Taxation, Corruption, and Growth

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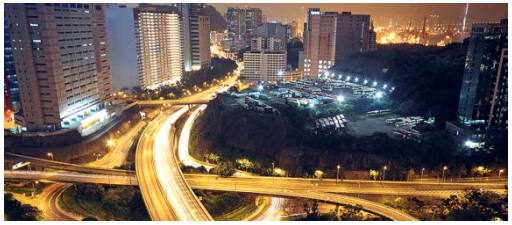
Motivation

- It taxation good for growth?
  - Incentive effects
  - Public good effects
  - Redistribution effects



- What role does the efficiency of government play?

- What is the optimum?

Model Structure

- Builds on Klette and Kortum (2004) model
  - Realistic firm dynamics, entry margin
- Innovation depends on firm's effort and quality of public infrastructure
- Government collects tax revenue to finance infrastructure investment
- Government efficiency impacts the realized public goods gain from taxes

Our Beloved Firms and Entry

- All firms experience trade-offs:
  - Better infrastructure lowers firm costs and boosts returns from innovation investments
  - Disincentive effects of taxation reduce expected innovation returns
- Better gov't efficiency has asymmetric gain in terms of growth
- Entrants display a special sensitivity

Key Theoretical Results

- Inverted-U effect of taxation on growth
  - Public good effect dominates at low rates
  - Incentive effect dominates at high rates
  - Interaction between taxation and government efficiency is positive for growth to left of peak
- The optimal taxation rate is higher for a more efficiency government

Empirical Approach

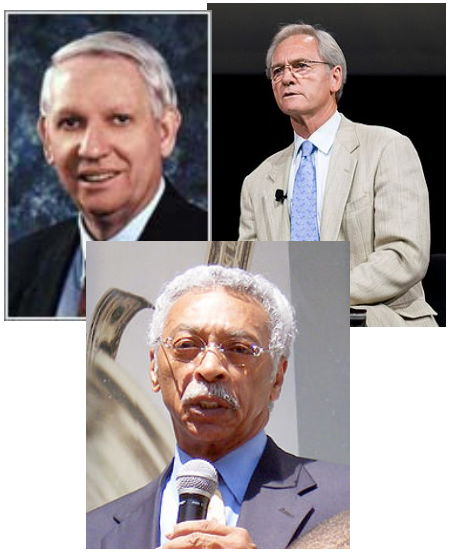
- State-level estimations of the model
  - GDP, employment, growth, etc.
  - Entrepreneurship/innovation particulars
- Causality?
  - Granger causality tests
  - State border effects by isolating counties

Data

- Traditional sources
  - BEA state data
  - Longitudinal Business Database (LBD)
  - NBER patent database
  - Tax receipts and Taxsim
- Structure
  - Focus on five-year periods starting 1983
  - Within each period, take averages of our outcome variables for GDP and employment

Lonely Planet: Alabama

Obsessed with football and race – two things Southerners never stop discussing – this rectangular state has a complicated and fascinating heritage. […] its reputation of rebels, segregation, discrimination and wayward politicians.



Key Empirical Results

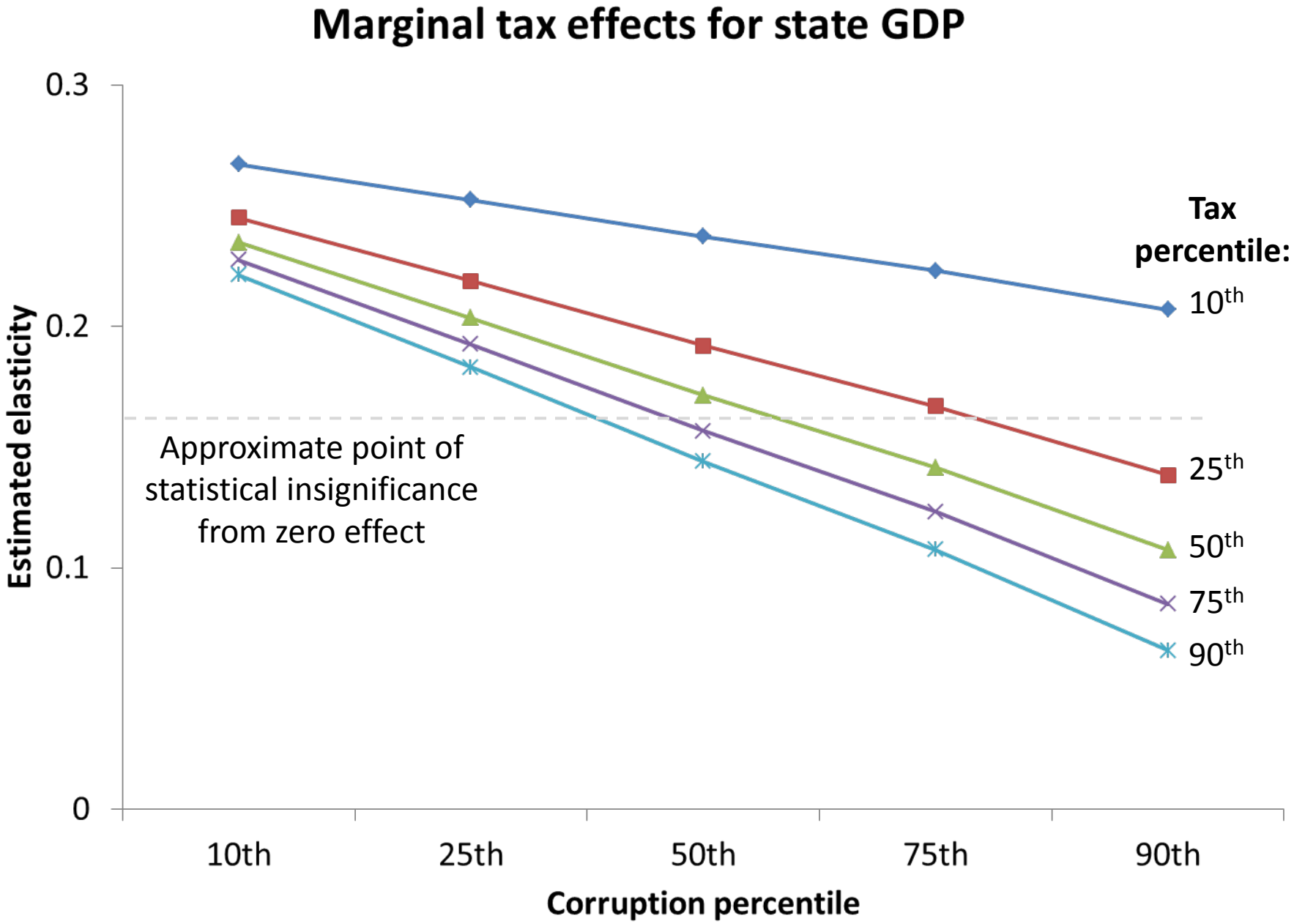
- Basic empirical approach:

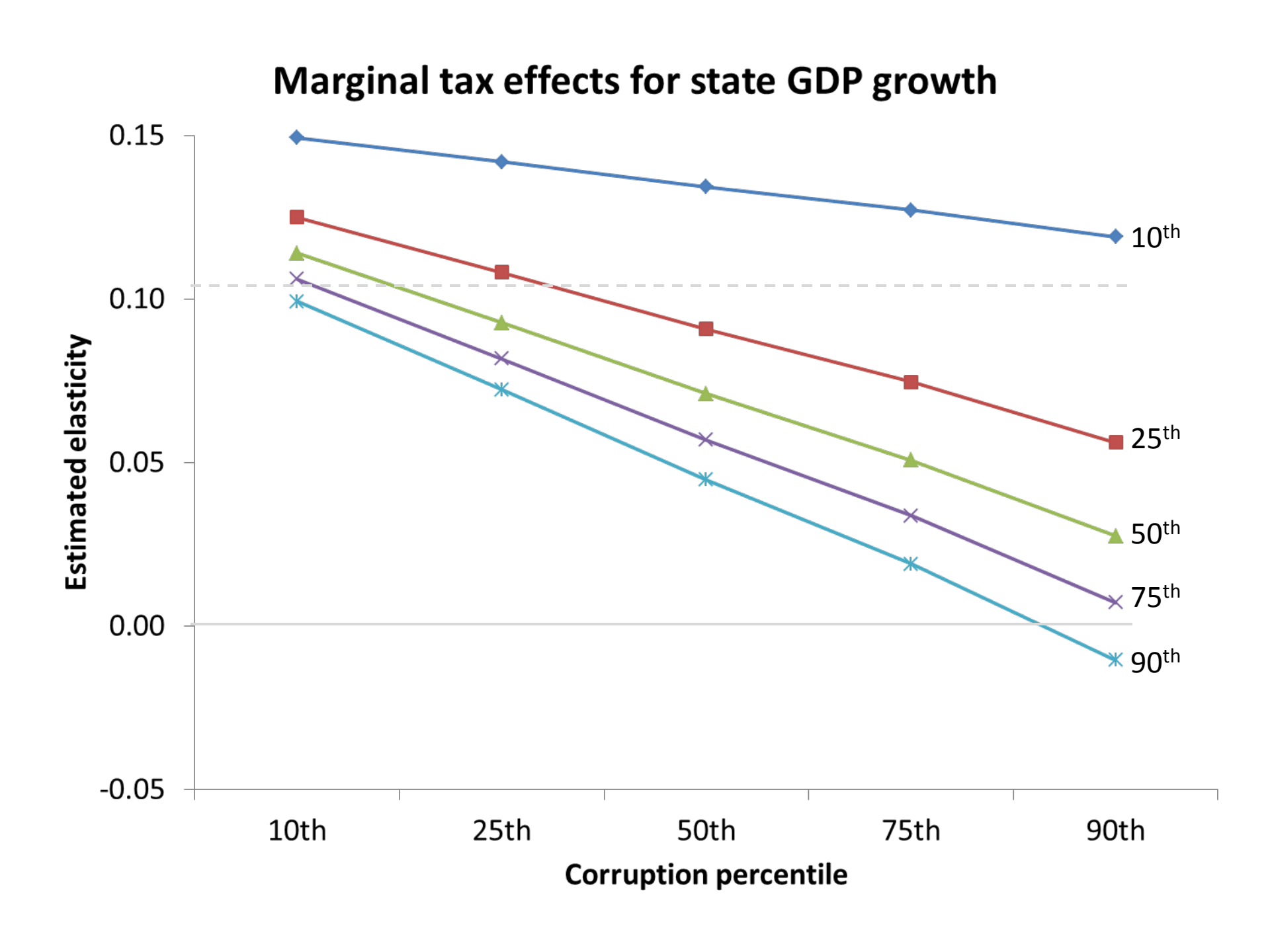
$$
\begin{aligned}
Y_{s,t} \quad = \quad & \beta_1 \ln(tax_{s,t-1}) + \beta_2 [\ln(tax_{s,t-1})]^2 + \\
& \gamma \ln(corruption_{s,t-1}) + \\
& \chi_1 \ln(tax_{s,t-1}) \cdot \ln(corruption_{s,t-1}) + \\
& \chi_2 [\ln(tax_{s,t-1})]^2 \cdot \ln(corruption_{s,t-1}) + \phi_s + \eta_t + \epsilon_{s,t},
\end{aligned}
$$

- Measure corruption through average number of officials convicted of federal crimes in the previous period
- Measure average income tax revenues collected in the previous period converted into constant 2000 dollars
- Both are normalized by initial state government size

Table 1a: Base estimation for log state GDP

Log tax revenues per gov. exp. in prior period	0.183 (0.096)	0.182 (0.096)
Log tax revenues per gov. exp. in prior period SQ		-0.033 (0.024)
Log corruption per gov. exp. in prior period	-0.017 (0.015)	-0.012 (0.019)
Interaction of taxes and corruption in prior period	**-0.060** **(0.023)**	**-0.072** **(0.040)**
Interaction of taxes and corruption in prior pd. SQ		**-0.021** **(0.028)**
State and period effects	Yes	Yes
Observations	188	188


Marginal tax effects for state GDP
0.3
0.2
0.1
0
Estimated elasticity
Approximate point of statistical insignificance from zero effect
Tax percentile:
10th
25th
50th
75th
90th
10th
25th
50th
75th
90th
Corruption percentile


Marginal tax effects for state GDP growth
0.15
0.10
0.05
0.00
-0.05
Estimated elasticity
10th
25th
50th
75th
90th
10th
25th
50th
75th
90th
Corruption percentile

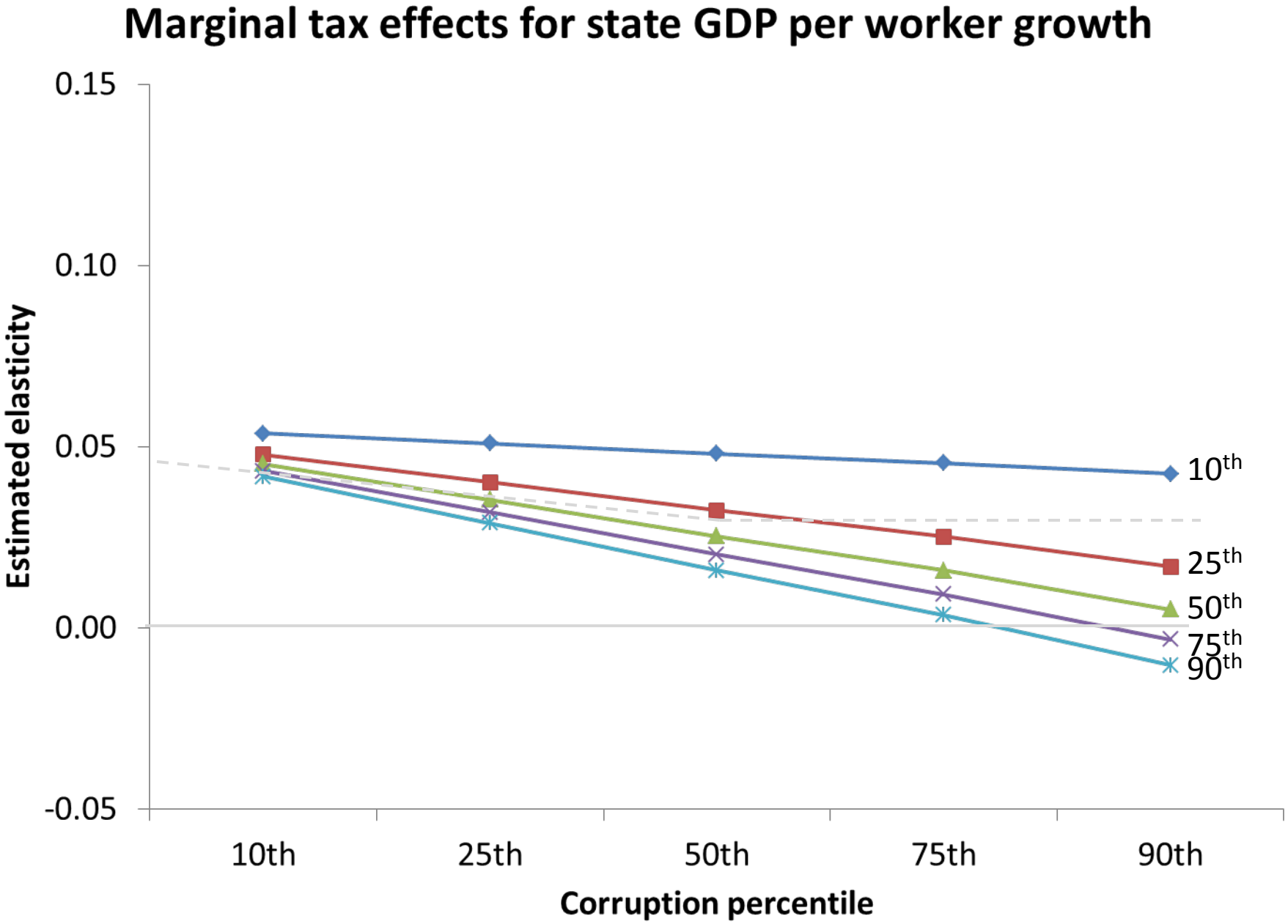

Marginal tax effects for state GDP per worker growth
0.15
0.10
0.05
0.00
-0.05
Estimated elasticity
10th
25th
50th
75th
90th
Corruption percentile
10th
25th
50th
75th
90th

Table 4: Panel relationship of taxation, corruption and economic activity

	Log total employment in young establishments in period	Log total employment in old establishments in period	Log total employment in entry/exit establishments in period	Log average size of continuing establishments in period	Log patenting of individuals and firms that are younger than five years	Log patenting of incumbent firms that are five years old or more
	(1)	(2)	(3)	(4)	(5)	(6)
Log tax revenues per gov. exp. in prior period	0.088	0.160	0.092	0.049	0.085	0.115
	(0.110)	(0.120)	(0.130)	(0.032)	(0.137)	(0.280)
Log corruption per gov. exp. in prior period	0.005	-0.008	0.007	0.004	0.003	-0.086
	(0.015)	(0.015)	(0.018)	(0.006)	(0.038)	(0.085)
Interaction of taxes and corruption in prior period	**-0.043**	**-0.055**	**-0.045**	**-0.014**	**-0.092**	**-0.075**
	(0.015)	**(0.025)**	**(0.018)**	**(0.010)**	**(0.037)**	**(0.076)**
State and period effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	188	188	188	188	188	188

Notes: See Table 1a. Column 1 of Table 1a is repeated for various economic outcomes.

Extensions to consider entry vs. incumbent roles


TENNESSEE
Russell Cave Nat'l. Mon.
Florence
Huntsville
NORTH CAROLINA
ARKANSAS
Tennessee
SOUTH CAROLINA
Gadsden
Black Warrior
Anniston
Bessemer
Birmingham
MISSISSIPPI
Tuscaloosa
Horseshoe Bend Nat'l. Military Pk.
GEORGIA
Auburn
Selma
Phenix City
Tombigbee
MONTGOMERY
ALABAMA
Alabama
Dothan
LOUISIANA
Mobile
Prichard
Mobile
FLORIDA
Gulf of Mexico

Table 6a: Panel relationship of taxation, corruption and growth in county employment

		Disaggregating the county sample around state borders					
	Base estimation using 100 mile spatial ring around county	Counties that border on other states	Counties that do not border onto other states	Counties with >50% of local employment in other states	Counties with <50% of local employment in other states	Narrowing spatial range from 100 miles to 50 miles around county	Widening spatial range from 100 miles to 200 miles around county
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Dependent variable is log growth in county employment						
Log tax revenues per gov. exp. in prior period	0.046 (0.047)	0.074 (0.053)	0.046 (0.053)	0.028 (0.098)	0.050 (0.046)	0.034 (0.037)	0.014 (0.051)
Log corruption per gov. exp. in prior period	0.009 (0.014)	0.021 (0.016)	0.006 (0.015)	0.038 (0.021)	0.005 (0.013)	0.005 (0.011)	0.007 (0.019)
Interaction of taxes and corruption in prior period	**-0.032 (0.013)**	**-0.036 (0.024)**	**-0.035 (0.014)**	**-0.056 (0.026)**	**-0.035 (0.013)**	**-0.022 (0.009)**	**-0.047 (0.021)**
Lagged log county level in the prior period	-0.394 (0.023)	-0.347 (0.033)	-0.428 (0.028)	-0.353 (0.038)	-0.403 (0.027)	-0.395 (0.024)	-0.392 (0.024)
County and period effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	11,180	4,216	6,964	2,853	8,327	11,180	11,180

Notes: See Table 3a. Estimations consider the panel relationship among taxation, corruption, and economic activity at the county level. The panel consists of 2795 counties from 47 states and four time periods of five years each (1988-1992 to 2003-2007), using lagged values from prior periods. The dependent variable is log county employment growth. The spatial explanatory metrics are defined using weighted averages of state activity in 100 mile rings around each county, adjusted in Columns 6 and 7 to 50 and 200 miles, respectively. The variable of interest is the interaction of lagged spatial income tax receipts and corruption (i.e., criminal convictions of public officials). Estimations weight by initial county employment, cluster standard errors by state, and include county and period fixed effects. Similar to the state estimations, there is less future economic expansion and growth following periods of high tax revenues when corruption is high. Columns 2-5 repeat this basic pattern in border versus non-border counties and when splitting the sample based upon whether a majority of local activity occurs in other neighboring states or not. In border estimations, taxation and corruption are mostly determined in states other than the county's home state.

Table 6b: Panel relationship of taxation, corruption and growth in county establishments

		Disaggregating the county sample around state borders					
	Base estimation using 100 mile spatial ring around county	Counties that border on other states	Counties that do not border onto other states	Counties with >50% of local employment in other states	Counties with <50% of local employment in other states	Narrowing spatial range from 100 miles to 50 miles around county	Widening spatial range from 100 miles to 200 miles around county
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Dependent variable is log growth in county establishments						
Log tax revenues per gov. exp. in prior period	0.073	0.084	0.068	0.084	0.066	0.043	0.038
	(0.031)	(0.037)	(0.033)	(0.047)	(0.030)	(0.025)	(0.038)
Log corruption per gov. exp. in prior period	0.002	0.007	0.001	0.026	-0.003	0.000	-0.004
	(0.010)	(0.010)	(0.011)	(0.018)	(0.010)	(0.008)	(0.013)
Interaction of taxes and corruption in prior period	**-0.025**	**-0.042**	**-0.021**	**-0.048**	**-0.023**	**-0.015**	**-0.033**
	(0.008)	**(0.014)**	**(0.008)**	**(0.033)**	**(0.008)**	**(0.006)**	**(0.015)**
Lagged log county level in the prior period	-0.316	-0.325	-0.369	-0.337	-0.297	-0.315	-0.312
	(0.036)	(0.037)	(0.042)	(0.038)	(0.045)	(0.038)	(0.037)
County and period effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	11,180	4,216	6,964	2,853	8,327	11,180	11,180

Notes: See Table 6a. The dependent variable is adjusted in these specifications to be log growth in county establishments.

Calibrated Model

FIGURE 1A: GROWTH VERSUS TAXATION

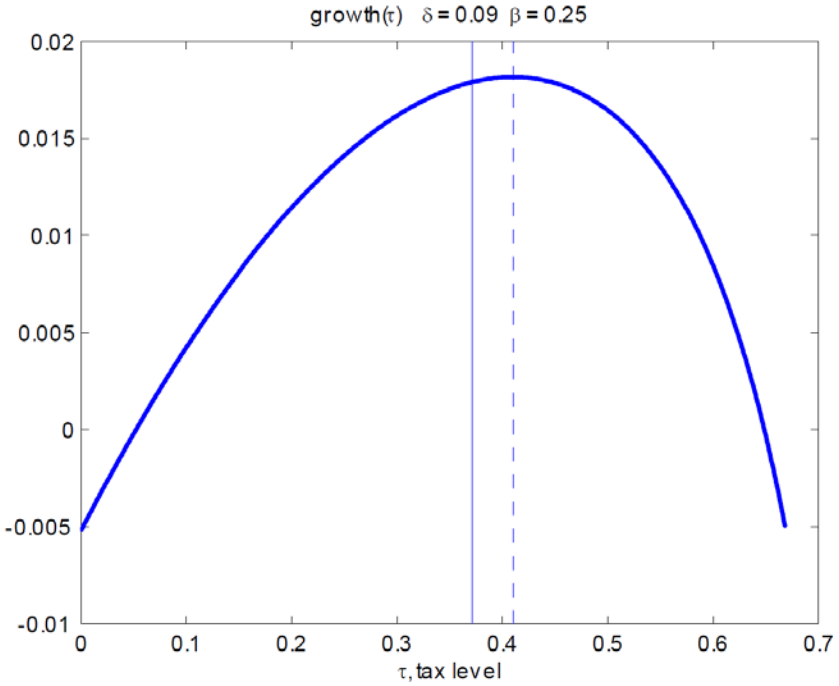
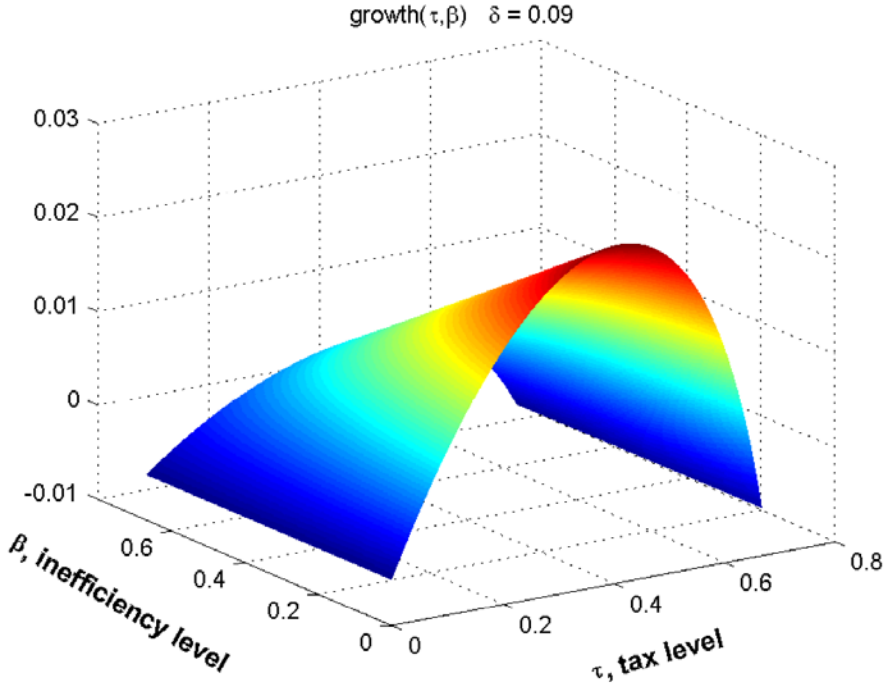


FIGURE 1B: GROWTH VERSUS TAXATION AND CORRUPTION



In calibrated framework, US not far off its optimal rate for its level of government efficiency

Calibrated Model

FIGURE 2A: CONS. EQ. VARIATION ξ VS TAXATION τ

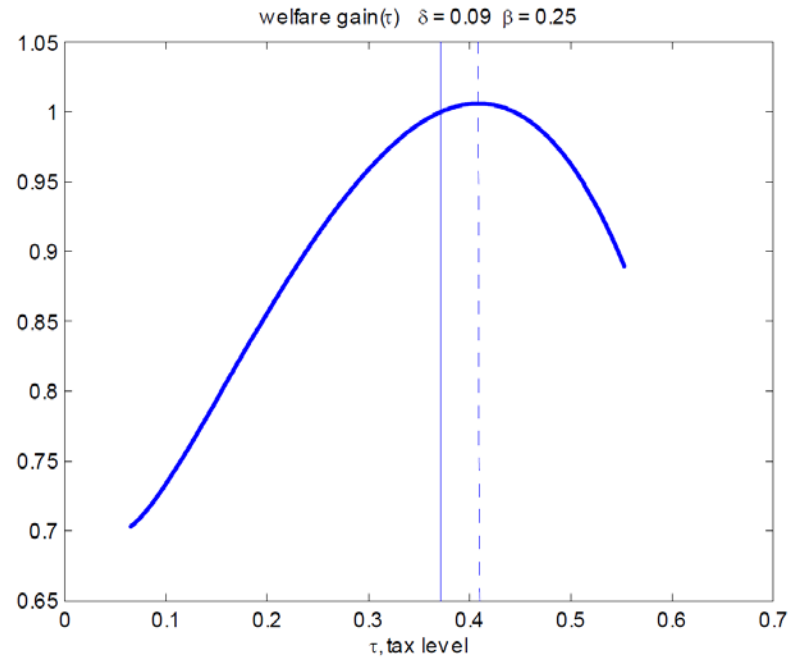
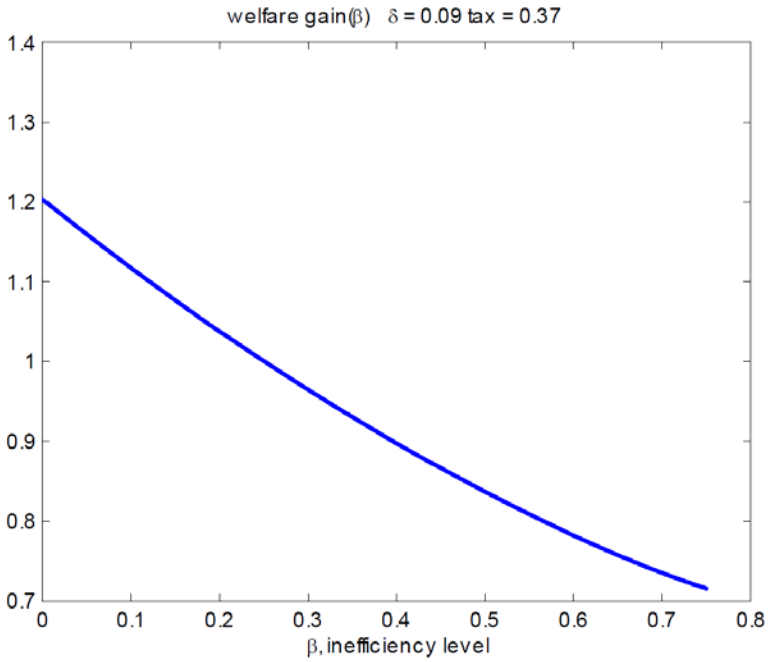


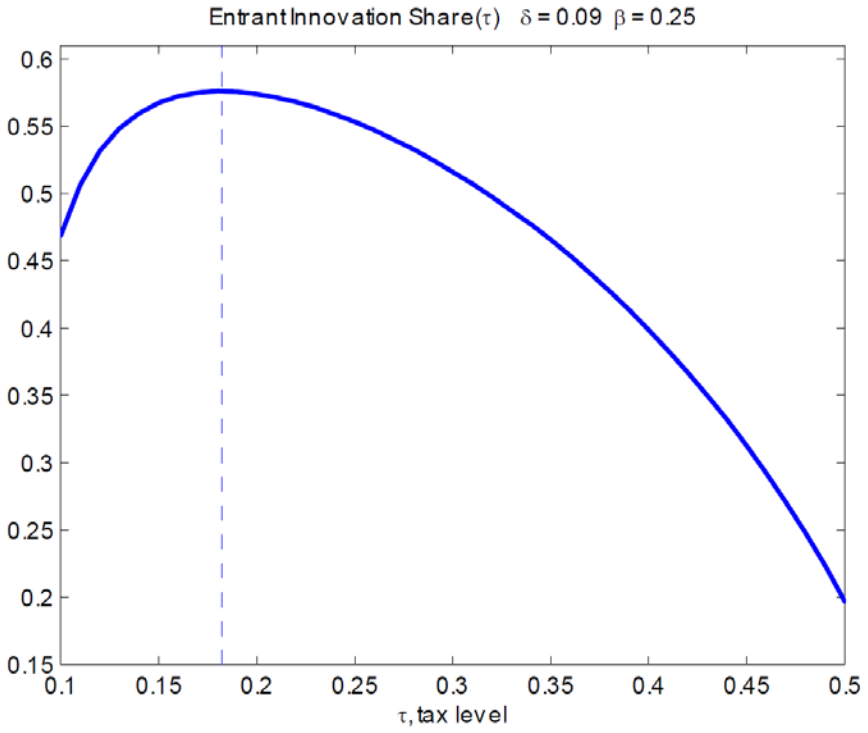
FIGURE 2B: CONS. EQ. VARIATION ξ VS CORRUPTION β



The biggest gains would come from improving efficiency versus tax optimization

Calibrated Model

FIGURE 4: ENTRANT INNOVATION SHARE IN TOTAL: $\tilde{x}/(x+\tilde{x})$



Dotted Line: Maximum.

Entrant share of innovation is increasing in government efficiency and lowering tax rates from current levels

Key Empirical Results

- An inverted-U effect of taxation on growth
  - The interaction of tax and corruption for growth is robustly negative
- Marginal effect of taxation on growth:
  - At <=25th corruption percentile, highly positive and significant until upper part of US tax range
  - At 90th corruption percentile, much lower and soon negative
- Marginal gain largest for better efficiency

Conclusions

- Hopefully making progress on several fronts
  - Better connections of taxes and growth
  - Understanding big levers for impact
  - Thinking through entry's role
- Much more that can be done
  - Optimal tax design (progressivity, personal vs. corporate, etc.)
  - More detailed considerations of types of expenditures and growth impact