



# Good, Bad and Ugly Colonial Activities: Studying Development Across the Americas

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Congreso de Economía Colombiana - 50 Años CEDE  
October 2, 2008



# Motivation

- Effects of historical/colonial factors on “institutions” and long-run development
- Evidence mostly based on cross-country data
- Huge variations in economic development at sub-national level

# PPP GDP Per Capita in 2000

Country	Obs	Mean	Log S.D.	Min	Max	Ratio ymax/ymin
Argentina*	24	11706	0.553	4578	40450	8.84
Bolivia	9	2715	0.395	1245	4223	3.39
Brazil	27	5754	0.576	1793	17596	9.81
Chile	13	8728	0.423	4154	19820	4.77
Colombia	30	5869	0.489	2368	22315	9.43
Ecuador	22	5058	0.834	1458	26574	18.23
Salvador	14	3237	0.286	2191	5954	2.72
Guatemala	8	3563	0.439	2100	8400	4.00
Honduras	18	2108	0.140	1716	2920	1.70
Mexico	32	8818	0.461	3664	23069	6.30
Panama	9	4336	0.676	1805	12696	7.04
Paraguay	18	4513	0.293	2843	7687	2.70
Peru	24	3984	0.570	1287	13295	10.33
US	48	32393	0.179	22206	53243	2.40
Uruguay	19	6723	0.231	3902	10528	2.70
Venezuela**	19	5555	0.231	3497	9088	2.60

\*Data for 1993, \*\*Income data



# Outline

- Literature Review
- Hypotheses and Historical Background
- Overview of Main Results
- Data
- Empirical Analysis I:
  - History → Development
- Empirical Analysis II:
  - History → ? → Development
- Conclusion and Future Research



# Empirical Literature Review I

## ■ Historical Factors and Development

- Acemoglu, Johnson, and Robinson (2001, 2002, 2006): Institutions depend on incentives: conditions faced by colonizers → inclusive vs. extractive institutions in the past → ...today
- Engerman and Sokoloff (2002): Good and bad “endowments” → economies of scale (technology is given!) → income concentration → development (literacy, finance, etc.)



# Empirical Literature Review II

- Big differences in development at sub-national level (Sachs, 2001)
- Big differences in institutional features at sub-national level and effects on development
  - Review: Pande and Udry (2005)
  - Africa: Merrouche (2007), Huillery (2007)
  - Brazil: Naritomi, Soares, and Assunção (2007)
  - Colombia: Rosas and Mendoza (2004), Bonet and Meisel (2006)
  - Europe: AJR (2005, 2006), Tabellini (2005)
  - India: Banerjee and Iyer (2004), Banerjee, Iyer and Somanathan (2004), Iyer (2003)
  - *Americas*: Nunn (2008)
  - US: Mitchener and McLean (1999 and 2003)



# Our Story I

- Pre-colonization population density or suitability for certain colonial activities
  - Technology & labor repression
  - Past “institutions”
  - “Institutions” today
  - GDP per capita today



# Our Story II

## ■ Important resources for colonizers

- Minerals
- Good conditions for cash crops (e.g. sugar)
- Natives

## ■ Extractive (“bad”) activities

- Minerals and cash crops worth exploiting even in regions without natives
- Import labor through *mita*, *encomienda*, slaves, or personal service
- Exogenous technology with high startup costs and economies of scale

## ■ Other activities

- Cattle, wheat, subsistence crops, manufacturing, etc.
- Endogenous technology - depends on presence of natives
- High presence of natives implied subjugation and exploitation
- Agriculture/Livestock: *Haciendas/Encomiendas* vs. Small plots
- Manufacturing: New England vs. *Obrajes*





# Our Story III

## ■ Main hypotheses

- Differences in within-country levels of development are related to differences in colonial activities
- Abundance of local labor (measured by pre-colonial population density) and bad activities (e.g. mining and cash crops) have a negative impact on current levels of development
- The link between colonial activities and current levels of development are institutions



# Historical Background: Example I

- Regions within the same country with different colonial activities
  - North-eastern Brazil (Alagoas and Pernambuco):  
Sugar regions + non-inclusive institutions (no intermarriage)
  - São Paulo: poor + inclusive institutions (much more intermarriage)
  - Today: São Paulo richer (~300% higher GDP p.c.)



## Historical Background: Example II

- Regions with the same soil and climate conditions and different population density
  - Tlaxcala in Mexico had 5 times the pre-colonial population density of Aguascalientes
  - In 2000, Tlaxcala had ½ GDP p.c. of Aguascalientes
  - In 2000, Tlaxcala had 2 times the poverty rate of Aguascalientes
  - Moody's index of contract enforcement (from 0 to 10) Tlaxcala: 1.93 vs. Aguascalientes: 3.05
  - WB Doing business index: Aguascalientes 1<sup>st</sup> vs. Tlaxcala 22<sup>nd</sup> (among 32)



## Historical Background: Example III

- Regions with the same colonial activities and different technologies
  - Textiles in the US: small scale mills and shops under property ownership
  - Textiles in Spain: like in the US
  - Textiles in Spanish America: *Obrajes* (“sweat shops”)
  - *Obrajes* invented in Spanish America as a consequence of available labor force (Gómez-Galvarriato, 2006)



# Historical Background: Example IV

- Persistence of the type of activities
  - Chocó region in Colombia: gold mining with slaves
  - Gold reserves depleted => slave owners switch to sugar cultivation to take advantage of available labor force
  - In 2000, Chocó region had less than  $\frac{1}{2}$  GDP p.c. of other regions



# Empirics: Overview of Main Results I

- Colonial activities and pre-colonization population density affect current development
  - Areas with dense pre-colonial population do worse today
  - *Conditional on being colonized*, areas with “*bad*” activities (e.g. sugar, mining) do worse than areas with “good” activities (e.g. manufacturing)
  - The positive effect of “good” activities goes away in areas with high pre-colonial population density (since “good” activities become “ugly”)



# Empirics: Overview of Main Results II

- Intermediating mechanism:

- Only weak evidence in favor of income inequality
- Some evidence in favor of institutions *à la* AJR
- Only weak evidence in favor of *current* ethnic composition



# Data: Sources

- 15 Latin American countries and the United States
- Current day variables from national statistical agencies or Human Development Reports
- Past population density from Denevan (1992) and references therein
  - Denevan has data on between and within country variation of population around 1492
  - Quality varies across countries, from very detailed to only data for big regions → cluster at pop density level
- Colonial economic activity from history books
  - Identify the main activity of a region
  - Classify activities in good and bad activities



# Data: Summary Statistics

Outcome variables	Obs	Mean	Std. Dev.	Min	Max
Log PPP GDP per capita	332	8.75	0.90	7.13	10.88
Log poverty rate	321	2.93	0.93	0.21	4.40
Health Index	52	4.24	0.34	2.95	4.52
Log Gini	258	-0.74	0.15	-1.15	-0.46
Percent native or black	217	9.95	16.27	0.09	138.86
<b>Historical variables</b>					
Log pre-colonial pop. density	332	0.31	2.31	-6.91	5.97
Good activities dummy	332	0.47	0.50	0.00	1.00
Bad activities dummy	332	0.22	0.42	0.00	1.00
<b>Control variables</b>					
Avg. temperature	332	19.97	5.83	2.38	29.00
Total rainfall	332	1.28	0.95	0.00	8.13
Landlocked dummy	332	0.57	0.50	0.00	1.00
Altitude	332	0.66	0.92	0.00	4.33

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- Add sum stats for institutions

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# Empirical Analysis

$$Y_{rc} = \beta_0 + \beta_1 * Ppop_{rc} + \beta_2 * Bad_{rc} + \beta_3 * Good_{rc} + \beta_4 * X_{rc} + \gamma_c + \varepsilon_{rc}$$

- $r$  = region,  $c$  = county
- $Ppop$  = 16<sup>th</sup> century population density
- $Bad$ : Mining, sugar, rice, tobacco
- $Good$ : agriculture, mfg, services
- $X_{rc}$  includes climate, elevation, landlocked
- Cluster error term at  $Ppop$  level



## Predictions ( $Y = \text{GDP per Capita}$ )

$$Y_{rc} = \beta_0 + \beta_1 * Ppop_{rc} + \beta_2 * Bad_{rc} + \beta_3 * Good_{rc} + \beta_4 * X_{rc} + Y_c + \varepsilon_{rc}$$

- $\beta_1 < 0$  (Technology choice = Ugly)
- $\beta_2 < \beta_3$  (at least in areas with low Ppop)

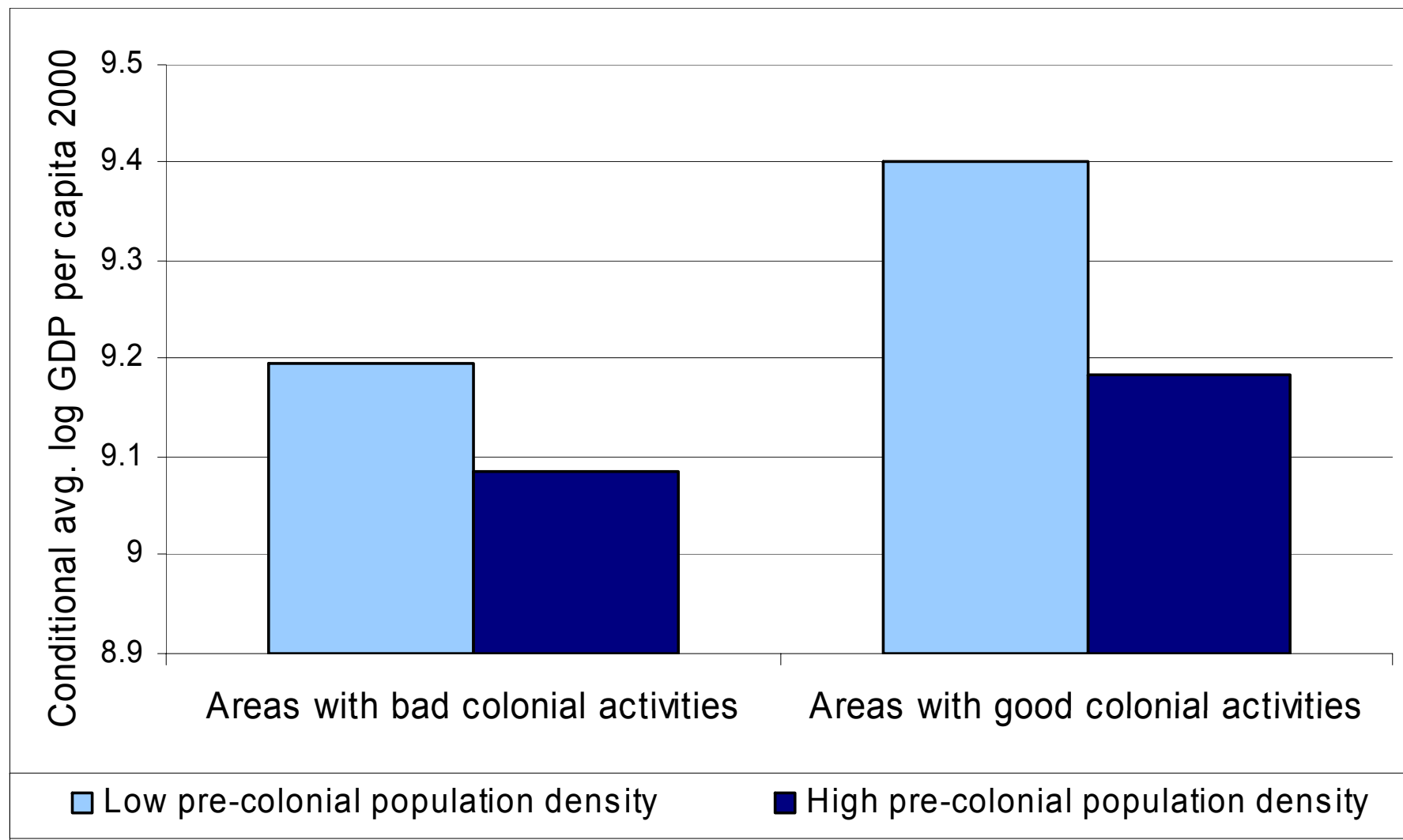
# Main Results: GDP per Capita

	(1)	(2)	(3)	(4)	(5)
Log pre-colonial pop density	-0.078 [0.024]***		-0.081 [0.023]***	-0.083 [0.022]***	-0.078 [0.021]***
Good activities dummy		-0.02 [0.088]	0.067 [0.075]	0.049 [0.074]	0.044 [0.071]
Bad activities dummy		-0.178 [0.092]*	-0.102 [0.083]	-0.129 [0.083]	-0.103 [0.078]
Climate	No	No	No	Yes	Yes
Elevation	No	No	No	No	Yes
Landlocked dummy	No	No	No	No	Yes
Observations	332	332	332	332	332
R-squared	0.77	0.76	0.77	0.78	0.79
F test: Good = Bad	-	6.25	7.40	7.39	5.48
P-value	-	0.013	0.007	0.007	0.020

# GDP per Capita Results Keeping Only Areas that Had Colonial Activities

	Dependent Variable: Log PPP GDP per capita	
	(1)	(2)
Log pre-colonial pop density	-0.043 [0.026]	-0.058 [0.033]*
Bad activities dummy	-0.137 [0.061]**	-0.134 [0.059]**
Climate	Yes	Yes
Elevation	Yes	Yes
Landlocked dummy	Yes	No
Observations	230	332
R-squared	0.85	
Estimation technique	OLS	Heckit

# 2000 GDP per Capita by Colonial Activities and Population Density



# Main Results: Poverty Rate

	(1)	(2)	(3)	(4)	(5)
Log pre-colonial pop density	0.054** [0.027]		0.057** [0.025]	0.054** [0.023]	0.048** [0.022]
Good activities dummy		-0.015 [0.090]	-0.075 [0.077]	-0.034 [0.077]	-0.015 [0.066]
Bad activities dummy		0.175* [0.095]	0.122 [0.085]	0.157* [0.088]	0.127 [0.082]
Climate	No	No	No	Yes	Yes
Elevation	No	No	No	No	Yes
Landlocked dummy	No	No	No	No	Yes
Observations	321	321	321	321	321
R-squared	0.76	0.76	0.77	0.79	0.82
F test: Good = Bad	-	7.03	7.94	7.21	4.87
P-value	-	0.009	0.005	0.008	0.029





## “Falsification” Exercise

- Did colonial activities have an impact on development in the pre-colonization period? Hard to answer, no GDP!
- Use data on pre-colonization health index from Backbone of History Project (Steckel and Rose, 2002)
  - Based on archeological data, they estimate a health index that goes from 0 to 100
- Data for 52 regions in our sample

# “Falsification” Exercise: Results

	Dependent variable:	
	<u>Log health index</u>	<u>Log PPP GDP per capita</u>
	(1)	(2)
Log pre-colonial pop dens	0.079 [0.052]	-0.125 [0.079]
Good activities dummy	-0.207 [0.164]	-0.209 [0.314]
Bad activities dummy	-0.007 [0.123]	-0.315 [0.385]
Log data year	-0.125 [0.143]	
Observations	52	52
R-squared	0.3	0.69
F test: Good = Bad	1.66	0.28
Prob	0.202	0.600



# What is the intermediating factor?

- (At least) three candidates:
  - Institutions
  - Inequality
  - Current ethnic composition



# Income Inequality

$$Y_{rc} = \beta_0 + \beta_1 * I_{rc} + \beta_2 * X_{rc} + \gamma_c + \varepsilon_{rc}$$

Reduced from:

$$Y_{rc} = \alpha_1 + \alpha_2 * PPop + \alpha_3 * Bad_{rc} + \alpha_4 * Good_{rc} + \alpha_5 * X_{rc} + \varphi_c + \xi_{rc}$$

First Stage:

$$I_{rc} = \delta_1 + \delta_2 * PPop + \delta_3 * Bad_{rc} + \delta_4 * Good_{rc} + \delta_5 * X_{rc} + \theta_c + \zeta_{rc}$$

## ■ Test:

- $\text{sign}(\alpha_i) = \text{sign}(\delta_i) * \text{sign}^T(\beta_1)$   $i=2, \dots, 4$
- Same statistical significance

# First Stage: Income Inequality

	(1)	(2)	(3)	(4)	(5)
Log pre-colonial pop density	0.005 [0.008]		0.003 [0.008]	0.002 [0.008]	-0.001 [0.008]
Good activities dummy		0.009 [0.015]	0.004 [0.012]	0.005 [0.012]	0.004 [0.012]
Bad activities dummy		0.041 [0.018]**	0.037** [0.015]	0.036** [0.015]	0.026 [0.015]*
Climate	No	No	No	Yes	Yes
Elevation	No	No	No	No	Yes
Landlocked dummy	No	No	No	No	Yes
Observations	258	258	258	258	258
R-squared	0.7	0.71	0.71	0.71	0.72
F test: Good = Bad	-	5.66	5.82	5.33	2.4
P-value	-	0.018	0.017	0.022	0.123



# Institutions

- No measure of institutions at the local level (yet)
- Good institutions at national level should decrease effect of local conditions on development **if** institutions explain the effect of history on development
  - Interact institutions (from AJR) and settler mortality with historical variables

# Interactions with National Institutions

	Log PPP GDP per capita	
	(1)	(2)
Log pre-colonial pop dens	-0.096 [0.023]***	-0.092 [0.025]***
Good activities dummy	0.064 [0.071]	0.063 [0.082]
Bad activities dummy	-0.092 [0.087]	-0.108 [0.097]
Log pop dens*Country institutions	0.046 [0.013]***	0.041 [0.018]**
Good activities*Country institutions	-0.035 [0.030]	-0.036 [0.045]
Bad activities*Country institutions	0.008 [0.039]	0.034 [0.041]
Observations	332	332
R-squared	0.8	-
F test: Good = Bad	4.8	5.49
P-value	0.030	0.020
F test: Good*Country institutions = Bad*Country institutions	1.02	2.06
P-value	0.314	0.153
Estimation method	OLS	IV

# Current Ethnic Composition

	Dependent variable:		
	Percentage	Percentage	Percentage
	native or black	native	black
	(1)	(2)	(3)
Log pre-colonial pop density	-1.193 [0.413]***	-0.709 [0.325]**	-0.576 [0.383]
Good activities dummy	0.371 [1.776]	-1.55 [1.376]	2.404 [1.429]*
Bad activities dummy	2.53 [2.273]	-1.938 [1.902]	7.082 [1.606]***
Observations	258	258	258
R-squared	0.71	0.71	0.72
F test: Good = Bad	5.82	5.33	2.4
P-value	0.017	0.022	0.123

Robust standard errors (clustered at pre-colonial population density level) in brackets. Regressions include country fixed effects and control variables. Significance levels: \* 10%, \*\* 5%, \*\*\* 1%





# Conclusions and Future Research

- Colonial activities matter for within country differences in output and poverty
- Evidence suggests institutions are a relevant factor in explaining effect of colonial activities on development
  - No strong evidence in favor of inequality
  - No strong evidence in favor of current ethnicity
- Future research:
  - Sub-national measures of current institutions (political variables like political competition)
  - Analyze sources and mechanics of persistence of institutions