Pain and Gain: The Short- and Long-run Effects of Economic Sanctions on Growth

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Introduction

- Economic sanctions are instruments for coercive foreign diplomacy
  - senders and targets
  - commonly used by US, EU, UN and others
  - imposed on the basis of well-defined standards
  - becoming more popular (instead of war)

- Sanctions and GDP per capita
  - EU/UN/US on Iraq (1990, -65.0%)
  - UN/US on Libya (2011, -62.4%)
  - EU/UN on Rwanda (1994, -47.5%)

- Endogeneity between sanctions and GDP
Research Questions and Findings

- What is the impact of economic sanctions on growth?
  - we propose an IV strategy to identify the impact of sanctions on growth
  - we find that OLS estimates are biased downward
  - negative in the SR and insignificant over LR (10 years)

- Trade sanctions vs. Smart sanctions
  - trade sanctions generate extensive collateral damage, whereas smart sanctions target key individuals (or entities) through financial and travel restrictions
  - trade sanctions: lingering negative effects both in SR and LR
  - smart sanctions: insignificant in the SR, positive over 10 years

- Impact Mechanism
  - TFP, human capital, democracy and general social unrest
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Literature Review

- **impact of economic sanctions**
  - Neuenkirch and Neumeier (15’, 16’), Shin et al. (16’), Rosenberg et al. (16’), Felbermayer et al. (19’)

- **trade, aid and growth**
  - Frankel and Romer (99’), Feyrer (19’), Rajan and Subramanian (08’)

- **trade vs. smart sanctions**
  - Ahn and Ludema (17’, 19’), Drezner (11’), Rosenberg et al. (16’), Hufbauer et al. (08’)

Outline

- Introduction
- Discuss our IV
- Main specification
- Regression results
- Conclusions
Threat to Identification

- $S_{ijt} \in \{0, 1\}$ – whether country $i$ sanctions country $j$ in year $t$. 

Conceptually, it can be expressed as a function $S_{ijt} = S_{ijt}(S_{it}, \chi_{jt})$, (1)

OLS is biased if $\chi_{jt}$ and $Y_{jt}$ (GDP per capita) are correlated.
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(1)

where

- $S_{it}$ is a latent variable associated with country $i$’s aggressiveness
- $\chi_{jt}$ as the characteristics of country $j$ in year $t$
- potentially more complicated form of $S_{ijt}$
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IV Strategy

- assume that $S_{it}$ is exogenous to $Y_{jt}$,
US Sanctions

![Graph showing the number of new sanctions initiated from 1950 to 2020. Key events include the Iran–USgoog and the End of the Cold War.]

- Structural break
- 77: IEEPA
- 62–63: Cuba
- 89–93: End of Cold War
US Sanctions

EXECUTIVE ORDER

PROHIBITING CERTAIN TRANSACTIONS WITH AND SUSPENDING ENTRY INTO THE UNITED STATES OF FOREIGN SANCTIONS EVADERS WITH RESPECT TO IRAN AND SYRIA

By the authority vested in me as President by the Constitution and the laws of the United States of America, including the International Emergency Economic Powers Act (50 U.S.C. 1701 et seq.) (IEEPA), the National Emergencies Act (50 U.S.C. 1601 et seq.), section 212(f) of the Immigration and Nationality Act of 1952, as amended (8 U.S.C. 1182(f)), and section 301 of title 3, United States Code,

I, BARACK OBAMA, President of the United States of America, hereby find that
IV Strategy

- assume that $S_{it}$ is exogenous to $Y_{jt}$,

- proxy $S_{it}$ with $\hat{S}_{it} = \sum_{j \in J \setminus i} S_{ijt}$
IV Strategy

- Assume that $S_{it}$ is exogenous to $Y_{jt}$.
- Proxy $S_{it}$ with $\hat{S}_{it} = \sum_{j \in J - i} S_{ijt}$
- "Stage zero" to use Probit to approximate $S_{ijt}(S_{it}, \chi_{jt})$ only with the exogenous components

$$S_{ijt} = \beta_0 + \beta_1 \hat{S}_{it} + \beta_2 \hat{C}_{ij} + \beta_3 \hat{S}_{it} \cdot \hat{C}_{ij} + \epsilon_{ijt}$$

where $(C_{ij})$ is the pre-determined country-pair characteristics.
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where $(C_{ij})$ is the pre-determined country-pair characteristics

- We use

$$\hat{S}_{jt} \equiv \sum_i \hat{S}_{ijt}$$

- to instrument the endogenous variable

$$S_{jt} \equiv \sum_i S_{ijt}$$
IV Regression

- IV regression specification:

\[
\log(Y_{jt}) = \beta_0 + \beta_S S_{jt} + \Phi_j + D_t + \Phi_j \cdot D_t^{10y} + R_j \cdot D_t + \epsilon_{jt},
\]

where

- \(Y_{jt}\) is the GDP per capita of country \(j\) in year \(t\)
- \(S_{jt}\) is the number of sanctions that country \(j\) received
- FEs include
  - country FEs interacted with decade FEs
  - region FEs interacted with year FEs
- \(\epsilon_{jt}\) is the error term
- We also substitute \(S_{jt}\) with \(S_{jt}^z\), where \(z\) indicates a particular type of sanctions.
  - \(z \in \{\text{trade, fin./trav., other}\}\)
IV Regression

- For lingering effects of sanctions, we regress

$$\log(\bar{Y}_{jt}^{10y}) = \beta_0 + \beta_S \sum_{t'=0,1,...,9} S_{jt+t'} + \Phi_j + D_t + \Phi_j \cdot D_t^{10y} + R_j \cdot D_t + \epsilon_{jt},$$

where

- $\bar{Y}_{jt}^{10y}$ is the average GDP per capita over 10 years
- $\sum_{t'=0,1,...,9} S_{jt+t'}$ is the sum of sanctions over 10 years
Data Source

- **Sanctions**
  - Global Sanctions Data Base (Felbermayr et al. 20’)

- **Economic indicators**
  - GDP per capita (WDI)
  - trade, TFP, human/physical capital (PWT)

- **History / Geography Characteristics**
  - Population, distance, language, colonial ties (CEPII)

- **Others**
  - Democracy (Acemoglu et al. 19’)
  - Strikes, Revolutions etc. (CNTS)
  - Wars (UCDP)

- **Sample restrictions**
  - 56 (-3) target countries (95% of observed sanctions), 50 largest sender countries
  - year: 1960-2015
Stage Zero

- Recall that the “stage zero” is a probit regression as follows

\[ S_{ijt} = \beta_0 + \beta_1 \hat{S}_{it} + \beta_2 \hat{C}_{ij} + \beta_3 \hat{S}_{it} \cdot \hat{C}_{ij} + \epsilon_{ijt} \]
## Stage Zero

<table>
<thead>
<tr>
<th>Dep. Var.</th>
<th>(1) Any $S_{ijt}$</th>
<th>(2) Any $S_{ijt}$</th>
<th>(3) $z=$Trade $S^z_{ijt}$</th>
<th>(4) $z=$Fin./Trav. $S^z_{ijt}$</th>
<th>(5) $z=$Other $S^z_{ijt}$</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\hat{S}_{it}$</td>
<td>0.0631*** (0.000465)</td>
<td>0.0511*** (0.000890)</td>
<td>0.0653*** (0.00167)</td>
<td>0.0943*** (0.00123)</td>
<td>0.102*** (0.00391)</td>
</tr>
<tr>
<td>$\hat{S}^z_{it}$</td>
<td>0.0653*** (0.00167)</td>
<td>0.0943*** (0.00123)</td>
<td>0.102*** (0.00391)</td>
<td>0.0305*** (0.00310)</td>
<td>-0.0858*** (0.00345)</td>
</tr>
<tr>
<td>$POP_i/POP_j$</td>
<td>-0.0562*** (0.00192)</td>
<td>-0.110*** (0.00327)</td>
<td>-0.0885*** (0.00407)</td>
<td>0.0305*** (0.00310)</td>
<td>-0.0858*** (0.00345)</td>
</tr>
<tr>
<td>$\log(distance)$</td>
<td>-0.0949*** (0.00507)</td>
<td>-0.150*** (0.00748)</td>
<td>-0.239*** (0.00779)</td>
<td>-0.0239*** (0.00806)</td>
<td>0.216*** (0.0106)</td>
</tr>
<tr>
<td>$LANG$</td>
<td>0.0843*** (0.0117)</td>
<td>0.113*** (0.0185)</td>
<td>-0.181*** (0.0234)</td>
<td>0.146*** (0.0183)</td>
<td>0.314*** (0.0192)</td>
</tr>
<tr>
<td>Observations</td>
<td>190,400</td>
<td>190,400</td>
<td>190,400</td>
<td>190,400</td>
<td>190,264</td>
</tr>
<tr>
<td>colonial ties</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>$\hat{S}<em>{it} \cdot \hat{C}</em>{ij}$</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>$\hat{S}^z_{it} \cdot \hat{C}_{ij}$</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
</tbody>
</table>
First Stage

- We run a naive regression

\[ S_{jt} = \beta_0 + \beta_1 \hat{S}_{jt} + \epsilon_{jt} \]

- Recall that
  - \( S_{jt} \) is the number of sanctions that country \( j \) received in year \( t \)
  - \( \hat{S}_{jt} \) is the \textit{predicted} number of sanctions with exogenous variables
## First Stage

<table>
<thead>
<tr>
<th>Dep. Var.</th>
<th>(1) $S_{jt}$</th>
<th>(2) $S^z_{jt}$ (z=Trade)</th>
<th>(3) $S^z_{jt}$ (z=Fin./Trav.)</th>
<th>(4) $S^z_{jt}$ (z=Other)</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\hat{S}_{jt}$</td>
<td>1.059*** (0.0570)</td>
<td>1.044*** (0.118)</td>
<td>1.062*** (0.0643)</td>
<td>1.836*** (0.201)</td>
</tr>
<tr>
<td>$\hat{S}^z_{jt}$ (z=Trade)</td>
<td>1.044*** (0.118)</td>
<td>1.062*** (0.0643)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$\hat{S}^z_{jt}$ (z=Fin./Trav.)</td>
<td></td>
<td></td>
<td>1.062*** (0.0643)</td>
<td></td>
</tr>
<tr>
<td>$\hat{S}^z_{jt}$ (z=Other)</td>
<td></td>
<td></td>
<td>1.062*** (0.0643)</td>
<td>1.836*** (0.201)</td>
</tr>
<tr>
<td>Constant</td>
<td>-0.425 (0.380)</td>
<td>-0.168 (0.438)</td>
<td>-0.177 (0.142)</td>
<td>-1.988*** (0.428)</td>
</tr>
<tr>
<td>Observations</td>
<td>3,808</td>
<td>3,808</td>
<td>3,808</td>
<td>3,808</td>
</tr>
<tr>
<td>Adjusted $R^2$</td>
<td>0.096</td>
<td>0.040</td>
<td>0.130</td>
<td>0.038</td>
</tr>
<tr>
<td>F-statistic</td>
<td>345.27</td>
<td>78.25</td>
<td>272.65</td>
<td>83.17</td>
</tr>
</tbody>
</table>
Recall that our main regression specification is

$$\log(Y_{jt}) = \beta_0 + \beta S_{jt} + \Phi_j + D_t + \Phi_j \cdot D_{t}^{10} + R_j \cdot D_t + \eta_{jt},$$

instrument $S_{jt}$ with $\hat{S}_{jt}$
## SR and LR Effects of Sanctions

<table>
<thead>
<tr>
<th>Dep. Var.</th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\text{log } Y_{jt} \times 100$</td>
<td>OLS</td>
<td>IV</td>
<td>OLS</td>
<td>IV</td>
</tr>
</tbody>
</table>

### panel A

$S_{jt}$

-0.230***

(0.0397)

-0.188***

(0.0525)

### panel B

$\sum_{t'=t}^{t+9} S_{jt'}$

-0.0292***

(0.00499)

-0.000279

(0.0157)

<table>
<thead>
<tr>
<th>Observations</th>
<th>2,103</th>
<th>2,103</th>
<th>1,626</th>
<th>1,626</th>
</tr>
</thead>
<tbody>
<tr>
<td>Countries</td>
<td>53</td>
<td>53</td>
<td>53</td>
<td>53</td>
</tr>
<tr>
<td>Region × Year FE</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Country × 10-Year FE</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>First Stage F-statistic</td>
<td>249.83</td>
<td></td>
<td>79.74</td>
<td></td>
</tr>
</tbody>
</table>
## Trade vs. Smart Sanctions

<table>
<thead>
<tr>
<th>Dep. Var.</th>
<th>(1) ( \log Y_{jt} \times 100 )</th>
<th>(2) ( \log \bar{Y}_{jt}^{10y} \times 100 )</th>
<th>(3) ( \bar{Y}_{jt}^{10y} \times 100 )</th>
<th>(4) ( \bar{Y}_{jt}^{10y} \times 100 )</th>
</tr>
</thead>
<tbody>
<tr>
<td>( S_{jt}^z ) (z=Trade)</td>
<td>-0.183* (0.0973)</td>
<td>-0.204** (0.0984)</td>
<td>( S_{jt}^z ) (z=Fin./Trav.)</td>
<td>-0.109 (0.0721)</td>
</tr>
<tr>
<td>( S_{jt}^z ) (z=Other)</td>
<td>-0.281 (0.285)</td>
<td>( \sum_{t'+t}^{t+9} S_{jt'}^z ) (z=Trade)</td>
<td>-0.0828*** (0.0201)</td>
<td>-0.0671** (0.0288)</td>
</tr>
<tr>
<td>( \sum_{t'+t}^{t+9} S_{jt'}^z ) (z=Fin./Trav.)</td>
<td>0.0549*** (0.0179)</td>
<td>0.0682*** (0.0233)</td>
<td>( \sum_{t'+t}^{t+9} S_{jt'}^z ) (z=Other)</td>
<td>0.220* (0.128)</td>
</tr>
</tbody>
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**Panel A**

**Panel B**

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<th>1,626</th>
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<td>53</td>
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<tr>
<td>Region ( \times ) Year FE</td>
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<td>✓</td>
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<td>✓</td>
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<tr>
<td>Country ( \times ) 10-Year FE</td>
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<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>First Stage F-statistic</td>
<td>69.32</td>
<td>10.65</td>
<td>54.72</td>
<td>4.35</td>
</tr>
</tbody>
</table>

* indicates significance at the 10% level, ** at the 5% level, and *** at the 1% level.
Mechanisms

- To understand the differential effects, we explore the mechanisms for growth.
Mechanisms

- To understand the differential effects, we explore the mechanisms for growth.

- We use the following regression specification

\[
\bar{X}_{jt}^{t'} y = \beta_0 + \sum_{z=\text{trade, smart}} \beta^z S^z_{jt} + \Phi_j + D_t + \Phi_j \cdot D_t^{10y} + R_j \cdot D_t + \epsilon_{jt},
\]

where \(\bar{X}_{jt}^{t'} y\) are the \(t'\)-year average of the mechanism variable \(X\) since year \(t\).
Mechanism Variables

- Two broad categories of $\bar{X}_{jt}^{t'y}$:
  1. trade, TFP and factors of production
     - export / GDP
     - import / GDP
     - TFP
     - human capital
     - physical capital
  2. objectives of sanctions
     - democracy
     - strikes, demonstrations, revolutions
     - terrorist activities
     - wars

- We plot the time series of $\beta^z_S$ with their 95% confidence intervals.
Figure: Sanctions By Objectives

Source: Global Sanctions Data Base (GSDB)
Mechanism Variables

- Two broad categories of $\bar{X}_{jt}^{t',y}$:
  1. trade, TFP and factors of production
     - export / GDP
     - import / GDP
     - TFP
     - human capital
     - physical capital
  2. objectives of sanctions
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     - strikes, demonstrations, revolutions
     - terrorist activities
     - wars

- We plot the time series of $\beta_S^Z$ with their 95% confidence intervals.
Figure: Potential Mechanisms, Part I (Trade vs. Smart Sanctions)

(a) Export/GDP  
(b) Import/GDP  
(c) TFP  
(d) Human Capital  
(e) Physical Capital
Figure: Potential Mechanisms, Part II (Trade vs. Smart Sanctions)

(a) Democracy

(b) Strikes

(c) Anti-Government Demonstrations

(d) Revolutions

(e) Terrorist Activities

(f) Wars
Conclusions

- We propose a novel IV strategy to address the endogeneity issue of sanctions.

- We show that
  - sanctions have a negative SR and insignificant LR effects on growth
  - trade sanctions are always detrimental
  - smart sanctions can be beneficial in the long run

- For mechanisms, we show that smart sanctions improve TFP, human capital and democracy, and they reduce the extent of social unrests.
Appendix