

## Natural Experiments and Event Studies

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## Outline

- 1 Randomized trials versus natural experiments
- 2 Impact of assassinations
- 3 Impact of leaders on economic growth
- 4 Coups

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## Experiments

### Randomized trial

A randomized trial is when the researcher is able to randomly assign observations control and treatment status. This guarantees that treatment status is uncorrelated with observable and unobservable qualities of the observations.

### Natural experiment

In a natural experiment, the researcher cannot control which observations are assigned to treatment or control, but he believes that the way that this assignment occurred is nonetheless uncorrelated with unobservable (and potentially observable) factors. Some observable factors may need to be “controlled for” in order to achieve this lack of correlation.

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## Impact of assassinations

Impact of assassinations on:

- Changes in democracy status and
- Intensity of war.

What if we just looked at how democratic a country is if there was an assassination versus if there wasn't one?

Countries with assassinations are probably

- More autocratic
- Less stable
- Have weaker institutions
- Show poor economic performance

Not a random sampling of countries.

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Table 8: What predicts attempts?

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Democracy dummy	-0.007*						-0.001 (0.003)
War dummy		0.028*** (0.006)					0.018*** (0.006)
Log energy use per Capita			-0.003*** (0.001)				-0.002*** (0.001)
Log population				0.005*** (0.001)			0.005*** (0.001)
Age of leader					-0.00022* (0.00012)		-0.00030** (0.00015)
Tenure of leader						-0.00011 (0.00020)	-0.00010 (0.00024)
Observations	11171	11671	9664	10607	12019	12133	9185
P-value of regression	0.08*	0.00***	0.00***	0.00***	0.08*	0.60	0.00***

Notes: Results are marginal effects from a probit specification. Robust standard errors in parentheses, adjusted for clustering at the country level. \* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%

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## The natural experiment

**Problem:** The treatment group (countries with leaders who were assassinated) is very different from the control group (countries without an assassination).

**Question:** Can we find a better control group?

Countries where an assassination attempt was made, but it was unsuccessful.

Jones, Benjamin F. and Benjamin A. Olken. 2007. "Hit or Miss? The Effect of Assassinations on Institutions and War." Working paper.

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## Summary statistics

From 1875–2007,

- 298 attempts,
- 251 “serious” attempts,
- 59 successful attempts.

Don't count coup d'états, uncovered plots.

- 55% of attempts used guns; 30% successful
- 31% used bombs; 7% successful

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## Regression

Consider the regression

$$y_i = \beta_0 + \beta_1 s_i + \epsilon_i,$$

where  $y_i$  is the outcome of interest (democracy or war status) and  $s_i$  is whether the attempt was successful.

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## Assumption

We need to assume that success is unrelated to the error term.

We already know that it's not—success is related to whether a gun or a bomb is used, so we need to add a dummy variable for the use of a gun as a control to our regression.

How can we try to test this assumption?

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**Table 3: Are successful and failed attempts similar?**

Panel A: Pairwise t-tests of sample balance.

Variable	Success	Failure	Difference	Pval on Difference
Democracy dummy	0.362 (0.064)	0.344 (0.035)	0.018 (0.072)	0.80
Change in democracy dummy	-0.036 (0.025)	-0.022 (0.019)	-0.013 (0.032)	0.67
War dummy	0.263 (0.059)	0.318 (0.034)	-0.055 (0.068)	0.42
Change in war	0.036 (0.058)	0.011 (0.034)	0.025 (0.067)	0.71
Log energy use per capita	-1.589 (0.338)	-1.740 (0.180)	0.152 (0.383)	0.69
Log population	9.034 (0.219)	9.526 (0.117)	-0.492 (0.248)	0.05*
Age of leader	55.172 (1.351)	52.777 (0.866)	2.395 (1.604)	0.14
Tenure of leader	9.328 (1.440)	7.619 (0.544)	1.709 (1.539)	0.27
Num obs	59	194		

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**Table 4: Assassinations and Institutional Change**

	(1)	(2)	(3)
	Absolute change in POLITY2 dummy	Directional change in POLITY2 dummy	Percentage of 'regular' leader transitions in next 20 years
<i>Panel A: Average effects</i>			
Success	0.091 (0.047)	0.079 (0.051)	0.111 (0.057)
Parm p-val	0.06*	0.12	0.06*
Obs	221	221	138
Data source	Polity IV	Polity IV	Archigos

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**Table 4: Assassinations and Institutional Change**

	(1)	(2)	(3)
	Absolute change in POLITY2 dummy	Directional change in POLITY2 dummy	Percentage of 'regular' leader transitions in next 20 years
<i>Panel B: Split by regime type in year before attempt</i>			
Success × Autocracy		0.131 (0.055)	0.191 (0.085)
Success × Democracy		-0.012 (0.083)	0.034 (0.043)
Autoc-Parm p		0.02**	0.03**
Democ-Parm p		0.89	0.43
Obs		221	133
Data source	Polity IV	Polity IV	Archigos

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## Results

Autocracies are more likely to become democratic after a successful assassination, while democracies do not change status.

The percentage of peaceful/lawful transitions of power in the next 20 years increases by 19 percentage points for autocracies, but only 3 percentage points for democracies (note: “percentage” in the table really means proportion).

Democracies are robust to assassinations.

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## Remaining question

Note: These are comparisons between successful assassination attempts and unsuccessful assassination attempts.

Unanswered question: Do successful assassinations look “good” for autocracies because having a successful assassination is good or because having a failed assassination is bad?

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**Table 6: Assassinations and Conflict: Change 1 Year After Attempt**

	(1)	(2)	(3)
	Gleditsch-COW Dataset 1875-2002	Gleditsch-COW Dataset 1946-2002	PRIO/Uppsala Dataset 1946-2002
<i>Panel A: Average effects</i>			
Success	-0.072 (0.068)	0.041 (0.093)	0.162 (0.071)
Parm p-val	0.29	0.66	0.02**
Obs	223	116	116
Data source	Gleditsch	Gleditsch	PRIO

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**Table 6: Assassinations and Conflict: Change 1 Year After Attempt**

	(1)	(2)	(3)
	Gleditsch-COW Dataset 1875-2002	Gleditsch-COW Dataset 1946-2002	PRIO/Uppsala Dataset 1946-2002
<i>Panel B: Split by war status in year before attempt</i>			
Success × Intense War	-0.255 (0.144)	-0.103 (0.257)	-0.110 (0.294)
Success × Moderate War			0.334 (0.163)
Success × Not At War	-0.024 (0.068)	0.020 (0.086)	0.070 (0.057)
Intense War-Param p	0.08*	0.69	0.71
Moderate War-Param p	N/A	N/A	0.05**
Not At War-Param p	0.73	0.82	0.22
Obs	222	116	116
Data source	Gleditsch	Gleditsch	PRIO

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**Leaders and economic growth**

**Question:** Do leaders matter for economic growth?  
 What if we look at how growth changes when leaders change?  
 Leadership changes are non-random.  
 U.S.: Incumbents more likely to be reelected when growth is good. Leaders change when the economy experiences a negative shock—change is (negatively) correlated with the error term (downward bias in estimates).  
 Also, coups are less likely when growth is high.

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**Idea**

How can we find leadership transitions are exogenous?  
 Death of leader by natural causes or accident.  
 57 deaths from 1945–2000  
 Are these leaders like all other leaders?  
 Mostly, but they are older.  
 Jones, Benjamin F. and Benjamin A. Olken. 2005. “Do Leaders Matter? National Leadership and Growth Since World War II.” *Quarterly Journal of Economics*. 120(3): 835–864.  
 Takeaway: Leaders matter a lot, mostly in autocratic countries and especially when there are few constraints on their power.

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## Impact of coups on foreign firms

**Question:** Were US-backed coups during the Cold War good for American firms that did business in the affected countries; *i.e.*, did the coups raise stock prices?

Specifically,

- Anglo-Iranian Oil Company (now BP; oil); Iran, 1953
- United Fruit Company (now Chiquita; bananas); Guatemala, 1954
- Anglo-Cuban Sugar (sugar); Cuba, 1961
- Anaconda (copper); Chile, 1971–1973

Dube, Arindrajit, Ethan Kaplan, and Suresh Naidu. 2008. “Coups, Corporations, and Classified Information.” Working paper.

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## Event studies

An *event study* looks at the impact of a particular event on the price of a stock.

We consider the regression

$$R_t^f = \alpha + \beta R_t^m + \gamma D_t + \epsilon_t,$$

which includes the returns ( $R$ ) to the market ( $m$ ) and a particular firm ( $f$ ). The first part of the model is quite similar to CAPM.

$D_t$  is a dummy variable that is 1 during the *event window*, the period for the start of the event for some number of days.

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## Abnormal returns

$$R_t^f = \alpha + \beta R_t^m + \gamma D_t + \epsilon_t,$$

$\gamma$  is the *abnormal daily return*; the average extra return that a firm gets, presumably from the event in question.

Total abnormal returns simply multiplies the daily abnormal return by the number of days in the event window.

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## Events

We can look at how the stock price of a firm changes during the period of the coup, from the first day of activities to the first day of the new regime.

But what about if the market knew about the coup in advance? What if top-secret information had leaked?

We also look for stock price changes following secret events (*i.e.*, insider trading):

- Coup approval by US President or UK Prime Minister
- Coup approval by head of CIA or MI6
- \$1M or more allocated to coup

TABLE IVB: Coup Dates

	Date	Country	Successful
Begin	August 15, 1953	Iran	Yes
End	August 20, 1953		
Begin	June 19, 1954	Guatemala	Yes
End	June 28, 1954		
Begin	April 15, 1961	Cuba	No
End	April 20, 1961		
Begin	September 11, 1973	Chile	Yes
End	September 11, 1973		

TABLE III: Private Event Selection

Date	Country	Description	Good
June 18, 1953	Iran	CIA/British Intelligence Both Approve Coup	Y
July 1, 1953	Iran	British Prime Minister Approves Coup	Y
July 11, 1953	Iran	President Eisenhower Approves Coup	Y
August 18, 1952	Guatemala	DCIA Approves PBFortune (Coup to Overthrow Arbenz)	Y
October 8, 1952	Guatemala	PBFortune Halted	N
December 9, 1953	Guatemala	DCIA Approves PBSuccess (Coup to Overthrow Arbenz)	Y
April 19, 1954	Guatemala	Full Approval Given to PBSuccess	Y
March 17, 1960	Cuba	Eisenhower Approves Plan to Overthrow Castro	Y
August 19, 1960	Cuba	Eisenhower Approves \$13 Million to Overthrow Castro	Y
January 30, 1961	Cuba	Kennedy Authorizes Continuing Bay of Pigs Op	Y
September 15, 1970	Chile	Nixon Authorizes Anti-Allende Plan (Incl. Poss. Coup)	Y
January 28, 1971	Chile	40 Committee Appropriates \$1.2 Million	Y
October 26, 1972	Chile	40 Committee Appropriates \$1.4 Million	Y
August 21, 1973	Chile	40 Committee Appropriates \$1 Million	Y

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## Assumptions

What do we need to assume?

$D_t$  is uncorrelated with the error term:

- There are no other events/no new information during the event window
- The stock isn't going through an especially good or bad period where it is getting consistent positive or negative shocks (investors aren't losing confidence when there is no new information).

Trick is to create an event window long enough to capture the full effect of what you're looking at, but short enough so that nothing else is going on.

-0.0047	0.0021	0.0177	0.0075	0.0199	0.0244	0.0332
(0.0052)	(0.0133)	(0.0197)	(0.0252)	(0.0355)	(0.0370)	(0.0446)
N=1039	N=1039	N=1039	N=1039	N=1039	N=1039	N=1039

Figure: Daily abnormal returns for windows 1, 3, 4, 7, 10, 12, and 16 days for private events in Chile

0.0018	-0.0012	0.0001	0.0035	0.0242	0.0218	-0.0044
(0.0043)	(0.0070)	(0.0089)	(0.0243)	(0.0265)	(0.0315)	(0.0397)
N=850	N=850	N=850	N=850	N=850	N=850	N=850

Figure: Daily abnormal returns for windows 1, 3, 4, 7, 10, 12, and 16 days for private events in Cuba

0.0068	0.0164	0.0244	0.0309	0.0224	0.0320	0.0306
(0.0032)**	(0.0076)**	(0.0081)***	(0.0130)***	(0.0165)	(0.0186)*	(0.0244)
N=2352	N=2352	N=2352	N=2352	N=2352	N=2352	N=2352

Figure: Daily abnormal returns for windows 1, 3, 4, 7, 10, 12, and 16 days for private events in Guatemala

0.0035	0.0143	0.0236	0.0307	0.0447	0.0540	0.0763
(0.0034)	(0.0059)***	(0.0064)***	(0.0139)**	(0.0166)***	(0.0211)***	(0.0287)***
N=812	N=812	N=812	N=812	N=812	N=812	N=812

Figure: Daily abnormal returns for windows 1, 3, 4, 7, 10, 12, and 16 days for private events in Iran

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TABLE IX  
Coup Event

	Coup Window	First Day of Coup	First Day of New Govt
ALL	0.0087 (0.0036)*** N=5053	0.0223 (0.0074)*** N=5053	0.0346 (0.0073)*** N=5053
Chile	0.0464 (0.0198)*** N=1039	0.0464 (0.0198)*** N=1039	0.0464 (0.0198)*** N=1039
Cuba	0.0091 (0.0080) N=850	0.0272 (0.0160)* N=850	0.0339 (0.0160)** N=850
Guatemala	-0.0012 (0.0044) N=2352	-0.0013 (0.0107) N=2352	0.0373 (0.0106)*** N=2352
Iran	0.0143 (0.0079)* N=812	0.0168 (0.0157) N=812	0.0206 (0.0157) N=812

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TABLE X  
Calibration

	Per Event Private Event Gain	Total Gain from Private Events	Gain From Coup Event	Total Gain from Coup	Relative Gain From Private Events
Iran	0.0540	0.1709	0.0584	0.2393	0.7452
Guatemala	0.0313	0.0636	0.0373	0.1033	0.6303
Cuba	0.0154	0.0469	0.0369	0.0855	0.5597
Chile	0.0303	0.1268	0.0464	0.1791	0.7321

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## Conclusions

The considered firms experienced stock returns of 8–24% due to (attempted) coups during the Cold War.

There is evidence that, at least in Iran and Guatemala, markets responded to classified information about the coups.

Indeed, 56–75% of the gains in stock value from the coups occur as secret information was leaked.

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