The Military Economy: arms expenditures, industry, exports

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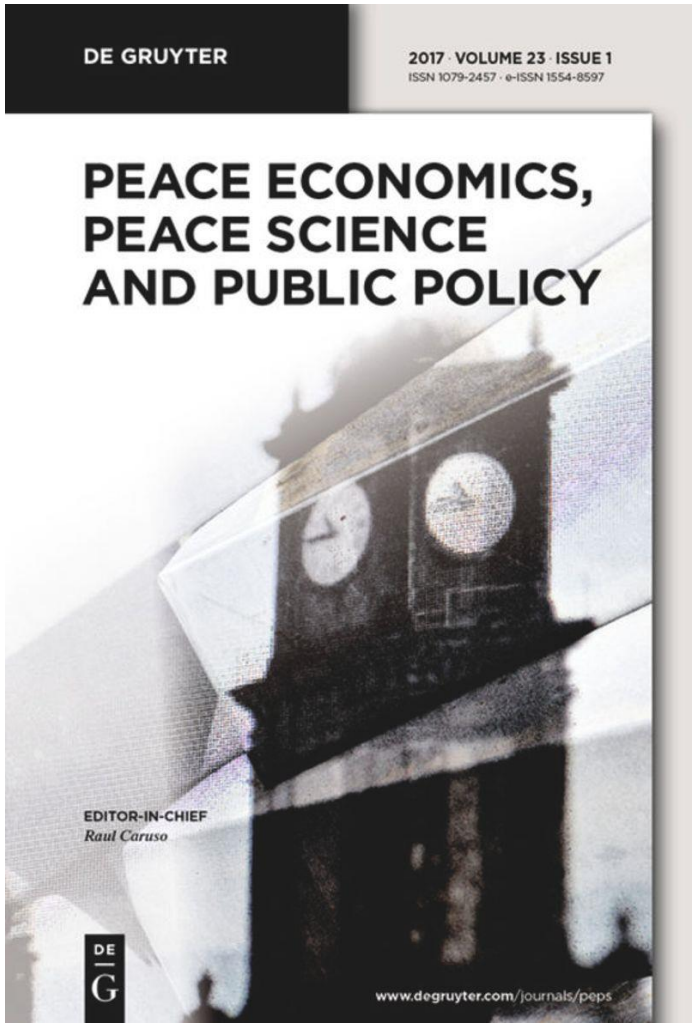
Some advertising



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CiteScore	2.8	2024, Scopus (Elsevier B.V., 2025)

Outline

#0 Military expenditures: facts and concepts

Some recent research:

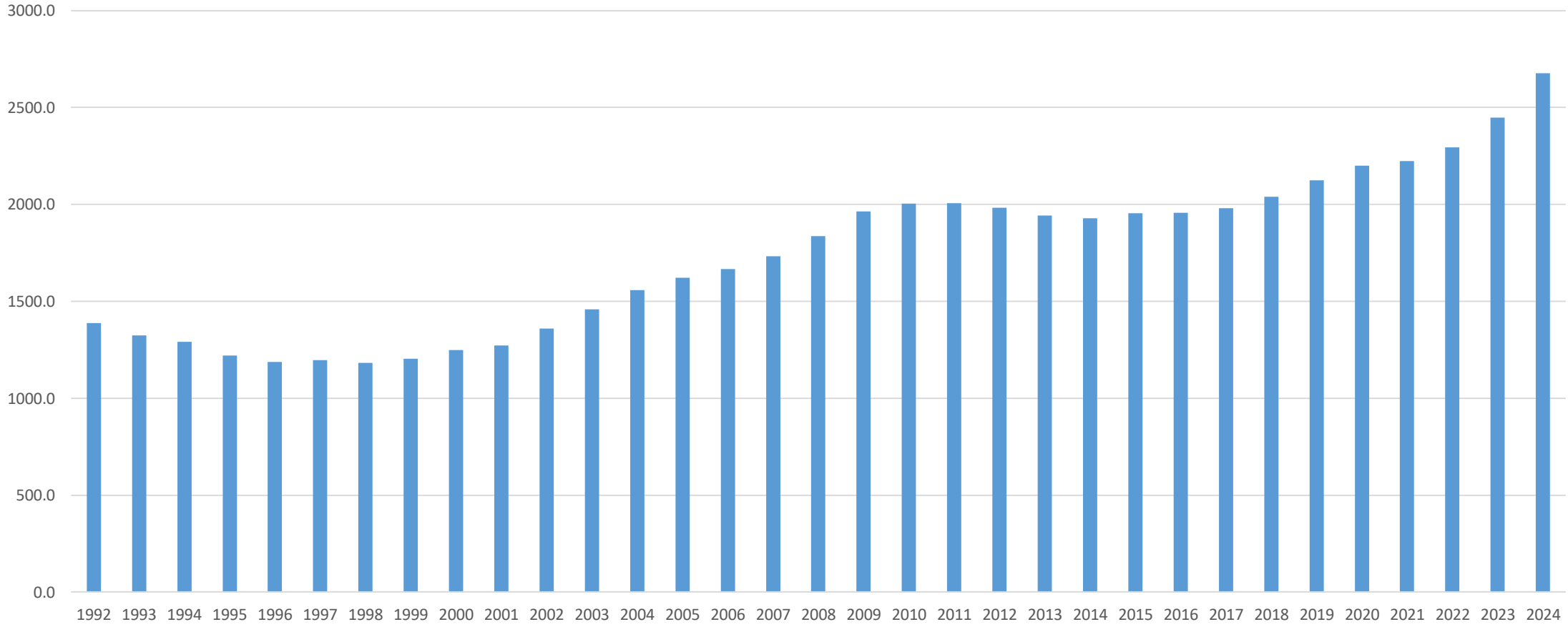
#1. Balestra, A., Caruso, R. (2025). The impact of US elections on US defense industry: firm-level evidence from 1996 to 2022. ***Defence and Peace Economics***, https://doi.org/10.1080/10242694.2025.2474757

#2. Baronchelli A., Caruso R. (2024), Did CIA interventions increase US arms exports? Evidence from the Cold War (1962–1989)***, Economics Letters***, https://doi.org/10.1016/j.econlet.2024.111672

#3. Biscione A., Caruso R. (2021), Military Expenditures and Income Inequality Evidence from a Panel of Transition Countries (1990-2015), ***Defence and Peace Economics***, https://doi.org/10.1080/10242694.2019.1661218

#4. (in)efficiency in military expenditures: the rationale for a coordinated EU spending. (spin-off of a report prepared for EPRS)

World military Expenditures 1992 - 2024
US$b. (2023, constant prices)



Between 1992 and 2024, global military expenditures experienced an approximate 93% increase. Specifically, they surged from 1,388 billion (in constant 2023 US dollars) to 2,677 billion dollars, exhibiting an annual growth rate (CAGR) of 2%.

Between 1992 and 2024, the most significant regional increases in military expenditures occurred in Eastern Europe (+359%), Asia and Oceania (+281%), Africa (+207%), Middle East (+188%). In contrast, Western Europe and North America experienced comparatively lower incrases in military spending, registering 32%, and 38% respectively during the considered period.

SIPRI DATA

Top 10 Military Spending

	2022	1992-2022	2005-2022
	(2021 US$ m.)	(growth rate %)	
USA	811,591	29.3	9.7
China	297,999	878.3	266.7
India	80,956	333.2	101.7
Saudi Arabia	73,041	175.4	76.2
Russia	71,981	57.6	111.4
United Kingdom	69,999	9.0	6.8
Germany	57,808	-2.3	58.4
France	57,000	5.5	11.3
Japan	53,947	22.6	15.8
South Korea	49,618	173.1	81.6

SIPRI DATA

Top 10 Per Capita Military Spending

	2022	1992-2022	2005-2022
	(2021 US$)	(growth rate %)	
Israel	2,440	-11.0	9.6
USA	2,435	-0.5	-2.7
Singapore	2,017	49.7	-4.4
Saudi Arabia	2,006	30.7	18.0
Kuwait	1,884	-77.6	-29.6
Norway	1,642	39.6	46.9
Australia	1,263	57.4	36.1
Oman	1,226	5.8	-25.1
Ukraine	1,157	12,980.5	2,148.4
United Kingdom	1,045	-6.3	-3.7

SIPRI DATA

Top 10 Military Spending (% Gov. Spending)

	2022	1992-2022	2005-2022
	(%)	(growth rate %)	
Belarus	32.1	NA	0.0
Saudi Arabia	27.8	0.0	0.0
Qatar	23.8	NA	2.5
Somalia	20.4	NA	NA
Pakistan	17.9	NA	-0.3
Oman	17.6	-0.3	-0.3
Chad	17.5	NA	1.4
Togo	17.5	0.3	1.1
Iran	17.3	0.7	0.3
Singapore	16.9	-0.4	-0.5

NATO DATA

Distribution of defence expenditure by main category (% of total defence expenditure)

	Equipment			Personnel			Infrastructure			Other		
	2014	2023e	change	2014	2023e	change	2014	2023e	change	2014	2023e	change
USA	25.97	29.30	+3.33	35.45	27.76	-7.70	1.71	1.55	-0.16	36.87	41.39	+4.52
United Kingdom	22.82	28.59	+5.77	36.59	30.64	-5.95	1.95	2.53	+0.58	38.63	38.24	-0.40
Germany	12.94	25.35	+12.40	50.67	36.61	-14.07	3.75	3.54	-0.21	32.63	34.51	+1.88
France	24.64	29.08	+4.44	48.59	40.10	-8.49	2.33	3.16	+0.82	24.43	27.67	+3.23
Italy	10.92	23.00	+12.08	76.41	60.74	-15.67	1.40	1.84	+0.44	11.27	14.41	+3.15
Poland	18.84	52.45	+33.61	51.45	26.66	-24.79	5.47	4.05	-1.42	24.24	16.84	-7.40
Canada	13.03	24.40	+11.37	50.90	39.22	-11.68	3.81	3.46	-0.35	32.26	32.91	+0.65
Spain	13.49	28.64	+15.15	67.34	57.17	-10.17	0.66	1.10	+0.43	18.50	13.09	-5.41
Türkiye	25.08	25.41	+0.33	56.88	50.23	-6.66	2.77	6.99	+4.22	15.27	17.37	+2.10
Netherlands	10.68	27.01	+16.33	56.50	37.14	-19.36	4.77	4.35	-0.42	28.05	31.50	+3.45

Notes: Figures 2023 are estimates.

(a) Equipment expenditure includes major equipment expenditure and R&D devoted to major equipment.

(b) Personnel expenditure includes military and civilian expenditure and pensions.

(c) Infrastructure expenditure includes NATO common infrastructure and national military construction.

(d) Other expenditure includes operations and maintenance expenditure, other R&D expenditure and expenditure not allocated among above-mentioned categories.

Why military expenditures?

1) Security concerns;
2) Affordability. Military expenditures are procyclical;
3) Political regimes. Autocracies spend more than democracies for military purposes.

Empirical approach: The determinants of milex:

- The security web,
- The GDP growth rates;
- The political regime (democracy vs autocracy)

Military expenditures and instability

‘Supporters’ of military expenditures point to the idea of deterrence, but…….

We know that **deterrence is nothing but a a nash equilibrium in two-players static game** characterized also by common knowledge. During the Cold War it seemed to work.

However, nowadays, It cannot work because

(i) the world is not bipolar.

(ii) We do not have enough information (Halperin and Schelling, 1961).

(iii) We would need a dynamic n-agent game.

In fact, in spite of the widespread idea, deterrence is often unstable.

1) **The impact of milex on conflict and outbreak of war**

1.1 a large literature on **arms races** (since 60s of last century) for dyads.

- Theoretical models. Richardson (1960), Fischer (1984), Intrilligator and Brito (1984), Intriligator and Brito (2000).
- Empirical studies: Dunne and Smith (2007), Anderton (1989), Isard, W., & Anderton, C. H. (1985), Diehl, P. F. (1985), McGuire (1977).

1.2 a smaller literature on impact of arms on civil conflicts and other types of violence. Pamp et al. (2018), Craft and Smaldone, (2002), Sislin and Pearson (2001), and Blanton (1999).

1.3 do not forget the game-theoretic literature on deterrence and its (in)stability. Military endowments are elements of the games. Zagare and Kilgour (2000), Quackenbusch and Zagare (2016).

What do we know about military expenditures?

3) **the impact of milex on economic growth.**

There is a large economic literature on the **detrimental impact of military expenditures on economic growth.** Saeed (2025), Becker and Dunne (2023), Dunne and Smith (2020), D'agostino, Dunne and Pieroni 2019].

4) Burden Sharing

- 4.1 Burden Sharing in military alliances (Hartley and Sandler, 1999)
- 4.2 Burden sharing combining milex and other commitments (ex. Peacekeeping), Kim, Sandler &Shimizu (2024); Kim and Sandler (2023); Sandler (2017).

What we do not know (enough) about Milex

1**. The impact of Milex on evolution of regimes.**

For example does militarization lead to autocracy or autocracies lead to a higher militarization?

2**. the structure of international trade of weapons and military products**

- 2.1 trade of spare parts of weapons
- 2.2 offsets (Brauer and Dunne, 2011)
- 2.3 directions of trade (Baronchelli and Caruso, 2024).
- 2.4 sanctions on arms, arms control agreement and trade, Baronchelli et al. (2022), Levine and Smith (2000).

3. **the structure and dynamics of military industry**

What we do not know about Milex

3. firm-level analysis of military industry 99.5% of paper on milex are based on aggregate data. There is a lack of papers with a firm-level evidence. Balestra and Caruso (2025); Klomp (2024), Klomp (2023) are few exceptions.

4. measuring militarization and military engagement of polities. By "military engagement," we may refer to a country's involvement in defense-related activities, including defense spending, the maintenance of military personnel, and overall militarization efforts.

5. **different channels** to estimate the negative impact of milex on economic development

- 5.1 milex and inequality, Caruso and Biscione (2022), Graham and Mueller (2019), Ali (2012)
- 5.2 milex and public debt, Caruso and Di Domizio (2017)
- 5.3 milex and investement.
- 5.4 milex, R&D and productivity Hartley (2006), Guellec et al. (2004). Poole and Bernard (1992).

Some recent publications

1. Balestra, A., Caruso, R. (2025). The impact of US elections on US defense industry: firm-level evidence from 1996 to 2022. ***Defence and Peace Economics***, https://doi.org/10.1080/10242694.2025.2474757

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The Impact of US Elections on US Defense Industry: Firm-Level Evidence from 1996 to 2022 Defence and Peace Economics, 2025, https://doi.org/10.1080/10242694.2025.2474757

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October 2, 2025

Motivation

The study examines the impact of US elections on defense revenues of US military firms from 1996 to 2022.

The existing literature has primarily focused on defense spending particularly examining how elections influence government defense expenditures.

However, there has been limited attention on how elections affect defense revenues of military companies.

A major obstacle is the **lack of detailed and comprehensive data on military companies**. This data scarcity has led to a gap in understanding how political cycles impact revenues of military firms.

Contribution

We developed a novel methodology for the identification of military companies and their military-related revenues data.

We contribute to the literature on the political business cycle (PBC) by investigating the relationship between elections and military revenues of military companies.

- In the year preceding presidential election the growth rate of defense revenues is 5.7% lower compared to other years.
- In presidential election years the growth rate of defense revenues is 6.2% higher compared to other years.

MILFIRM - Motivation

Dual-sector engagement: the majority of companies operating within the defense industry concurrently produce goods for civilian use.

- Boeing exemplifies this situation, being a significant manufacturer of both commercial and military aircraft.

Existing industrial classification systems lack dedicated codes for defense companies, and no comprehensive directory currently identifies firms involved in defense manufacturing.

Distinguishing revenues from military versus civilian product sales is an additional challenge. Companies are not required to disclose the share of their financial performance tied to military production.

- Lockheed Martin: 90%
- Boeing: 54%

MILFIRM - Methodology (1/3)

The **dual-sector engagement** issue is addressed by:

- cross-referencing company and patent information (**identification**)
- collecting defense revenues based on business lines (**military vs. civilian revenues**)

Sources used in data collection:

- Orbis
- Orbis IP
- Refinitiv

MILFIRM - Methodology (2/3)

- Step 1: A **text-based** search in Orbis identified 2,849,262 companies worldwide by analyzing "Activity Description" for keywords such as *military*, *defense*, *weapon*, *security*.

- Step 2: To narrow the focus to military-related companies, we identified firms in Orbis IP with at least one **patent** in IPC categories F41 (Weapons) or F42 (Ammunition and Blasting). This process yielded 3,384 companies globally. ◂ Patents

- Step 3: Of the 3,384 identified firms, 654 were excluded for reasons such as inactivity, leaving a final dataset of 2,730 companies globally, including 831 manufacturers based in the US. ◂ Map

MILFIRM - Methodology (3/3)

- Step 4: Of the 831 U.S. manufacturers, 558 were excluded due to insufficient financial information.
  For the remaining firms, we collected sub-company data at the **business line** level and manually reviewed each business line to identify those closely linked to the military industry. This process resulted in a final set of 103 companies, for which we gathered defense revenue data from 1996 to 2022.

◂ Military spending vs. Military Revenues

Comparison with SIPRI (1/2)

To validate our data collection, we compared it with the SIPRI Arms Industry database, which offers detailed information on arms and total revenues for over 200 public and private arms-producing companies across 25+ countries since 2002.

Differences MILFIRM vs. SIPRI:

- Number of companies:
  - MILFIRM: 103
  - SIPRI Arms Industry Database: 44
- Time span:
  - MILFIRM: 1996-2020
  - SIPRI Arms Industry Database: 2002-2022

Comparison with SIPRI (2/2)

The MILFIRM data collection process and SIPRI methodology yield similar results. MILFIRM not only captures companies and revenues as reported by SIPRI but also includes a larger number of firms and covers a broader time period.

- Distribution ◂ Total ◂ SIPRI Firms
- Correlation MILFIRM and SIPRI ◂ Correlation 1 ◂ Correlation2
- Descriptive Statistics ◂ Statistics

Literature

PBC (Nordhaus, 1975): To secure re-election, the incumbent may engage in the manipulation of public spending.

Two competing hypothesis:

1. **Elections increases the defense revenues**:
   - Stimulate the economy: [Nincic and Cusack (1979); Cusack and Ward (1981); Griffin et al. (1982), Mayer(1992;1995)]
   - National Security/Military-Industrial complex: [Randquist (1978); Mayer(1992;1995); Luechinger and Moser (2014)]
2. **Elections decreases the defense revenues**
   - Voters are fiscal conservatives: [Peltzman (1992); Brenden and Drazen (2005)]
   - Voters' preferences lean towards allocating resources to other public spending areas like healthcare, education, and social security rather than defense spending. [Potrafke (2010); Efthyvoulou (2012); Bove et al. (2017); Klomp (2023)]

Methods

Panel of 103 firms over the period 1996-2022

$$\Delta ln(Military\ Revenues)_{it} = \alpha_{it} + \beta_1 Elections_t + \beta_2 \mathbf{X}_t + \beta_3 \mathbf{F}_{it} + \mu_i + \epsilon_{it}$$

Where:

- $\Delta ln(Military\ Revenues)_{it}$ is the growth rate of military revenues for company i at time t.
- Indep. var(s): **US election years**. To capture changes throughout the political cycle, we use alternatively four dummy variables, each for every year of presidential mandate.
- The vector $\mathbf{X}_t$ represents a set of political controls encompassing: (i) the incumbent ideology, (ii) legislative fractionalization, (iii) women participation, (iv) corruption, (v) military spending and (vi) military export.
- The vector $\mathbf{F}_{it}$ represents a set of firm controls: (i) firm age, (ii) size and (ii) R&D expenditure.

◂ Description ◂ Statistics

Findings (1/3)

Dep.Var. $\Delta ln(MilitaryRevenues)$	(1)	(2)	(3)	(4)
Executive Election Year	**0.062*** **			
	[0.019]			
Post-Executive Election Year		0.001		
		[0.018]		
Midterm Election Year			-0.003	
			[0.018]	
Pre-Executive Election Year				**-0.057*** **
				[0.016]
Republican	**0.070*** **	**0.045** **	**0.045** **	**0.058*** **
	[0.019]	[0.019]	[0.020]	[0.019]
Legislative fractionalisation (log)	**-4.552*** **	**-4.736*** **	**-4.741*** **	**-4.350*** **
	[1.084]	[1.116]	[1.105]	[1.081]
Women Participation (log)	**-0.531*** **	**-0.416*** **	**-0.420*** **	**-0.505*** **
	[0.114]	[0.102]	[0.101]	[0.113]
Control of Corruption (log)	**-0.572*** **	**-0.416*** **	**-0.420*** **	**-0.456*** **
	[0.162]	[0.157]	[0.152]	[0.153]
Military spending (log)	0.067	0.101	0.1	0.11
	[0.089]	[0.089]	[0.091]	[0.089]
Military export$_{t+1}$(log)	**0.906***	0.589	0.601	**0.858***
	[0.515]	[0.506]	[0.497]	[0.518]
cons	-0.19	0.315	0.321	-0.762
	[1.585]	[1.594]	[1.559]	[1.634]
Firms Controls	Y	Y	Y	Y
Firm FE	Y	Y	Y	Y
Obs	1,913	1,913	1,913	1,913
Firms	103	103	103	103
R_sq overall	0.049	0.042	0.042	0.048
R_sq within	0.051	0.042	0.042	0.05
R_sq between	0.048	0.055	0.059	0.056
Robust standard error in brackets. * p<0.1, ** p<0.05, *** p<0.01.				

Findings (2/3)

Dep.Var. $\Delta ln(MilitaryRevenues)$	(1)	(2)	(3)	(4)
Executive Election Year	**0.060*** **			
	[0.020]			
Post-Executive Election Year		0.006		
		[0.018]		
Midterm Election Year			-0.000	
			[0.017]	
Pre-Executive Election Year				**-0.061*** **
				[0.017]
Republican	**0.109*** **	**0.087** **	**0.087** **	**0.097*** **
	[0.016]	[0.016]	[0.016]	[0.016]
Alignment	-0.039	**-0.068***	**-0.070** **	-0.053
	[0.038]	[0.035]	[0.035]	[0.037]
Women Participation (log)	**-0.539*** **	**-0.441*** **	**-0.443*** **	**-0.530*** **
	[0.116]	[0.104]	[0.103]	[0.114]
Control of Corruption (log)	**-0.402***	-0.161	-0.168	**-0.258**
	[0.214]	[0.189]	[0.186]	[0.195]
Military spending (log)	-0.006	0.082	0.085	0.073
	[0.104]	[0.098]	[0.098]	[0.098]
Military export$_{t+1}$(log)	0.929	0.817	0.802	**1.010***
	[0.588]	[0.587]	[0.580]	[0.590]
cons	-2.491	-3.314	-3.305	**-3.716***
	[2.270]	[2.221]	[2.202]	[2.230]
Firms Controls	Y	Y	Y	Y
Firm FE	Y	Y	Y	Y
Obs	1,913	1,913	1,913	1,913
Firms	103	103	103	103
R_sq overall	0.039	0.033	0.033	0.04
R_sq within	0.04	0.032	0.033	0.041
R_sq between	0.036	0.057	0.057	0.051
Robust standard error in brackets. * p<0.1, ** p<0.05, *** p<0.01.				

Findings (3/3)

Not all elections hold the same significance: **executive elections are more influential than legislative elections.**

Pre-executive election years correlate with a lower the growth rate of defense revenues by 5.7%.

- Incumbents may divert resources from defense to voter-preferred public spending, such as tax cuts, which take time to show effects, beginning this strategy a year before elections to improve re-election chances, as previous studies have shown.

Executive election years correlate with an higher growth rate of defense revenues by 6.2%.

- Just before elections, the incumbent's behavior may shift towards pork barrel politics. Support for the defense sector can be provided through both budgetary (e.g. PCA [Mayer (1992;1995) ; DeRouen&Heo (2000;2001)]) and non-budgetary measures.

Robustness checks

1. SIPRI data ◂ SIPRI Data
2. SIPRI companies - MILFIRM data ◂ SIPRI Companies
3. Military Engagement:
   - High Engagement ◂ High Engagement
   - Low Engagement ◂ Low Engagement
4. Pooled OLS ◂ Pooled OLS
5. Company Size
   - Military Revenues ◂ Size - Military Revenues
   - Number of Employees ◂ Size - Number of Employees
   - Total Asset ◂ Size - Total Asset

Conclusions

This study investigates the impact of US elections on the military revenues of US defense companies.

A novel methodology is provided which allows identifying military producers by cross-referencing company data with patent data and isolating defense revenues using business line data.

Key findings highlight the influence of executive elections over legislative elections:

- **Pre-Election Year:** The growth rate of defense revenues is significantly lower (-5.7%) compared to other years. This supports evidence that incumbents deprioritize defense spending to favor voter-preferred categories.
- **Election Year:** Defense revenues growth is significantly higher (+6.2%) compared to other years. This support the evidence that incumbents engage in pork barrel politics, boosting defense sector support to gain political favor.

Thank you

Granted Patents F41&F42 Classes (1950-2023)

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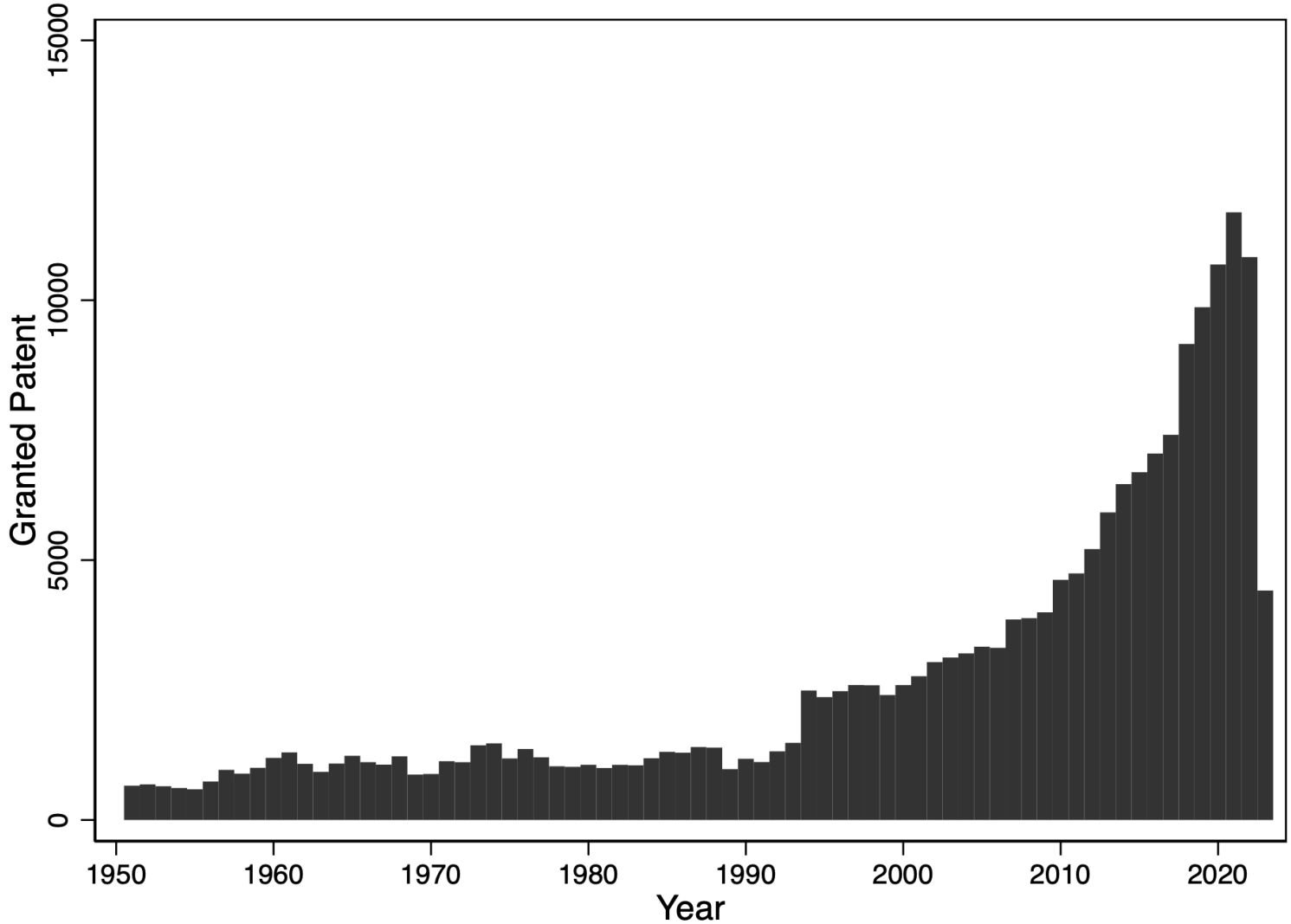

Headquarters Location

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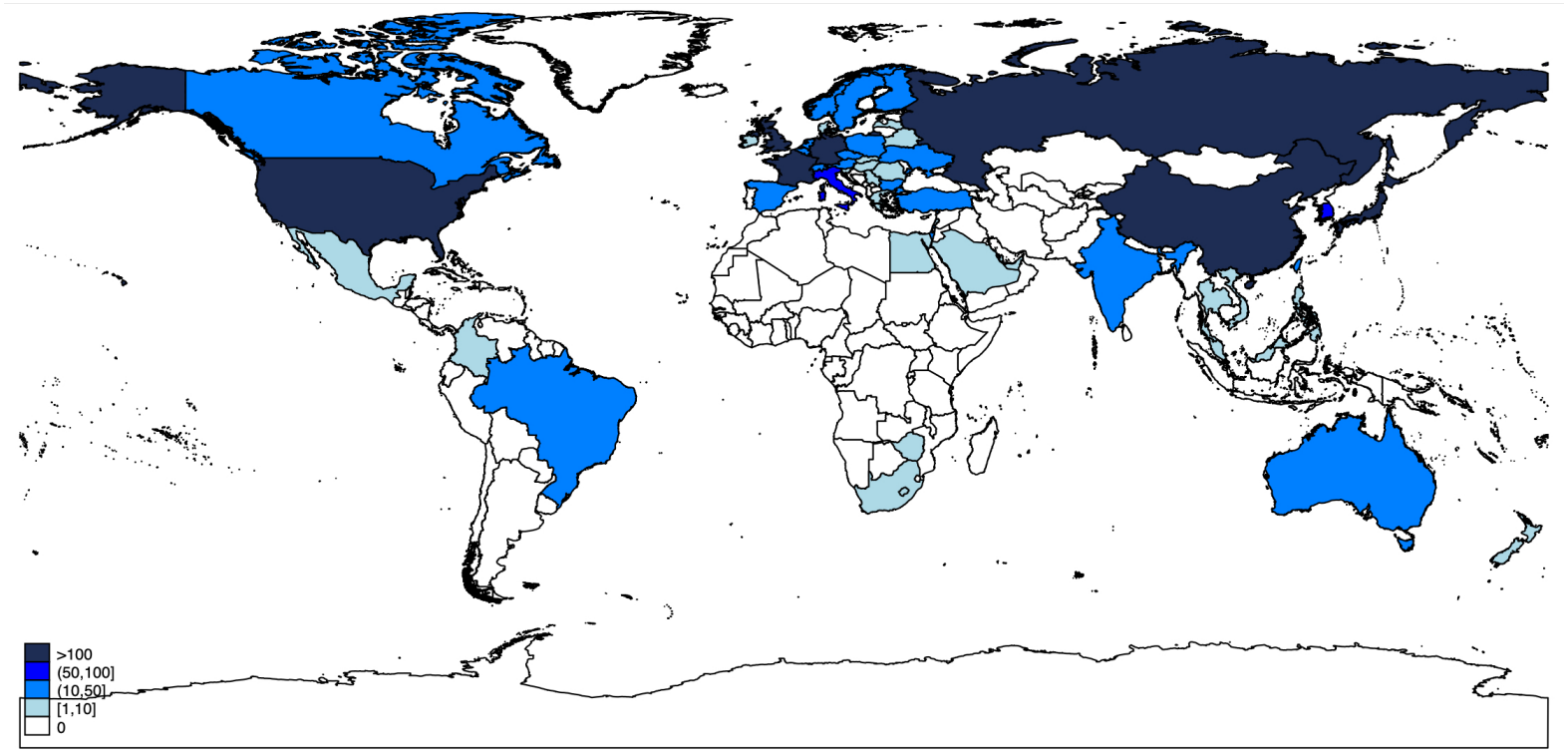

Military Spending vs. Military Revenues

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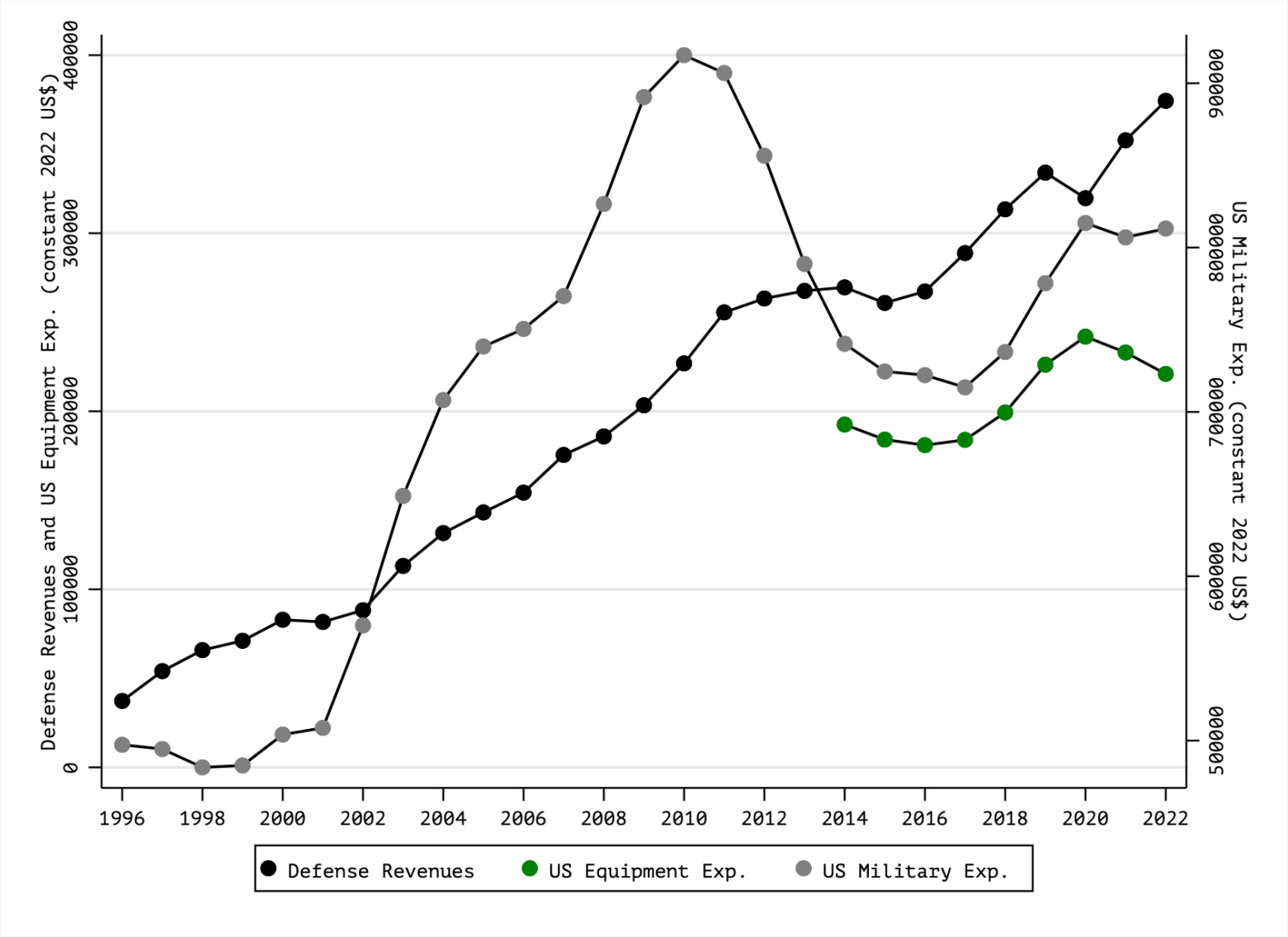

Correlations MILFIRM and SIPRI

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	MILFIRM (log)	SIPRI (log)
MILFIRM (log)	1.0000	
	(438)	
SIPRI (log)	0.9070*	1.0000
	(438)	(438)

* significance level of 1%; obs. in parenthesis

MILFIRM and SIPRI - Correlation

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For lower defense revenue values, MILFIRM typically reports lower figures than SIPRI, while for moderate levels, MILFIRM data tend to be slightly higher than SIPRI's.

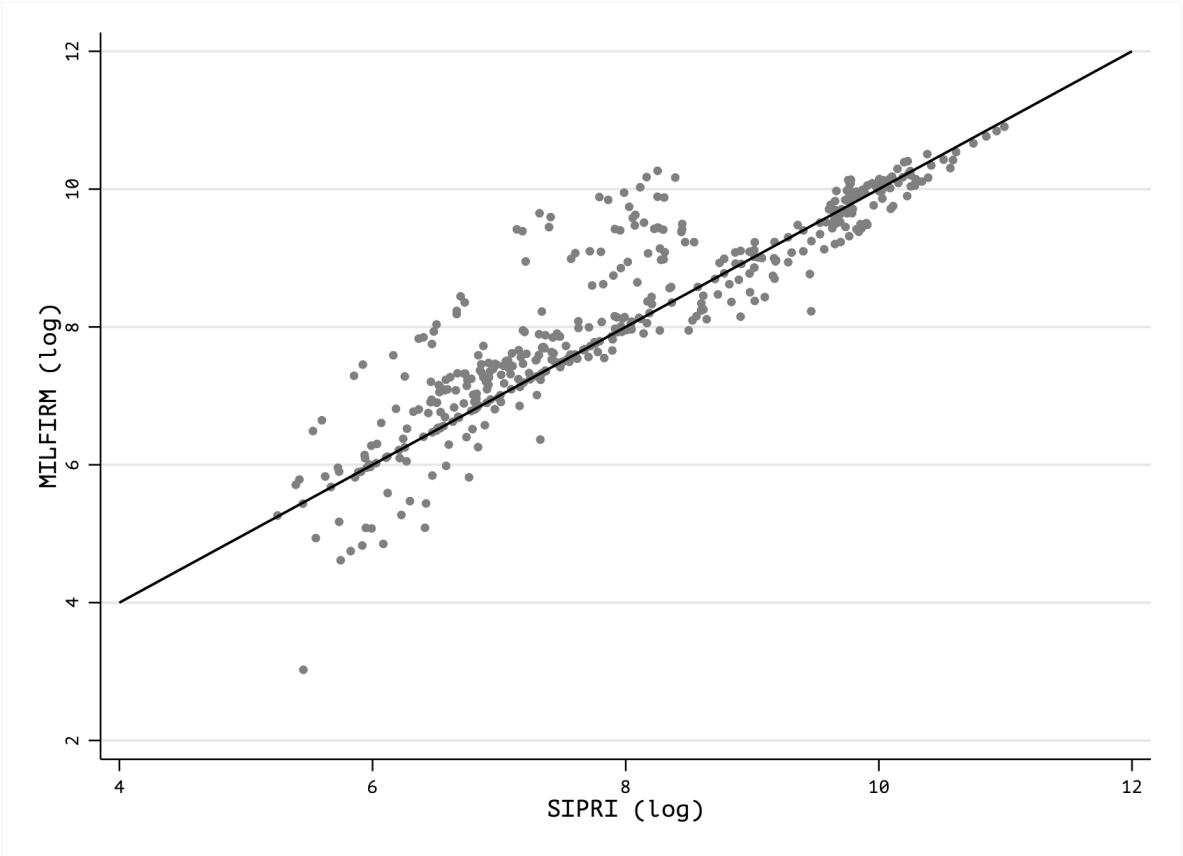

Figure: Correlations MILFIRM and SIPRI

MILFIRM and SIPRI - Distribution

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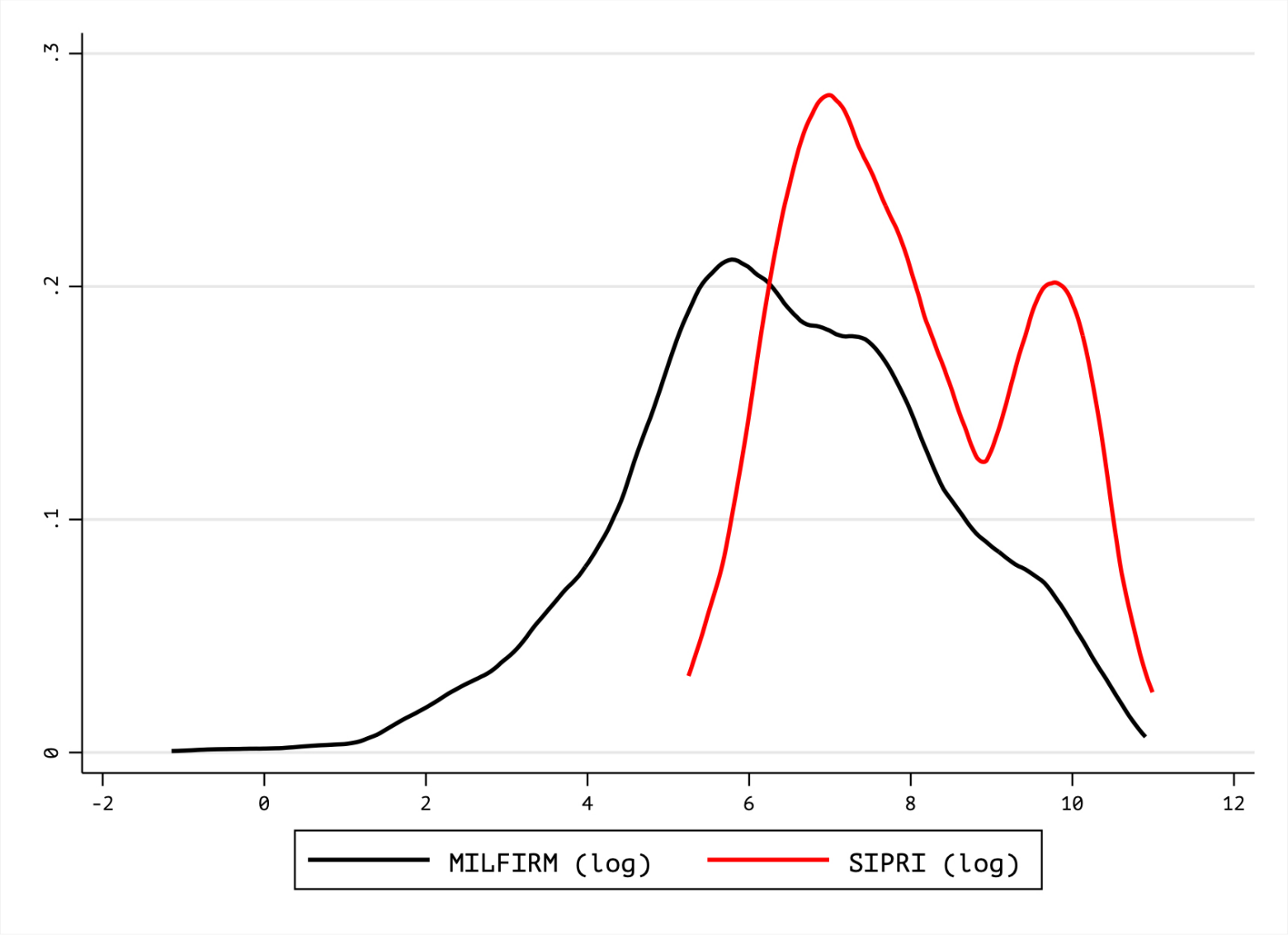

MILFIRM and SIPRI - Distribution

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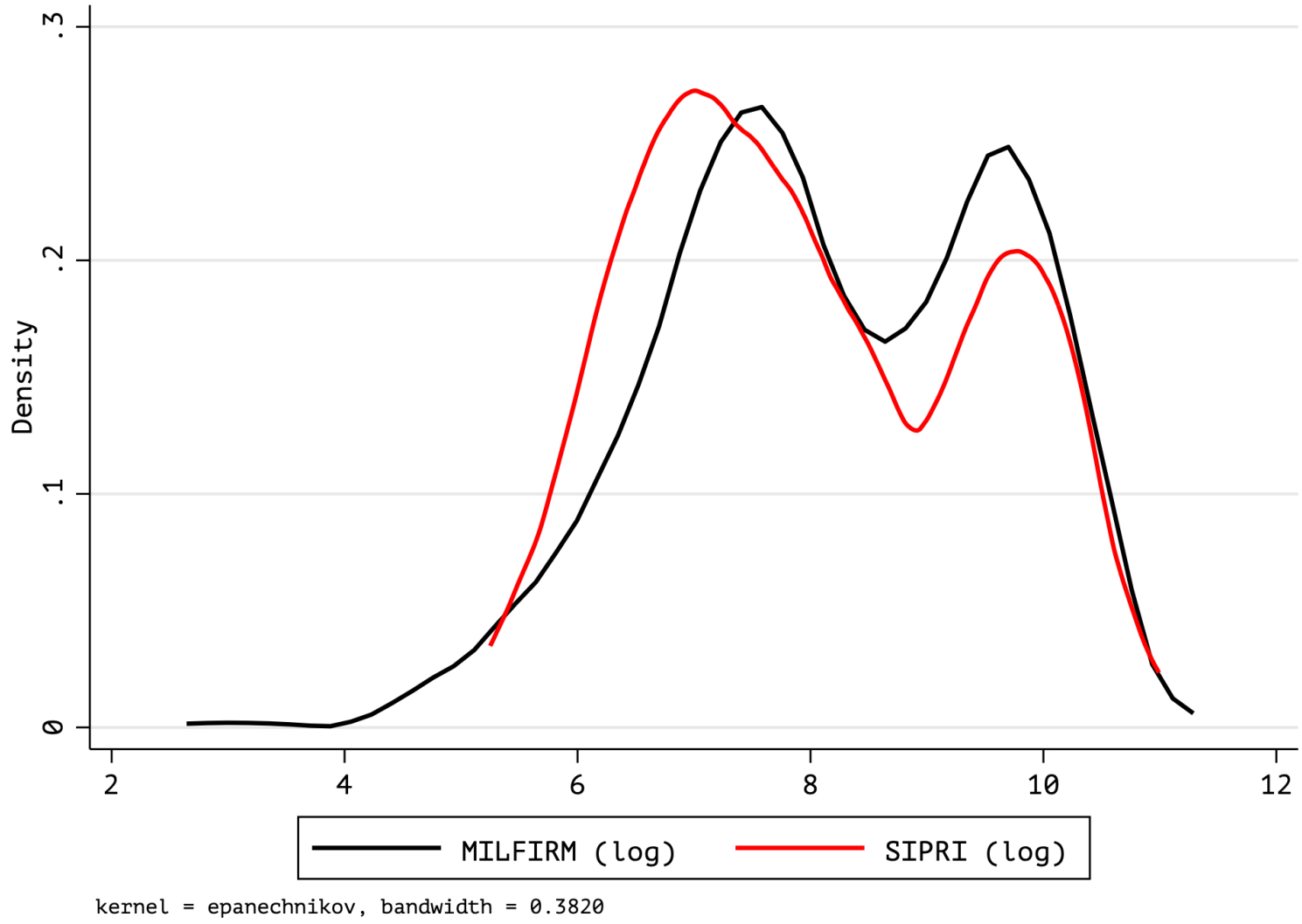

Correlations MILFIRM and SIPRI

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Variable	Obs	Mean	Std. dev.	Min	Max
MILFIRM (log) (total)	1,913	6.419253	1.912815	-1.147363	10.90508
MILFIRM (log)	438	8.190825	1.432707	3.025549	10.90508
SIPRI (log)	438	7.994773	1.407414	5.249979	10.99188

Variables Description

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Variable	Description	Source
Dependent Variable(s)		
$\Delta ln(MilitaryRevenues)$	Log change of firm military revenues in constant 2022 US$	MILFIRM
$\Delta ln(SIPRIMilitaryRevenues)$	Log change of firm military revenues in constant 2022 US$	SIPRI Arms Industry Database
Independent Variable(s)		
Elections	Set of 4 dummy variables each one capturing a year in presidential mandate	Database of Political Institutions
Firm Controls		
Age	Incorporation date	Orbis/Refinitive
Total asset (log)	Log of total asset in constant 2022 US$	Orbis/Refinitive
Employees (log)	Log of total number of employees	Orbis/ Refinitive
$R\&D_{t-1}(log)$	Log of total R&D expenditure	Orbis/ Refinitive
Country Controls		
Republican	Dummy variable taking a value of 1 if the executive is affiliated with the Republican Party, and 0 otherwise.	Database of Political Institutions
Alignment	Dummy variable taking a value of 1 if the executive party holds an absolute majority in the legislative houses with lawmaking powers, and 0 otherwise.	Database of Political Institutions
Legislative fractionalisation (log)	Continuous variable ranging from 0 to 1, indicating the probability that two randomly chosen deputies from the legislature belong to different parties (log).	Database of Political Institutions
Women Participation (log)	Continuous variable ranging from 0 to 1 representing the percentage of women in the House of Representatives. (log)	Comparative Political Dataset
Control of Corruption (log)	Continuous variable capturing perceptions of the extent to which public power is exercised for private gain, including both petty and grand forms of corruption, as well as "capture" of the state by elites and private interests. Estimate gives the country's score on the aggregate indicator, in units of a standard normal distribution.	World Governance Indicators
Military spending (log)	Log of US military spending in constant 2022 US$	SIPRI
Military $export_{t+1}(log)$	Log of US export of military product at time t+1 in constant 2022 US$	SIPRI

Summary Statistics

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Variable	Obs	Mean	Std. dev.	Min	Max
Dep. var.					
Δ ln(Military Revenues)	1,913	0.103	0.293	-2.014	1.954
Δ ln(SIPRI Military Revenues)	415	0.079	0.168	-0.887	0.955
Indep. var(s)					
Executive Election Year	2,720	0.261	0.439	0	1
Post-Executive Election Year	2,720	0.259	0.438	0	1
Midterm Election Year	2,720	0.257	0.437	0	1
Pre-Executive Election Year	2,720	0.224	0.417	0	1
Political controls					
Republican	2,720	0.456	0.498	0	1
Alignment	2,720	0.717	0.450	0	1
Legislative fractionalisation (log)	2,720	-0.698	0.013	-0.740	-0.682
Women Participation (log)	2,720	-1.814	0.224	-2.207	-1.291
Control of Corruption (log)	2,261	0.338	0.136	0.038	0.628
Military spending (log)	2,720	13.435	0.209	13.089	13.729
Military export$_{t+1}$ (log)	2,614	8.714	0.313	8.007	9.168
Firm controls					
Total asset (log)	2,130	7.193	2.217	-7.116	13.283
Employees (log)	2,291	8.937	1.823	1.609	12.737
R&D (log)	1,972	3.713	2.216	-4.167	9.772

SIPRI data

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Dep.Var. Δ ln(Military Revenues)	(1)	(2)	(3)	(4)
Executive Election Year	0.024			
	[0.022]			
Post-Executive Election Year		0.017		
		[0.021]		
Midterm Election Year			-0.009	
			[0.015]	
Pre-Executive Election Year				**-0.023****
				[0.011]
Republican	**0.120*****	**0.128****	**0.122****	**0.128*****
	[0.021]	[0.026]	[0.022]	[0.023]
Legislative fractionalisation (log)	**-2.072***	-1.966	-1.924	**-2.134***
	[1.225]	[1.241]	[1.257]	[1.262]
Women Participation (log)	**-0.322***	**-0.320****	**-0.291***	**-0.355****
	[0.114]	[0.102]	[0.101]	[0.113]
Control of Corruption (log)	-0.213	0.012	-0.074	-0.079
	[0.177]	[0.141]	[0.111]	[0.113]
Military spending (log)	-0.115	0.041	-0.028	-0.025
	[0.108]	[0.109]	[0.105]	[0.106]
Military export$_{t+1}$ (log)	0.388	1.001	0.619	0.864
	[0.886]	[1.091]	[0.902]	[0.950]
Firms Controls	Y	Y	Y	Y
Firm FE	Y	Y	Y	Y
Obs	283	283	283	283
Firms	29	29	29	29
R_sq overall	0.217	0.216	0.215	0.218
R_sq within	0.162	0.160	0.157	0.164
R_sq between	0.386	0.389	0.398	0.388

SIPRI firms - MILFIRM Data

Return to presentation

Dep.Var. Δ ln(Military Revenues)	(1)	(2)	(3)	(4)
Executive Election Year	0.034			
	[0.027]			
Post-Executive Election Year		0.017		
		[0.022]		
Midterm Election Year			-0.014	
			[0.018]	
Pre-Executive Election Year				**-0.036****
				[0.017]
Republican	**0.074*****	**0.059*****	**0.062*****	**0.068*****
	[0.023]	[0.022]	[0.021]	[0.022]
Legislative fractionalisation (log)	-2.312	-2.312	-2.388	-2.169
	[1.684]	[1.618]	[1.669]	[1.634]
Women Participation (log)	**-0.413*****	**-0.361****	**-0.364****	**-0.406****
	[0.151]	[0.152]	[0.150]	[0.158]
Control of Corruption (log)	**-0.377*****	**-0.273***	**-0.302****	**-0.318****
	[0.136]	[0.154]	[0.150]	[0.154]
Military spending (log)	0.018	0.033	0.025	0.041
	[0.104]	[0.105]	[0.101]	[0.107]
Military export$_{t+1}$ (log)	0.314	0.210	0.206	0.306
	[0.722]	[0.709]	[0.709]	[0.711]
Firms Controls	Y	Y	Y	Y
Firm FE	Y	Y	Y	Y
Obs	550	550	550	550
Firms	38	38	38	38
R_sq overall	0.059	0.057	0.056	0.059
R_sq within	0.053	0.051	0.050	0.054
R_sq between	0.053	0.059	0.066	0.035

High Defense Engagement - Defense Revenues >50% of Total Revenues

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Dep.Var. Δ ln(Military Revenues)	(1)	(2)	(3)	(4)
Executive Election Year	**0.064****			
	[0.027]			
Post-Executive Election Year		-0.007		
		[0.026]		
Midterm Election Year			0.009	
			[0.027]	
Pre-Executive Election Year				**-0.065****
				[0.030]
Republican	**0.061*****	0.034	0.033	**0.049***
	[0.025]	[0.024]	[0.025]	[0.025]
Legislative fractionalisation (log)	**-4.603****	**-4.870*****	**-4.848*****	**-4.347****
	[1.810]	[1.861]	[1.846]	[1.813]
Women Participation (log)	**-0.640*****	**-0.503****	**-0.498****	**-0.614*****
	[0.201]	[0.201]	[0.195]	[0.221]
Control of Corruption (log)	-0.360	-0.221	-0.209	-0.254
	[0.228]	[0.210]	[0.218]	[0.223]
Military spending (log)	0.028	0.069	0.075	0.069
	[0.147]	[0.146]	[0.147]	[0.144]
Military export$_{t+1}$ (log)	**1.598***	1.129	1.110	1.503
	[0.896]	[0.898]	[0.869]	[0.942]
cons	-1.439	-0.568	-0.623	-1.925
	[2.240]	[2.293]	[2.259]	[2.372]
Firms Controls	Y	Y	Y	Y
Firm FE	Y	Y	Y	Y
Obs	750	750	750	750
Firms	43	43	43	43
R_sq overall	0.057	0.050	0.050	0.058
R_sq within	0.055	0.048	0.048	0.056
R_sq between	0.028	0.032	0.030	0.022
Robust standard error in brackets. * p<0.1, ** p<0.05, *** p<0.01.				

Low Defense Engagement - Defense Revenues <50% of Total Revenues

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Dep.Var. Δ ln(Military Revenues)	(1)	(2)	(3)	(4)
Executive Election Year	**0.064****			
	[0.026]			
Post-Executive Election Year		0.007		
		[0.026]		
Midterm Election Year			-0.014	
			[0.024]	
Pre-Executive Election Year				**-0.053*****
				[0.018]
Republican	**0.081*****	**0.055***	**0.057***	**0.067****
	[0.029]	[0.030]	[0.029]	[0.029]
Legislative fractionalisation (log)	**-4.499*****	**-4.674*****	**-4.688*****	**-4.344*****
	[1.296]	[1.327]	[1.315]	[1.287]
Women Participation (log)	**-0.517*****	**-0.416*****	**-0.419*****	**-0.490*****
	[0.137]	[0.109]	[0.111]	[0.121]
Control of Corruption (log)	**-0.761*****	**-0.585****	**-0.601*****	**-0.627*****
	[0.232]	[0.232]	[0.212]	[0.214]
Military spending (log)	0.086	0.124	0.112	0.133
	[0.111]	[0.111]	[0.115]	[0.112]
Military export$_{t+1}$ (log)	0.574	0.349	0.372	0.555
	[0.622]	[0.631]	[0.616]	[0.620]
cons	0.393	0.637	0.739	-0.280
	[2.222]	[2.286]	[2.185]	[2.302]
Firms Controls	Y	Y	Y	Y
Firm FE	Y	Y	Y	Y
Obs	793	793	793	793
Firms	49	49	49	49
R_sq overall	0.056	0.048	0.049	0.053
R_sq within	0.057	0.048	0.048	0.054
R_sq between	0.169	0.196	0.199	0.183
Robust standard error in brackets. * p<0.1, ** p<0.05, *** p<0.01.				

Pooles OLS

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Dep.Var.	(1)	(2)	(3)	(4)
$\Delta ln(MilitaryRevenues)$				
Executive Election Year	**0.064****			
	[0.021]			
Post-Executive Election Year		-0.001		
		[0.019]		
Midterm Election Year			-0.002	
			[0.909]	
Pre-Executive Election Year				**-0.059*****
				[0.018]
Republican	**0.073*****	**0.046****	**0.046****	**0.061****
	[0.020]	[0.016]	[0.019]	[0.019]
Legislative Fractionalisation (log)	**-4.500*****	**-4.741*****	**-4.725*****	**-4.284*****
	[1.083]	[1.082]	[1.090]	[1.052]
Women Participation (log)	**-0.567*****	**-0.450*****	**-0.451*****	**-0.552*****
	[0.122]	[0.119]	[0.118]	[0.128]
Control of Corruption (log)	**-0.624*****	**-0.463*****	**-0.462****	**-0.501****
	[0.165]	[0.167]	[0.165]	[0.165]
Military spending (log)	0.076	0.116	0.114	0.119
	[0.086]	[0.086]	[0.086]	[0.087]
Military export_{t+1} (log)	0.100	0.062	0.063	0.094
	[0.066]	[0.066]	[0.065]	[0.067]
cons	1.649	1.800	1.797	0.944
	[1.449]	[1.476]	[1.126]	[1.504]
Firms Controls	Y	Y	Y	Y
Firm FE	Y	Y	Y	Y
Obs	1,913	1,913	1,913	1,913
R_sq	0.120	0.112	0.112	0.119

Robust standard error in brackets. * p<0.1, ** p<0.05, *** p<0.01.

Size - Military Revenues

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Panel A: Size measured by Military Revenues								
	Below the median				Above the median			
Dep.Var. $\Delta ln(MilitaryRevenues)$	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Executive Election Year	**0.097*** **				**0.051** **			
	[0.030]				[0.021]			
Post-Executive Election Year		-0.005				0.001		
		[0.033]				[0.019]		
Midterm Election Year			-0.036				0.010	
			[0.030]				[0.017]	
Pre-Executive Election Year				**-0.044***				**-0.063*** **
				[0.024]				[0.018]
cons	1.642	2.056	2.161	1.393	-1.590	-1.475	-1.493	**-2.334***
	[1.972]	[1.969]	[1.949]	[2.031]	[1.168]	[1.167]	[1.150]	[1.217]
Political Controls	Y	Y	Y	Y	Y	Y	Y	Y
Firms Controls	Y	Y	Y	Y	Y	Y	Y	Y
Firm FE	Y	Y	Y	Y	Y	Y	Y	Y
Obs	653	653	653	653	799	799	799	799
Firms	49	49	49	49	54	54	54	54
Robust standard error in brackets. * p<0.1, ** p<0.05, *** p<0.01.								

Size - Number of Employees

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Panel B: Size measured by Number of Employees								
	Below the median				Above the median			
Dep.Var. $\Delta ln(MilitaryRevenues)$	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Executive Election Year	**0.100*** **				**0.051** **			
	[0.030]				[0.022]			
Post-Executive Election Year		0.002				-0.006		
		[0.035]				[0.017]		
Midterm Election Year			-0.046				0.016	
			[0.033]				[0.015]	
Pre-Executive Election Year				-0.041				**-0.065*** **
				[0.029]				[0.016]
cons	1.010	1.441	1.644	0.823	-1.082	-0.924	-1.030	**-1.862***
	[2.165]	[2.176]	[2.141]	[2.221]	[1.068]	[1.056]	[1.061]	[1.113]
Political Controls	Y	Y	Y	Y	Y	Y	Y	Y
Firms Controls	Y	Y	Y	Y	Y	Y	Y	Y
Firm FE	Y	Y	Y	Y	Y	Y	Y	Y
Obs	612	612	612	612	840	840	840	840
Firms	47	47	47	47	53	53	53	53
Robust standard error in brackets. * p<0.1, ** p<0.05, *** p<0.01.								

Size - Total Asset

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Panel C: Size measured by Total Asset								
	Below the median				Above the median			
Dep.Var. $\Delta ln(MilitaryRevenues)$	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Executive Election Year	**0.084*** **				**0.063** **			
	[0.030]				[0.022]			
Post-Executive Election Year		0.007				-0.009		
		[0.035]				[0.018]		
Midterm Election Year			-0.034				0.006	
			[0.032]				[0.016]	
Pre-Executive Election Year				**-0.048***				**-0.058*** **
				[0.027]				[0.017]
cons	1.417	1.716	1.911	1.069	-1.340	-1.084	-1.205	**-1.999***
	[2.053]	[2.068]	[2.043]	[2.149]	[1.100]	[1.087]	[1.087]	[1.217]
Political Controls	Y	Y	Y	Y	Y	Y	Y	Y
Firms Controls	Y	Y	Y	Y	Y	Y	Y	Y
Firm FE	Y	Y	Y	Y	Y	Y	Y	Y
Obs	612	612	612	612	840	840	840	840
Firms	47	47	47	47	53	53	53	53

Robust standard error in brackets. * p<0.1, ** p<0.05, *** p<0.01.

Did CIA interventions increase US arms exports? Evidence from the Cold War (1962-1989)

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MOTIVATION

- This study draws inspiration form Berger et al. (2013) which shows that, during the Cold War, CIA interventions increases purchases of US products by foreign governments assisted by the CIA.
- CIA interventions included several activities from covert political operations to covert paramilitary operations, mainly aimed either to support leaders already in power or to install new ones.
- The study is also related to Bove et al. (2014) which sheds light on the correlation between US military assistance and the expansion of trade between the US and the recipient countries.

OBJECT

- The aim of the study is to investigate whether CIA activities during the Cold War in a country were correlated with US exports of both Major Conventional Weapons (MCW) and Small Arms and Light Weapons (SALW) to that country.
- Arms sales are to be considered as a regular and integral part of US foreign policy then CIA interventions are the first step in a long term engagement strategy with specific countries, leading to arms transactions aimed at fostering enduring and stable political and economic relations.
  - CIA interventions are expected to increase US arms exports.
- The study also analyses the effect of CIA interventions on exports to the intervened country from other NATO countries.

DATA

- Data on SALW and MCW exports from the US to 117 and 98 countries, respectively, over the period 1962-1989 are collected. Export from other NATO countries to the same recipients are also collected.
- The data on SALW trade are in nominal US dollars and are sourced from the NISAT (Norwegian Initiative on Small Arms);
- The data on MCW trade are expressed in TIV (trend-indicator values) and are from SIPRI Arms Transfers Database.
- Since the data from NISAT (and in some instances also data from SIPRI) do not provide data on zero flows, we treated missing as zeros.
- Data on CIA intervention are drawn from Berger et al. (2013) distinguishing interventions with the aim of supporting leaders already in power or installing new ones.

THE GRAVITY MODEL

- To estimate the impact of CIA interventions on arms trade, we use a gravity model which is the workhorse of the applied international trade literature.
- The model resembles Newton's law of gravity stating that exports are directly proportional to the exporting and importing countries' economic "mass" (GDP), and inversely proportional to the distance between them. In its most basic form, the gravity model can be written as follows:

$$T_{ij} = A\,\frac{Y_i Y_j}{D_{ij}}$$

- T_{ij} is the volume of trade between country *i* and country *j*
- A is a constant
- $Y_i$is the GDP of country *i*
- Y_j is the GDP of country *j*
- D_{ij} is the distance between country *i* and country *j*

THE ECONOMETRIC SPECIFICATION

- The gravity equation is log transformed so that it can become linear:

$$lntrade_{ij} = \beta_0 + \beta_1 lnGDP_i + \beta_2 lnGDP_j + \beta_3 lnDist_{ij} + \varepsilon_{ij}$$

Where $lntrade_{ij}$ is the log of the volume of the trade between country *i* and *j*; $lnGDP_i$ and $lnGDP_j$ the log of the GDP of country *i* and *j* respectively; $lnDist_{ij}$ is the log of the distance between the two countries and ε_{ij} is the error term.

- This equation is estimated using OLS; However, proposed a Pseudo Maximum Likelihood (PPML) estimator which maintain the non-linearity of the equation and allows estimation of zero flows.

THE MODEL

The gravity model is estimated using Pseudo Maximum Likelihood (PPML):

$$arms\ exports_{jt}^{US} = exp\left(\alpha_j + \alpha_t + \beta\ CIA_{jt} + \delta\ Y_{jt} + \ \theta\ \tau_{jt}^{US} - \ \ \theta\left[lnP_{jt} + lnP_t^{US}\right] \ + \ \boldsymbol{\gamma} X_{jt}\right) *\ \varepsilon_{jt}$$

Where

- $arms\ exports_{jt}^{US}$, denotes arms exports from the US to country *j* at time *t*, either exports of SALW or MCW
- CIA_{jt}, is a dummy that equals one if the CIA either installed a foreign leader or provided covert support for the regime once in power in country *j* at time *t*
- X_{jt} is a vector of time-varying characteristics of the importing country. Controls include a dummy for KGB interventions in that year; a variable describing the level of military involvement in the government; the level of democracy; a dummy for US military embargoes; and a dummy for the presence of a civil conflict in that year
- α_j and α_t are country and time fixed effects respectively
- Y_{jt} is the importer's GDP in nominal values
- $\theta\ \tau_{jt}^{US}$ are time-variant bilateral trade costs

THE IMPACT OF CIA INTERVENTIONS ON MCW TRADE, 1962-1989

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	US exports	Exports from other NATO countries	US exports	Exports from other NATO countries	US exports	Exports from other NATO countries	US exports	Exports from other NATO countries
CIA interventions	0.816**	0.316						
	(0.342)	(0.270)						
CIA: install and support			0.796**	0.326				
			(0.346)	(0.273)				
N. of years: all interventions					0.032**	**0.050*** **		
					(0.015)	**(0.016)**		
N of years: install and support							0.050**	0.049***
							(0.021)	(0.017)
Observations	2,181	2,493	2,181	2,493	2,181	2,493	2,171	2,488
Country FE	Y	Y	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y	Y	Y
MRT	Y	N	Y	N	Y	N	Y	N
PseudoR2	0.769	0.601	0.768	0.601	0.768	0.612	0.772	0.608
N countries	98	117	98	117	98	117	98	117

Country and time fixed effects are included as well MRTs and importer controls; Standard Errors are clustered at country level; *** p<0.01, ** p<0.05, * p<0.1

THE IMPACT OF CIA INTERVENTIONS ON SALW TRADE, 1962-1989

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	US exports	Exports from other NATO countries	US exports	Exports from other NATO countries	US exports	Exports from other NATO countries	US exports	Exports from other NATO countries
CIA interventions	0.848*	**-1.002*** **						
	(0.453)	**(0.238)**						
CIA: install and support			0.885*	**-1.100*** **				
			(0.492)	**(0.201)**				
N. of years: all interventions					0.038***	**-0.032*** **		
					(0.012)	**(0.006)**		
N of years: install and support							0.038***	-0.033***
							(0.012)	(0.006)
Observations	2,854	3,128	2,854	3,128	2,854	3,128	2,841	3,118
Country FE	Y	Y	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y	Y	Y
MRT	Y	N	Y	N	Y	N	Y	N
PseudoR2	0.893	0.820	0.893	0.821	0.894	0.820	0.893	0.820
N countries	117	132	117	132	117	132	116	132

Country and time fixed effects are included as well MRTs and importer controls; Standard Errors are clustered at country level; *** p<0.01, ** p<0.05, * p<0.1

RESULTS

1. **During years of CIA interventions, US exports of SALW to intervened countries were 111% higher compared to non intervention years, while exports of MCW were 113% higher.**
2. When the CIA intervened to install a new leader, US exports of SALW to the country increased by 115% compared to non intervention years, while exports of MCW saw a 109% increase.
3. During CIA intervention years, exports of SALW from other NATO members to the intervened countries were 64% lower compared to non intervention years, while the coefficient for MCW exports is not significant
4. As the duration of CIA influence increased, exports of SALW from other NATO members to countries intervened by the CIA decreased by approximately 3%. Conversely, exports of MCW from other NATO countries increased by 5% with the prolongation of CIA influence.

Conclusions

- This study contributes to explain the relationship between US foreign policy and US arms exports during the Cold War. The results reveal

1. CIA interventions increase US exports of both SALW and MCW to intervened countries.
2. SALW and MCW exports from the US increase with the prolongation of CIA influence.
3. CIA interventions consistently reduced exports of SALW from other NATO countries, with this decline continuing throughout the interventions.
4. The duration of CIA influence is positively correlated with MCW exports of other NATO countries to the intervened countries.

MILITARY EXPENDITURES AND INCOME INEQUALITY EVIDENCE FROM A PANEL OF EUROPEAN TRANSITION COUNTRIES (1990-2015)

Defence and Peace Economics, 2021
https://doi.org/10.1080/10242694.2019.1661218

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This paper contributes to the literature on military spending by analyzing the relationship between military spending and income inequality in a panel of transition economies over the period 1990-2015.

Findings highlight a **positive relationship between military expenditures and income inequality**.

Inequality-narrowing hypothesis:

(1) higher military expenditure can generate higher aggregate demand and therefore an increase in the employment level in the whole economy.

(2) In particular, if the military industry is labor-intensive and if military production is domestic, military spending could be expected to become a driver of economic growth.

(3) If a large share of military spending is allocated to wages and salaries of military personnel. [conscription].

Inequality-widening hypothesis is based on:

(1) military industry hires more productive workers who have higher salaries than the less-skilled workers in the civil sector. In this way, the military expenditure can increase the inter-sectorial wage gaps

(2) Increasing military spending reduces the amount of resources which could be used for other channels of public spending and in particular for welfare [crowding out argument].

(3) Since the veterans have lower productivity and wages than non-veterans [see on this point Griliches and Mason (1972), Rosen and Taubman (1982) and Angrist (1990)] military spending increases income inequality because of the gap in wages between military and civilian employees.

(4) Military expenditures reduce human capital. This is true in the presence of compulsory conscription [see several papers by Panu Poutvaara].

The panel of countries

The analysis focuses on a panel of 26 transition economies. Most of them have experienced a considerable increase in income inequality after the Cold War because of privatization process. [see Milanovic, 1998; 1999].

In this respect, it is worth noting that in most Eastern countries military conscription has been kept even after the end of the socialist system. Between 2003 and 2010, about half of the countries considered in our analysis have abolished mandatory military service. Currently, the mandatory military service still exists in half of these countries.

Military conscription

Countries	Military Conscription	Year of Abolition
Albania	NO	2010
Armenia	YES	
Azerbaijan	YES	
Belarus	YES	
Bosnia and Herzegovina	NO	2006
Bulgaria	NO	2008
Croatia	NO	2008
Czech Republic	NO	2004
Estonia	YES	
Georgia	YES	
Hungary	NO	2004
Kazakhstan	YES	
Latvia	NO	2004
Lithuania	YES	
Macedonia	NO	2006
Moldova	YES	
Montenegro	NO	2006
Poland	NO	2006
Romania	NO	2007
Russia	YES	
Serbia	NO	2011
Slovakia	NO	2006
Slovenia	NO	2003
Tajikistan	YES	
Ukraine	YES	
Uzbekistan	YES	

Source: CIA World Factbook

Main variables

Dependent variables:

(1) Gini index computed by SWIID dataset.
(2) Gini Index computed by GID dataset
(3) Theil index computed by GID dataset

Explanatory variables:

(i) Military expenditure (t-1)
(ii) Military expenditures per capita (t-1)
(iii) Military Burden, namely the Ratio between Military expenditure and GDP (t-1)

Estimation strategy

$$lninequality_{it} = \beta_0 + \beta_1 lnmilex_{it-1} + \beta_2 X_{it-1} + \beta_3 W_{it} + \mu_i + \upsilon_{it}$$

The dependent variable is $lninequality_{it}$ representing the level of income inequality in country *i* at time *t*;

$lnmilex_{it-1}$ is alternativaly:

(i) the one-year lagged military expenditure;

(ii) the one-year lagged military expenditure per capita

(iii) The one-year lagged military burden

We employ an OLS- fixed effect model.

Military spending and income inequality - Main Results

	dependent variables								
	Gini (source GID)			Gini (source SWIID)			Theil (source GID)		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Milex (t-1)	**0.02*** **			**0.01** **			**0.05*** **		
	(0.01)			**(0.00)**			**(0.01)**		
Milex per capita (t-1)		**0.02*** **			**0.01** **			**0.05*** **	
		(0.01)			**(0.00)**			**(0.01)**	
Milex/GDP (t-1)			**0.02*** **			**0.01** **			**0.05*** **
			(0.01)			**(0.00)**			**(0.01)**
Conflict (dummy)	-0.04*	-0.04*	-0.04*	-0.01	-0.01	-0.01	-0.10*	-0.10*	-0.10*
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.05)	(0.05)	(0.05)
Military Conscription (dummy)	-0.06*	-0.06*	-0.06*	-0.03**	-0.03**	-0.03**	-0.13*	-0.13*	-0.13*
	(0.03)	(0.03)	(0.03)	(0.01)	(0.01)	(0.01)	(0.07)	(0.07)	(0.07)
CONTROL VARIABLES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Constant	3.11***	3.16***	3.15***	8.16***	8.17***	8.17***	2.00**	2.10**	2.10**
	(0.35)	(0.35)	(0.35)	(0.23)	(0.23)	(0.23)	(0.76)	(0.76)	(0.76)
Observations	619	619	619	582	582	582	621	621	621
Number of countries	25	25	25	26	26	26	25	25	25
R-squared	0.26	0.26	0.26	0.37	0.37	0.38	0.26	0.25	0.256

Main results

(1) Lagged values of military expenditure are significantly and positively associated with current values of income inequality.

(2) Control variables exhibit the expected signs.

(3) Conflict appears to reduce inequality [see Scheidel (2017) in this respect].

(4) Military conscription appears to reduce inequality.

Among the plausible interpretations, one of the most common arguments is the **crowding-out** effect on welfare expenditures. In the light of data availability, we focus on three types of welfare expenditures namely (i) subsidies and transfers; (ii) health expenditures and (iii) education expenditures.

.

$$lny_{it} = \beta_0 + \beta_1 ln\left(\frac{milex}{total\ GE}\right)_{it-1} + \beta_2 X_{it-1} + \mu_i + \tau + \upsilon_{it}$$

Where y_{it} denotes alternatively (i); (ii) and (iii)

Dependent variables	Subsidies and Transfers	Subsidies and Transfers	Health Expenditure	Health Expenditure	Education Expenditure	Education Expenditure
Milex/GE t-1	**-0.724*** **	**-0.713*** **	-0.000	0.006	0.014	0.009
	(0.069)	**(0.050)**	(0.006)	(0.007)	(0.011)	(0.010)
GDP t-1	0.494***	0.972***	0.966***	0.885***	0.980***	0.914***
	(0.115)	(0.262)	(0.043)	(0.053)	(0.058)	(0.074)
Population	-5.178***	-6.312***	0.600	1.513***	0.135	1.046
	(1.640)	(2.123)	(0.389)	(0.535)	(0.927)	(1.018)
Time Trend		-0.061**		-0.001		-0.001
		(0.025)		(0.005)		(0.009)
Constant	88.396***	95.021***	-11.255*	-25.041***	-4.986	-19.393
	(27.003)	(30.973)	(6.290)	(8.399)	(15.324)	(16.189)
CONTROL VARIABLES	YES	YES	YES	YES	YES	YES
Observations	369	369	379	379	306	306
Number of countries	23	23	26	26	23	23
R-squared within	0.670	0.680	0.874	0.884	0.882	0.889
R-squared between	0.250	0.216	0.879	0.715	0.956	0.807
R-squared overall	0.060	0.053	0.885	0.734	0.943	0.793

Robust Standard errors in brackets; statistical significance *** p < 0.01, ** p < 0.05, * p < 0.10

Interpretation

The crowding-out argument is partly confirmed. Only subsidies are negatively influenced by one-year lagged military spending so confirming the crowding-out argument.

Since both education and health expenditures may descend from mandatory norms, it is likely that the crowding out effect in the short-run takes the shape of a reduction in subsidies and transfers which are discretionary.

In this perspective the crowding-out effect appears to be confirmed.

Summary of the results

The general results show that **military expenditure is associated with higher income inequality**.

However, there is a nuanced evidence in the light of

(i) the negative impact of conscription on income inequality

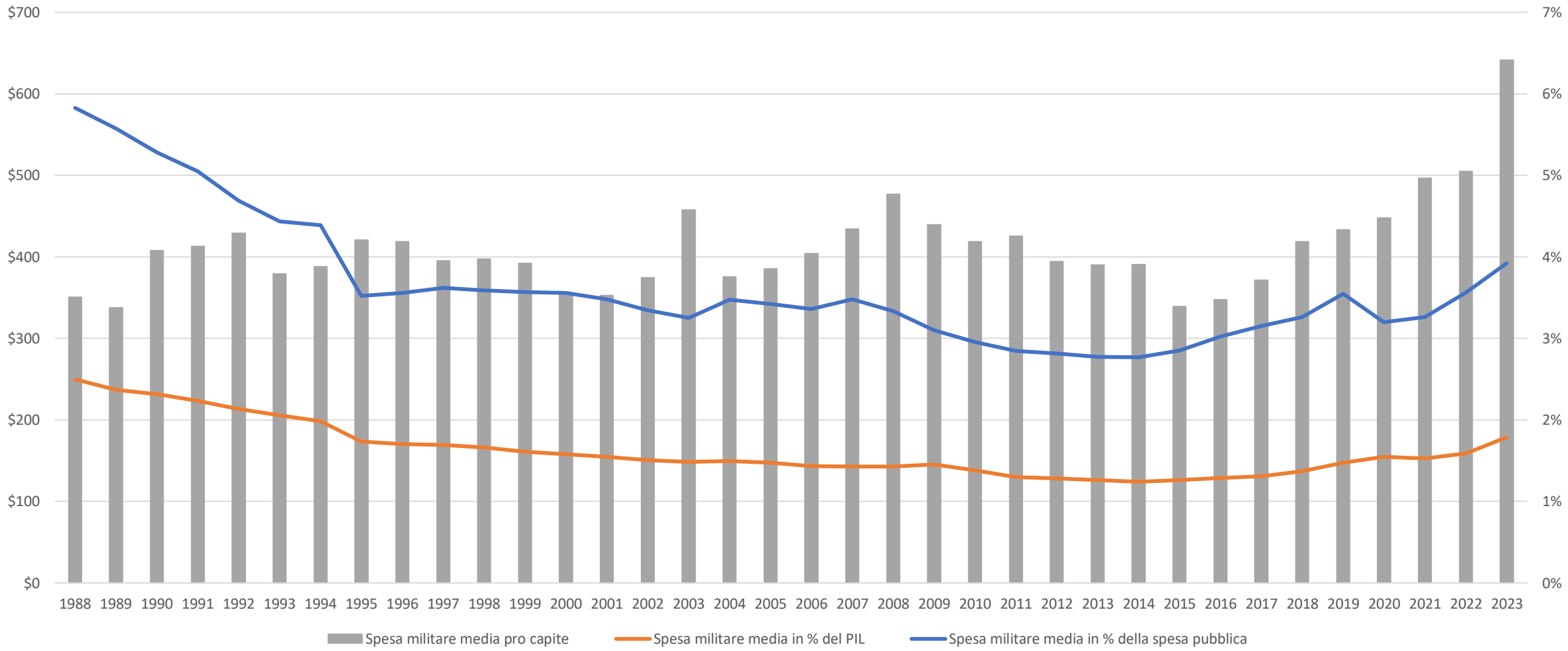
(ii) The non-linearity in the relationship

(iii) The crowding-out argument is partly confirmed (perhaps only for discretionary public spending).

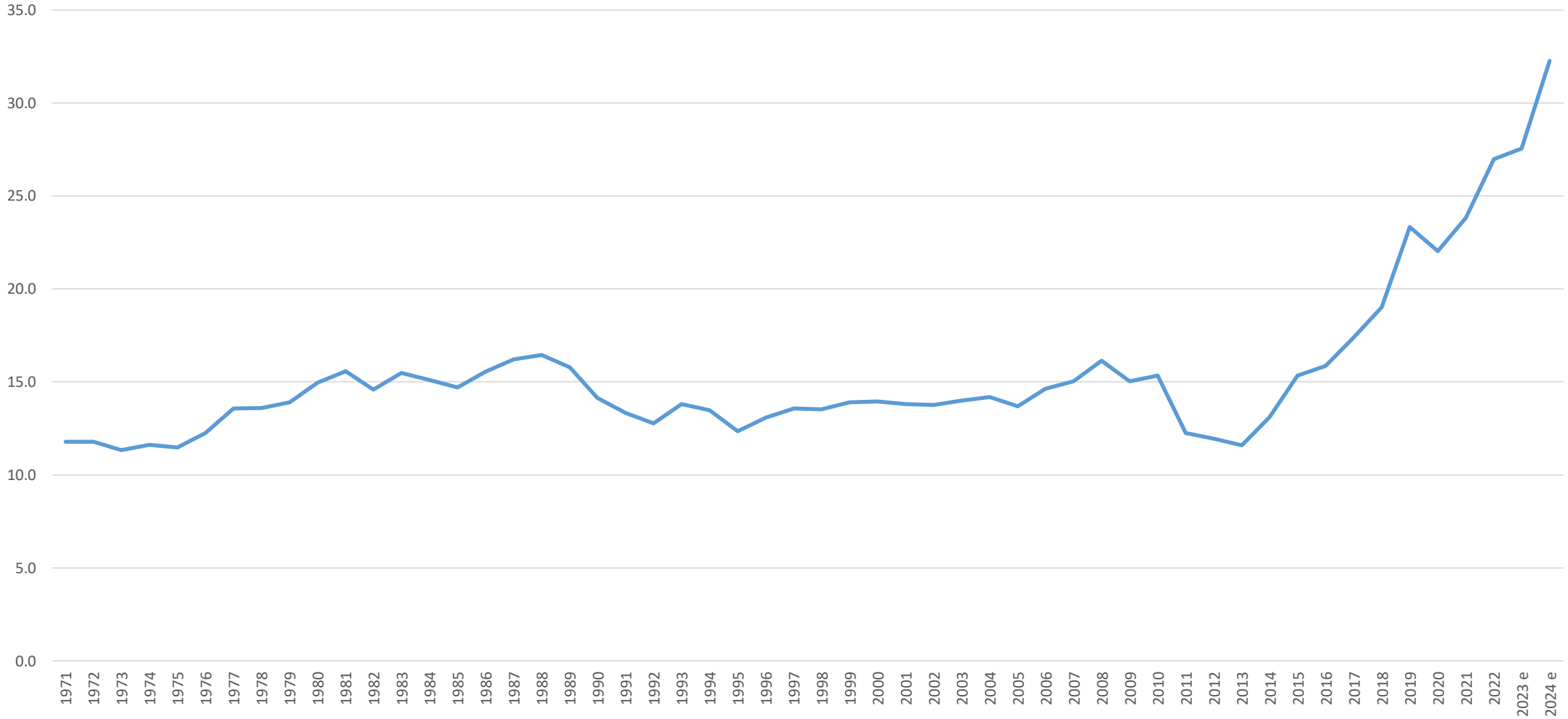
In any case results can be sensitive to the measures of income inequality adopted.

A rationale for an integration of EU military spending?

Military expenditures 1988-2023 in EU countries



% Equipment EU, 1971 – 2024, source: NATO



For several years, the fragmentation of the military industry has been known, and consequently in the production and supply of weapon systems. The words often used are "duplication" and "multiplication" to indicate the fact that the lack of integration among member states allows a plethora of military industrial projects to survive, which are in fact inefficient.

The escalation of the war between Russia and Ukraine in 2022 did not increase integration and cooperation but unfortunately highlighted even more the deficit of cooperation.

Maulny (2023) noted that of the defense acquisitions announced by EU countries between spring 2022 and June 2023, 78% were purchased from outside the EU. Of these, in particular, 80% came from the United States, 13% from South Korea, 3% from the United Kingdom and Israel, and 1% from other countries. The United States alone accounts for 63% of the EU countries' acquisition plans.

This dependence on non-EU suppliers is also highlighted in the Draghi report as well as in the 2023 and 2024 CARD reports.

As highlighted by Kleczka et al. (2024), on average around 25-30% of the largest defense companies in the EU are owned by investors not belonging to the EU.

Some strategically important companies are linked to non-EU defense industry firms, mainly coming from the United States and the United Kingdom. In general, a growing trend can be observed in which: (i) non-EU companies participate in mergers and acquisitions of great relevance for the European defense industry; (ii) non-EU companies win an increasing share of EU defense-related tenders

What about europe?

First I refer to a study made for EPRS | European Parliamentary Research Service . With regard to defence (https://www.europarl.europa.eu/RegData/etudes/STUD/2020/654197/EPRS_STU(2020)654197_EN.pdf)

- We found that MS on average waste about 46% of their current expenditure on troop deployment, with an overall estimated current waste of about €32 billion. This figure is confirmed by several robustness exercises.
- Our results suggest the existence of large potential benefits from further European integration in troop deployment, supporting expanding initiatives such as the EU Battlegroups.
- In the second exercise, we find that MS on average waste about 50% of their current expenditure in military procurement, with an overall estimated waste of €12.7 billion.
- We also find in both exercises that larger countries are systematically more efficient than smaller countries, as they can exploit their larger scales. The DEA methodology also suggests the existence of strong returns to scale in both cases, particularly for military procurement.
- This suggests that coordination of policies and common spending in the defence sector would allow MS to exploit economies of scale, saving resources and improving the quality of spending.
- For instance, if 7 billion or 25% of current MS expenditure in procurement was integrated at European level (a reasonable hypothesis), MS countries would collectively save about 2.7 billion.

DEA Methodology

The Data Envelopment Analysis (DEA) is a popular benchmarking technique that was initiated by Farrell (1957) and developed, among others, by Charnes et al. (1978) and Banker et al. (1984). The DEA is a non-parametric model that consists of solving a linear program to obtain, for a given input, the maximum output. Hence, the radial distance from the observed point to its corresponding production frontier gives the output based technical (in)efficiency for each unit.

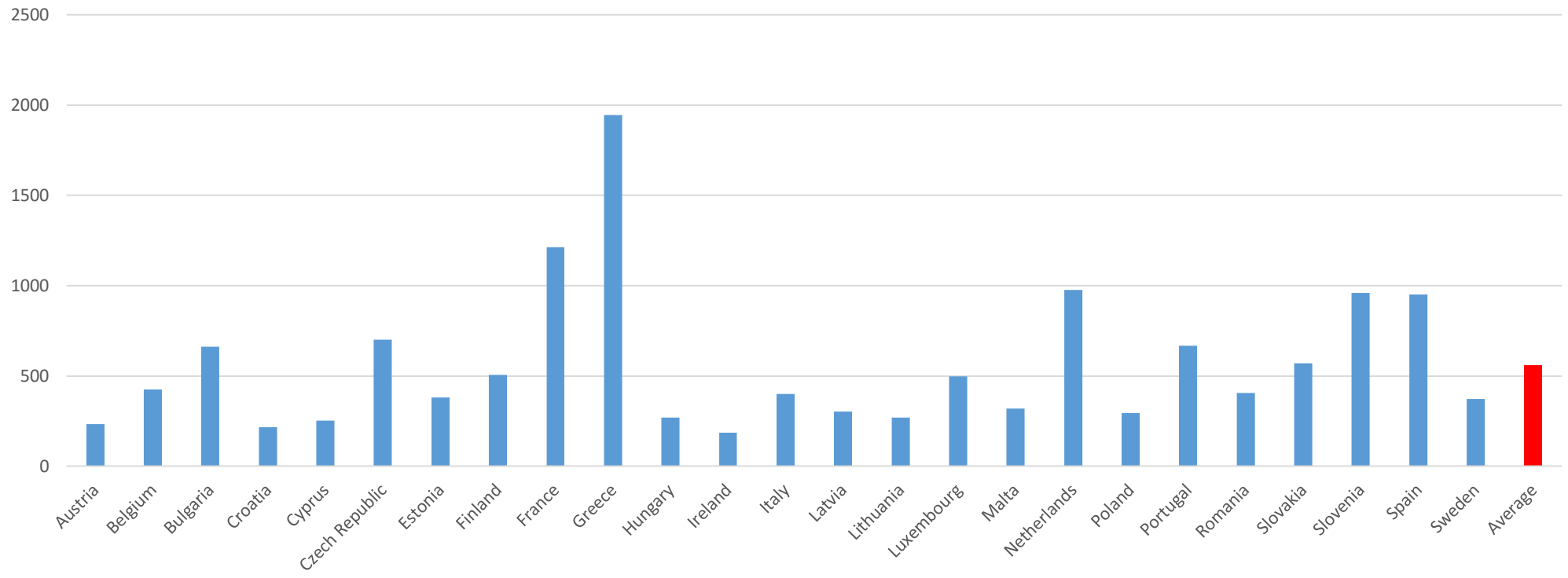
A further advantage of DEA that is particularly important for our research question is the possibility **to test different hypotheses regarding returns to scale** characterizing the production process (e.g., Tsai and Molinero 2002; Hernandez Villafuerte et al. 2017). In addition, to incorporate preference heterogeneity by regressing the inefficiency estimates from the benchmarking analysis against a set of control variables (Simar and Wilson 2007).

The DEA methodology requires the definition of inputs and outputs. However, unlike other public services, there are no established indicators of output/outcome for defence (a textbook example of a ‘pure public good’) and very few studies have discussed the topic along these lines (see however Hartley and Solomon, 2015).

Faced with these difficulties, in what follows we focus mainly on deployability of troops. **Deployability** of troops is a potential measure for defence efficiency because it captures the capability of a country to respond quickly to conflicts and crises. the number of ‘deployable’ troops that is the numbers of military personnel (e.g. soldiers) that could be readily employed in a conflict (land forces) on the total. This is both a measure of the effective military capability of a country and also a measure of its commitment to have a well-functioning army.

In 2017, according to EDA, the simple average quota of deployable forces in the EU27 was only 25.8% of total land forces. Figure presents mean values across the period 2005-2017 of deployable troops (land forces) per millions of inhabitants. Greece is the MS with the highest ratio.

Deployable troops per million inhabitants (mean values, 2005-2017)



Average **deployed** troops per year across the period 2005-2017

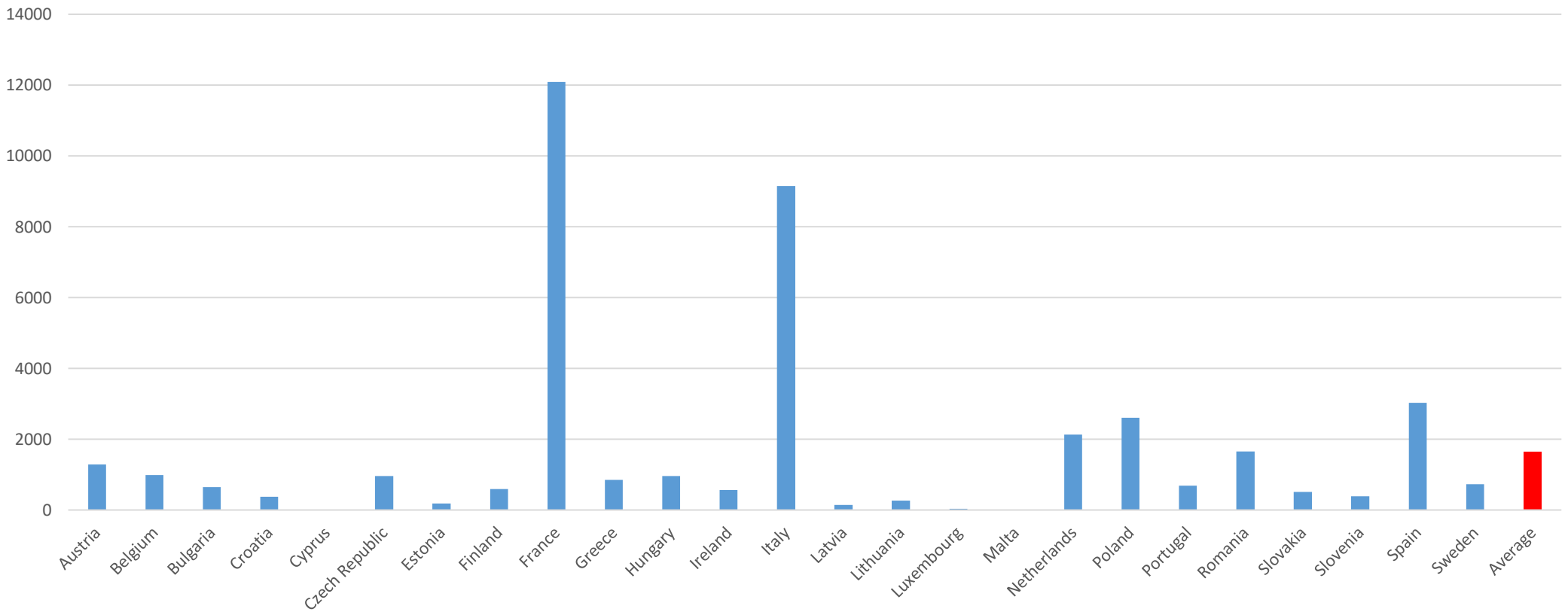


Figure reports the average number of deployed troops per year for MS countries across the period. The MS average is 1,600 and the standard deviation is 2,800, thus denoting a high dispersion across MS. France and Italy are the major senders of troops. France has contributed to military missions by sending on average more than 12,000 troops per year between 2005 and 2017, and the average for Italy is 9,100

Three estimations

Input	Output
Defence expenditures per capita	Deployed troops
Defence expenditure / GDP	Ratio between equipment expenditure (in absolute value) and total number of armed forces
Defence expenditure /GDP	Deployable troops on 100,000 inhabitants

DEA estimation I : defence expenditure per capita and employed troops

Country	Efficiency score (VRS model)	Defence expenditures per capita (€) (average 2005-2017)	Average aggregate waste(€m) = average waste per capita x population 2017	Scale efficiency	Returns to scale
Bulgaria	1	86.03	0	0.30	irs
France	1	625.61	0	0.76	drs
Italy	1	360.62	0	1	crs
Romania	1	101.45	0	0.64	Irs
Malta	0.85	101.24	6.54	.01	irs
Hungary	0.83	109.90	184.61	0.42	irs
Poland	0.77	175.22	1569.03	0.76	irs
Lithuania	0.74	116.74	88.67	0.12	irs
Latvia	0.67	129.11	83.92	0.067	irs
Spain	0.63	234.22	3963.96	0.80	irs
Croatia	0.60	143.98	242.67	0.17	irs
Slovakia	0.56	154.66	373.67	0.24	irs
Czech Republic	0.51	177.22	917.19	0.42	irs
Ireland	0.42	205.14	567.03	0.26	irs
Slovenia	0.38	224.80	288.59	0.18	irs
Estonia	0.36	238.67	199.86	0.08	irs
Portugal	0.36	241.15	1594.96	0.31	irs
Austria	0.33	289.99	1696.49	0.53	irs
Belgium	0.25	360.32	3075.44	0.43	irs
Netherlands	0.24	490.38	6351.23	0.71	irs
Luxembourg	0.23	368.37	164.72	0.02	irs
Cyprus	0.23	381.77	252.88	0.00	irs
Greece	0.20	440.73	3922.99	0.38	irs
Sweden	0.19	465.38	3747.92	0.33	irs
Finland	0.17	503.57	2305.99	0.17	irs

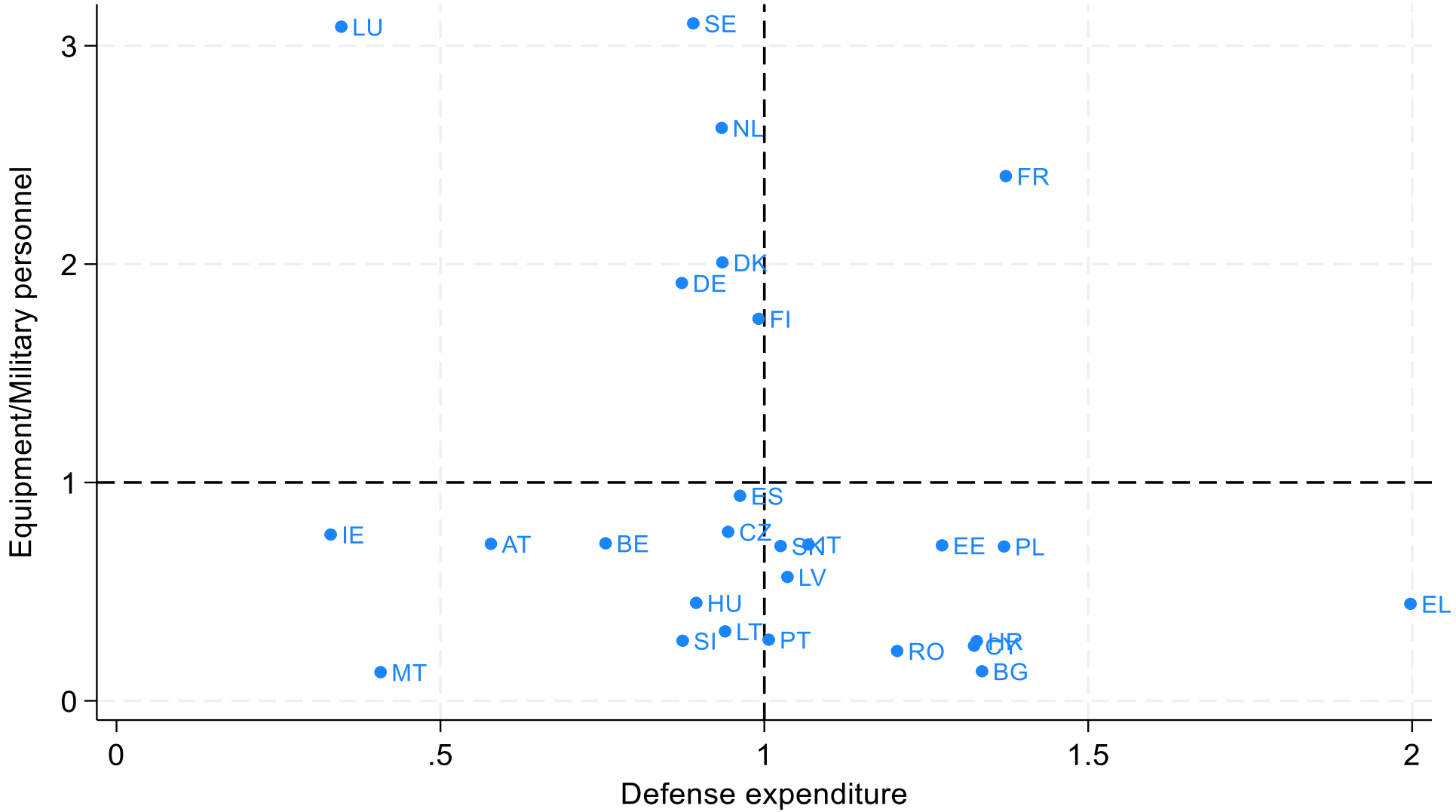
The DEA estimation returns **an average efficiency score Θ of 0.54** for all MS whereas the average efficiency score for larger countries is 0.85. That is, larger countries appear to be more efficient than other MS, an implicit indicator of the existence of returns of scale (see below). France and Italy in particular exhibit an efficiency score equal to 1, whereas the corresponding figures for Poland and Spain are respectively 0.765 and 0.635.

Using our estimated Θ, we can compute the waste for EU countries. For each country, the current waste is computed as: *waste* = (1-Θ) x *Actual Input* where *Actual Input* is the average level of defence expenditure per capita across the period 2005-2017. The third column of Table reports the current average waste for countries; this is slightly larger than €1.2 billion million with a standard deviation of 1,7. Summing over all countries, the average current waste per year is about €31.5 billion. Note that for larger countries (Italy, France, Poland and Spain) the total waste is only €5.5 billion, again pointing to relevant scale effects.

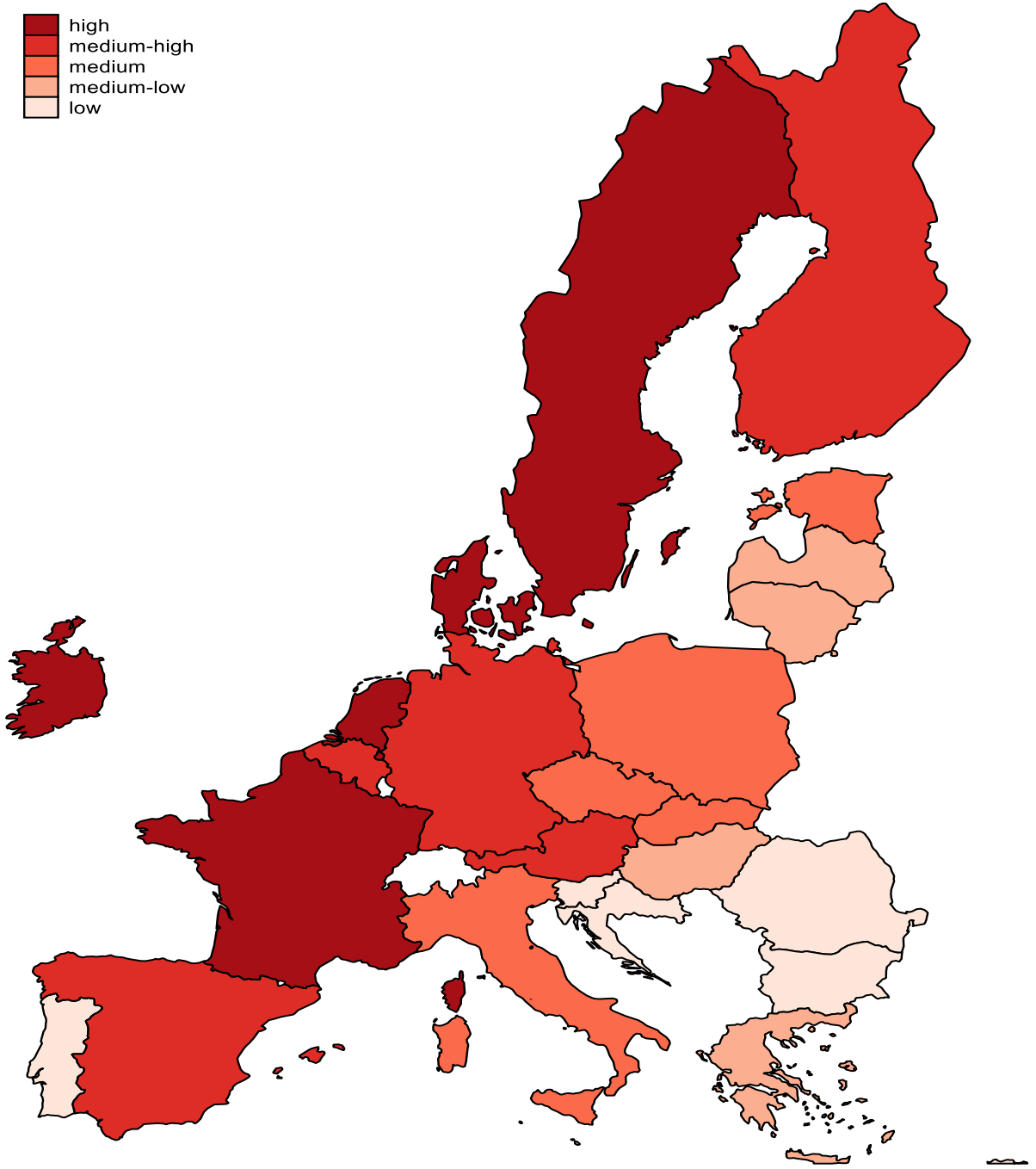
Estimation II

We do not have a long time series for deployable troops. To proxy deployability, in the DEA model we relates the **defense spending as a percentage of GDP (input**) to the **ratio of equipment expenditure (in absolute value) to the total number of armed forces military personnel as the output.**

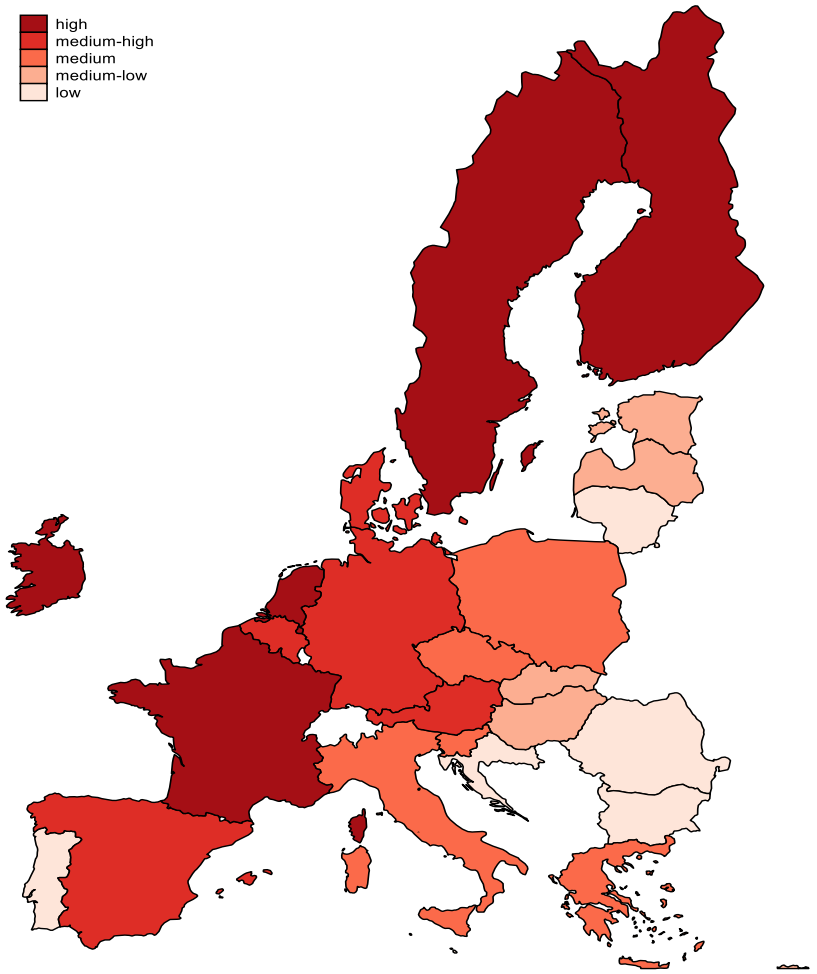
We use the **average value of each variable for the period 2005–2021**.

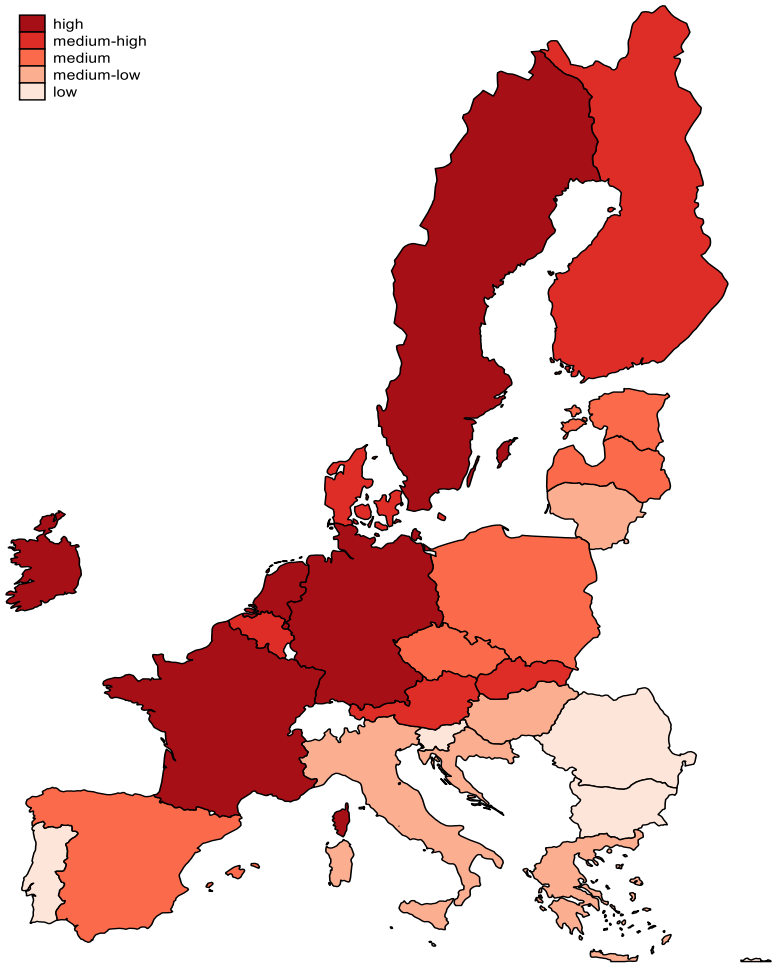

LU
SE
NL
FR
DK
DE
FI
ES
IE
CZ
AT
BE
SK
MT
EE
PL
LV
HU
EL
LT
SI
PT
RO
HR
CY
BG
MT
3
2
1
0
0
.5
1
1.5
2
Equipment/Military personnel
Defense expenditure

Country	Efficiency Scores	Returns to scale
Ireland	1	irs
Sweden	1	crs
Netherlands	0.85	irs
France	0.77	irs
Denmark	0.65	irs
Germany	0.63	irs
Finland	0.56	irs
Austria	0.4	irs
Total	0.34	irs
Spain	0.3	irs
Belgium	0.28	irs
Czechia	0.25	irs
Estonia	0.23	irs
Italy	0.23	irs
Poland	0.23	irs
Slovakia	0.23	irs
Latvia	0.18	irs
Greece	0.14	irs
Hungary	0.14	irs
Lithuania	0.1	irs
Croatia	0.09	irs
Malta	0.09	crs
Portugal	0.09	irs
Slovenia	0.09	crs
Cyprus	0.08	irs
Romania	0.07	irs
Bulgaria	0.04	irs
Total	0.34	


high
medium-high
medium
medium-low
low

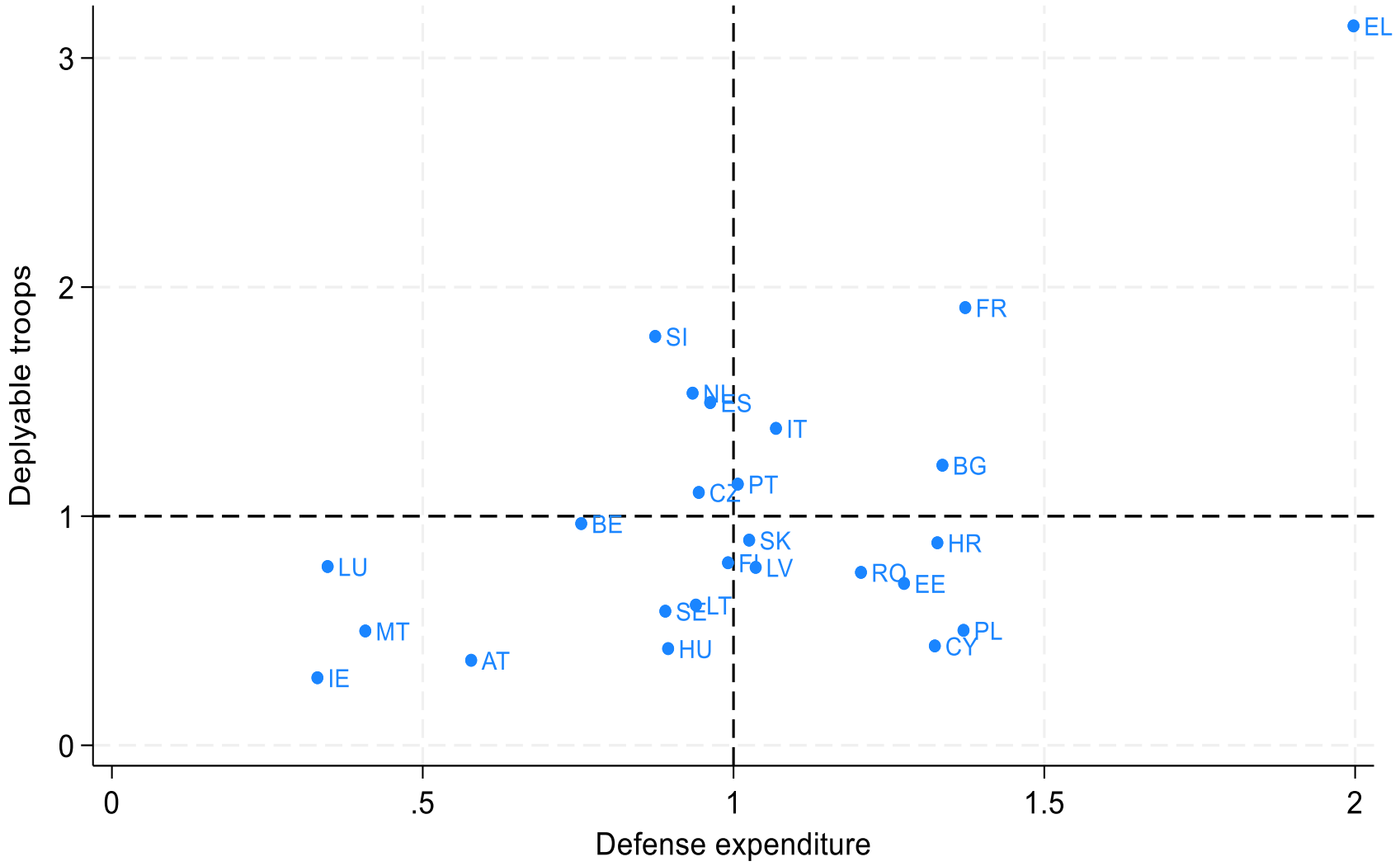
Efficiency scores 2000-2010 and 2011-2020



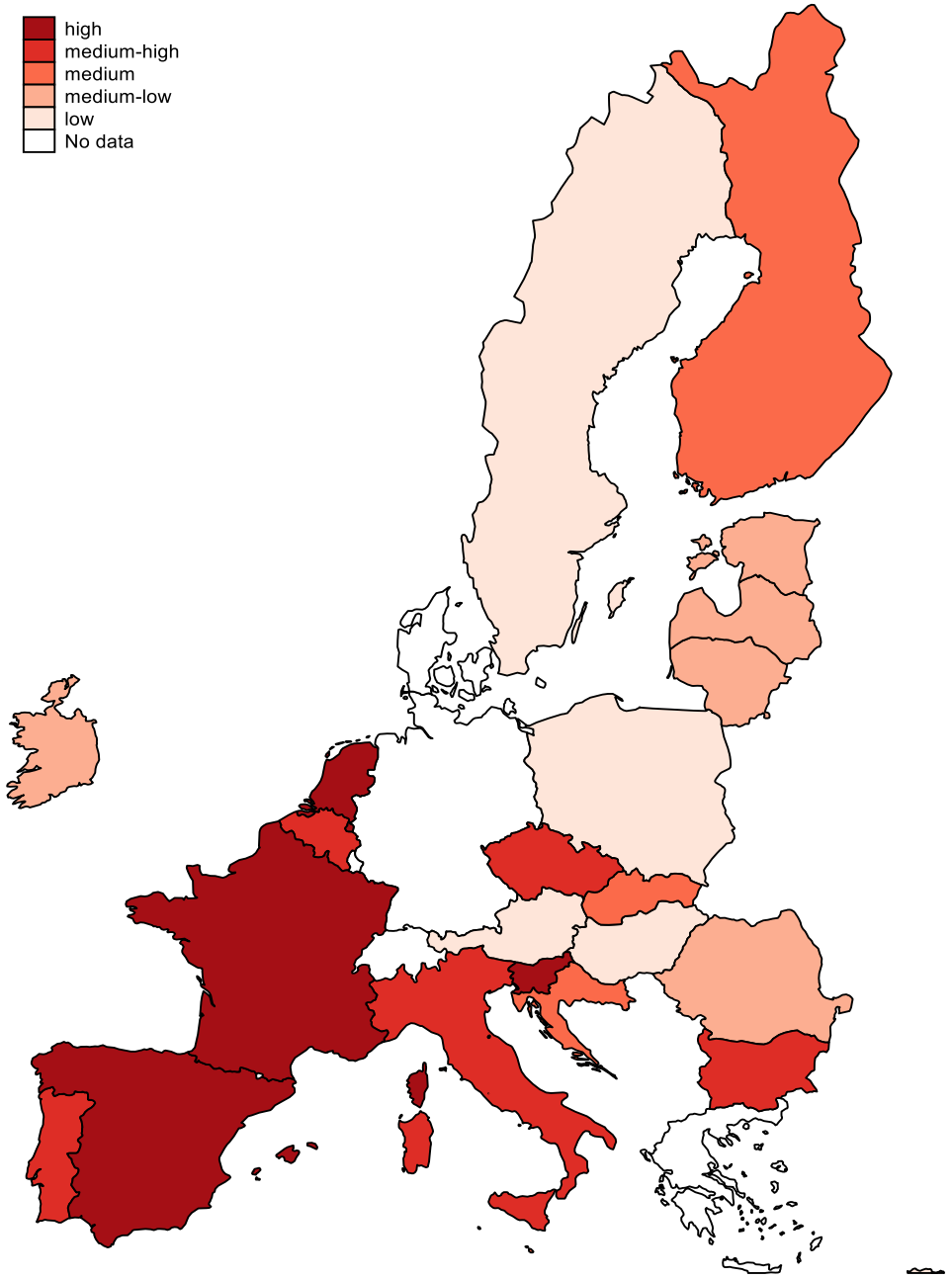


Estimation III

In the third estimation we use as input the ratio defense expenditure/ GDP and as output the numer of deployable troops over 100,000 inhabitants. The number of deployable troops (Source: EDA) finishes in 2017.


Deplyable troops
3
2
1
0
0
.5
1
1.5
2
Defense expenditure
EL
FR
SI
NL
ES
IT
BG
PT
CZ
BE
SK
HR
FI
LV
RO
EE
LU
LT
SE
MT
PL
HU
CY
AT
IE

Country	Eff. Scores	Returns to scale
France	1	drs
Slovenia	1	crs
Netherlands	0.85	irs
Spain	0.83	irs
Italy	0.75	irs
Belgium	0.66	irs
Bulgaria	0.64	irs
Portugal	0.63	irs
Czechia	0.61	irs
Malta	0.6	crs
Slovakia	0.49	irs
Croatia	0.47	irs
Finland	0.44	irs
Ireland	0.44	crs
Latvia	0.43	irs
Romania	0.4	irs
Estonia	0.37	irs
Lithuania	0.34	irs
Sweden	0.33	irs
Austria	0.31	crs
Poland	0.26	irs
Hungary	0.24	irs
Cyprus	0.23	irs
TOTAL	0.54	


high
medium-high
medium
medium-low
low
No data

In sum

General results

1. The results highlight that there is ample room for efficiency gains by exploiting increasing returns to scale in the production of ‘deployable troops’. In this respect, it seems clear that increasing common action at the EU level would generate benefits for the military capabilities of MS.

2. There is a substantial heterogeneity in efficiency scores.

Game Over