Assessing the Reliability of the Future Years Defense Program and Building a Forecast

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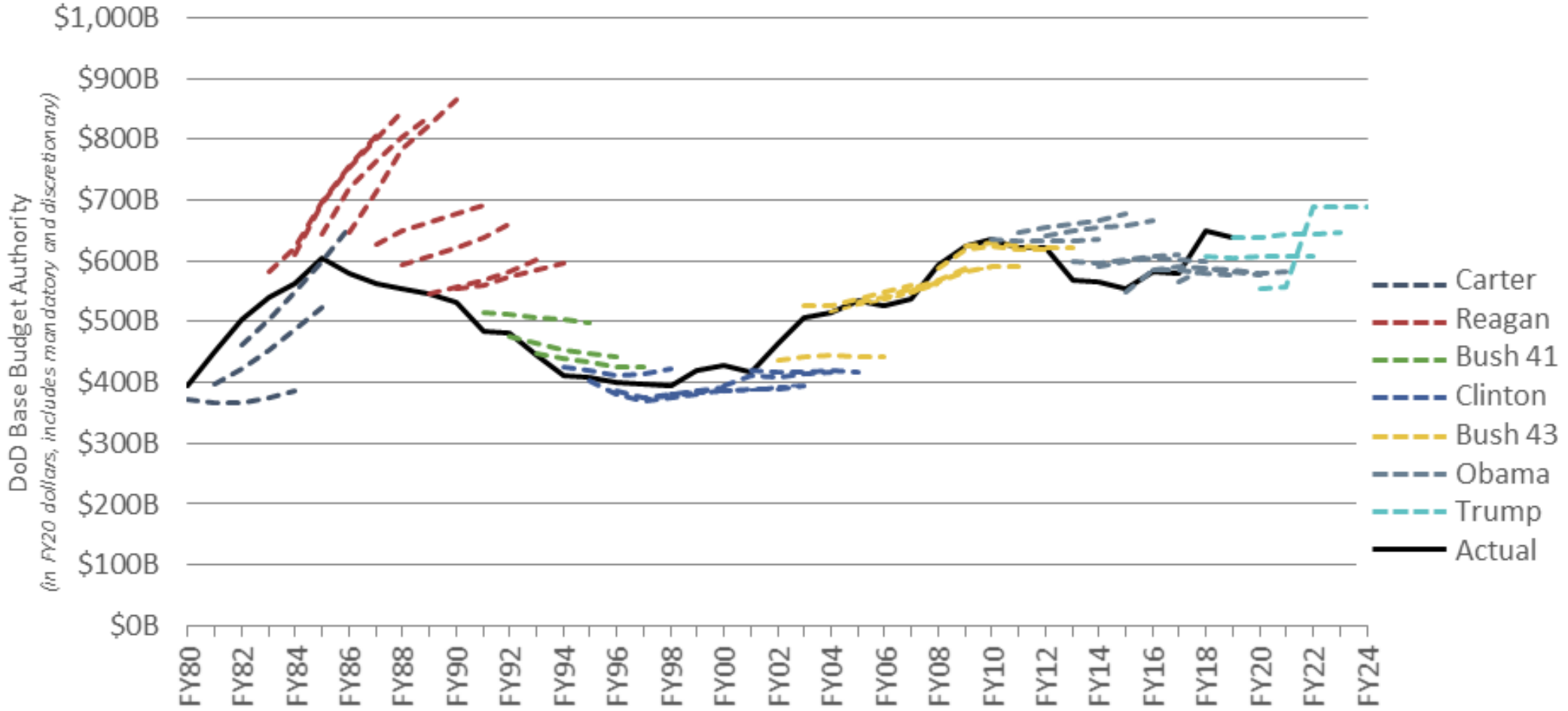
What is the FYDP? Why does it matter?

- Discerning, negotiating, and communicating priorities are necessary tasks for the U.S. defense acquisition system to implement its portion of the National Defense Strategy effectively.
- One of the Department of Defense's (DoD) central tools for doing so is the Future Years Defense Plan (FYDP), a projection of the cost and composition of the force over the next five years.
- Annually updated and submitted as part of the President's budget submission projection, the FYDP provides insights into DoD's priorities and future expectations.

This paper seeks to answer the following questions:

- How reliable are projections within the FYDP as an indicator for actual spending?
- Which services and budget categories have the most and least reliable projections?

Historical Topline FYDP Estimates



Source: Harrison and Daniels, 2020, pp. 11

Weaknesses of the FYDP

- Expressing an administration's desired funding is often in tension with projecting what will materialize.
  - This tension contributes to "systematic fiscal optimism" (Jordan, 2015, pp. 274)
- Measures of reliability or confidence intervals for the projections are absent.
- Line Item and Program element level data can be hard to use because, unlike many other DoD budget documents, they are not collated across components.
- These challenges partially reflect the ambition of the FYDP, while long-range project estimates are typical, a 1995 review found that most developed democracies only planned overall budgets 2-3 years forward.

How we measure reliability

- The FYDP projects five years forward, starting with the President's Budget (PB), and looks two years back to report actual spending.
- This paper compares the 2nd year of the FYDP projections for FY2019 to the actual spending.
- The executive branch made the projections in the PB18 and reported the actual spending in PB21.

FYDP Reporting Year	Budget Request (Available in P-1s, P-40s, R-1s, and R-2s)			Out Years (FYDP Exclusive, available in P-40s and R-2s)			
	Actual Spending (PB-2)	Enacted Budget (PB-1)	President's Budget (PB)	2nd Year of FYDP (PB+1)	3rd Year of FYDP (PB+2)	4th Year of FYDP (PB+3)	5th Year of FYDP (PB+4)
PB18	FY 2016	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021	FY 2022
PB19	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021	FY 2022	
PB20	FY 2018	FY 2019	FY 2020	FY 2021	FY 2022		
PB21	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025

Hypothesis 1: The FYDP aids in estimating actual spending

Future Years Defense Projection and Actual Spending – Direct Relationship

H_{1A}: A future years defense projection of higher (lower) spending for a procurement line item directly predicts higher (lower) actual spending for that line item.

H_{1B}: A future years defense projection of higher (lower) spending for an RDT&E program element directly predicts higher (lower) actual spending for that program element.

John Roth and Gen. Anthony R. Ierardi brief reporters on the PB 2018.
Image Source: Jim Garamone, 2017 May 23. VIRIN: 170523-D-FB314-001

Results: Reliability of the FYDP

- For these logarithmically transformed continuous variables, a larger coefficient means a stronger correlation in the model.
- For both RDT&E and Procurement, the 2nd out year projections are a significant estimator for actual spending.
- The base estimate for the president's budget strongest, but the 2nd out year is a better predictor than prior actual spending.

Account	Log(Actual Spend 2016)	Log(PB18 Base)	Log(PB18 OCO)	Log(2nd Out Year from PB18)
RDT&E (R-2)	**0.07** (0.01)***	**0.35** (0.04)***	0.06 (0.04)	**0.23** (0.03)***
Procurement (P-40)	**0.09** (0.02)***	**0.27** (0.04)***	**0.12** (0.02)***	**0.25** (0.03)***

***p < 0.001, **p < 0.01, *p < 0.05, ·p < 0.1.

Hypothesis 2: The reliability of projection varies between DoD components

Projecting Component and Reliability of Future Years Defense Projection Estimates

$H_{2A:}$ The reliability with which a procurement line item's future years defense projection directly predicts actual spending for that line items varies based on the DoD component responsible for the projection.

$H_{2B:}$ The reliability with which a RDT&E program element's future years defense projection directly predict actual spending for that program element varies based on the DoD component responsible for the projection.

Image Source: Woodward, F.M. and Arthur, D. (2019 Aug). "Long-Term Implications of the 2020 Future Years Defense Program." CBO: 1.

Results: Differences Between Components

- Here a higher coefficient means a correlation with greater actual spending (relative to the baseline of Navy projections).
- For RDT&E, Air Force and Other DoD both underestimate actual spending in a manner that is significantly different from the Navy.
- For Procurement, the Army is significantly different from the Navy. Other DoD also shows a big difference, but due to an even greater error estimate, the variation does not meet the study's threshold for significance. for significance.

Account	Army	Air Force	Other DoD
RDT&E (R-2)	0.06 (0.15)	**0.35 (0.15)***	**0.41 (0.16)****
Procurement (P-40)	**0.72 (0.30)***	0.16 (0.30)	0.85 (0.49)·

***p < 0.001, **p < 0.01, *p < 0.05, ·p < 0.1.

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Discussion and Conclusions

- An observer that knows the 2nd Year of the FYDP will be significantly more able to anticipate actual spending levels for included RDT&E Program Elements and Procurement Line Items.
- This was true even for PB18, even though acting DoD Comptroller John Roth had reported that “[t]he Secretary has not spent any time at all looking at anything beyond F.Y. '18 to date.”
- Likewise, the projection process appears to matter; while not all DoD components estimate significantly different than one another, there are noteworthy variations for both RDT&E and Procurement.
- The study will expand the model to include additional years to better forecast the reliability of FYDP projections for years past 2019.
- Contact us for open access to the underlying unclassified FYDP dataset.

Appendix: Regression Results

Estimating Actual 2019 Spending

	R-2 Model	**P-40 Model**
(Intercept)	**3.59** (0.28)***	**4.11** (0.37)***
Study Variables - FYDP		
log(FYDP2+1)	**0.23** (0.03)***	**0.25** (0.03)***
Study Variables - Mil. Dept. (Baseline=Navy)		
Army	0.06 (0.15)	**0.72** (0.30)*
Air Force	**0.35** (0.15)*	0.16 (0.30)
Other DoD	**0.41** (0.16)**	0.85 (0.49)·
Controls		
log(Actual+1)	**0.07** (0.01)***	**0.09** (0.02)***
log(PB Base+1)	**0.35** (0.04)***	**0.27** (0.04)***
log(PB OCO+1)	0.06 (0.04)	**0.12** (0.02)***
AIC	3321.37	3179.68
BIC	3369.13	3230.67
Log Likelihood	-1650.68	-1578.84
Num. obs.	877	762
Num. groups: BudgetActivity	7	
Var: BudgetActivity (Intercept)	0.06	
Var: Residual	2.44	3.50
Num. groups: MDAP		62
Num. groups: AccountDSI		16
Var: MDAP (Intercept)		0.22
Var: AccountDSI (Intercept)		0.13

***p < 0.001, **p < 0.01, *p < 0.05, ·p < 0.1.