

ILLUMINATING THE SHADOWS IN U.S. STATES

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WHY HIDE IN THE SHADOWS

Two schools of thought

- **Businesses are not willing to pay high taxes and keep all of their profits to themselves.**
- **Businesses are willing to pay taxes, but not willing to pay bribes.**

(Friedman et al. (*JPUBE* 2000) and Dreher et al. (*ITAX* 2009))



TWO COMPETING HYPOTHESES

How does corruption affect the size of the shadow economy?

- **Complementary**
 - Johnson et al. (*BPEA* 1997)
Corruption as a tax increasing the regulatory burden on businesses (without generating a tax revenue for the government) pushing them into the shadows.
 - Hindricks et al. (*JPUBE* 1998)
Corrupt tax payer avoids paying taxes by bribing the corrupt tax inspector.



TWO COMPETING HYPOTHESES

How does corruption affect the size of the shadow economy?

- **Substitute**

- Choi and Thum (*IER* 2005) and Dreher et al. (*ITAX* 2009)

Ability of the firms to move freely between the official and unofficial sectors reduces the opportunities for bribery of government officials, making corruption and shadow economy substitutes.



WHAT DO THE DATA SAY?

- **Complementary**

Johnson et al. (*AER PP* 1998),

Friedman et al. (*JPUBE* 2000)

Buehn and Schneider (*ITAX* 2012)

- **Substitute**

Dreher et al. (*ITAX* 2009)

- **Conditional on Income**

Dreher and Schneider (*PUCH* 2010)



ILLUMINATING THE SHADOWS

- A new index measuring the size of the shadow economy based on satellite data on night lights.
 - Henderson et al. (*AER* 2012) use night lights data to measure economic activity across countries.
 - They find a strong correlation between official GDP and the intensity of night lights in developed countries, but the correlations is weaker in developing countries.
 - They argue that the weak correlation is due to either the presence of the shadow economy or the low data quality.
 - Provided that we are able to hold the data quality constant, any difference in the economic activity measured by official GDP and the intensity of the night lights reflects the size of the shadow economy.



ILLUMINATING THE SHADOWS

- **A new index measuring the size of the shadow economy based on satellite data on night lights.**
 - **In the US, since the official GDP at the state level is estimated by a single federal agency, the Bureau of Economic Analysis (*BEA*), we are able to hold the data quality constant.**
 - **In order to calculate the Shadow Economy Index (*SEI*) we follow an approach similar to what development economists follow to calculate the total factor productivity (*TFP*).**



ILLUMINATING THE SHADOWS

- The economic activity measured by the intensity of night lights, Y , in state s at time t is a function of official GDP:

$$Y_t^s = U_t^s \cdot GDP_t^s$$

where U is the coefficient measuring the size of the shadow economy.

- Expressing the economic activity in state s relative to Washington, DC gives us an index of the size of the shadow economy relative to Washington, DC.

$$\frac{U_t^s}{U_t^{DC}} = \frac{Y_t^s / GDP_t^s}{Y_t^{DC} / GDP_t^{DC}}$$



ILLUMINATING THE SHADOWS



CORRUPTION IN U.S. STATES



- As our measure of corruption, we use the Corruption Convictions Index (CCI) which is calculated using the number of government officials convicted in a state for crimes related to corruption in a specific year.
- The data are from the Justice Department's "Report to Congress on the Activities and Operations of the Public Integrity Section" and cover a broad range of crimes from election fraud to wire fraud.



CORRUPTION IN U.S. STATES

- In response to Watergate and to growing concerns about corruption, in 1976 a Public Integrity Section was established in the Justice Department to prosecute corrupt public officials. The Public Integrity Section reports the number of public officials convicted for the crimes related to corruption annually.
- Following Glaeser and Saks (*JPUBE* 2006), we deflate the number of convictions by state population.



SOME PROBLEMS WITH CCI

- The data cover public corruption convictions in federal courts only; thus, cases tried by state and local prosecutors are excluded.
- Federal prosecutors have considerable discretion over how much effort to put into investigating public corruption. Hence, the number of convictions depends not only on the level of corruption but also on levels of prosecutorial effort (Boylan and Long *SPPQ* 2003). As Rasmusen et al. (*ALER* 2009) argue, prosecutors choose which cases to prosecute so as to maximize their conviction rates and visibility. They are more likely to prosecute high profile cases (Gordon *AJPS* 2009).



SOME PROBLEMS WITH CCI

- The number of federal convictions is related to prosecutorial resources in a state. Alt and Lassen (*JLEO* 2012), for example, find that greater prosecutorial resources result in more convictions using data on corruption convictions in U.S. states over 25 years.
- While data are reported year by year, there is an unknown, and most likely variable, time lag between crimes and convictions.
- The data give little to no indication as to the seriousness of a case. Finally,
- The data cover only those officials who are caught and, of course, convicted.

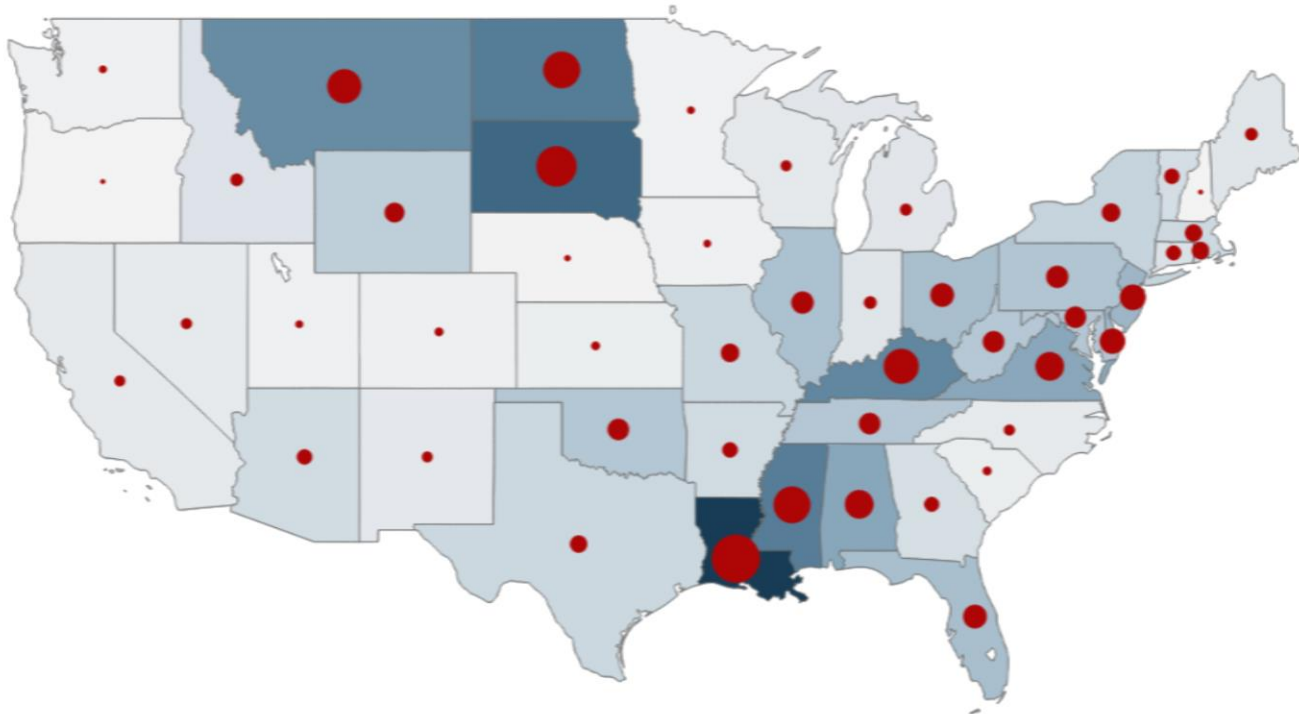


SOME PROBLEMS WITH CCI

- **There may well be partisan bias in the prosecution of public officials by federal prosecutors, i.e., the U.S. attorneys. They are appointed by the President with the advice and support of home-state partisans (Alt and Lassen 2012). Anecdotal as well as empirical evidence supports the partisan-bias hypothesis: the unprecedented midterm dismissal of seven U.S. attorneys in 2007, for example, led to congressional investigations. Some were allegedly dismissed either because they did not pursue corruption investigations against prominent Democrats with sufficient vigor or because they did pursue prominent Republicans (Gordon 2009). Using data from public corruption prosecutions, Gordon (2009) finds evidence of partisan bias both under Bush and Clinton Justice Departments.**



***SEI AND CCI* IN U.S. STATES**



SOUTH DAKOTA? ARE YOU KIDDING ME?

- **Native American Reservations (also in Arizona, New Mexico, North Dakota, and Oklahoma)**
- **In the beginning of the year, South Dakota Republicans on repealed a historic anti-corruption law approved by voters in a statewide referendum on Election Day. The law, which passed with more than 51% backing in November, would have created an independent ethics commission, limited lobbyist gifts to lawmakers, banned officials from joining lobbying firms for two years after leaving office. Gov. Dennis Daugaard, a Republican, signed the repeal bill claimed that the public had been "hoodwinked by scam artists who grossly misrepresented these proposed measures."**



WHAT DO OUR DATA SAY?

- We estimate following model with Arellano-Bover/Blundell-Bond system GMM estimator, assuming *CCI*, *Income*, and *Tax Burden* are determined endogeneously (annual data between 1997 and 2012):

$$\begin{aligned} SEI_{s,t} = & \alpha_s + \mu_t + \beta_1 SEI_{s,t-1} + \beta_2 CCI_{s,t} \\ & + \beta_3 College_{s,t} + \beta_4 Urban_{s,t} + \beta_5 \text{Log Income}_{s,t} + \beta_6 \text{Log Income}_{s,t}^2 \\ & + \beta_7 Tax\ Burden_{s,t} + \beta_8 \text{Log Population}_{s,t} + \varepsilon_{s,t}. \end{aligned}$$

- **College:** Share of people with a college degree or above
- **Urban:** Share of people live in urban areas
- **Income:** Real median income
- **Tax Burden:** Share of total state income that goes to state and local taxes.
- **Population:** State population



WHAT DO OUR DATA SAY?

- The results of the Arellano-Bover/Blundell-Bond system GMM estimation are as follows:

$$\begin{aligned} SEI_{s,t} = & \underset{(0.039)^a}{0.834} SEI_{s,t-1} + \underset{(0.206)^b}{0.455} CCI_{s,t} \\ & - \underset{(8.442)^c}{15.556} College_{s,t} - \underset{(3.463)^b}{7.777} Urban_{s,t} + \underset{(414.093)^c}{683.154} \text{Log } Income_{s,t} - \underset{(19.053)^c}{31.608} \text{Log } Income_{s,t}^2 \\ & + \underset{(43.181)}{60.095} Tax\ Burden_{s,t} - \underset{(0.839)^b}{2.015} \text{Log } Population. \end{aligned}$$

- The Hansen test of overidentifying restrictions is satisfactory, as is the Arellano-Bond test for AR(2) errors.



WHAT NEXT?

Constructing a *SEI* for

- **MSAs in US;**
- **Cities/Regions in EU countries;**
- **How about Departments in Colombia?**

