

Industrial Mobilization – Assessing Surge Capabilities, Wartime Risk, and System Brittleness

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Research Questions

What is the ability of existing and surge production capabilities to replace current inventories in the event of a prolonged great power conflict?

Has the industrial base become more brittle— that is, less able to replace inventory—over time?

Are some industries or categories of weapons at greater risk than others?

Are systems with civilian analogs at less risk?

Methodology

- **Time to replace inventories used as metric for ability of the defense industrial base to meet the demands of great power conflict**
- **Data from budget exhibits (P40s, P21s), SARs, service inventory data**
- **Production data used:**
 - **“1-8-5” efficient rate**
 - **“MAX” surge rate (production with existing facilities and tooling)**
- **Two years used for interim calculations:**
 - **FY 1999: pre-9/11 surge**
 - **FY 2020: Most recent**
 - **In future: FY 1989, FY 2008**
- **Calculation includes production lead time**

Inventory Replacement (Years) at Adjusted Surge Rate

$$= \frac{\text{Inventory Objective} - (\text{Production Leadtime} \times \text{Agg. 1-8-5})}{\text{Agg. Max}} + \text{Production Leadtime}$$

The Experience of the Past

World War I:

- Mobilization begins with declaration of war
- Centralized direction established
- Too late: US forces mostly equipped by French and British until late 1918

Interwar period: Much planning but little concrete action

World War II

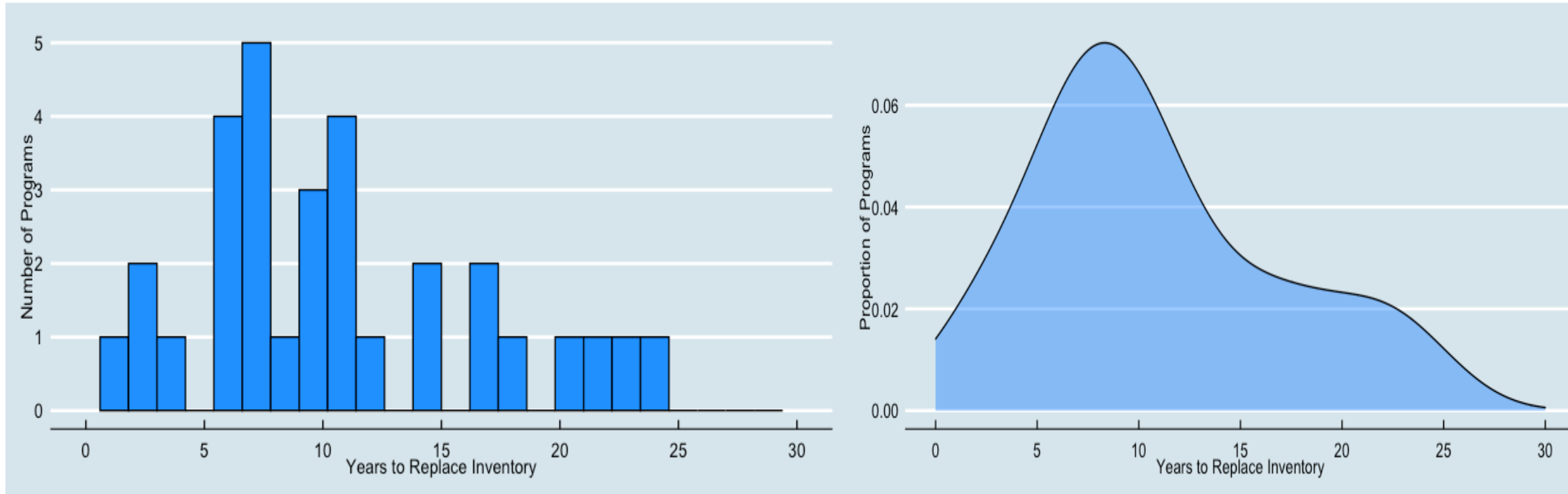
- Three waves: 1938/1939, 1940, 1942
- Centralized direction, government owned facilities and, later, conversion of civilian industry
- US equips own forces and allies
- BUT: Late 1943/early 1944 before US forces fully equipped, industrial mobilization takes 5 years

Cold War: Large defense budgets sustain robust industrial base

Post-Cold War: “Last supper” and radical consolidation

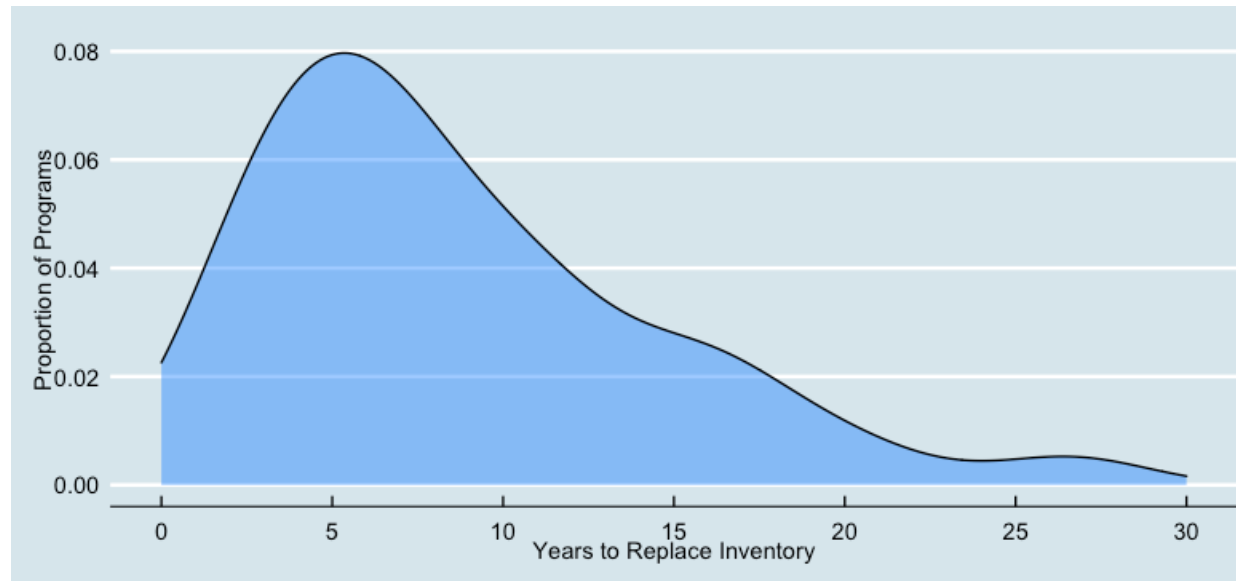
Today: Most studies focus on sustainability and health of peacetime industrial base, little on industrial mobilization

What is the ability of existing production capabilities to replace current inventories in the event of a prolonged great power conflict?



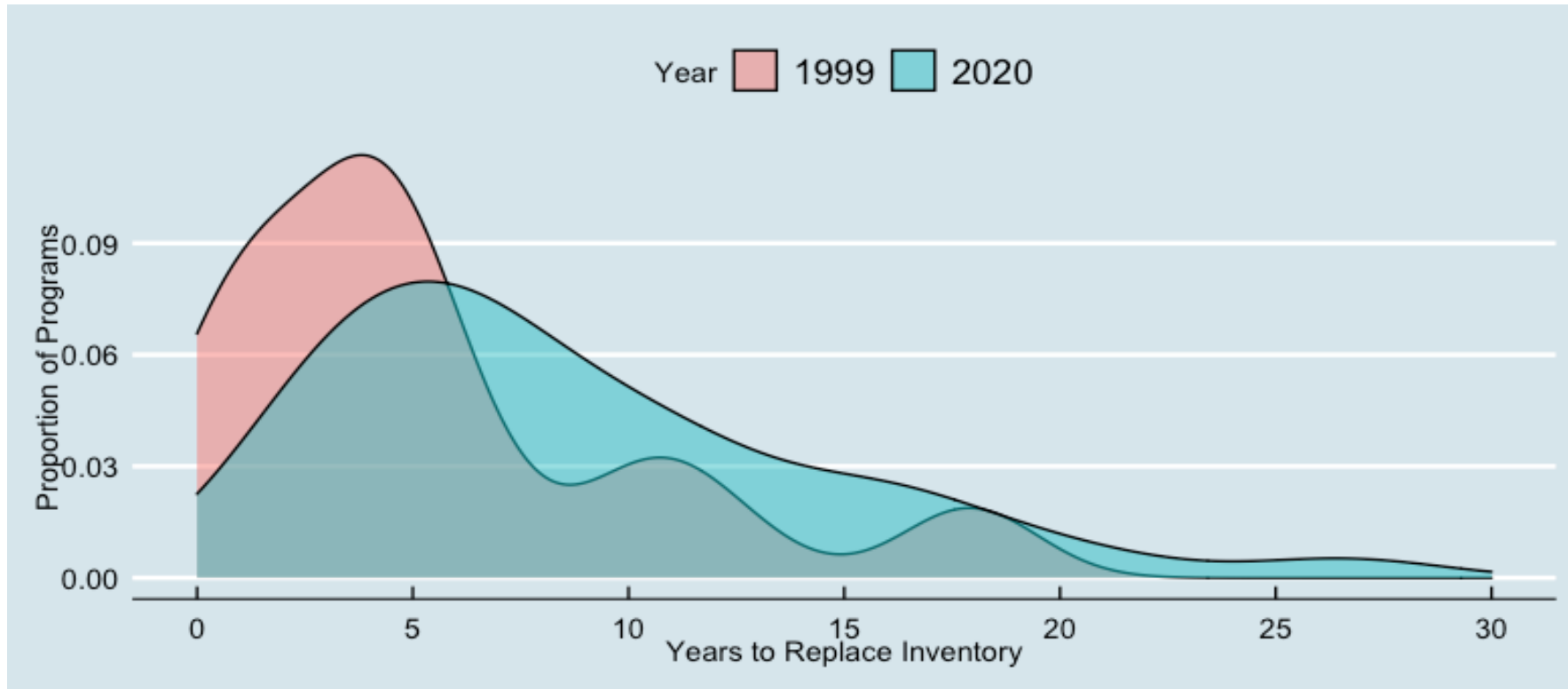
Curve shows smoothed histogram. Mean: 14.4 years; Median: 10.3 years
The times appear to be reasonable for replacgne inventory in a peacetime, non-surge environment.

What is the ability of surge production capabilities to replace current inventories in the event of a prolonged great power conflict?



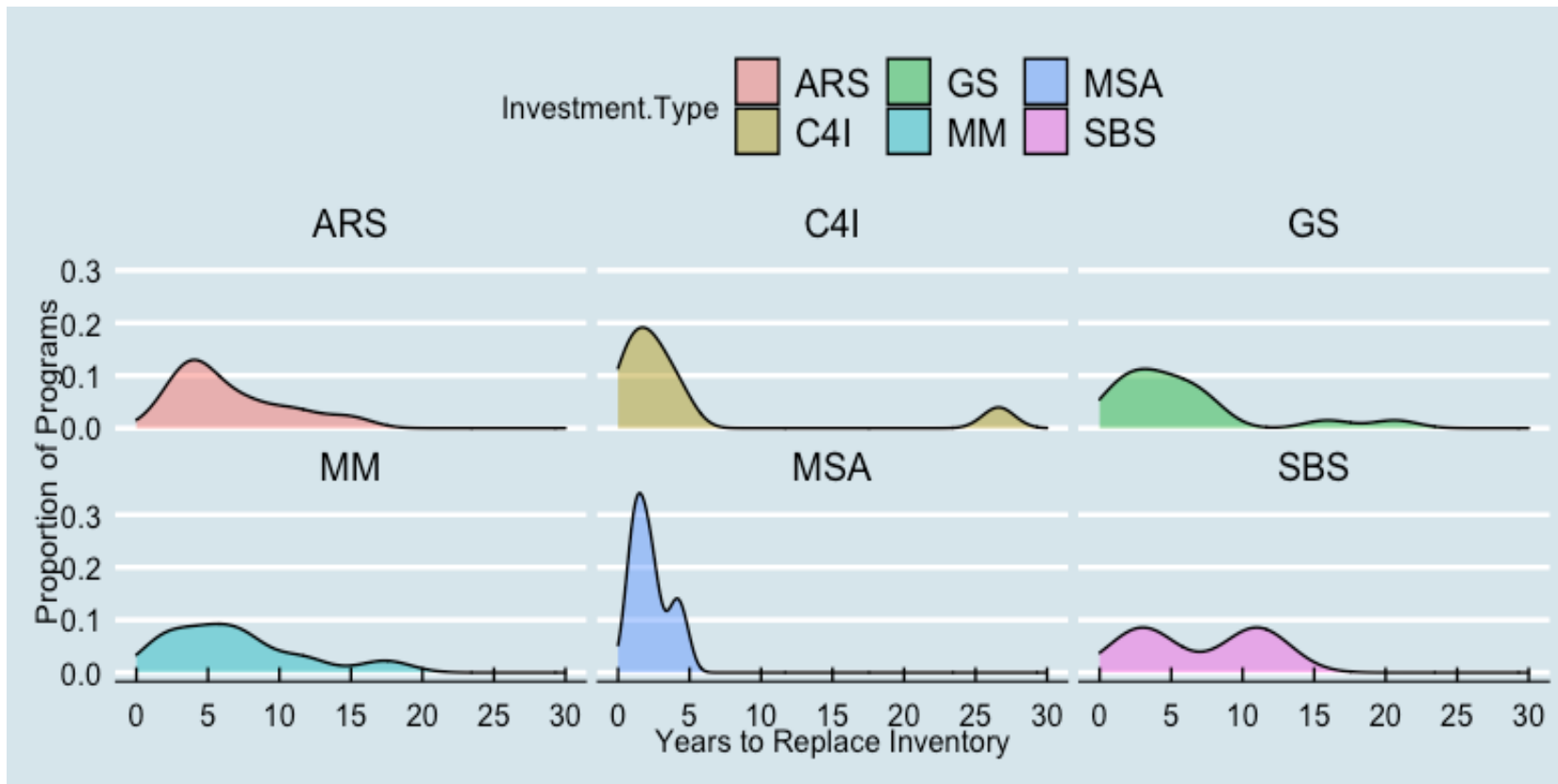
Increasing production to the surge rate reduces the amount of time needed to replace inventories. However, the effect is not as large as might be expected. Mean replacement time declines from 14.4 years to 8.7 years, median from 10.3 years to 7.5 years.

Has the industrial base become more brittle— that is, less able to replace inventory—over time?



Yes. The mean replacement time increases from 6.6 years in FY 1999 to 8.7 years in FY 2020, and the median increases from 4.3 years to 7.5 years.

Are some industries or categories of weapons at greater risk than others?



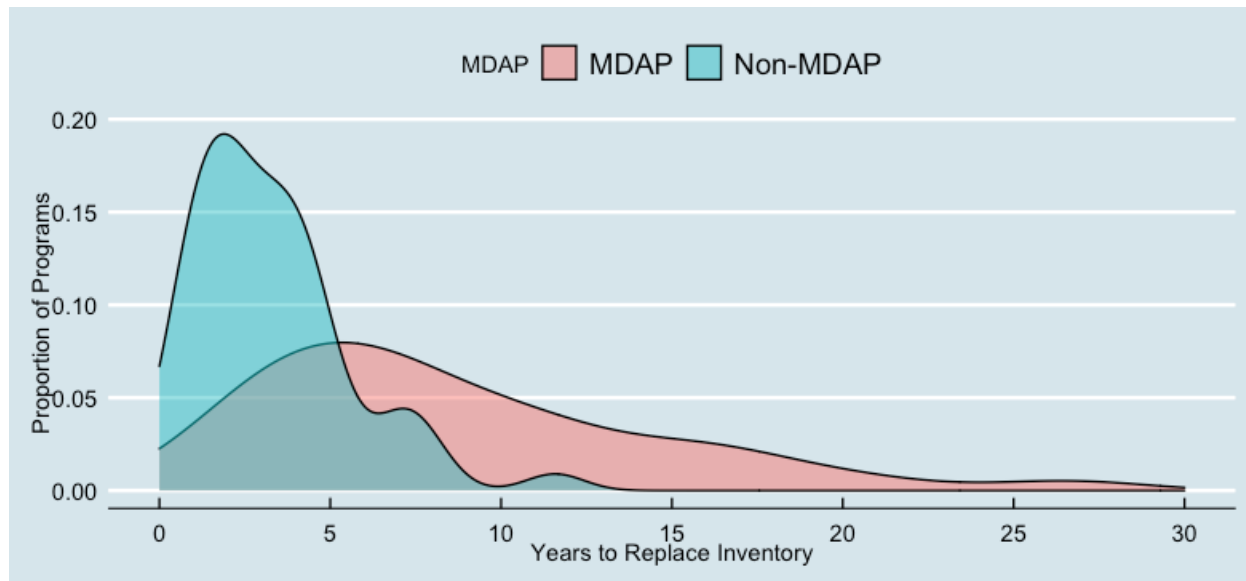
Legend: Aircraft and Related Systems (ARS), C4I Systems (C4I), Ground Systems (GS), Missiles & Munitions (MM), Mission Support Activities (MSA), Space Based Systems (SBS).

Ships: A Special Case

	Time to replace inventory (yrs)
Aircraft carriers	54
Large Surface Combatant	39.7
Small Surface Combatant	15.3
Submarines	19.6
Amphibious ships	23.7
Combat logistics ships	11.25

Yes. Median replacement times vary greatly, from 2 years to 7. Ships have longest replacement times of all.

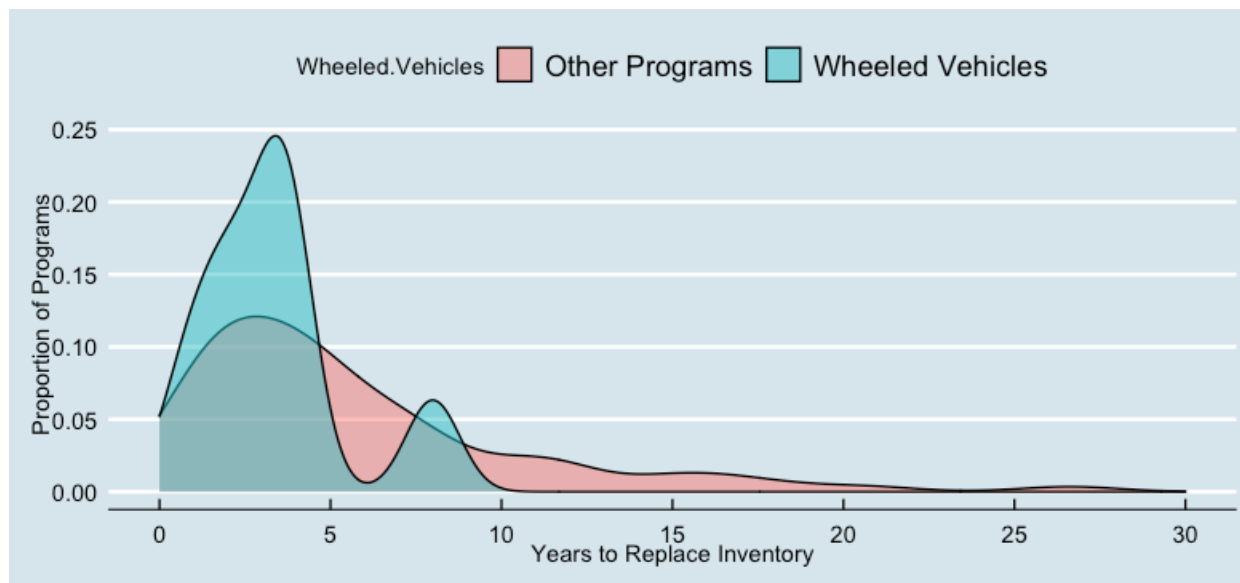
Are systems with civilian analogs at less risk?



Maybe

Non-MDAP programs have much shorter inventory replacement times (Median of 3 years compared to 7.5 years).

Wheeled vehicles, a category with clear civilian industry analogs, also have shorter replacement times (Median of 3.5 years).



Conclusion and Recommendations

Conclusion: The defense industrial base could not quickly replace most weapon system inventories. Even at surge production rates, replacement would take many years.

Recommendations:

- **Identify low-cost ways to relieve bottlenecks.**
 - High cost initiatives unlikely to compete in budget process but focused improvements may have large effects
- **Ascertain wartime attrition and expenditure rates.**
 - These rates reflect actual wartime requirements.
- **Develop supplemental acquisition strategies ahead of time.**
 - To enhance production and identify substitute systems
- **Scrub the production data in the budget justification books**
 - Many errors found in doing project research.