (0.54)	−0.107 (1.51)	−0.120 (1.67)	−0.018 (0.66)	0.012 (0.42)	0.015 (0.53)
Turnout * food grain production	−0.001 (1.56)					
Turnout * flood damage				0.005 (2.86)		
Political competition	5.899 (3.20)	12.00 (3.08)	5.853 (3.21)	0.753 (0.717)	−0.404 (0.32)	0.657 (0.60)
Political competition * food grain production		−0.027 (2.04)				
Political competition * flood damage					0.182 (1.69)	
Election dummy	2.535 (2.36)	2.420 (2.30)	0.061 (0.03)	−0.125 (0.29)	−0.003 (0.01)	0.197 (0.39)
Election dummy * food grain production			0.012 (1.25)			
Election dummy * flood damage						−0.037 (0.71)
Economic controls	YES	YES	YES	YES	YES	YES
State effects	YES	YES	YES	YES	YES	YES
Year effects	YES	YES	YES	YES	YES	YES
Number of observations	471	471	471	486	486	486
Adjusted R^2	0.77	0.77	0.77	0.29	0.29	0.28

39

(3) Ferraz and Finan (2008, *QJE)*

- How does information about corruption affect voter choices in a democracy? And how is this impact affected by the strength of local media?

- Closely related to arguments in Sen (1981) and Besley and Burgess (2002), but rely on an experiment in Brazil that led to exogenously better performance information

(3) Ferraz and Finan (2008, *QJE)*

- How does information about corruption affect voter choices in a democracy? And how is this impact affected by the strength of local media?

- Closely related to arguments in Sen (1981) and Besley and Burgess (2002), but rely on an experiment in Brazil that led to exogenously better performance information

- Starting in 2003, the Brazil federal government began randomly auditing municipalities for corruption

  -- Teams of 10 well-trained independent auditors

  -- Instances of corruption (e.g., over-invoicing, diversion of funds) were publicized in the press and on the internet

from the newspaper *Diário de Pará* illustrates the use of the audit reports in the political campaign and how this information came as a complete surprise to the public: "The conclusions from the CGU were used extensively in the political campaigns, by not only the opposition parties but those that received positive reports as well...The reports were decisive in several cities. In the small city of Vicosa, in Alagoas, where a lot of corruption was found, the mayor Flavis Flaubert (PL) was not re-elected. He lost by 200 votes to Pericles Vasconcelos (PSB), who during his campaign used pamphlets and large-screen television in the city's downtown to divulge the report. Flaubert blames the CGU for his lost." (*Diário de Pará* (PA) - 10/18/2004)

To illustrate the type of irregularities found and the procedure used to code corruption, consider the following examples extracted from the audit reports. In São Francisco do Conde, Bahia, the firm Mazda was contracted, without a public call for bids, to build approximately nine kilometers of a road. The cost of the construction was estimated at R\$ 1 million based on similar constructions. The receipts presented by Mazda and paid by the government totalled R\$ 5 million. No further documentation was shown by the municipal government proving the need for the additional amount of resources. The auditors found that the firm did not have any experience with construction and had sub-contracted another firm for R\$ 1.8 million to do the construction. Hence, the project was over-paid by more than R\$ 3 million. As evidence of corruption, it was later found that the firm Mazda gave an apartment to the mayor and his family valued at R\$600,000. We classified this violation as an incidence of over-invoicing.

(3) Ferraz and Finan (2008, *QJE)*

- Theoretically the release of information on corruption (or any other measure of official performance) could have positive or negative effects on re-election prospects

  -- If performance is better (worse) than expected, it could boost (hurt) re-election success

(3) Ferraz and Finan (2008, *QJE)*

- Theoretically the release of information on corruption (or any other measure of official performance) could have positive or negative effects on re-election prospects

  -- If performance is better (worse) than expected, it could boost (hurt) re-election success

- Intuitively the release of information on corruption could hurt "dirty" politicians and help "clean" ones

  -- Most municipalities had between 0 and 4 incidents of corruption founds by auditors

- Econometric identification: the municipalities chosen for audits were chosen by public lottery, some (by chance) before the Oct. 2004 municipal elections, some after
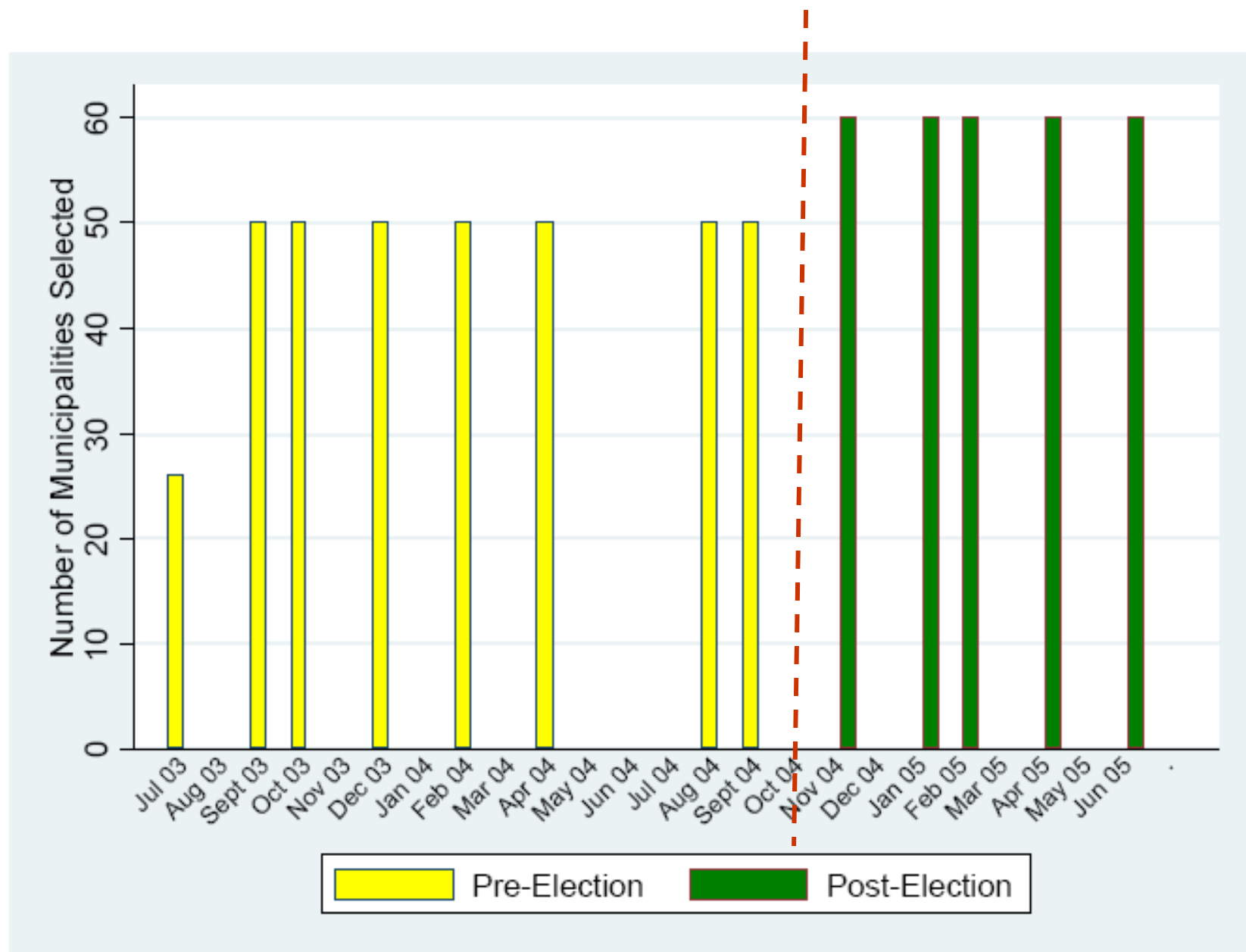
FIGURE II: TIMING OF THE RELEASE OF THE AUDITS

(3) Ferraz and Finan (2008, *QJE)*

- The municipalities chosen for audits before and after the election look very similar along observables, helping rule out manipulation in audit timing (table 1)

To test the hypothesis that the impact of the disclosure of information about corruption depends on the existence of local media, we augment the specification in equation 2 with a set of terms to capture the triple interaction between whether the municipality was audited, its corruption level, and the availability of local media:

$$(3) \quad E_{ms} = \alpha + \beta_0 C_{ms} + \beta_1 A_{ms} + \beta_2 M_{ms} + \beta_3 (A_{ms} \times M_{ms}) + \beta_4 (A_{ms} \times C_{ms})$$
$$+ \quad \beta_5 (M_{ms} \times C_{ms}) + \beta_6 (A_{ms} \times C_{ms} \times M_{ms}) + X_{ms}\gamma + \nu_s + \varepsilon_{ms}.$$

Our measure of media, M_{ms}, is the number of local AM radio stations that exist in the municipality. As discussed in the background section, radio is the most important source of local news in Brazil and broadcasters play a key role in disseminating information about

(3) Ferraz and Finan (2008, *QJE)*

- The municipalities chosen for audits before and after the election look very similar along observables, helping rule out manipulation in audit timing (table 1)

- Audits have the hypothesized positive impact on the re-election of mayors with zero corruption, and a negative effect on mayors with higher than median corruption

  -- Large electoral magnitudes (table 3)
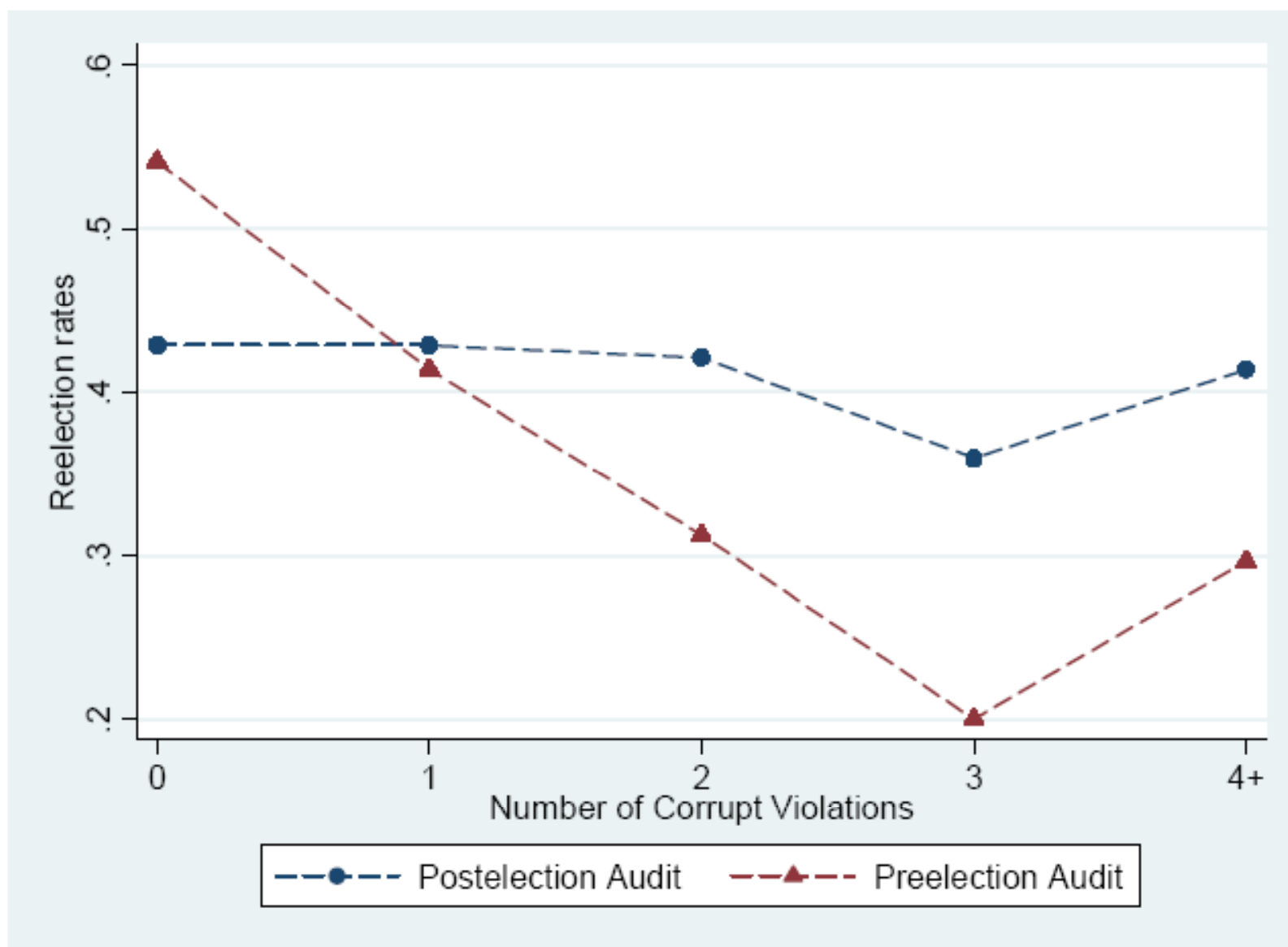
FIGURE III: RELATIONSHIP BETWEEN RE-ELECTION RATES AND CORRUPTION LEVELS FOR MUNICIPALITIES AUDITED BEFORE AND AFTER THE ELECTIONS
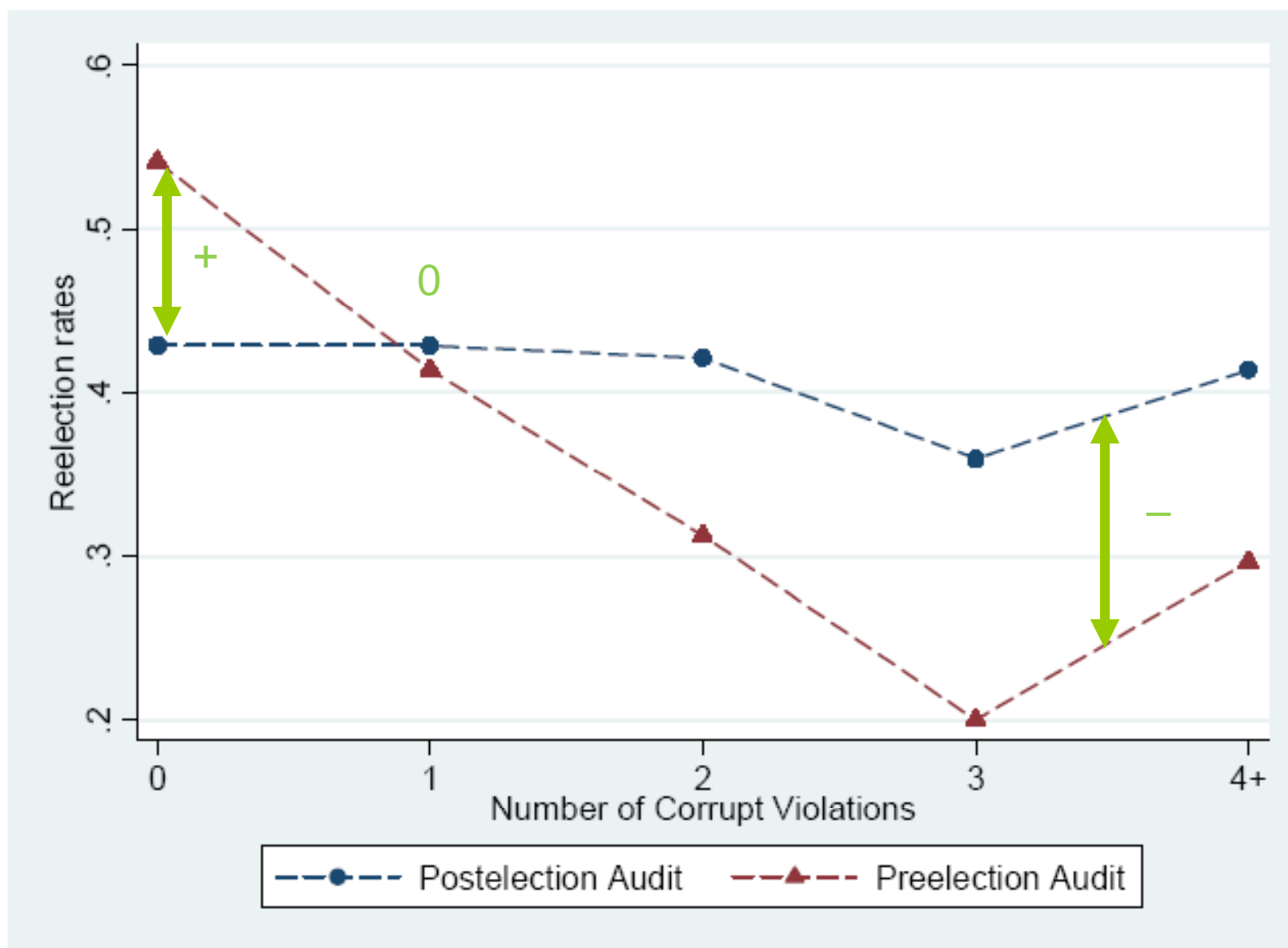
FIGURE III: RELATIONSHIP BETWEEN RE-ELECTION RATES AND CORRUPTION LEVELS FOR MUNICIPALITIES AUDITED BEFORE AND AFTER THE ELECTIONS

TABLE III: THE EFFECTS OF THE RELEASE OF THE AUDITS ON RE-ELECTION RATES BY THE LEVEL OF REPORTED CORRUPTION

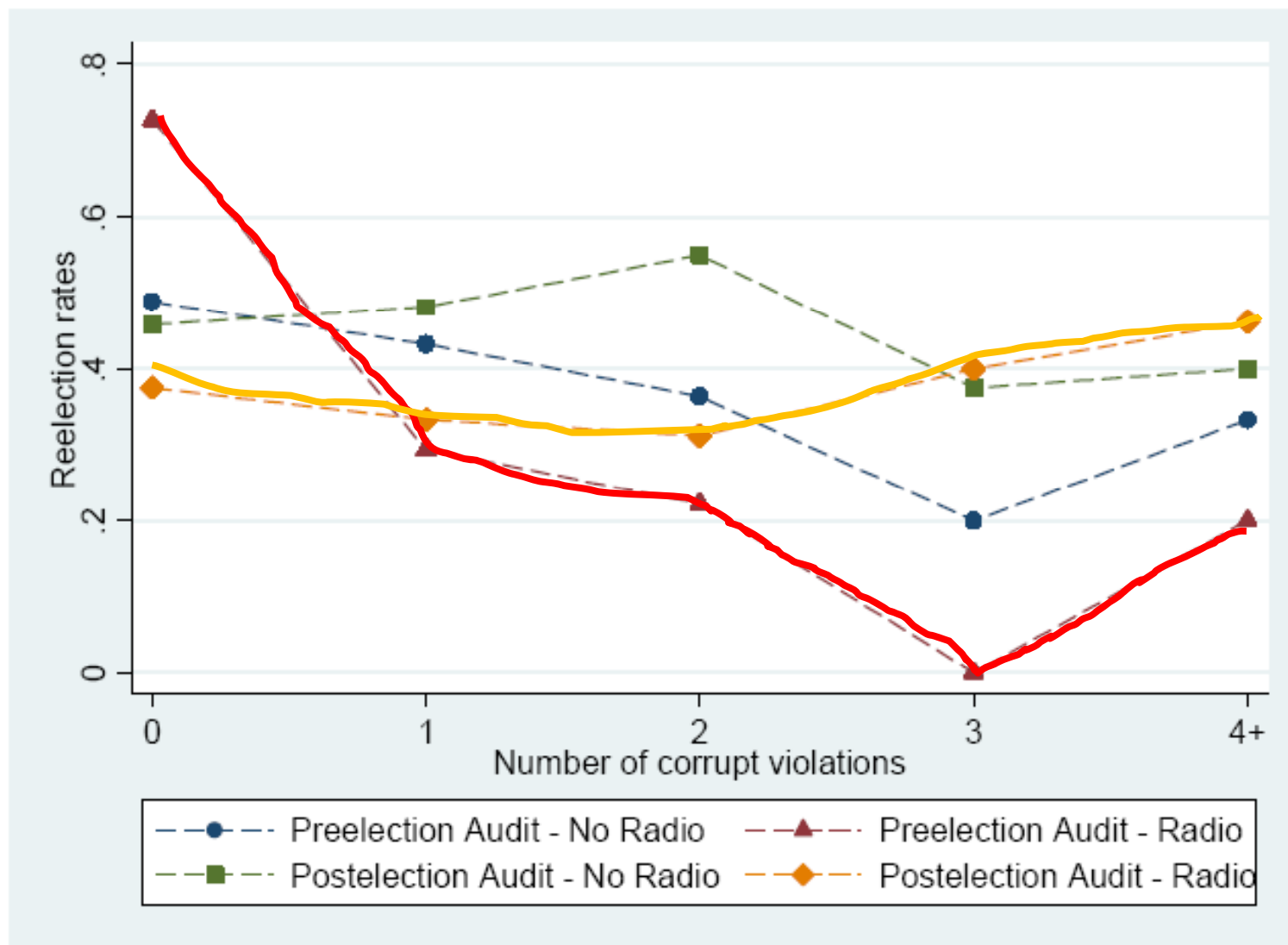|	Linear		Quadratic	Semi-parametric	Corruption ≤ 5	Corruption ≤ 4
	(1)	(2)	(3)	(4)	(5)	(6)
Preelection audit	0.029	0.030	0.126	0.084	0.068	0.086
	[0.083]	[0.082]	[0.101]	[0.104]	[0.087]	[0.088]
Preelection audit × Number of corrupt violations	-0.038	-0.038	-0.200		-0.070	-0.088
	[0.035]	[0.035]	[0.090]*		[0.041]+	[0.043]*
Preelection audit × Number of corrupt violations^2			0.034			
			[0.017]*			
Preelection audit × Corruption = 0				0.010		0.003
				[0.156]		[0.036]
Preelection audit × Corruption = 2				-0.253		
				[0.148]+		
Preelection audit × Corruption = 3				-0.321		
				[0.192]+		
Preelection audit × Corruption = 4+				-0.159		
				[0.168]		
Number of corrupt violations	-0.013	-0.012	0.037		0.012	0.003
	[0.026]	[0.027]	[0.066]		[0.033]	[0.036]
Number of corrupt violations^2			-0.009			
			[0.011]			
Corruption = 0				0.028		
				[0.126]		
Corruption = 2				0.052		
				[0.114]		
Corruption = 3				-0.006		
				[0.129]		
Corruption = 4+				-0.002		
				[0.136]		
Observations	373	373	373	373	362	351
R-squared	0.05	0.18	0.19	0.22	0.19	0.20
F-test (p-values)			0.089	0.192		
State fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Municipal characteristics	No	Yes	Yes	Yes	Yes	Yes
Mayor characteristics	No	Yes	Yes	Yes	Yes	Yes

(3) Ferraz and Finan (2008, *QJE)*

- Better information about corruption leads to more electoral accountability in Brazil, especially in areas with good local radio coverage (table 6)

  -- Audits decreased re-election by 16 percentage points (over one third) if three corruption violations and one local radio station, versus 4 p.p. if no local radio station

(3) Ferraz and Finan (2008, *QJE)*

- Better information about corruption leads to more electoral accountability in Brazil, especially in areas with good local radio coverage (table 6)

   -- Audits decreased re-election by 16 percentage points (over one third) if three corruption violations and one local radio station, versus 4 p.p. if no local radio station

   -- However, for clean municipalities, if no corruption violations were found, re-election odds increased by 17 percentage points

- This result survives other interaction controls for local demographics, education, economic inequality, legal institutions, political competition

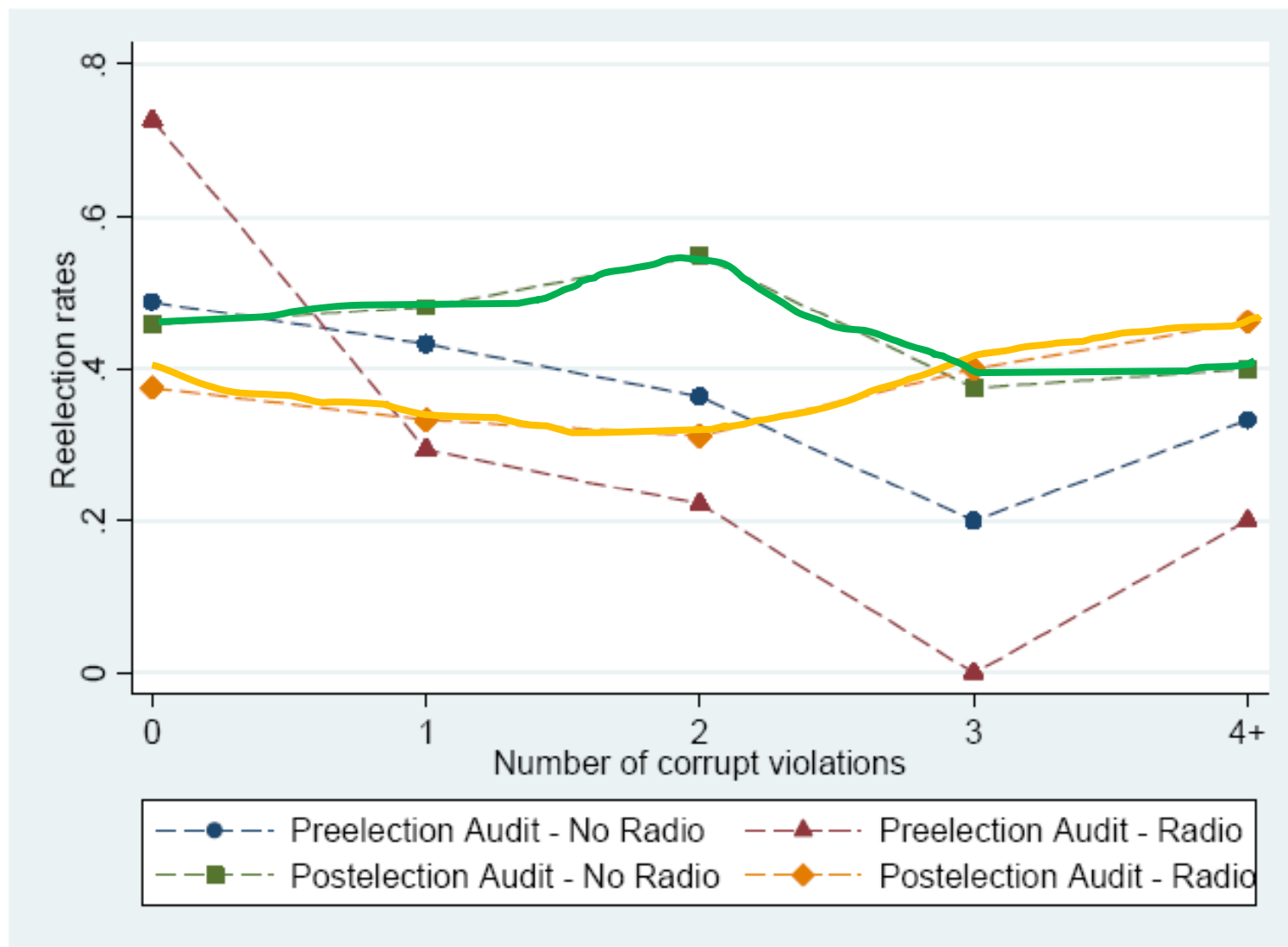   -- Local newspapers and TV do not have the same effect
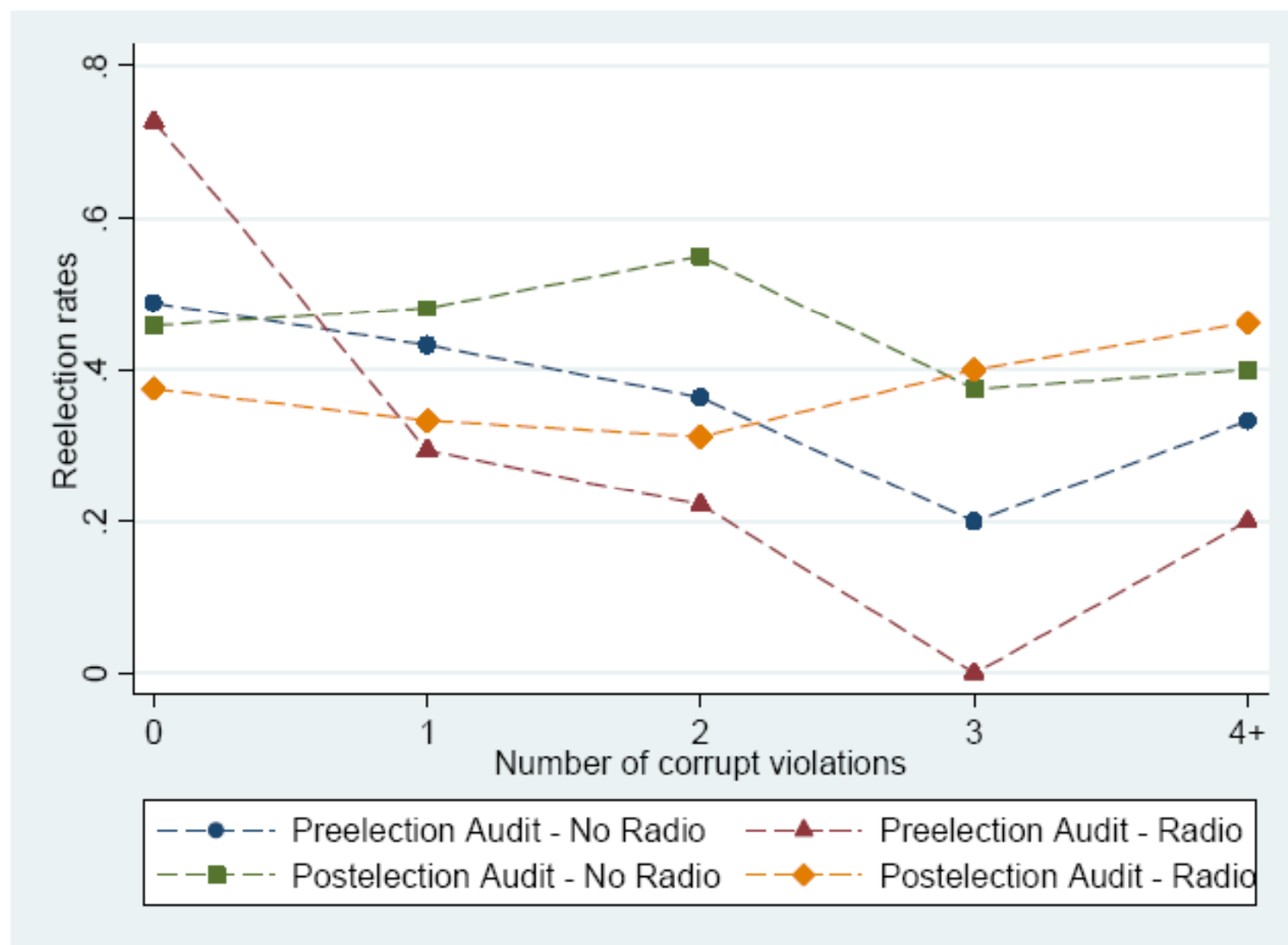
FIGURE IV: RELATIONSHIP BETWEEN RE-ELECTION RATES AND CORRUPTION LEVELS FOR MUNICIPALITIES AUDITED BEFORE AND AFTER THE ELECTIONS AND THE EXISTENCE OF LOCAL RADIO
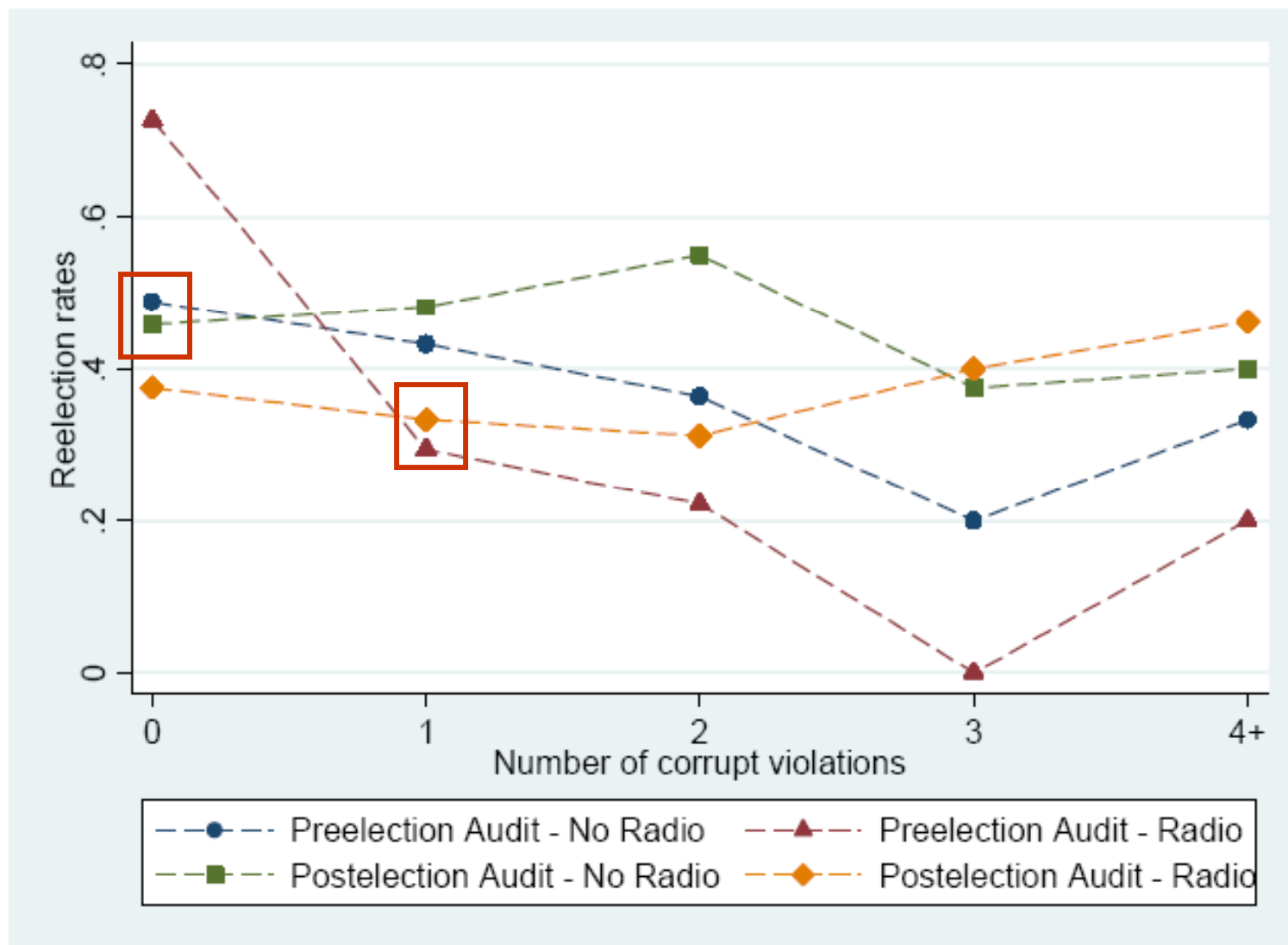
FIGURE IV: RELATIONSHIP BETWEEN RE-ELECTION RATES AND CORRUPTION LEVELS FOR MUNICIPALITIES AUDITED BEFORE AND AFTER THE ELECTIONS AND THE EXISTENCE OF LOCAL RADIO

FIGURE IV: RELATIONSHIP BETWEEN RE-ELECTION RATES AND CORRUPTION LEVELS FOR MUNICIPALITIES AUDITED BEFORE AND AFTER THE ELECTIONS AND THE EXISTENCE OF LOCAL RADIO

FIGURE IV: RELATIONSHIP BETWEEN RE-ELECTION RATES AND CORRUPTION LEVELS FOR MUNICIPALITIES AUDITED BEFORE AND AFTER THE ELECTIONS AND THE EXISTENCE OF LOCAL RADIO

TABLE VI: THE EFFECTS OF THE RELEASE OF THE AUDITS ON RE-ELECTION RATES BY CORRUPTION LEVELS AND LOCAL RADIO

Dependent variable: *Pr(re-election)*	Full sample	Corruption ≤ 5	Demographic interactions	Demographic and institutional interactions	Households w/ radio
	(1)	(2)	(3)	(4)	(5)
Preelection audit	-0.059	-0.033	0.296	0.208	-0.954
	[0.091]	[0.096]	[1.121]	[1.247]	[0.629]
Number of corrupt violations	-0.034	-0.013	-0.13	-0.069	-0.161
	[0.029]	[0.035]	[0.224]	[0.288]	[0.194]
Number of radio stations	-0.131	-0.150	-0.216	-0.253	
	[0.064]*	[0.063]*	[0.073]**	[0.083]**	
Preelection audit × Number of radio stations	0.229	0.271	0.356	0.449	
	[0.099]*	[0.104]**	[0.115]**	[0.129]**	
Preelection audit × Number of corrupt violations	0.007	-0.018	-0.236	-0.412	0.458
	[0.038]	[0.044]	[0.402]	[0.430]	[0.229]*
Number of corrupt violations × Number of radio stations	0.050	0.058	0.082	0.09	
	[0.026]+	[0.025]*	[0.025]**	[0.028]**	
Preelection audit × Corrupt violations × Radio stations	-0.118	-0.157	-0.185	-0.238	
	[0.045]**	[0.067]*	[0.051]**	[0.064]**	
Proportion households with radio					-0.834
					[0.782]
Preelection audit × Households w/ radio					1.225
					[0.752]
Number of corrupt violations × Households w/ radio					0.181
					[0.243]
Preelection audit × Corrupt violations × Households w/ radio					-0.645
					[0.292]*
Observations	373	362	373	373	373
R-squared	0.20	0.21	0.24	0.28	0.20
Demographic interactions	No	No	Yes	Yes	No
Institutional interactions	No	No	No	Yes	No

(3) Ferraz and Finan (2008, *QJE)*

- What effect will a program like this have on politician quality / selection in the long-run?

- Could this audit approach be implemented elsewhere?

  -- Echoes the Olken (2007) finding that outside auditors can be quite effective

  -- Will auditors eventually get captured by politicians?

- Is there an unmodeled interaction with Brazilian political culture (or other institutions) that matters here, that would limit generalizability?

Whiteboard #1

Whiteboard #2

Whiteboard #3

Whiteboard #4

Whiteboard #5