

"The Military Multiplier"

by Anastasiia Antonova, Ralph Luetticke, and Gernot Müller

Discussion by Tobias Kawalec

University of Oxford

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Taking Bang-for-the-Buck literally

Motivation:

- Relevance of military expenditures uncontested ([Ramey and Zubairy, 2018](#); [Federle et al., 2024](#); [Marzian and Trebesch, 2026](#)), **now** again of heightened importance
- Limited evidence on *efficacy* of government military spending

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Key questions:

- What influences the **military multiplier** - the **per-\$ change in military goods**?
- Are there material differences pre/post-1990?

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Results:

- **MMs ("Bang-for-the-Buck") maximized when military spending not crowded out**, i.e., MMs maximized under **high supply and (private) demand elasticity**
- The **shrinking industrial base** caused the decrease in MMs through **higher reallocation costs towards military production**, crowding out **non-govt military consumption**

Big picture: wartime expenditures are large - but are they effective?

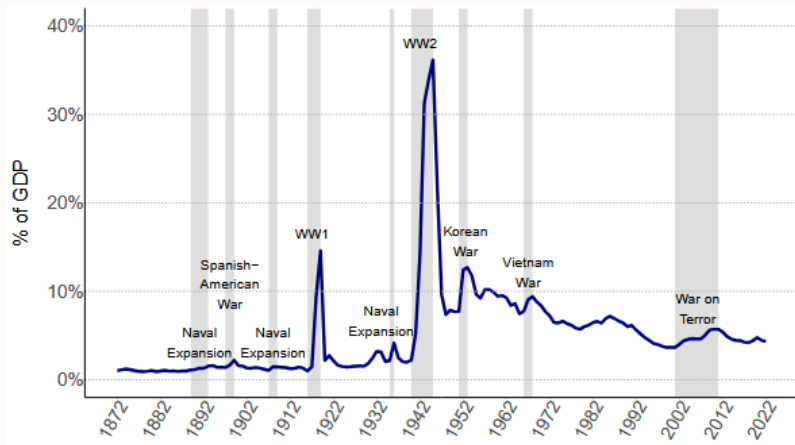


Figure: Military expenditure surges in the U.S. (Marzian and Trebesch (2026), Fig.1).

On MMs #1: relative prices can be sufficient statistics

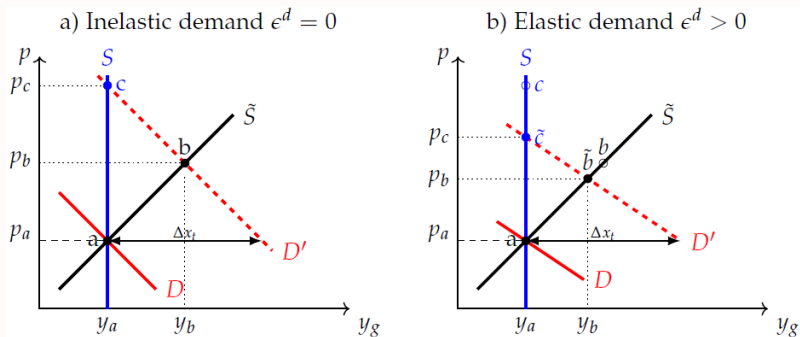


Figure: Relative prices and equilibrium production of military goods (Antonova et al. (2026), Fig.1).

Bottom line: MMs increase in the (price) elasticity of demand and supply

On MMs #2: How the Military Multiplier evolved over time

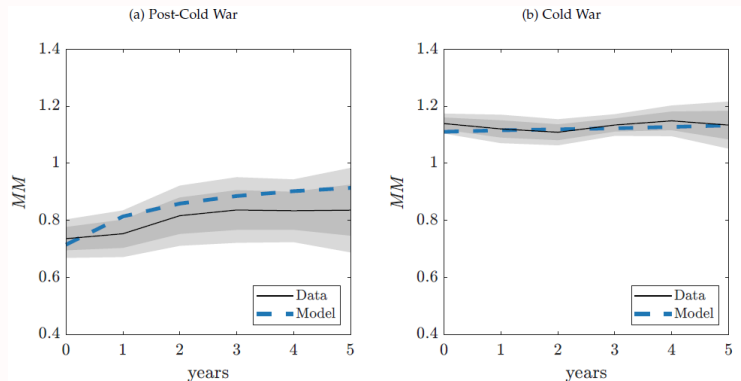


Figure: MMs in the data and in the model during and after the Cold War ([Antonova et al. \(2026\)](#), Fig.4).

Bottom line: after the Cold War, MMs *fell* below one, caused by...

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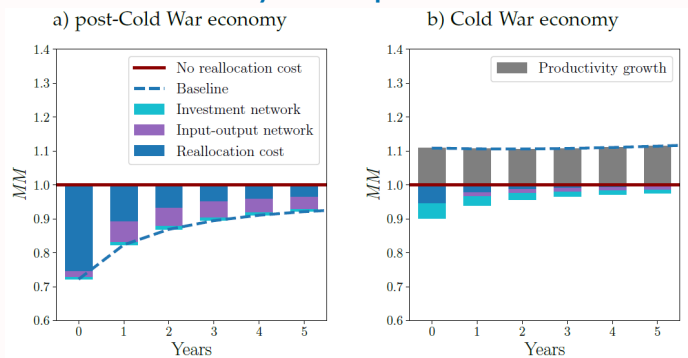


Figure: The determinants of the *MM* (Antonova et al. (2026), Fig.7).

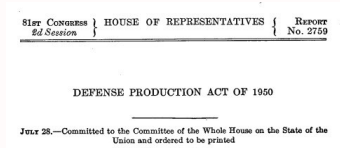
Bottom line: after the Cold War, *MMs fell* below one, caused by...

1. a lack of military productivity growth
2. larger sectoral reallocation costs

Comment #1: the legal dimension of the Military Multiplier

What are the *legal* limits to shifts in the supply and demand for military goods?

The Defense Production Act of 1950



- Allows the U.S. govt. to *enforce* some industrial reallocation
- Heavily used for government procurement, lately also used for non-defense industries
- Directly links the supply elasticity to government decisions (Ilzetzki, 2024)

The Arms Exports Control Act of 1976

ARMS EXPORT CONTROL ACT

[Public Law 90-629]

[As Amended Through P.L. 119-60, Enacted December 18, 2025]

[Currency: This publication is a compilation of the text of Public Law 90-629. It was last amended by the public law listed in the As Amended Through note above and below at the bottom of each page of the pdf version and reflects current law through the date of the enactment of the public law listed at <https://www.govinfo.gov/app/collection/comps/>]

- Gives the U.S. govt. power to restrict the export of goods containing restricted tech
- Actively invoked (e.g., in 2024, RTX settled 750 outstanding claims in relation to AECA for USD 200 million)
- Arms exports complementary with NATO?

⇒ Both move the **supply** and **demand** elasticities in the defense sector beyond the modeled price sensitivity

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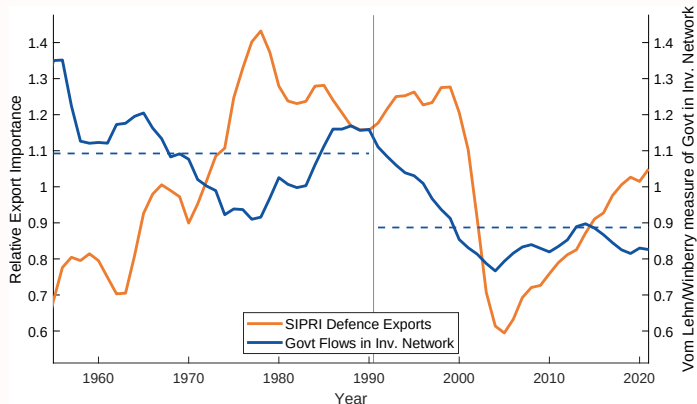


Figure: The relative importance of the federal government purchases for the investment network in [Vom Lehn and Winberry \(2022\)](#) and the relative importance of military exports over time.

Comment #1: the legal dimension of the Military Multiplier

Focus on the **supply**-side of the economy:

- Assume that government-mandated reallocation of capital can be captured by changes to the **elasticity of sectoral reallocation** military productivity:

$$\epsilon_{Mj}^R(L_t) = \bar{\epsilon}_{Mj}^R + \eta_j L_t, \quad \eta_j > 0, L_t \in [0, 1]$$

where L can be thought of as 'legal enforcement' of reallocation

Supply elasticity:
$$\epsilon_M^S(L_t) = \epsilon \frac{1 - \alpha_M}{\alpha_M} + \frac{1}{\alpha_M \xi_M} \sum_j \frac{\alpha_j \xi_j}{1 + \tilde{\phi}_{Mj}} (\bar{\epsilon}_{Mj}^R + \eta_j L_t),$$

$\Rightarrow \partial MM / \partial L_t > 0 \rightarrow$ Legal framework can push *MMs* **upwards** (relevant in Cold War?)

$\Rightarrow$ Possible push to obtain *MMs* > 1 : knowledge spillovers from mandated reallocation:

$$A_{t,M} = \bar{A}_M \exp(\theta L_t R_{t,M}).$$

Comment #2: Hall and Sargent (2021), or: not all war-finance is alike

War-finance as in:	Gallatin-Barro (1979)	Lucas-Stokey (1983)
Asset markets	Incomplete	Complete
Optimal taxes	Follow a random walk	Constant
Bond returns	State-independent (risk-free)	State-contingent
Shock absorbed	By taxes <u>and</u> debt	By ex-post bond returns

$$\underbrace{\frac{G_t}{Y_t} - \bar{g}^b}_{\text{Govt. spending}} + \underbrace{r_{t-1,t} \frac{B_{t-1}}{Y_{t-1}} - \bar{r}b^b}_{\text{Nominal return}} =$$

$$\underbrace{\frac{T_t}{Y_t} - \bar{\tau}^b}_{\text{Tax revenue}} + \underbrace{\frac{B_t - B_{t-1}}{Y_t} - \bar{\Delta}b^b}_{\text{Debt growth}} + \underbrace{\frac{M_t - M_{t-1}}{Y_t} - \bar{\Delta}m^b}_{\text{Money growth}} + \underbrace{g_{t-1,t} \frac{B_{t-1}}{Y_{t-1}} - \bar{g}b^b}_{\text{GDP growth}} + \underbrace{\pi_{t-1,t} \frac{B_{t-1}}{Y_{t-1}} - \bar{\pi}b^b}_{\text{Debt-inflation channel}} + \underbrace{\dots}_{\text{Higher-order terms}}$$

Comment #2: Hall and Sargent (2021), or: not all war-finance is alike

$$\underbrace{\frac{G_t}{Y_t} - \bar{g}^b}_{\text{Govt. spending}} + \underbrace{r_{t-1,t} \frac{B_{t-1}}{Y_{t-1}} - \bar{r}\bar{b}^b}_{\text{Nominal return}} = \underbrace{\frac{T_t}{Y_t} - \bar{\tau}^b}_{\text{Tax revenue}} + \underbrace{\frac{B_t - B_{t-1}}{Y_t} - \bar{\Delta b}^b}_{\text{Debt growth}} + \underbrace{\pi_{t-1,t} \frac{B_{t-1}}{Y_{t-1}} - \bar{\pi}\bar{b}^b}_{\text{Debt-inflation channel}} + \dots$$

⇒ Why should we care?

1. The ability to raise funds pre-conditions military expansions that give rise to *MMs*
 - Policy recommendations on *MMs* ought to take this constraint into account
2. War-finance materially impacts the returns on bondholders and equilibrium inflation
3. The *MM* is ultimately determined by price elasticities in the model. Now, assume that $P_t^G \neq P_t^C$ - then, the IGBC is

$$\frac{B_{t-1}}{P_t^C} = \sum_{j=0}^{\infty} \left(\prod_{k=0}^{j-1} (1 + r_{t+k})^{-1} \right) \left(T_{t+j} - \frac{P_{t+j}^G}{P_{t+j}^C} G_{t+j} \right),$$

where $1 + r_t \equiv \frac{1+i_t}{1+\pi_{t+1}^C}$.

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$$\frac{B_{t-1}}{P_t^C} = \sum_{j=0}^{\infty} \left(\prod_{k=0}^{j-1} (1 + r_{t+k})^{-1} \right) \left(T_{t+j} - \frac{P_{t+j}^G}{P_{t+j}^C} G_{t+j} \right),$$

$P_t^G \neq P_t^C$ (Cox et al., 2024) with different levels of price stickiness:

1. From above: war-finance choice can move losses between bondholders and public
2. Relative stickiness matters for *MMs* and it matters for absolute cost of war-finance
3. By the IGBC: if military goods become persistently more expensive in the long-run *and* govt. consumption tilted towards military, then any given war expenditure yields a *larger* (monetary-)fiscal adjustment

⇒ **War-finance choice + sectoral stickiness = funding structure non-trivial for *MM***

Final Remarks

- Very rich quantitative RBC-IO model giving rise to the concept of *military multipliers* and successfully explaining estimated empirical movements therein over time
 - The *shrinking manufacturing base in the U.S.* increases reallocation costs for military build-ups, thereby pushing out non-governmental purchases of military goods through larger relative price movements
- Two comments, summarized:
 1. What drove the observed $MM > 1$ pre-1990? What role was played by other governments' demand for complementary military goods?

(Related: departures from perfect competition in military sector are possible ($\Rightarrow$ [Evidence](#)))
 2. Not all war-finance is alike ([Hall and Sargent, 2021, 2022](#))

Thank you!

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Appendix comment: the economic limits of perfect competition

Support for the assumption of perfect competition in the military sector is mixed on the...

TABLE 4 SECTORAL BIAS FOR TOP FIRMS AND SECTORS		
	Government Share (%)	Private Share (%)
A. Firms		
Lockheed Martin	8.0	.3
Northrop Grumman	1.5	.2
Leidos Holdings	1.2	.1
B. Six-Digit Sectors		
541700: Scientific research and development services	8.3	.2
336411: Aircraft manufacturing	7.8	.4
541300: Architectural, engineering, related services	7.2	.6
C. Two-Digit Sectors		
33: Manufacturing	30.6	12.7
54: Professional, scientific, technical services	28.1	4.0
56: Administrative and waste management	8.8	1.1

NOTE.—The table shows spending shares for top federal spending firms and sectors. Six-digit sectors are from the BEA Input-Output Accounts, roughly corresponding to six-digit NAICS sectors. Private shares are measured by total business sales for firms and output sold as final goods for sectors (net of output sold as intermediates to other sectors and net exports).

(a) ...supply-side: Table 4 of [Cox et al. \(2024\)](#)

The Department of Defense (DOD) is the sole buyer (a monopsony) in the U.S. defense marketplace.¹ Moreover, even at the initial bidding stage, many DOD contracts have at most two or three possible sellers. Once a seller has been selected and the contract is underway, the seller essentially becomes a monopolist for the life of the product because the cost of switching to another company and beginning the production cycle anew can be prohibitive.² Unlike competitive markets, which have a single clearing price, bilateral monopolies admit a range of prices at which both parties are potentially willing to trade—some favoring the buyer and others favoring the seller. Hence the bilateral monopoly problem, at its core, is a bargaining problem.³ From a policy design standpoint, bargaining

(b) ...demand-side: An excerpt from the the [Institute for Defense Analysis \(2017\)](#) on the market structure for defense procurement. See also [European Parliament \(2025\)](#)

Figure: Possible departures from perfect competition in the defense sector.