

Comments on “Optimal Innovation Policy and the Reallocation of Public Funds: Evidence from China’s Pharmaceutical Reforms”

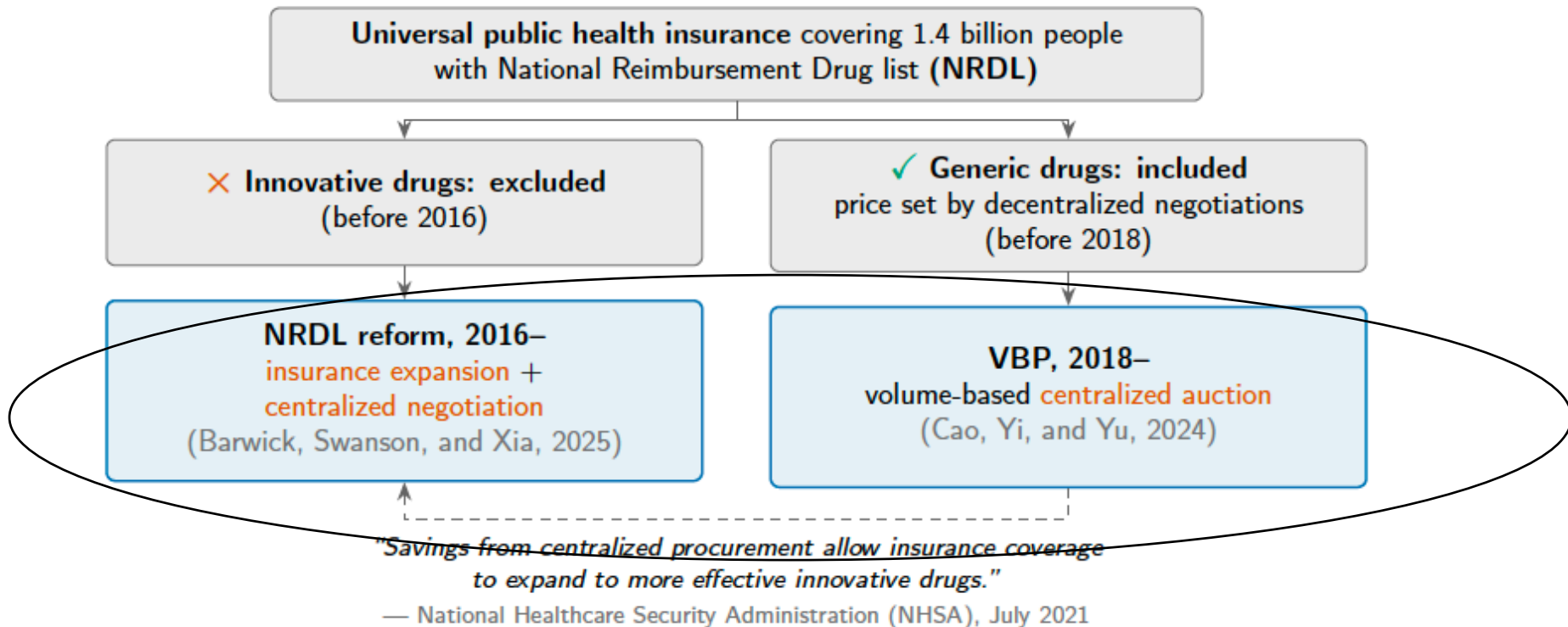
Barwick, Swanson, Xia, and Xia



**Lee Branstetter
Carnegie Mellon University and NBER
October 2, 2026**

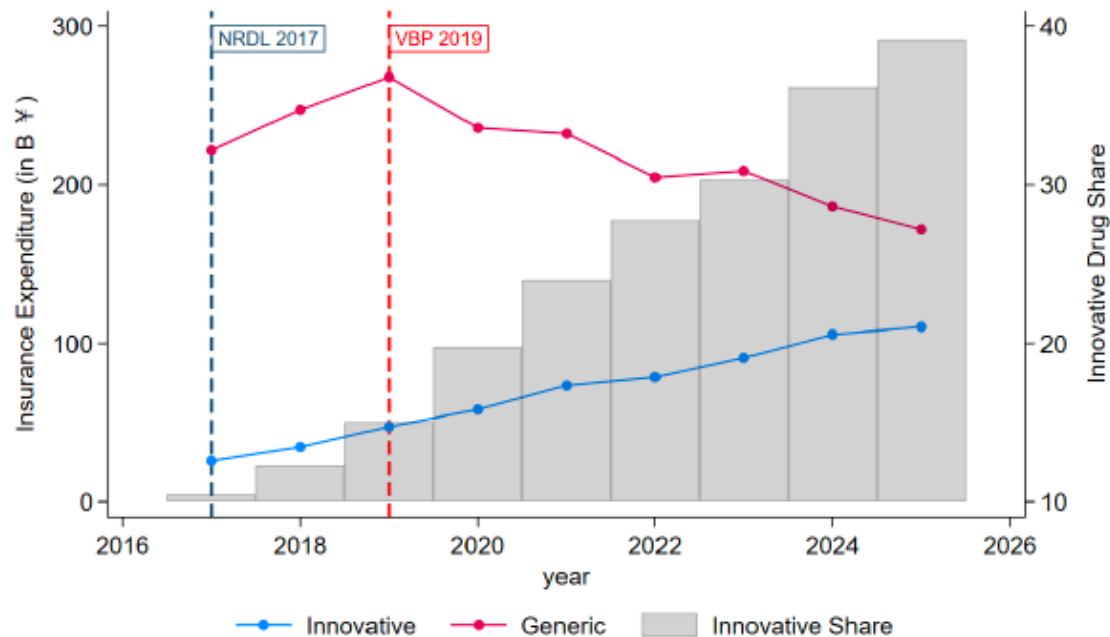
The basic story: China undertook a consequential reform of drug reimbursement in the mid-2010s...

Institutions



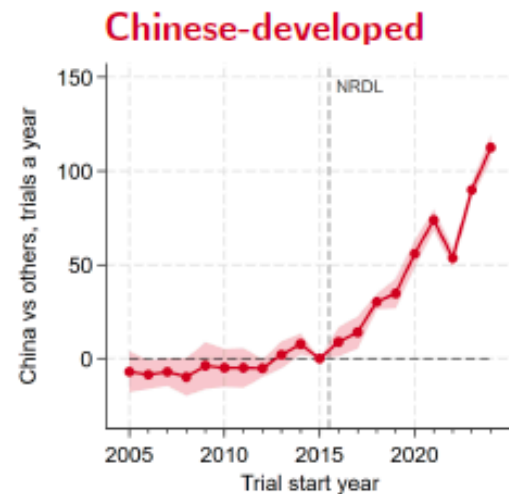
That reallocated payments from generic producers to producers of innovative drugs

Fact 1b. The resulting reallocation

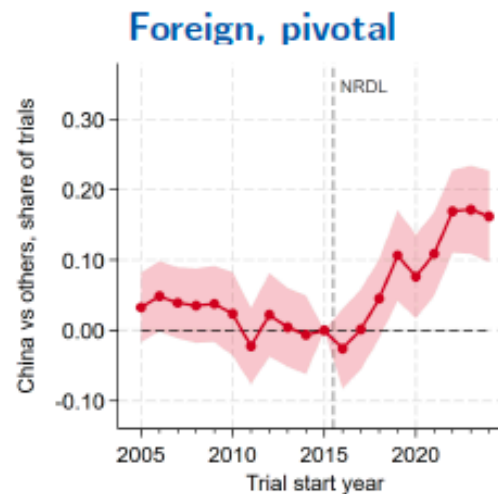


Prompting a Chinese indigenous drug development boom...

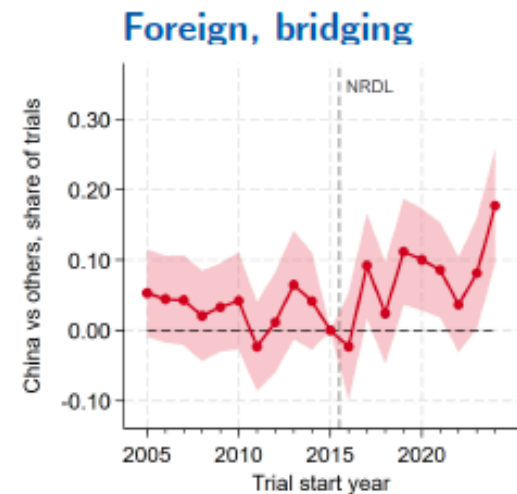
Fact 2b. Event studies: Phase III trials, China against other countries



Num. of Chinese-developed trials
+56 trials a year (s.e. 0.9)
12 a year in 2011–15



Chinese site prevalence
+7.1 pp (s.e. 1.0)
11.6% of trials in 2005–15



Chinese site prevalence
+4.7 pp (s.e. 1.1)
13.3% of trials in 2005–15

Event study: China vs. 17 control countries

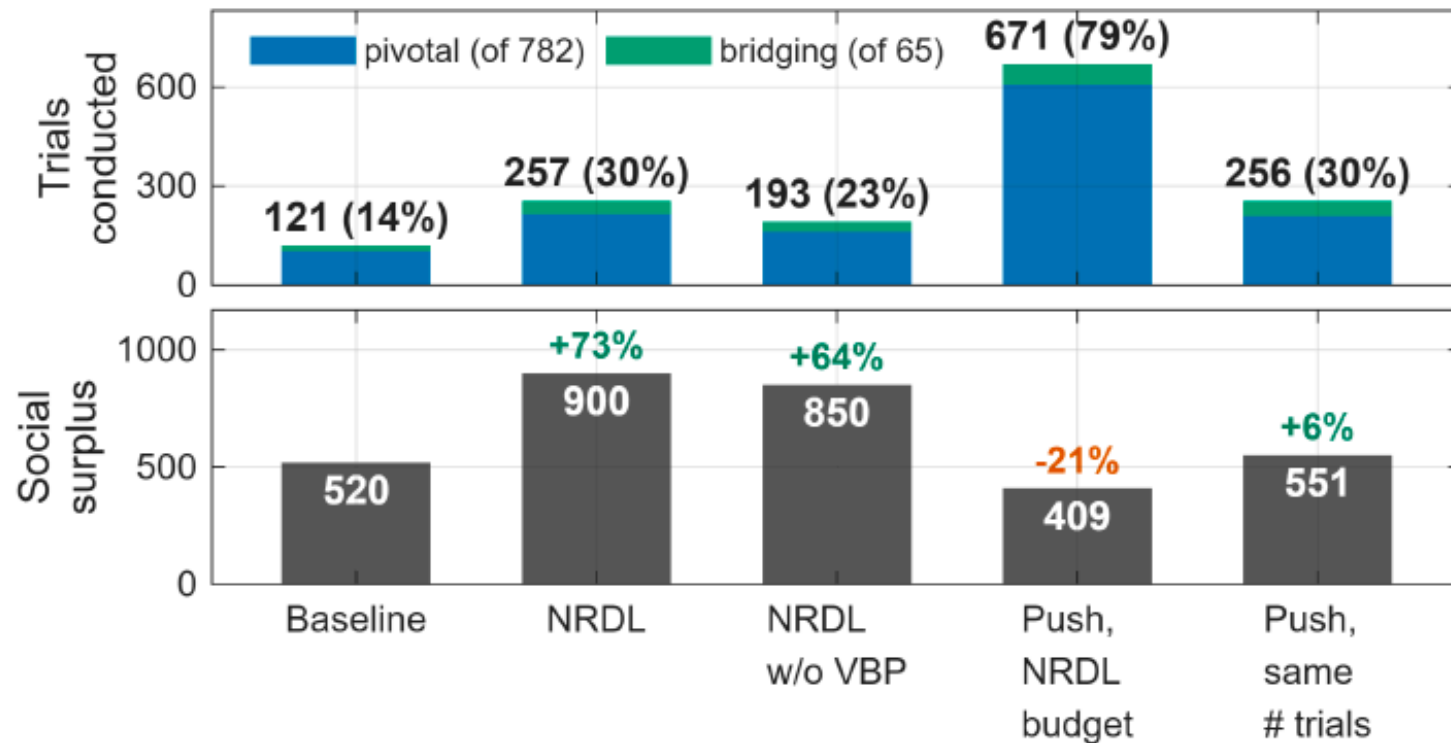
[▶ home-market pivots](#)

[▶ site list](#)

And an (expected) increase in social welfare!

Welfare Comparisons

▸ quality of launches ▸ consumer surplus ▸ tables



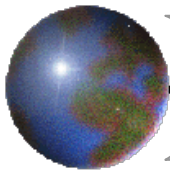
Social surplus = CS + PS – government spending, bn RMB, ten-year NPV; % against baseline.

But the story is more complicated than that...

- Chinese biotech firms began signing out-licensing deals with big pharma firms, starting in the mid-2010s, with **2015** seen as a major turning point.
- By 2025, out-licensing deals surpassed U.S. \$130 billion.
- That appears to be an order of magnitude larger than the domestic reallocation of reimbursement revenues driven by pricing reform (~RMB 80B = \$12B).
- The Market Authorization Law (**2015**, 2019) allowed biotech firms to outsource manufacturing, lowering the costs of entry.
- Hong Kong listing rules were amended in **2018** to allow pre-revenue, pre-profit biotech firms to go public; significant capital flows resulted.
- Local governments have established 387 national biotech parks, 179 high-tech zones, and 17 state-level clusters.
- Government guidance funds (state-directed VCs) have injected significant funds into the biotech sector.

How much of the increase in Chinese indigenous drug trials can be attributed solely to domestic price reform?

- The calibrated model assumes that domestic price reform is the only change driving the increase in drug trials.
- Other things are going on.
- What fraction of the increase in Chinese trials stems solely from the change in domestic price reform?
- We don't know.
- In principle, it is possible to figure this out.
- To do that, authors will need to acknowledge the multiple shocks hitting this industry at roughly the same time as domestic price reform and make a serious effort to estimate the partial effect of price reform.
- I look forward to the next version of the paper that reflects this more complicated reality.



Comments on “Retreating from Science” Gross, Sampat, and Zhang



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**Though we were only children when the war ended,
my generation grew up in the shadow of America's
bitter retreat from Vietnam...**



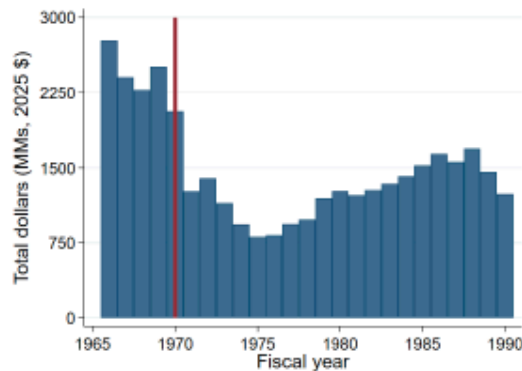
This paper hits the reader with the impact of a Vietnam War movie...



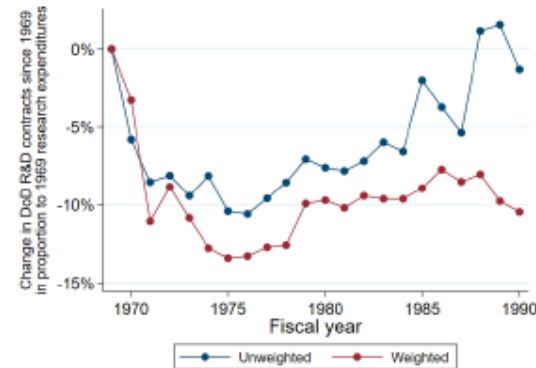
GSZ teach us that the war prompted a retreat from DoD funding of science...

Figure 1: Sharp drop in DoD funding for scientific research broadly visible in the data

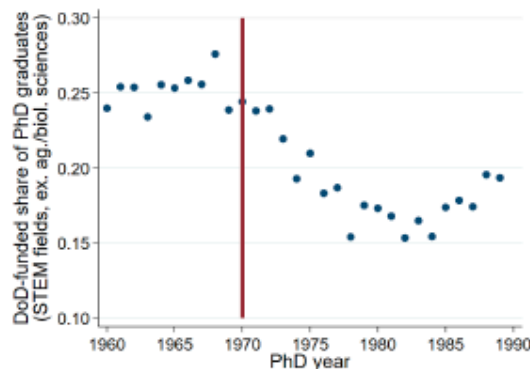
Panel (A): DoD R1/R2 university research contracts, 1966-1990 (2025 \$, MMs)



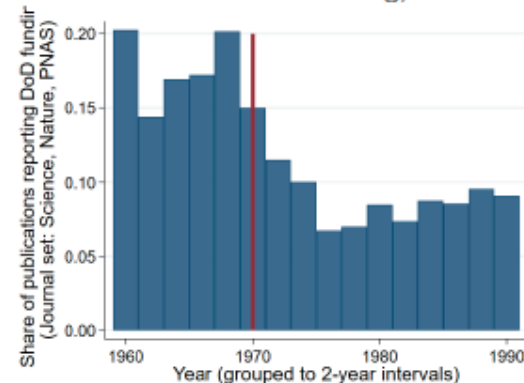
Panel (B): Average funding declines as share of 1969 research expenditures



Panel (C): Share of STEM PhDs acknowledging DoD funding in dissertation, 1960-1990 (IPW)



Panel (D): Share of papers in Sci/Nat/PNAS with DoD author or funding, 1960-1990



That led to lasting declines in scientific output in the fields formerly reliant on DoD funding...

Figure 3: Scientists, PhD grads, and pubs at more vs. less exposed university fields, 1960-1990

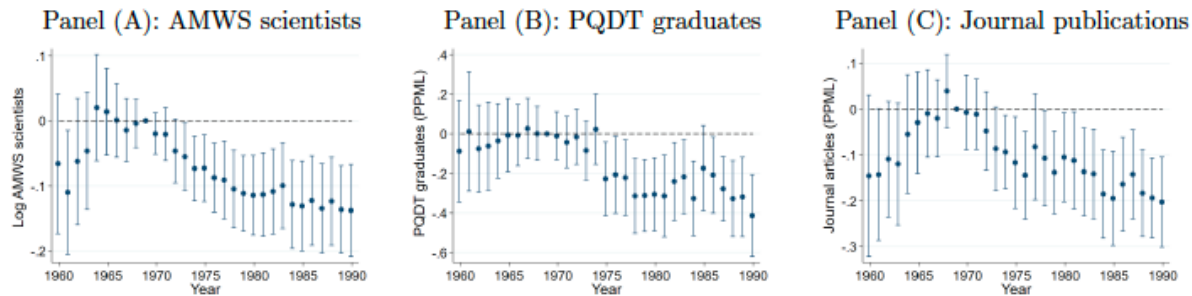


Figure 4: Differences in total US vs. foreign publications in affected fields, 1960-2000

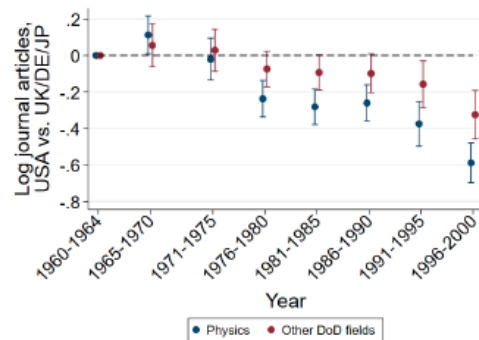
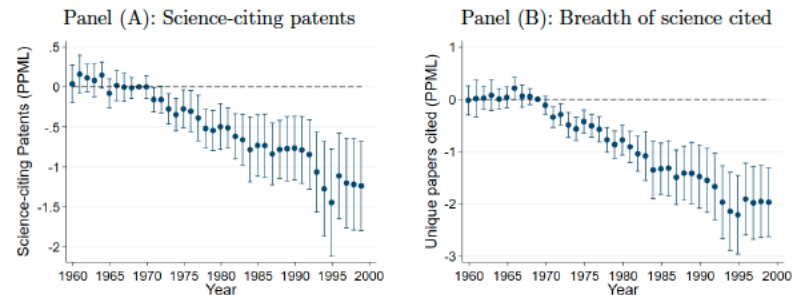


Figure 5: Patenting in technology areas with differential exposure to DoD-funded science

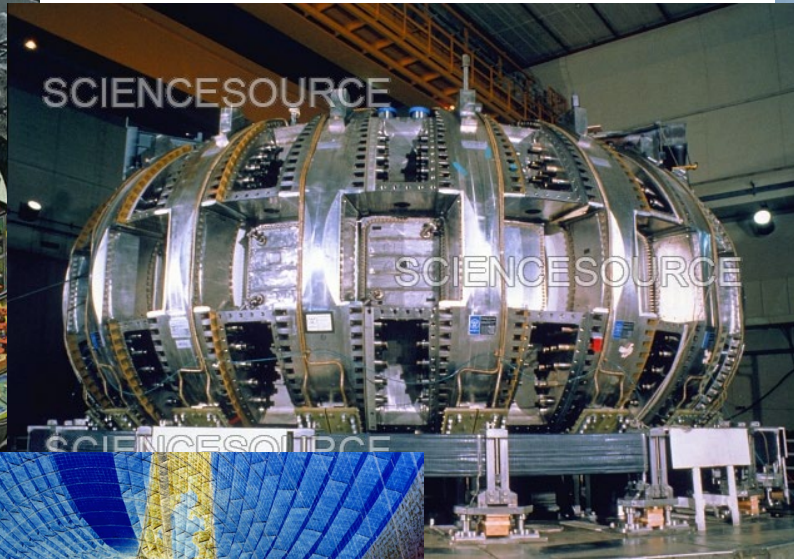
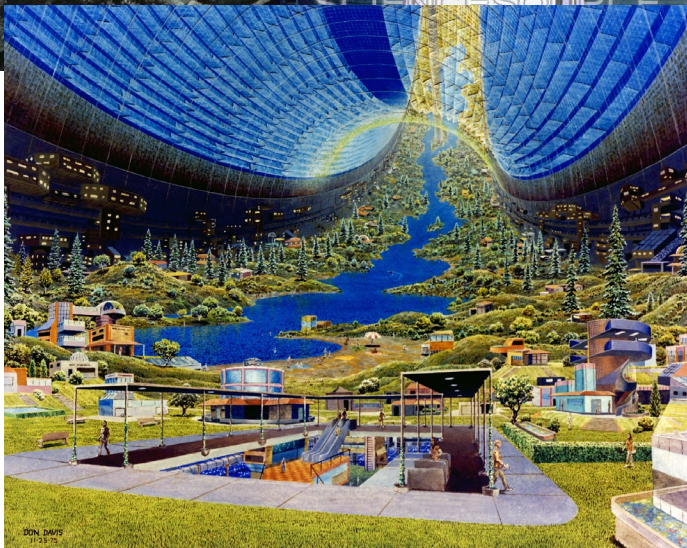
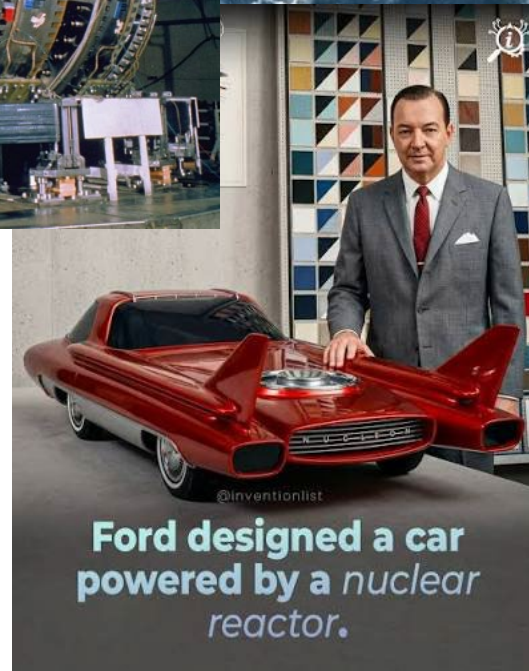


The writing calls to mind an image like this...

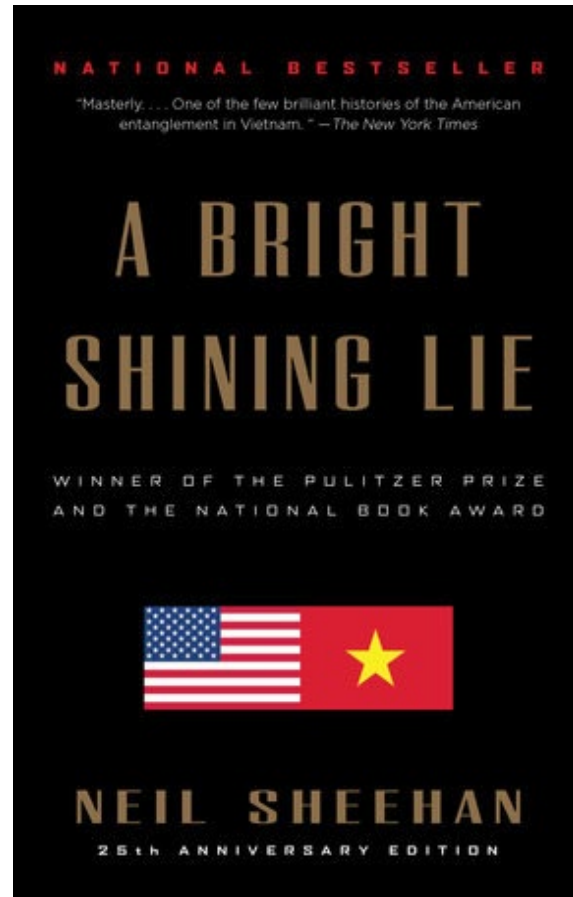


RETREAT FROM SCIENCE: 1970s

What victories might have been won had we not retreated from the field?

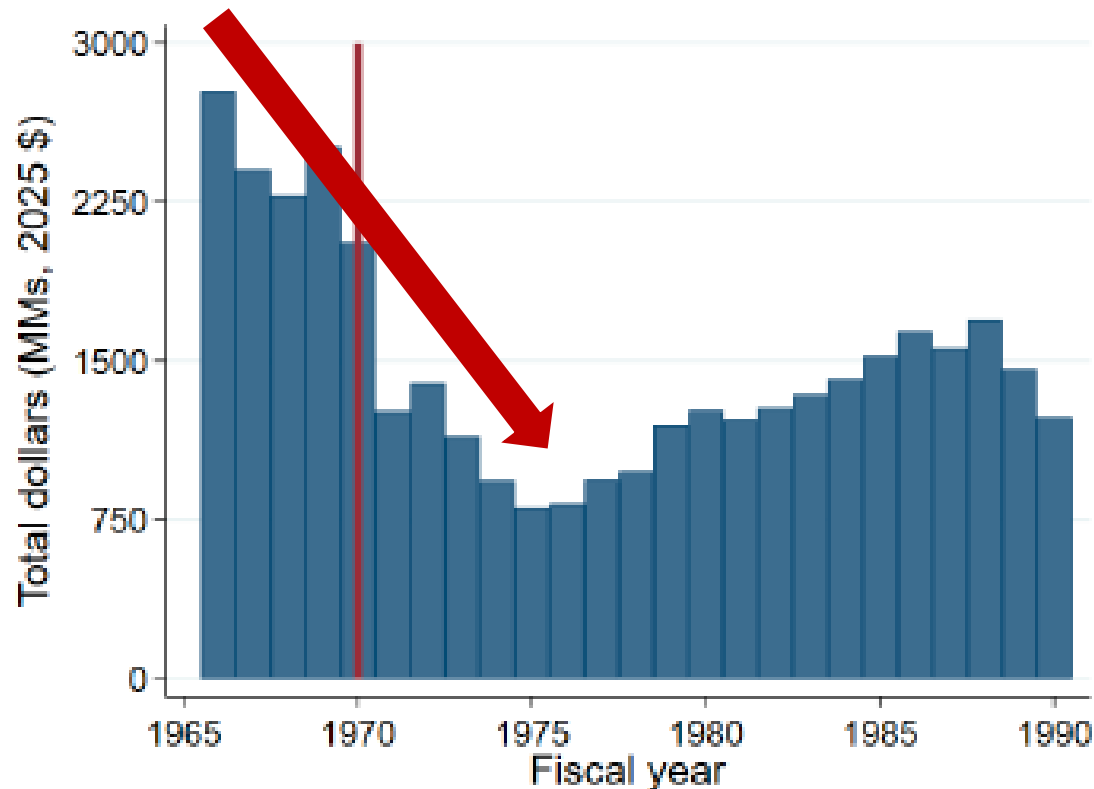


Or were those imagined technological victories a mirage? Like the notion of victory in Vietnam...



Even before the Mansfield Amendment, the times they were a changin'...

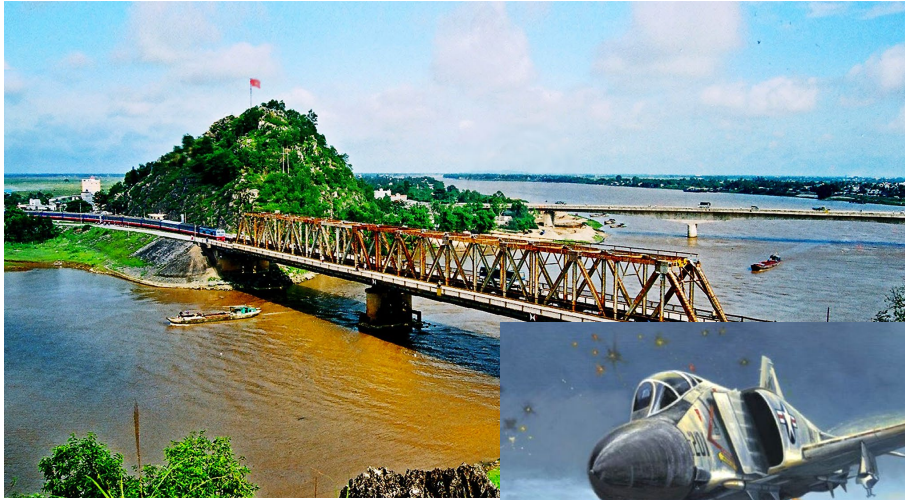
Panel (A): DoD R1/R2 university research contracts, 1966-1990 (2025 \$, MMs)



By the mid-1960s, the military investment in “macro-physical systems” was running into diminishing returns

- McNamara’s number crunchers proved that expansion in the number and firepower of our arsenal of nuclear weapons had extended far into the domain of diminishing returns...
- And the massive bombing campaigns of the 1960s failed to subdue the North Vietnamese or even significantly interdict the resupply of the Vietcong along the Ho Chi Minh Trail.
- Physicists had harvested the long-hanging fruit that could be picked without ever larger, ever more expensive tools like massive supercolliders.
- Advances in the size and power of our rockets and jets slowed down...
- Meanwhile, the emerging field of computer science offered up the possibility of revolutionary changes in warfare that substituted precision for sheer quantity and firepower.
- Even during the Vietnam War, the military began redirecting its research to this new domain of opportunity, with encouraging results.
- Programs with classic operational names like “White Igloo” led the way.

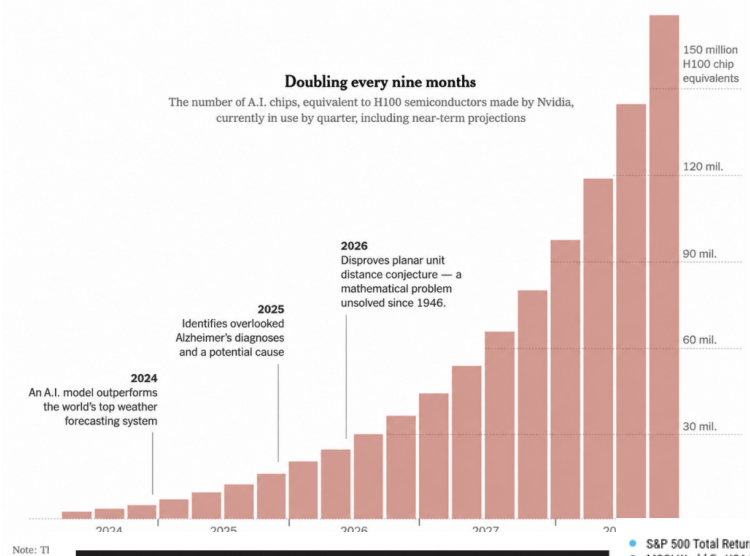
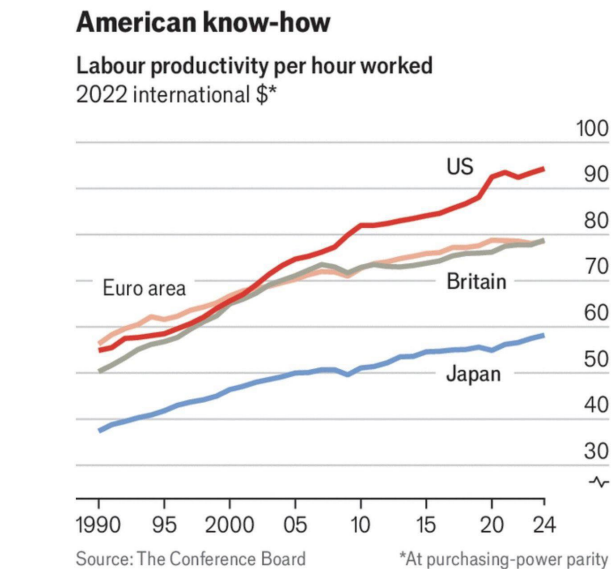
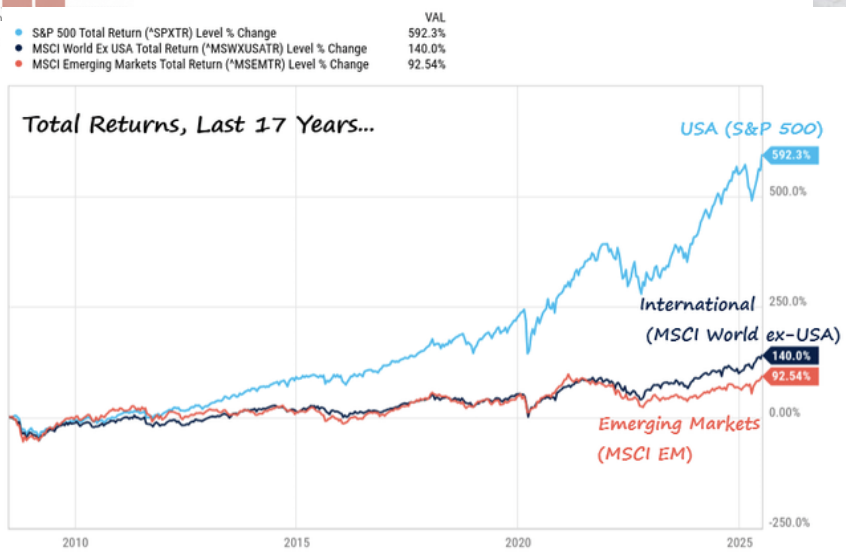
A bridge too far...



The DoD responded (rationally) to changes in the locus of scientific opportunity

- The pivot from physics to computer science continued after the Vietnam War...
- The Pentagon's late 70s "Assault Breaker" approach doubled down on investment in sensors, computation, stealth, and precision.
- The Reagan defense buildup fully funded these shifts in scientific effort, raising defense-related R&D to historic highs.
- Aggregate *university* science funding did not recover to the heights of the 1960s.
- But computer science enjoyed a golden age of DoD-funded federal largesse, eclipsing anything the formerly emergent field had known in the 1960s.
- The Pentagon generously funded the development of new hybrid fields like materials science, which did not even exist in the "golden" 1960s.
- New military capabilities emerged that outclassed the Soviet Union, were on full display in Gulf War 1...

And helped lay the groundwork for today's IT / AI boom!



AI Stocks
These companies benefit

Hyperscaler & AI Clouds
Meta IBM amazon Microsoft
Oracle Alphabet Alibaba Group CoreWeave

AI Chip Designers
NVIDIA synopsys Qualcomm
arm BROADCOM cadence AMD

Chip Manufacturing & Equipment
TSMC SAMSUNG Lam micron
ASML SK hynix SANDISK intel

Data Center Infra & Power
Bloom SIEMENS Schneider CATERPILLAR
HOCHTIEF E.ON SUPERMICO GE VERNOVA CORNING

Sometimes the path to victory requires a strategic retreat...

- The U.S. military withdrew from a war of choice it could never win to refocus on the war of necessity it absolutely had to win – and emerged victorious!
- In the process of securing that victory, it disinvested from mature sciences where progress had slowed and doubled down on fields making revolutionary progress.
- This reinvestment was guided by the elite scientists of JASON and DARPA who saw where the locus of scientific opportunity was moving.
- America (and the world) are still reaping the benefits of that farsighted reallocation of science funding.
- The message this group conveys to policymakers cannot be something as simplistic as “investment in science is (always and everywhere) good, disinvestment is (always and everywhere) bad.”
- The story of America’s consequential redirection of its defense science investments is a rich and compelling story well worth the telling...

Who could possibly tell that (true!) story better than the heroic economists behind this fascinating paper?



From Retreat to Victory!