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ISSN: 2752-1931

A comment on Jumping The Gun: How Dictators Got Ahead Of Their Subjects (2023)

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Abstract

Instructions:
Hariri & Wingender add new nuance to the traditional wisdom that economic modernisation is a path to democracy. They show that the diffusion of repressive, military technologies, causes a decline in the number of democratisations in the following years, and argue that this is because of a greater ability to forcefully oppress popular dissent.

We conduct a robustness replication exercise, focussed on three tests:

- *i) Are findings robust to alternative weightings of individual technologies in the instrument for country-aggregate military technology?*
- *ii) Is high leverage in individual countries, regions or time periods driving the global findings?*
- *iii) Are the strength of the IV and its independence of important macroeconomic indicators a chance occurrence?*

The main findings of the paper are largely robust to these tests.

1. Introduction

Hariri and Wingender (henceforth, HW) test the hypothesis that increased military capability of a non-democratic regime can suppress transitions to democracy. They capture military capability with a measure of the observed military technologies employed in a country. Their dataset spans 169 countries and the period 1820 to 2010.

Because realised levels of military technologies are likely endogenous, they develop "an instrument for technology adoption based on inverse distance-weighted adoption in other countries" (p.728). Table 2 of the paper justifies the use of this IV. Table 3 provides the main results, showing that "the rapid diffusion of repressive technologies has impeded democratisation around the world, by allowing autocratic rulers to suppress popular resistance against their regimes" (p.728).

2. Reproducibility

HW provided a detailed replication package, including all data and code necessary to replicate their main findings. Both the code and data were annotated and this greatly aided replication.

There was some minor inconsistency in relative file paths.

3. Replication

We conducted a robustness replication. We now explain why we chose the particular robustness checks introduced above in the instructions, as well as our main findings. We present additional figures in the appendix.

i. Alternative Weighting

HW present the following table:

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Table 1. *List of Groundbreaking Military Technologies.*

Infantry firearms	Machine guns	Artillery	Tanks	Attack aircraft	Combat helicopters
Matchlock musket	Hand cranked	Field guns	Early tank	Early attack aircraft	1st gen. helicopter
Snaphaunce	Automatic	Rifled artillery	WWII tank	WWII attack aircraft	2nd gen. helicopter
Flintlock		Steel tubes	1st gen. MBT	1st gen. jet fighter	
Percussion lock		Breech loading	2nd gen. MBT	2nd gen. jet fighter	
Miniø bullet rifle		Recoil mechanism	3rd gen. MBT	3rd gen. jet fighter	
Breech-loading rifle				4th gen. jet fighter	
Tubular magazine					
Box magazine					
Assault rifle					

Note: See Online Appendix A for a description of the individual technologies.

They then aggregate these technologies to generate a single value for military capacity for each country in each year. In this aggregation, each technology is given the same weight. We reweight the technologies by the inverse of the number of years since their adoption. Therefore, in the year 2000, a technology adopted in 1999 would have a weighting of 1, and a technology adopted in 1900 would have a weighting of 1/100.

Providing microfoundations for any weighting scheme is challenging, and we do not claim that our alternative weighting scheme is superior. Instead, we suggest our weighting scheme tests for robustness of grandfathering out obsolete technologies from the index.

Table 1: Reweighted Estimates

	Democratisation		Durable democratisation		Unreversed democratisation		Democratic Reversal	
	Reweighted (1)	Original (2)	Reweighted (3)	Original (4)	Reweighted (5)	Original (6)	Reweighted (7)	Original (8)
Military tech. index (lagged)	-0.90	-1.10**	-0.90	-1.27***	-0.48	-0.66**	-0.94	0.16
	(0.60)	(0.51)	(0.47)	(0.40)	(0.29)	(0.27)	(4.57)	(0.97)
Log GDP per capita (lagged)	1.19	1.31**	1.62***	1.87***	1.00	1.13***	-0.15	-1.19
	(0.63)	(0.59)	(0.57)	(0.56)	(0.40)	(0.38)	(4.48)	(1.60)
Kleibergen-Paap F	7.15	16.30	8.1	19.87	18.6	21.61	0.40	8.51

Notes: Replication of the IV estimates of Table 3. Significance levels: $***<0.01; **<0.05$.

The magnitude and direction of the point estimates are very similar in the reweighted and original specification. That said, the F-test is somewhat smaller, and some of the coefficients are less significant.

ii. Leave-one-Out

Does high leverage in individual countries, regions or time periods drive aggregate results?

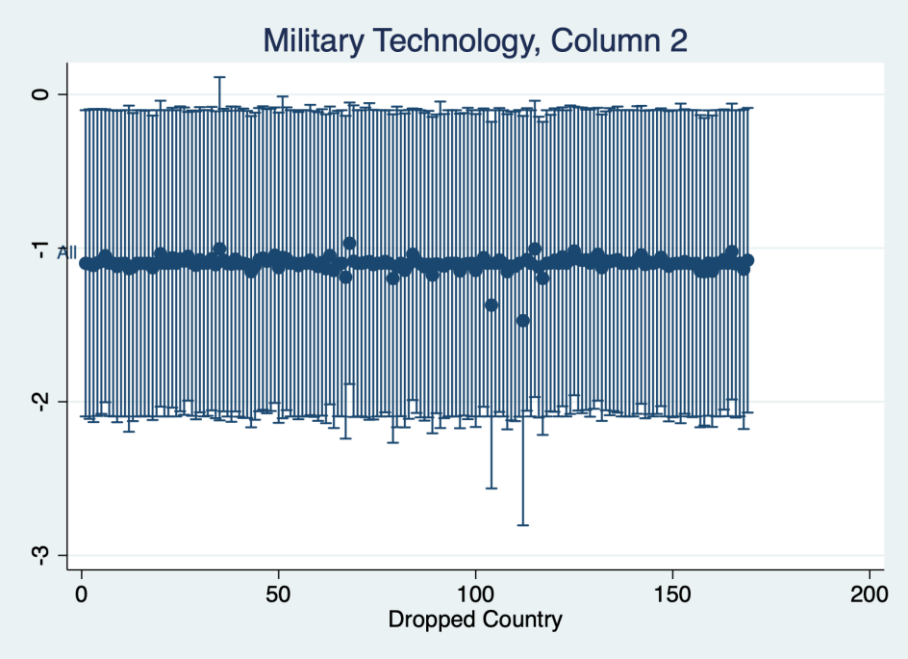
If an individual country, time period or world region has large leverage, it could drive the main results (once again, the main results are from Table Three, which we reprint below). To test for robustness to such leverage, we conduct, leave-one-out robustness checks where we respectively leave out one country, decade, or world region.

Table 3. *Main Estimates.*

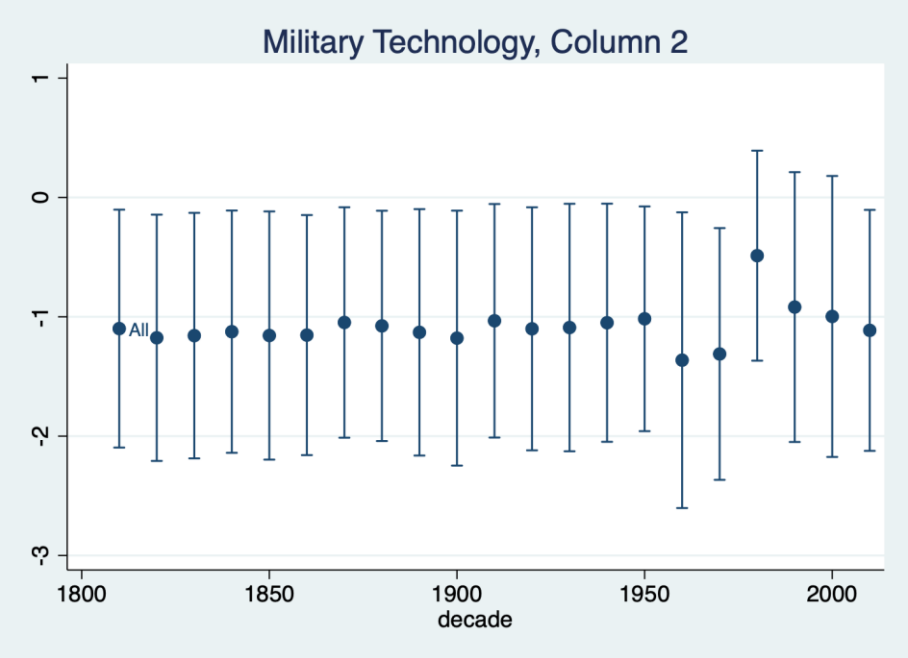
Dependent variable:	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Democratisation (all)		Durable democratisation		Unreversed democratisation		Democratic reversal	
Military tech. index (lagged)	−0.26**	−1.10**	−0.31***	−1.27***	−0.32***	−0.66**	−0.21	0.16
	(0.11)	(0.51)	(0.09)	(0.40)	(0.08)	(0.27)	(0.24)	(0.97)
Log GDP per capita (lagged)	0.78	1.31**	1.24***	1.87***	0.89**	1.13***	−0.84	−1.19
	(0.48)	(0.59)	(0.42)	(0.56)	(0.36)	(0.38)	(1.28)	(1.60)
Time FEs	Y	Y	Y	Y	Y	Y	Y	Y
Autocracy-spell FEs	Y	Y	Y	Y	Y	Y	N	N
Country FEs	n/a	n/a	n/a	n/a	n/a	n/a	Y	Y
Observations	6,894	6,894	7,047	7,047	7,673	7,673	3,700	3,700
Autocracy spells	186	186	155	155	128	128	n/a	n/a
Mean of dependent variable	0.017	0.017	0.012	0.012	0.007	0.007	0.018	0.018
Estimator	OLS	2SLS	OLS	2SLS	OLS	2SLS	OLS	2SLS
Kleibergen-Paap *F*	n/a	16.30	n/a	19.87	n/a	21.61	n/a	8.51

Notes: Linear probability models with annual data based on (1). All coefficients and standard errors are multiplied by 100 such that the coefficient on military technology measures how many percentage points more likely an autocracy is to democratise in a given year when adopting one additional military technology. In columns (1) and (2), we report the likelihood of democratisation in autocracies. After democratisation, countries leave the sample. In columns (3) and (4), we do not count democratic transitions as such if the subsequent period of democracy lasts less than ten years. The number of observations in this case is larger than in the first two columns, as countries are still considered autocratic during democracy spells too brief to satisfy the ten year cutoff. In columns (5) and (6), we only count democratic transitions that have not been reversed. In columns (7) and (8), the outcome is reversals from democracy to autocracy. We instrument the military technology index in the 2SLS specifications as described in Section 4. Robust standard errors clustered at the country level are given in parentheses. *** and ** significant at the 1% and 5% levels, respectively.

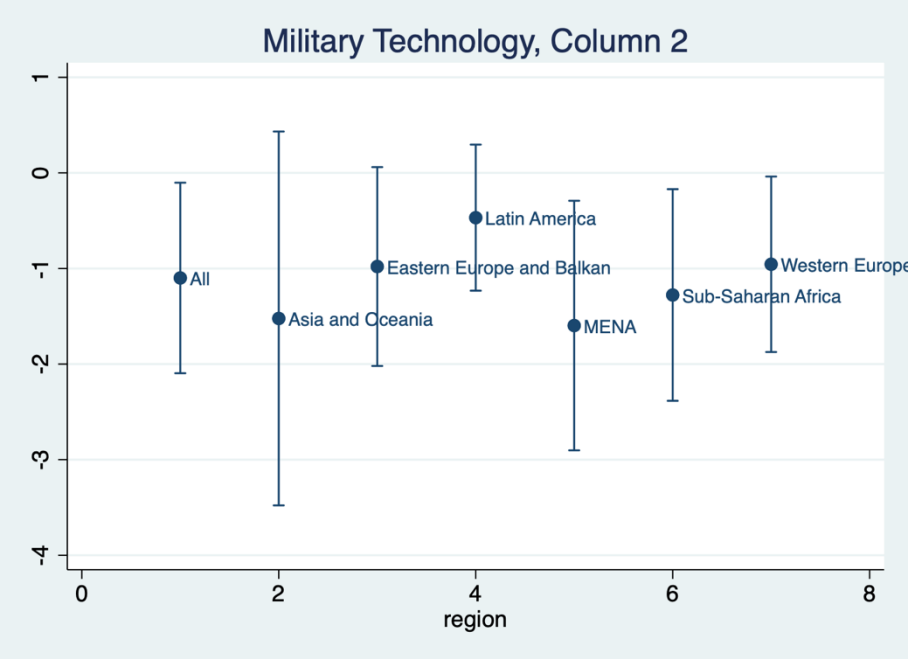
We show one graph (of the coefficient on military tech. with a 95% CI from column 2) for each of these leave-one-out analyses here, and place the graphs for both the military tech index and log GDP for columns 1-4 in the appendix. In all cases, the full sample is the left-most coefficient.



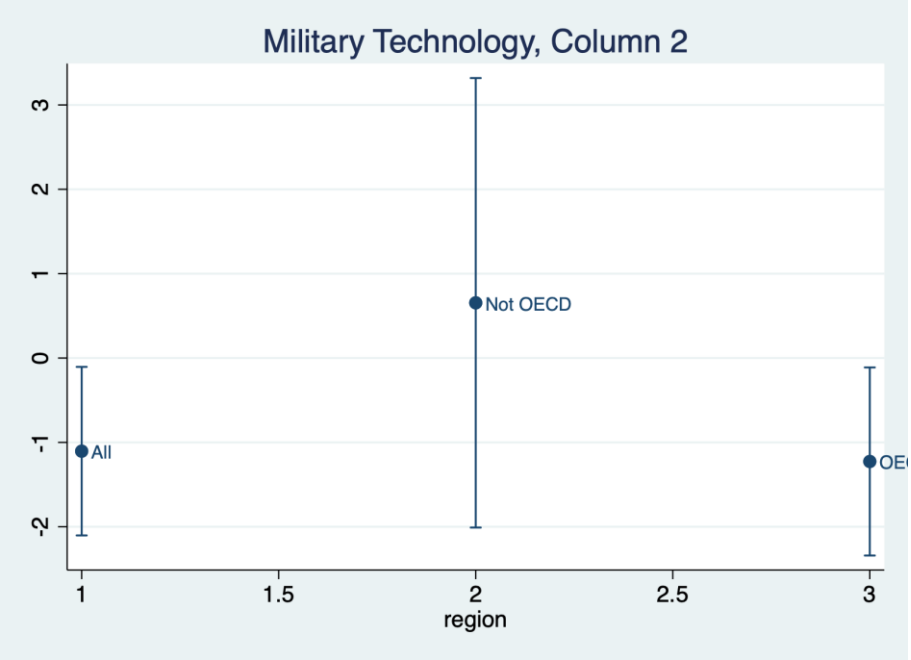
Notes: In column 2 (and all other columns, see appendix), no individual country has sufficient leverage to drive the global results.



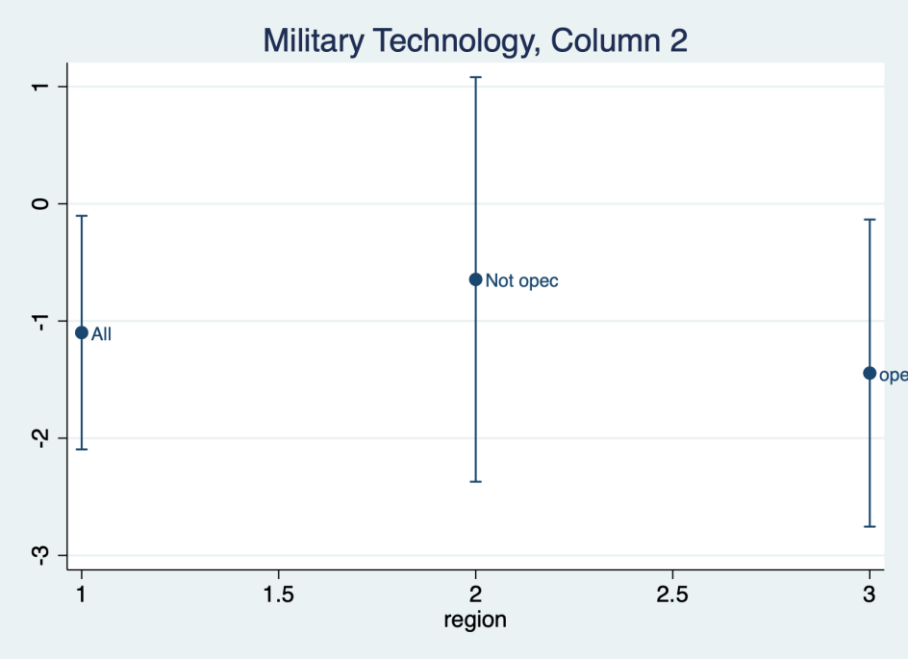
Notes: In column 2 (and all other columns, see appendix), coefficients and standard errors vary little across time periods.



Notes: In column 2 (and all other columns, see appendix), there are no differences between world regions based on geography.



Notes: In column 2 (and all other columns, see appendix), the OECD and non-OECD groups are statistically indistinguishable, though in many cases, non-OECD group has large standard errors.



Notes: In column 2 (and all other columns, see appendix), OPEC and Non-OPEC groups are statistically indistinguishable in all columns.

iii. Randomisation Inference & The Instrument

In this subsection, we replicate Panel A of Table Two (reprinted below):

Table 2. *First Stage and Exclusion Restriction.*

	(1)	(2)	(3)	(4)	(5)
			Dependent variable:		
	Military tech.	GDP/cap. (log)	Trade (log)[a]	Interstate war[b]	Militarised dispute[c]
Panel A: instrument is the independent variable					
Instrument	1.41***	−1.73	16.83	−1.03	4.26
	(0.25)	(6.64)	(11.14)	(4.19)	(4.39)
	[0.29]	[-0.01]	[0.09]	[0.00]	[0.02]
Panel B: comparable OLS estimates (military tech. is the independent variable)					
Military tech.	1.00***	4.18***	5.34**	1.48**	2.46**
	(0.00)	(1.54)	(2.09)	(0.61)	(1.01)
	[1.00]	[0.16]	[0.11]	[0.08]	[0.08]

Notes: All regressions include autocracy-spell fixed effects and year fixed effects. We use annual data 1820–2010 from all autocracies in the world as classified by Boix *et al.* (2013). [a]Trade is import plus exports in dollars. Trade data are only available from 1870 onward. *Source:* Barbieri *et al.* (2009; 2016). [b]The dependent variable is a dummy for interstate war. *Source:* Sarkees and Wayman (2010). [c]The dependent variable is a dummy for militarised disputes short of war. *Source:* Palmer *et al.* (2015). Robust standard errors clustered at the country level are given in parentheses. *** and ** significant at the 1% and 5% levels, respectively. Standardised coefficients are given in square brackets.

While not a formal test, Column 1 is of interest for the implications it has for the strength of the instrument. HW provide the formal F-test in Table 3, though they do not present standard first stage output. Columns 2-5 provide suggestive evidence that the exclusion restriction is not violated, showing that GDP, trade, wars and militarised disputes are not correlated with the instrument.

Given that these are cross-country comparisons, the number of observations is not large (169 countries in total). As such, we conduct randomisation inference tests, as alternative estimates of the p-values for each of the 5 columns. There are several ways the randomisation inference could be conducted. One approach would be to conduct the permutations at the point the instrument is made. While econometrically feasible, this is not computationally feasible for thousands of permutations.[1] A more computationally feasible approach is to permute the baseline IV once it

[1] On our computers, this took ~15 mins. Multiplying that by 1000 iterations, it would take ~10 days run time.

has been created, and to then replicate Panel A of Table Two. Taking this more computationally feasible approach, the randomisation inference p-values are presented below:

	(1) Military Technology	*(2) GDP per capita*	*(3) Trade*	*(4) Interstate War*	*(5) Militarised Dispute*
*c**	*0*	*1*	*0*	*21*	*0*
*n***	*1000*	*1000*	*1000*	*1000*	*1000*
*p****	*0*	*0.001*	*0*	*0.021*	*0*

**The number of permutations for which the absolute value of the coefficient of interest is greater than or equal to the absolute value of the coefficient of interest observed in the original regression.*
***The number of permutations.*
****p = c/n*

The p-value from each column suggests the observed relationship are statistically significant.

4. Conclusion

HW provide high quality replication files and using these, we successfully replicate the main findings of the paper. Then, conducting a robustness replication, we find coefficients in the main results (Table 3) are of similar magnitude and significance. This is true for both alternative weightings of the instrument, and for a large number of leave-one-out specifications. It is somewhat less clear whether the informal tests of the exclusion restriction (columns 2-5 of Table 2) hold when replacing standard p-values with randomisation inference p-values. However, as noted in the main body, our randomisation inference was limited due to computing constraints.

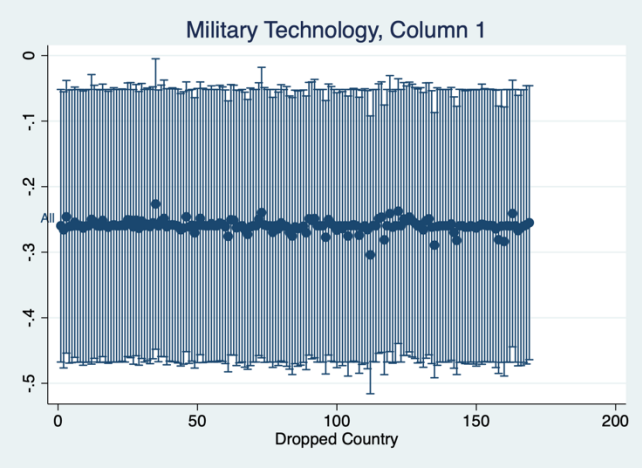
References

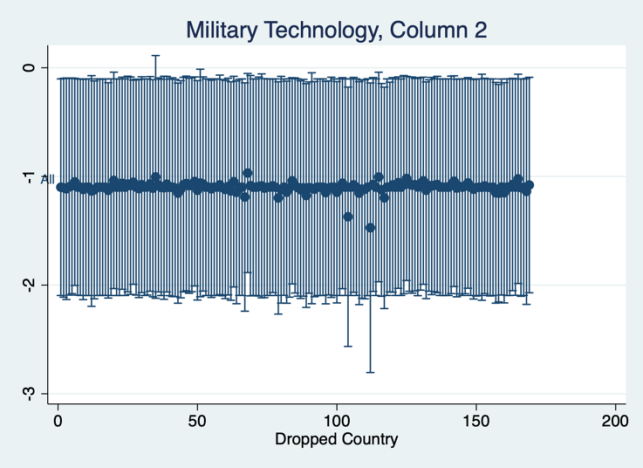
Hariri, J. G., & Wingender, A. M. (2023). Jumping the gun: how dictators got ahead of their subjects. *The Economic Journal, 133*(650), 728-760.

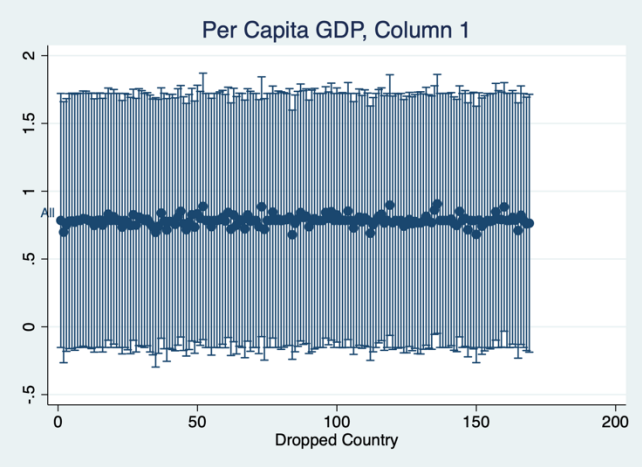
Additional Figures

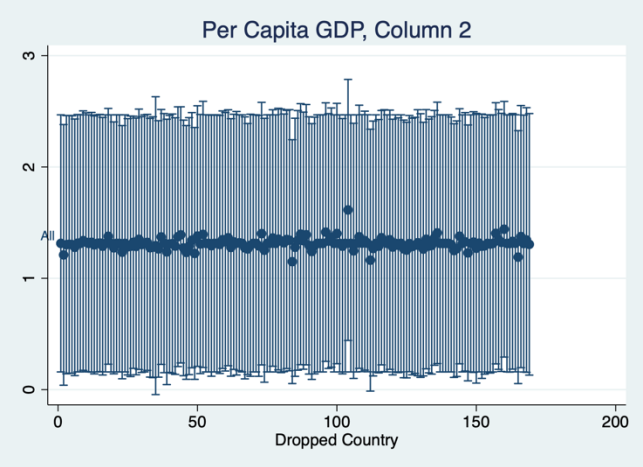
We provide additional figures for columns 1 and 2. The remaining columns replicate, so we do not show them. In each case, the baseline estimate is the left-most observation.

Leave One Country Out

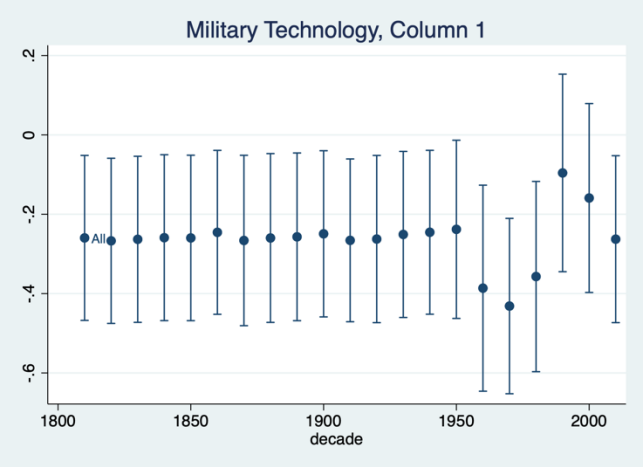


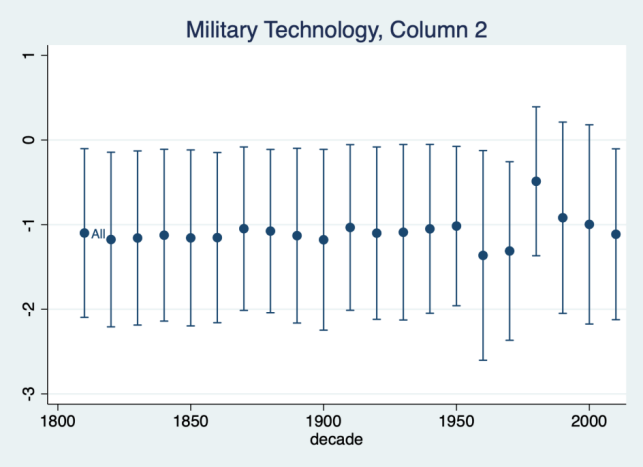


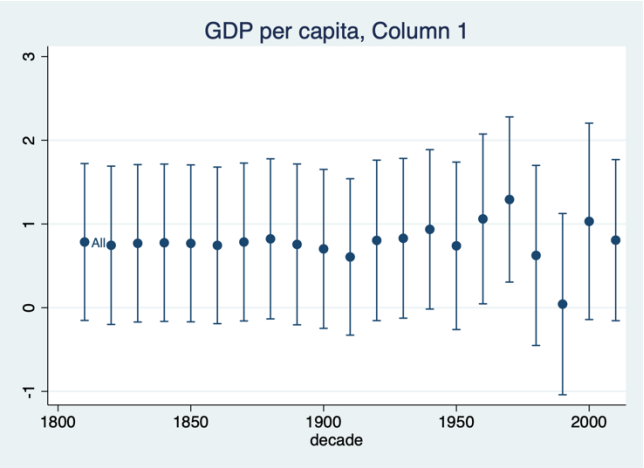


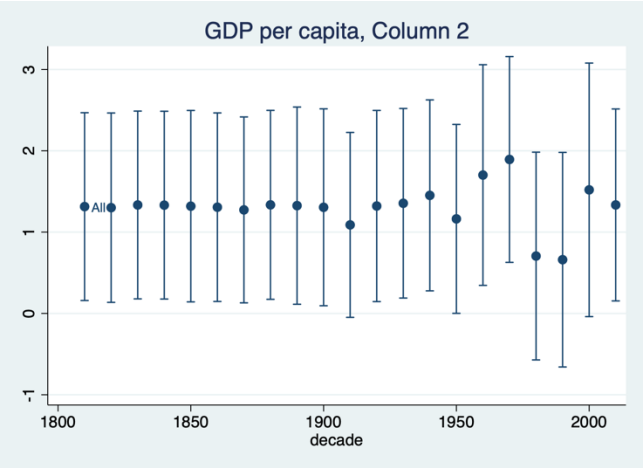


Leave One Decade Out









Leave One Geographic Region Out