

Can U.S. Treasury Markets Add and Subtract?

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My view of paper's aim:

- ① Provide evidence **news about US government spending** impacts bond yields via
 - increase in nominal term premium
 - decrease in convenience yield
- ② Provide evidence that bond investors and forecasters do not have full information and don't update beliefs fully rationally

Why do we care?

- Fiscal risk has not always been centre stage in the US
 - Not surprising if Argentine bonds are exposed to fiscal risk (sorry Roberto ;))
 - Interesting to know that US bonds have some exposure to fiscal risk and this may be increasing
- Interesting to study deviations from rationality for professionals such as bond investors and forecasters
 - Bond investors and forecasters more sophisticated than households
 - FIRE fails for bond investors and forecasters

Summary

- **Key Finding:** CBO cost release dates show largest effect on Treasury values
- **Model Framework:**
 - Rational Bayesian investors value Treasuries using present value approach
 - Learn about fiscal stance through CBO releases, realized surpluses, bond prices
 - Fiscal stance includes: surplus policy, government discount rates, future debt path
- **Key Mechanisms:**
 - Parameter learning is gradual due to policy persistence
 - Large negative cost releases lead to sustained negative Treasury responses
 - Model explains why large positive proposals show insignificant value changes

Unknowability Problem

- In the future, events will take place which we currently do not even entertain as possible
- The state space is expanding to include events we have not even thought of yet
- Our current and past actions are creating the future state space in a way we do not fully understand
- This is particularly important in the context of governments and asset prices because governments in richer countries step in to deal with crises
- A full understanding of how the US surplus will evolve is impossible
- It's not even clear the US will exist in 100 years time

Model Setup: Rational Bayesian Learning

- Investors determine Treasury values using present value framework
- They learn about unobservable fiscal stance components:
 - Persistent components of surplus policy
 - Government discount rates
 - Future path of debt
 - Learning sources:
 - CBO cost releases
 - Realized surpluses
 - Bond price data

χ

Key Model Components

Realized Surplus: $\hat{S}_{t+1}^o = \chi_t + \varepsilon_{st+1}$
with $\chi_{t+1} = \mu_\chi + \rho_\chi(\chi_t - \mu_\chi) + \varepsilon_{\chi t+1}$

Gov't Return: $\hat{r}_{gt+1}^o = h_t + \varepsilon_{rt+1}$
with $h_{t+1} = \mu_h + \rho_h(h_t - \mu_h) + \varepsilon_{ht+1}$

- χ_t , h_t are latent (unobservable) processes
- Parameters μ_χ , ρ_χ , μ_h , ρ_h unknown to investors
- Superscript 'o' denotes variables observed by investors

Present Value Framework

- Government budget identity links observable market value of debt:

$$\hat{b}_t^o = \alpha^* + \mathbb{E}_t \sum_{j=1}^T \nu^{j-1} \gamma \hat{S}_{t+j}^o - \mathbb{E}_t \sum_{j=1}^T \nu^{j-1} \hat{r}_{gt+j}^o + \mathbb{E}_t \nu^T \hat{b}_{t+T},$$

- Expected value of debt/GDP ($\psi_t \equiv E_t \nu^T \hat{b}_{t+T}$) follows:

$$\psi_{t+1} = \mu_\psi + \rho_\psi (\psi_t - \mu_\psi) + \varepsilon_{\phi t+1}$$

- Results in observable debt relation:

$$b_t^o = b_0 + b_\chi \chi_t + b_h h_t + \psi_t$$

- Monthly CBO cost intensity measure $\bar{\mathcal{V}}_t^o$ provides signal about surplus policy

$$\bar{\mathcal{V}}_t^o = c_0 + c_1 \chi_t + \epsilon_{c,t}$$

- Parameters c_0 and c_1 are unobservable to investors and $\epsilon_{c,t} \sim N(0, \sigma_c^2)$ is independent to all other shocks.

Learning Problem: Summary

- Bond investors do not observe the vector of latent states $\mathcal{Z}_t \equiv [\chi_t, h_t, \psi_t]'$, and they do not know the value of the parameters

$$\Theta \equiv [\mu_\chi, \rho_\chi, \sigma_\chi^2, \sigma_\chi^2, c_0, c_1, \sigma_c^2, \mu_h, \rho_h, \sigma_r^2, \sigma_h^2, \mu_\psi, \rho_\psi, \sigma_\psi^2, \sigma_{\chi h}, \sigma_{\chi \psi}, \sigma_{h \psi}]'$$

- They observe monthly surpluses, cost intensity measure, government returns adjusted for inflation and growth, and debt to GDP, summarized in the vector $y_t^o = [\hat{S}_t^o, \bar{\mathcal{V}}_t^o, \hat{r}_{gt}^o, b_t^o]$.
- Estimate prior from via maximum likelihood estimates using data from 1980 to December 1997.
- Implement Bayesian learning

The Signal

- Signal obtained from CBO cost estimates
- CBO estimates costs of legislative proposals
- Some proposals are passed

Why do we need the Learning Model?

- Would a simple regression of yields against estimates of the deficit or its changes be enough? Why go beyond Appendix B?

Table B.3. Treasury value changes on large proposal days and FOMC meeting days

	Deficit proposal days (1)	FOMC meeting days (2)	Other days (3)	All days (4)
Mean bps	-1.84	3.09	0.22	0.07
<i>t</i> -statistic	[-2.20]	[2.36]	[0.49]	[0.20]
<i>p</i> -value	(0.02)	(0.98)	(0.64)	(0.50)
Cumulative change in %	-20.70	16.39	8.36	4.06
<i>p</i> -value	(0.00)	(1.00)	(0.74)	(0.55)
Observations	1,125	530	3,842	5,497

Notes: This table presents the average daily and cumulative changes in Treasury values, organized across four different sets of days. Column 1 reports changes on days with large negative proposals, specifically excluding those that overlap with FOMC meeting days. Column 2 reports changes in a 3-day window centered on FOMC meeting days. Column 3 reports changes on other trading days and column 4 reports changes on all trading days. *t*-statistics are in squared brackets. We report the percentage of simulated changes in Treasury values that fall below the actual realizations in parentheses.

Learning Model: Decomposition

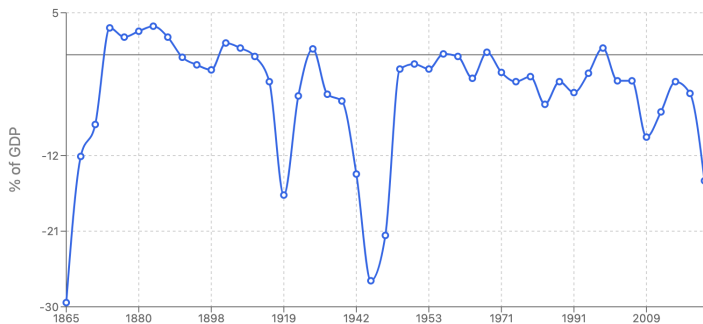
- Main benefit seems to be the ability to decompose effects
 - news vs cashflows
 - inflation, term premium, convenience yield
- Is that the right focus when it comes to the deficit?

Wars and Deficits

- Wars impact federal finances through:
 - Direct military expenditures
 - Reduced tax revenues
 - Long-term veteran care costs
- Recent veteran spending trends:
 - 2023: \$302 billion (5% of federal spending)
 - Major increase due to Iraq/Afghanistan veterans
 - PACT Act (2022) expanded benefits for toxic exposure

<https://www.pgpf.org/blog/2024/04/spending-on-veterans-in-the-budget>

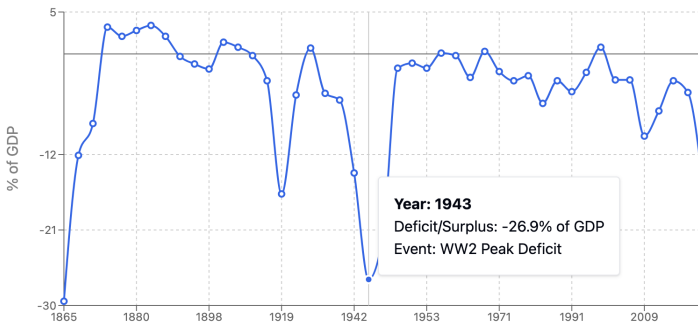
US Federal Surplus/Deficit as Percentage of GDP (1865-2020)



Key observations:

- Largest deficits occurred during major wars (Civil War, WW1, WW2)
- Regular surpluses were common in the late 1800s
- Modern era (post-1970) has seen persistent deficits
- Significant deficit spikes during major crises (2008 Financial Crisis, 2020 COVID-19)

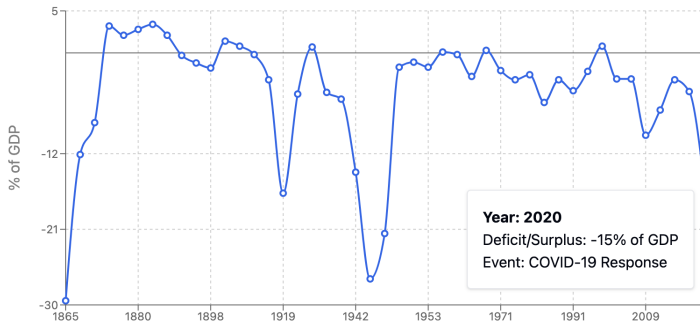
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Refine Learning Model to Account for Wars

- COB tells us what spending is for – you know if it is war related – why discard this information?
- Parameters can depend on a war state (which is observable!)
- Have two sets of priors: war priors and non-war priors

New Questions

- Do fiscal risks associated with war spending have different price effects relative to other spending?
- Spending money on disabled veterans is very different from spending money on childrens' education

Questions about the Signal

- CBO spending estimates depend on discount rates they use
- We really don't know which discount rate to use
- Different discount rates mean a different signal!
- Discounting gains from education spending need careful thought: it can be particularly useful to have a good education in very bad states. It's useful in good states too!

Interpretation of Forecast Errors

- Hard to predict COVID!
- Are forecast errors that big a deal in a very unknowable world?

Conclusion

- My takeaways: Fiscal policy matters for bond prices. Fiscal risk seems to matter now for bond prices. Interesting in light of Ricardian Equivalence.
 - Actual numbers are interesting, but I won't remember them in a week from now...
- Why does fiscal policy matter? I think it's because of financing wars. Can you show this? Wars are very different from other events – have huge impact on state space.
 - I would like to understand the long term risks of policies that involve military confrontation, even for a super power.