
Discussion of Stefano DellaVigna and Eliana La Ferrara
“Detecting Illegal Arms Trade”

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Roadmap: Model-Based Predictions

- A. If illegal arms trade exists during an embargo:
 $\Delta \text{ Stock Price} / \Delta \text{ Hostility} > 0$
- B. If illegal arms trade only from corrupt countries during embargo:
 $\Delta \text{ Stock Price} / \Delta \text{ Hostility} \Big|_{\text{Corrupt}} > 0$
 $\Delta \text{ Stock Price} / \Delta \text{ Hostility} \Big|_{\text{Not corrupt}} = 0$
- C. The wrinkle from the model: A model of the UN
 $\Delta \text{ Prob. future embargo} / \Delta \text{ Hostility} > 0$ (seems reasonable)
 » $\Delta \text{ Stock Price} / \Delta \text{ Embargo} \Big|_{\text{Not corrupt}} < 0$
 ◆ And this is why $\Delta \text{ Stock Price} / \Delta \text{ Hostility} \Big|_{\text{Not corrupt}} < 0$
 » $\Delta \text{ Stock Price} / \Delta \text{ Embargo} \Big|_{\text{Corrupt}} > 0$
 ◆ Increasing the value of
 $\Delta \text{ Stock Price} / \Delta \text{ Hostility} \Big|_{\text{Corrupt}} - \Delta \text{ Stock Price} / \Delta \text{ Hostility} \Big|_{\text{Not corrupt}}$
- D. Implies net effects:
 – $\Delta \text{ Stock Price} / \Delta \text{ Hostility} \Big|_{\text{Not corrupt}} < 0$
 » Because of UN channel
 – $\Delta \text{ Stock Price} / \Delta \text{ Hostility} \Big|_{\text{Corrupt}} > 0$
 » If illegal arms channel > UN channel
 – $\Delta \text{ Stock Price} / \Delta \text{ Hostility} \Big|_{\text{Corrupt}} - \Delta \text{ Stock Price} / \Delta \text{ Hostility} \Big|_{\text{Not corrupt}} > 0$
 » If either the illegal arms channel OR UN channel are active

A. Hostility is Good for Defense Sector

- Testing whether: $\Delta \text{ Stock Price} / \Delta \text{ Hostility} > 0$
- Returns =
 - 0.0009 Event increasing war during embargo
(.0021)
 - +0.0010* Event decreasing war during embargo
(.0018)

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B. Testing the Illegal Arms Model

Appendix Table A3. Stock Market Reaction. Robustness

| Dep. Var.: | 3-Day Stock Returns (-1,1) | | | | | |
|--|----------------------------|------------------------|-----------------------|---------------------|------------------------|------------------------|
| | Abnormal Returns | | | | Raw Returns | Excess Returns |
| | (1) | (2) | (3) | (4) | (5) | (6) |
| Event During Embargo (1=Increase War, -1=Decrease, 0=No Event) | -0.0042 (0.0018)** | -0.0041 (0.0014)*** | -0.0056 (0.0024)** | -0.0016 (0.0024) | -0.0045 (0.0013)*** | -0.0046 (0.0014)*** |
| Event During Embargo* (High-Corruption Country) | 0.0115 (0.0041)*** | 0.0118 (0.0039)*** | 0.0124 (0.0043)*** | 0.0105 (0.0054)* | 0.012 (0.0039)*** | 0.0117 (0.0036)*** |
| Indicator for High-Corruption Country | -0.0001 (0.0002) | | -0.0001 (0.0002) | -0.0001 (0.0003) | -0.0004 (0.0003) | 0 (0.0002) |
| Constant | -0.0001 (0.0001) | -0.0001 (0.0001) | -0.0001 (0.0001) | 0 (0.0001) | 0.0023 (0.0001)*** | 0.0011 (0.0001)*** |
| Clustering of Standard Errors | By Date | By Company | By Company | By Company | By Company | By Company |
| Shift Date for Time Difference > 8 Hours | | X | | | | |
| Sample of Companies | | | Worldscope | SIPRI | | |
| N | 492541 | 492541 | 319078 | 202731 | 492541 | 492541 |

Net effect of an event:

| | | | | | | |
|--|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|
| Low-Corruption: Coeff. (H_1 : Effect=0) (SE) [t] | -0.0042 (.0018) [2.3] | -0.0041 (.0014) [2.9] | -0.0056 (.0024) [2.3] | -0.0016 (.0024) [0.7] | -0.0045 (.0013) [3.5] | -0.0046 (.0014) [3.3] |
| High-Corruption: Coeff. (H_1 : Effect>0) (SE) [t] | 0.0073 (.0045) [1.6] | 0.0077 (.0044) [1.9] | 0.0068 (.0049) [1.4] | 0.0089 (.0059) [1.5] | 0.0075 (.0041) [1.8] | 0.0071 (.0039) [1.8] |

How Big Are the Effects?

- A positive shock to the demand for bullets (ie a worsening of the conflict) yields:
 - Low-corruption countries:
 - » Stock price declines: -0.42%
 - » Median market cap: \$408m
 - » Decline in market cap = -\$1.7m
 - » 105 companies → Sector loses \$180m
 - High-corruption countries:
 - » Stock price rises: $-0.42\% + 1.15\% = +0.73\%$
 - » Median market cap: \$150m
 - » Decline in market cap = +\$1.1m
 - » 48 companies → Sector gains \$53m

- Implication: Worsening of conflict in an embargoed country is bad for the defense sector
- Are these effects large enough that analysts will track illegal arms shipments?

What is a Positive Demand Shock?

- Remember the principle of opportunity cost
 - War is a change in the demand for bullets
 - But, relative to what?
 - The alternative to war today is war tomorrow
 - » Which may require even more bullets
 - Indeed, rebels should only attack today, if they think it will cost less than attacking tomorrow.
- Thus: Is war today a positive or negative shock to the demand for bullets?
 - This paper: it is a positive
 - » Arms traders: $\Delta(\text{stock price}) / \Delta\text{hostilities} > 0$
 - Alternative approach: it is news either way
 - » Arms traders: $\Delta(\text{stock price})^2 / \Delta\text{hostilities} > 0$

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C. A Model of the U.N.

- Authors assert:
 $\Delta \text{Prob. future embargo} / \Delta \text{Hostility} > 0$ (seems reasonable)
- Implications
 - » $\Delta \text{Stock Price} / \Delta \text{Embargo} |_{\text{Not corrupt}} < 0$
 - » $\Delta \text{Stock Price} / \Delta \text{Embargo} |_{\text{Corrupt}} > 0$
- What not test this directly?
What about news about embargoes?
 - Those who respect embargoes: Stock price ↓
 - Illegal arms traders: Stock price ↑

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D. Testing the Illegal Arms + UN Model

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Testing Illegal Arms, or the Joint Model?

Table 6. Stock Market Reaction to Events Outside the Embargo

| Dep. Var.: | Abnormal 3-Day Stock Return (-1,1) | | |
|--|------------------------------------|------------------------|--------------------------------------|
| | (1) | (2) | (3) |
| Event During Embargo (1=Increase War, -1=Decrease, 0=No Event) | -0.001 (0.0014) | -0.0042 (0.0013)*** | -0.0043 (0.0014)*** |
| Event During Embargo * (Low Cost of Embargo Violation) | | 0.0115 (0.0036)*** | 0.0114 (0.0038)*** |
| Event Outside Embargo (1=Increase War, -1=Decrease, 0=No Event) | 0.0001 (0.0013) | 0.0003 (0.0016) | 0 (0.0017) |
| Event Outside Embargo * (Low Cost of Embargo Violation) | | -0.0008 (0.0027) | 0.0005 (0.0025) |
| Event in Countries without Embargo (1=Increase War, -1=Decrease, 0=No Event) | 0.0025 (0.0012)** | 0.0023 (0.0014) | 0.0023 (0.0014) |
| Event in Countries without Embargo * (Low Cost of Embargo Violation) | | 0.0008 (0.0027) | 0.0001 (0.0028) |
| Proxy for Low Cost of Embargo Violation - Indicator Variable | | -0.0001 (0.0002) | -0.0001 (0.0002) |
| Constant | -0.0001 (0.0001) | -0.0001 (0.0001) | -0.0001 (0.0001) |
| Proxy Measure - Indicator Variable for Low Cost of Embargo Violation | | High Corruption | Low Transparency of Arms Trade |
| N | 492541 | 492541 | 475101 |

Final Comment: Statistical Power

- ❑ 8 embargoed countries examined (excl. 5 embargoed countries)
- ❑ 18 “events” analyzed
 - 10 events reducing hostilities
 - » Ceasefire, leader captured / dead / return to power, major battle
 - 8 events increasing hostilities
 - » Attacks, coup attempt
- ❑ 153 arms-producing companies
 - 123 from OECD countries
 - 30 from non-OECD
- ❑ 1786 company*events ($18 \times 153 = 2754 \rightarrow$ many missing obs)
- ❑ 490,754 company*non-events (153 companies, 1985-2005)

Final Comment: Statistical Power

- Analysis of 6 placebo windows
 - Worryingly: 4 of 12 coefficients significant

Table 8. Stock Market Reaction: Placebo Treatments

| Dep. Var.: Timing relative to Event: | Abnormal 3-Day Stock Return of Company j | | | | | |
|--|--|---------------------|----------------------|---------------------|---------------------|-----------------------|
| | (-10,-8) | (-7,-5) | (-4,-2) | (2,4) | (5,7) | (8,10) |
| | (1) | (2) | (3) | (4) | (5) | (6) |
| Event During Embargo (1=Increase War, -1=Decrease, 0=No Event) | 0.0003 (0.0012) | 0.0023 (0.0012)* | 0.0027 (0.0012)** | 0.0024 (0.0016) | -0.0003 (0.0013) | -0.0028 (0.0014)** |
| Event During Embargo* (High-Corruption Country) | 0.0014 (0.0027) | -0.0047 (0.0029) | -0.0042 (0.0025)* | -0.0022 (0.0029) | -0.0017 (0.0034) | 0.0022 (0.0029) |
| Indicator for High-Corruption Country | -0.0001 (0.0002) | -0.0002 (0.0003) | -0.0002 (0.0003) | -0.0001 (0.0002) | -0.0001 (0.0002) | -0.0001 (0.0002) |
| Constant | -0.0001 (0.0001) | -0.0001 (0.0001) | -0.0001 (0.0001) | -0.0001 (0.0001) | -0.0001 (0.0001) | -0.0001 (0.0001)* |
| N | 484230 | 486666 | 489317 | 489317 | 486666 | 484230 |

- Suggestion: An alternative falsification exercise:
 - Repeat the regressions for different industry codes
 - » Same exercise, different industry