

ECON B225: ECONOMIC DEVELOPMENT

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War and Conflict

Conflict, War and Economic Development:

Some obvious statements

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- **War and conflict *within* a country is destructive:**
 - ▣ Kills and injures people
 - ▣ Destroys property/capital
 - ▣ Destroys infrastructure
- **Economic effects of destruction:**
 - ▣ Less productive capacity (destroys people and capital)
 - ▣ Often large opportunity cost (fighting isn't producing)
 - ▣ Civil conflict may affect social capital
- **Likely I don't need to convince you that theory suggests conflict is bad for economic development**

Still there are challenges on this subject

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- **What is the actual relationship? How much (in a quantitative sense) does war and conflict in a country affect growth and development?**
 - ▣ Hard to measure because of old friends: reverse causality and omitted variables
- **Do war and conflict matter in the long run?**
 - ▣ Maybe there are mechanisms in society to help the country catch up in growth after a trauma
 - ▣ Solow suggests there is
 - ▣ Poverty traps are an unproven theoretical problem
- **What about connections between economic qualities (like economic inequality) and policies (like foreign aid) and conflict?**

Big Advancements in Data Availability on Conflict

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□ In the past:

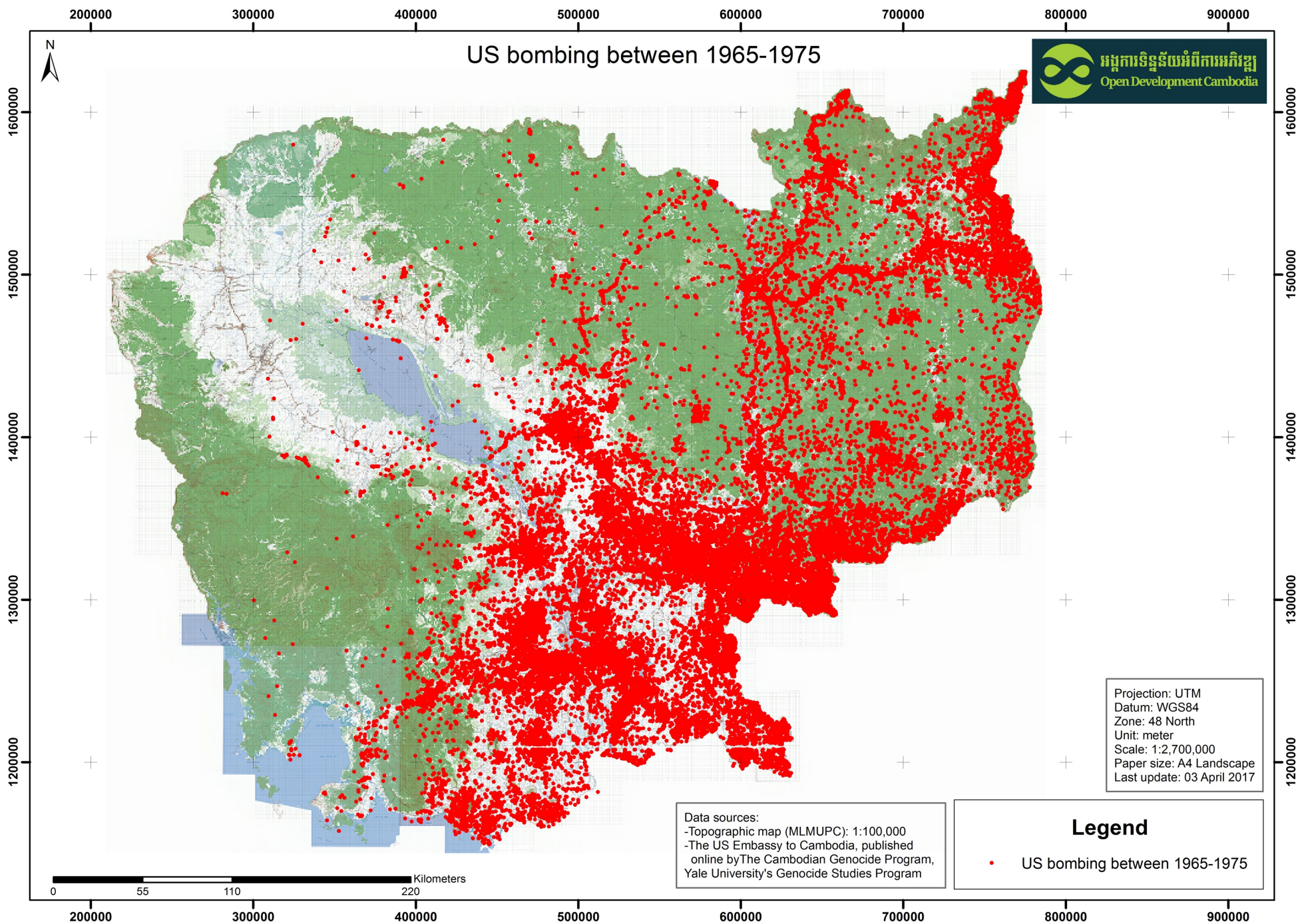
- Only knew which countries were involved in a war or conflict or not

□ Now, geolocated conflict events:

- Armed Conflict Location Event Dataset: <https://acledata.com/#/dashboard>
- Uppsala Conflict Data Project: <https://ucdp.uu.se/>
- US Department of Defense historical bombing:
<https://data.opendevlopmentmekong.net/dataset/us-bombing-in-cambodia-1965-1975-?type=dataset>

□ Also, political scientists have datasets on:

- Coups, revolutions, riots, etc.



Miguel and Roland (2011)

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- **Research question:** Does prolonged and intense bombing affect long-term economic growth and if so how much?

Motivation

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- **Long-run economic effects of war are not clear**
 - ▣ War destroys capital (physical, human, social), displaces people
 - ▣ Conflict and poverty traps. Vicious cycle:
 - War $\Rightarrow$ Poverty $\Rightarrow$ Resource scarcity $\Rightarrow$ War
 - ▣ But Solow model predicts rapid catch up
 - Returns to capital are higher with scarcer destroyed capital
 - Temporary investment in capital until country regains original growth
- **Previous Literature**
 - ▣ Bad data on destruction from war
 - ▣ Typical problems of reverse causality and OVB in studying effects of war quantitatively

Study Setting: Vietnam

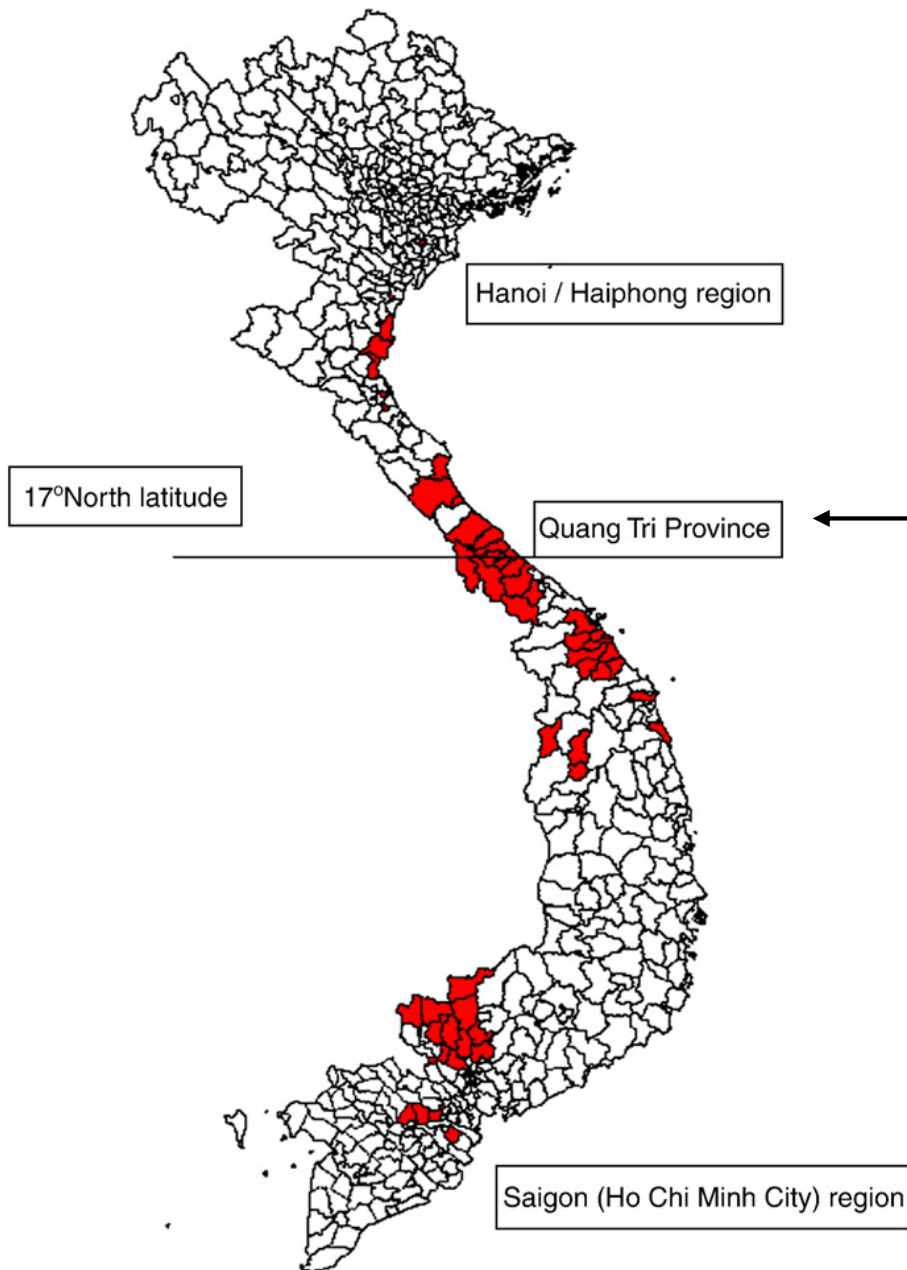
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- **Vietnam War occurs in the context of the Cold War**
 - ▣ French defeated at Dien Bien Phu in spring 1954
 - ▣ 1954 Geneva Conference splits Vietnam into the North and the South at the 17th parallel to end the First Indochina War
 - ▣ US fears communist takeover of South Vietnam by North Vietnam
 - Worry this will lead to other countries in the region becoming communist (“Domino Theory”)
- **US combat troops land in 1965**
- **Fall of Saigon in 1975**
- **US drops 3x more bombs on Vietnam in this period than it did in Europe and Pacific during all of WWII**

Why would this affect long-term economic performance?

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- **Economic theory (Solow) suggests:**
 - ▣ Bombing will only have short-term effects
 - Partially destroys capital stock
 - As long as it doesn't affect the production function, then this will result in a temporary increase in capital accumulation as the country regains its steady-state growth
 - If some areas are harder hit than others and capital is mobile, capital will move in to these areas to take advantage of a higher return
 - ▣ Long-term effects are possible if the bombing causes a poverty trap
 - People become so poor that they cannot save and invest (they consume everything they produce)
 - No capital accumulation takes place
 - Again, this can be overcome if capital is mobile



- Illustration of the units of analysis in this paper (districts)
- 70 percent of all ordnance targeted the red districts in Figure 1.

Quang Tri Province was “bombed flat” during the war. It is an extreme outlier so it is left out of the sample at points in the analysis

Fig. 1. Map of Vietnam – 10% of districts with the highest total U.S. bombs, missiles, and rockets per km² shaded.

Data

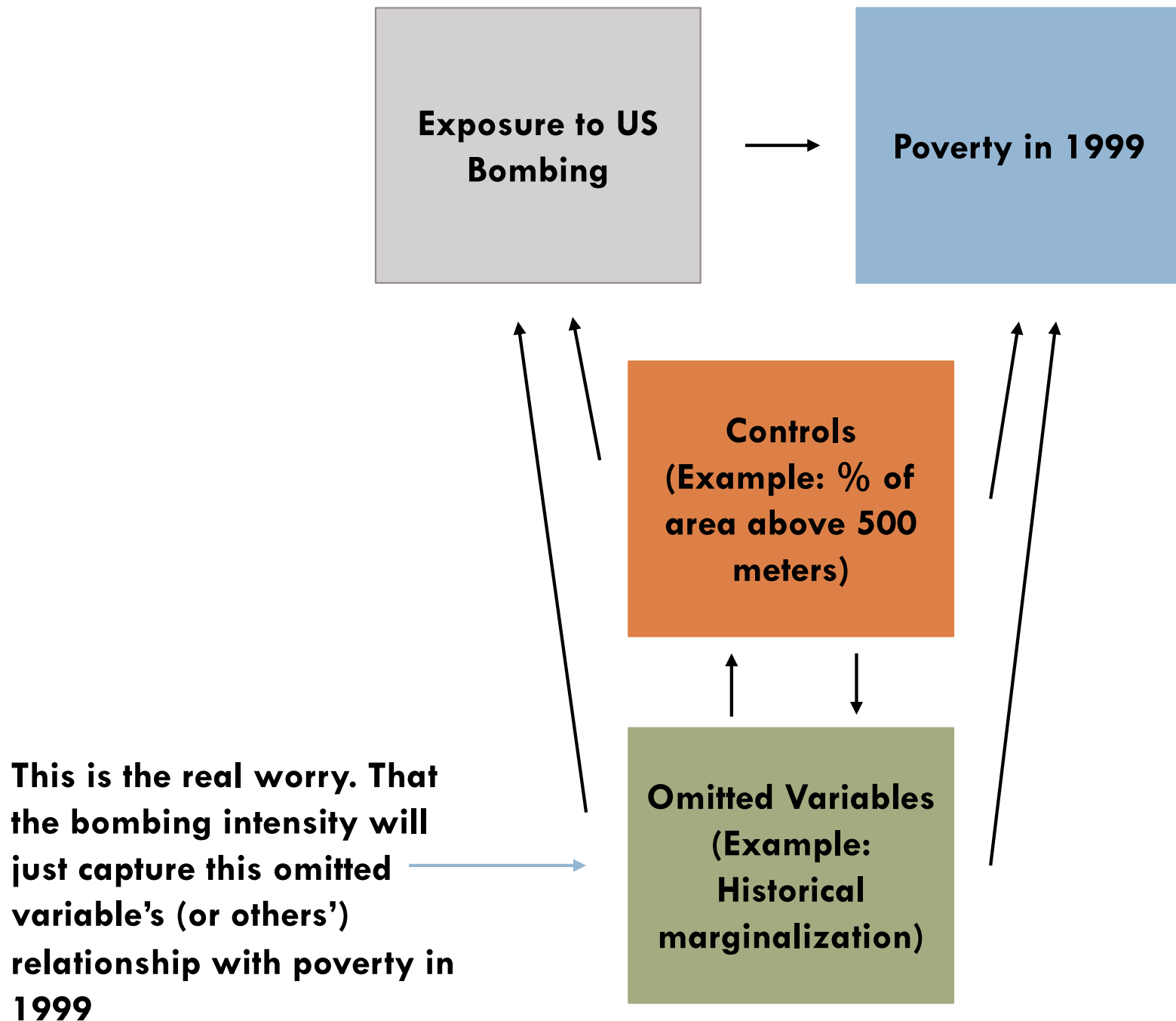
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- **District-level cross section of data**
 - ▣ Each row in the data is a different district
- **Dependent variable:** District average poverty rate in 1999
- **Independent variable of interest:** Intensity of US bombing during the Vietnam War
 - ▣ Measured by total number of US bombs, missiles, and rockets targeted per square km
 - ▣ From US Air Force and Navy records declassified after the war
 - Raw data include bombing location, quantity and category of ordnance
 - Declassified after the war and provided to the Govt. of Vietnam
- **Controls:** Various sources (see data appendix)

Identification Problem

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- **What is the identification problem here?**
 - ▣ Reverse causality isn't as much of a problem because of “temporal clarity.” Poverty in 1999 is not able to affect bombing in the past.
 - ▣ Bigger problem: Omitted Variable Bias
 - Why did the US bomb certain districts over others? Reasons:
 - North Vietnamese Army (NVA) and Viet Cong (VC) activity
 - Local population sympathetic to NVA and VC
 - Possibly more sympathy for NVA related to poverty and historical marginalization
 - Also possible these areas are more remote and harder for the US military to operate in

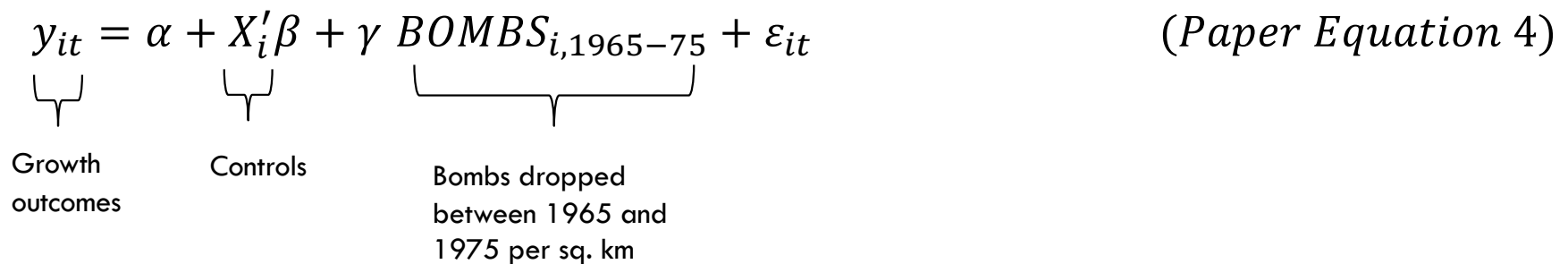


Identification Strategy

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- **Basic multivariate regression (control for as much as possible)**

$$y_{it} = \alpha + X_i' \beta + \gamma BOMBS_{i,1965-75} + \varepsilon_{it} \quad (\text{Paper Equation 4})$$



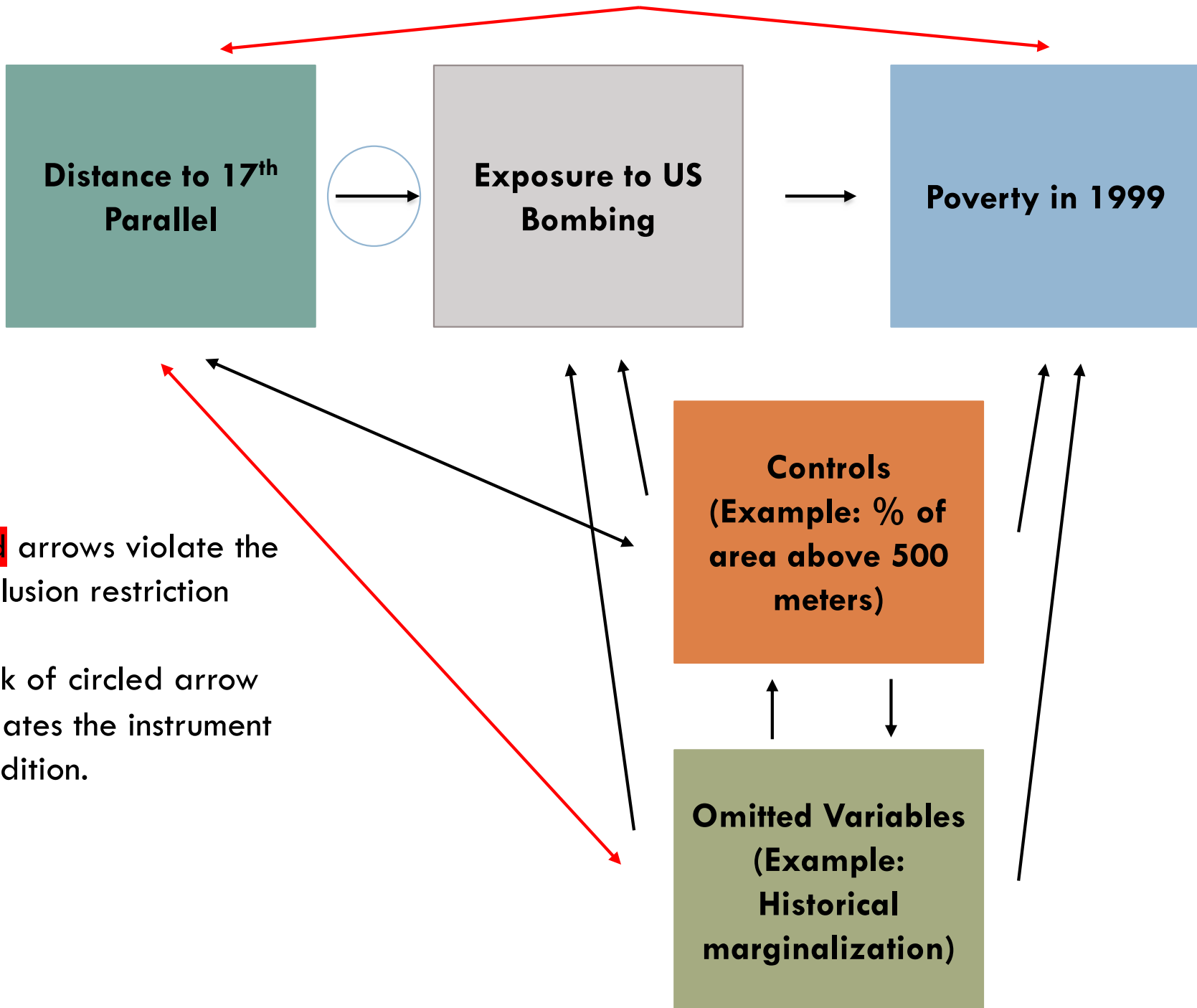
Growth outcomes Controls Bombs dropped between 1965 and 1975 per sq. km

γ Is the coefficient of interest. Controls include various measures for weather, climate, terrain, and geography

Identification Strategy (cont.)

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- **Use distance from the 17th parallel (the divider between North and South Vietnam)**
- **Logic:**
 - ▣ The 17th parallel was chosen arbitrarily by diplomats in 1954. Therefore, distance to it is not correlated with historical poverty and marginalization (satisfies exclusion restriction)
 - ▣ Defined the border between the combatants, so the closer you get to it the more intense the conflict and the more bombing (instrument condition satisfied)
 - Table 3 shows this is empirically supported



Red arrows violate the exclusion restriction

Lack of circled arrow violates the instrument condition.

Results

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Table 4
Local bombing impacts on estimated 1999 poverty rate.

	Dependent variable: estimated poverty rate, 1999					
	OLS	OLS	OLS	OLS	OLS	IV-2SLS
	(1)	(2)	(3)	(4)	(5)	(6)
Total U.S. bombs, missiles, and rockets per km ²	− 0.00087* (0.00048)	− 0.00040* (0.00022)	− 0.00065*** (0.00012)	− 0.00079*** (0.00016)		0.00026 (0.00042)
Population density (province), 1960–61 (÷ 100)	− 0.0089*** (0.0016)	− 0.0021** (0.0009)		− 0.0023** (0.0010)	− 0.0021** (0.0010)	− 0.0020* (0.0010)
Former South Vietnam	− 0.317*** (0.087)	− 0.174** (0.071)		− 0.122* (0.071)	− 0.139** (0.058)	− 0.104 (0.082)
Proportion of land area 250–500 m	0.341*** (0.096)	0.339*** (0.070)	0.182*** (0.067)	0.325*** (0.069)	0.342*** (0.070)	0.349*** (0.073)
Proportion of land area 500–1000 m	0.386** (0.172)	0.261*** (0.052)	0.157** (0.062)	0.261*** (0.053)	0.253*** (0.054)	0.257*** (0.055)
Proportion of land area over 1000 m	0.571** (0.231)	− 0.048 (0.113)	− 0.001 (0.159)	− 0.066 (0.111)	− 0.044 (0.120)	− 0.043 (0.116)
Average precipitation (cm)	0.00027 (0.00044)	0.00111*** (0.00035)	0.00060 (0.00046)	0.00110*** (0.00033)	0.00068* (0.00038)	0.00063 (0.00044)
Average temperature (Celsius)	0.033 (0.029)	− 0.012 (0.019)	− 0.034 (0.022)	− 0.013 (0.020)	− 0.0143 (0.0196)	− 0.0143 (0.0199)
Latitude (°N)	− 0.0127 (0.0108)	− 0.0088 (0.0088)	0.038 (0.026)	− 0.0044 (0.0088)	− 0.0051 (0.0081)	− 0.0025 (0.0100)
Latitude − 17°N					− 0.0044 (0.0069)	
District soil controls	No	Yes	Yes	Yes	Yes	Yes
Province fixed effects	No	No	Yes	No	No	No
Exclude Quang Tri province	No	No	No	Yes	No	No
Observations	55	584	584	576	584	584
R ²	0.75	0.61	0.79	0.63	0.60	–
Mean (S.D.) dependent variable	0.39 (0.16)	0.41 (0.20)	0.41 (0.20)	0.41 (0.20)	0.41 (0.20)	0.41 (0.20)

Notes: Robust Huber–White standard errors in parentheses. Significant at 90(*), 95(**), and 99(***) percent confidence. Disturbance terms are clustered at the province level in regressions 2–7. The district soil type controls include the proportion of district land in 18 different soil categories. The omitted altitude category is 0–250 m. The instrumental variable in regression 6 is |Latitude − 17°N|.

←
small relationship.
Average Effect
=
32.2 × 0.00026
= 0.008, a 0.8
percentage point increase
in poverty rate

Results

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Table 6

Local war impacts on consumption expenditures and growth (VLSS data).

	OLS (1)	OLS (2)	OLS (3)
<i>Panel A: dependent variable: 2002 per capita consumption expenditures</i>			
Total U.S. bombs, missiles, and rockets per km ²	2.4 (1.7)	5.3 (3.4)	
Latitude – 17°N			3.3 (54.5)
Exclude Quang Tri province	No	Yes	No
Observations	55	54	55
R ²	0.61	0.62	0.60
Mean (S.D.) dependent variable	3084 (1007)	3092 (1014)	3084 (1007)
<i>Panel B: dependent variable: 1992/93 per capita consumption expenditures</i>			
Total U.S. bombs, missiles, and rockets per km ²	– 1.5 (1.0)	– 2.0 (2.2)	
Latitude – 17°N			53.9 (48.1)
Exclude Quang Tri province	No	Yes	No
Observations	55	54	55
R ²	0.46	0.44	0.47
Mean (S.D.) dependent variable	1831 (591)	1847 (585)	1831 (591)
<i>Panel C: dependent variable: growth in consumption, 1992/93–2002</i>			
Total U.S. bombs, missiles, and rockets per km ²	0.0030*** (0.0007)	0.0036** (0.0017)	
Latitude – 17°N			– 0.057** (0.028)
Exclude Quang Tri province	No	Yes	No
Observations	55	54	55
R ²	0.47	0.41	0.41
Mean (S.D.) dependent variable	0.74 (0.38)	0.72 (0.37)	0.74 (0.38)

Results

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Table 7

Local war impacts on physical infrastructure and human capital.

	OLS (1)	OLS (2)	OLS (3)	OLS (4)	OLS (5)	IV-2SLS (6)
<i>Panel A: dependent variable: proportion of households with access to electricity, 1999</i>						
Total U.S. bombs, missiles, and rockets per km ²	0.00168*** (0.00055)	0.00036*** (0.00012)	0.00025 (0.00016)	0.00043** (0.00017)		0.0019** (0.0009)
Latitude – 17°N					–0.033*** (0.009)	
District soil controls	No	Yes	Yes	Yes	Yes	Yes
Province fixed effects	No	No	Yes	No	No	No
Exclude Quang Tri province	No	No	No	Yes	No	No
Observations	55	584	584	576	584	584
R ²	0.59	0.57	0.75	0.57	0.58	–
Mean (S.D.) dependent variable	0.72 (0.21)	0.71 (0.27)	0.71 (0.27)	0.71 (0.27)	0.71 (0.27)	0.71 (0.27)
<i>Panel B: dependent variable: proportion of literate respondents, 1999</i>						
Total U.S. bombs, missiles, and rockets per km ²	0.00005 (0.00012)	0.00003 (0.00006)	0.00009 (0.00006)	0.00012** (0.00006)		0.00041 (0.00037)
Latitude – 17°N					–0.0070 (0.0052)	
District soil controls	No	Yes	Yes	Yes	Yes	Yes
Province fixed effects	No	No	Yes	No	No	No
Exclude Quang Tri province	No	No	No	Yes	No	No
Observations	55	584	584	576	584	584
R ²	0.65	0.59	0.75	0.59	0.59	–
Mean (S.D.) dependent variable	0.89 (0.07)	0.88 (0.11)	0.88 (0.11)	0.88 (0.11)	0.88 (0.11)	0.88 (0.11)

Results

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Table 8
Local bombing impacts on 1999 population density.

	Dependent variable: population density, 1999					
	OLS	OLS	OLS	OLS	OLS	IV-2SLS
	(1)	(2)	(3)	(4)	(5)	(6)
Total U.S. bombs, missiles, and rockets per km ²	0.13 (0.49)	2.0 (8.9)	12.4 (10.9)	6.1 (12.5)		− 13.9 (19.7)
Population density (province), 1960–61	0.89*** (0.19)	0.66 (0.42)		0.68 (0.42)	0.67* (0.40)	0.62 (0.45)
Former South Vietnam	282.7* (145.2)	857.9 (1890.2)		344.4 (1735.1)	1048.9 (862.8)	− 821.7 (2899.1)
Proportion of land area 250–500 m	− 1332*** (426)	− 3997 (3125)	− 1416 (1721)	− 3890 (3133)	− 3845 (2830)	− 4230 (3272)
Proportion of land area 500–1000 m	13 (261)	− 2164 (1661)	− 1762 (1460)	− 2181 (1686)	− 1829 (1370)	− 2075 (1586)
Proportion of land area over 1000 m	− 1468*** (489)	− 1264 (1983)	− 111 (1722)	− 1084 (2014)	− 1316 (1745)	− 1399 (1982)
Average precipitation (cm)	− 1.27** (0.55)	− 22.7 (15.6)	− 9.9 (9.2)	− 22.7 (15.4)	− 14.1 (11.2)	− 11.0 (10.5)
Average temperature (Celsius)	− 46.7 (49.2)	767.3 (846.7)	470.0 (373.6)	774.9x (373.6)	828.0 (887.3)	824.6 (882.9)
Latitude (°N)	36.9** (16.5)	103.2 (177.5)	− 1317.1 (904.5)	60.4 (164.4)	91.0 (120.2)	− 48.1 (266.0)
Latitude − 17°N					237.1 (328.6)	
District soil controls	No	Yes	Yes	Yes	Yes	Yes
Province fixed effects	No	No	Yes	No	No	No
Exclude Quang Tri province	No	No	No	Yes	No	No
Observations	55	584	584	576	584	584
R ²	0.86	0.16	0.56	0.15	0.15	−
Mean (S.D.) dependent variable	465 (540)	1659 (5846)	1659 (5846)	1678 (5884)	1659 (5846)	1659 (5846)

Conclusions

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- **No measurable robust long-run local economic impacts of the bombing**
 - ▣ Bombing largely targeted rural areas. Little fixed infrastructure. Destroyed forest and farmland. Naturally recovered with time.
 - DOD: “the agrarian nature of the Vietnamese economy precludes an economic collapse as a result of the bombing”
 - ▣ NVA rebuilt destroyed infrastructure quickly for war purposes
 - ▣ Vietnam invested heavily in public works after the war, likely avoiding poverty traps
 - ▣ Mobility of capital