Can the Covid Bailouts Save the Economy?

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Motivation

- Coronavirus pandemic shuts down large parts of economy
- Many businesses bound to fail without government assistance
  - Unable to pay wages, fixed costs (e.g., rent), and service debts
  - Liquidity cushion quickly exhausted, especially for small firms
- Danger that corporate default wave breaks financial system
  - "Doom loop" of corporate defaults, intermediary failures
  - Once banks/insurers fail, get spillovers to other credit markets
- Large government interventions to support businesses
  - Direct lending to firms: PPP, MSLP, CCF
  - How effective are these policies?
  - What are the long-term fiscal costs?

This Paper

- Quantify effectiveness of lending programs relative to "do-nothing" counterfactual
  - Based on macro model with firms, intermediaries, & government (Elenev, Landvoigt, & Van Nieuwerburgh 2020, ELVN)
  - Map government programs to model one-by-one, & combined
  - Analyze macro, financial, & fiscal impact of policies after Covid-shock

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  - Analyze macro, financial, & fiscal impact of policies after Covid-shock
- Programs soften contraction by mitigating 40% of corp defaults
  - 1/3 smaller drop in GDP and consumption along recovery path
  - 50% smaller decline in investment
  - Absent programs, half of intermediaries would fail
  - Same rise in government debt with & without lending programs: money spent on bailouts instead of lending program

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  - Absent programs, half of intermediaries would fail
  - Same rise in government debt with & without lending programs: money spent on bailouts instead of lending program
- Guaranteed, forgivable loans such as PPP most effective
  - Corp. debt secondary market interventions have small positive effect
  - Better targeting of programs could greatly reduce fiscal cost

Government Lending Programs

- Paycheck Protection Program (PPP): $671 billion (3.1% of 2019 GDP)
  - Two-year loans with 1% interest
  - Up to 100% of principal forgiven (if used for payroll)
  - Banks originate, Fed provides terms financing, Treasury guarantees losses

Government Lending Programs

- Paycheck Protection Program (PPP): \$671 billion (3.1% of 2019 GDP)
- Main Street Lending Program (MSLP): \$600 billion (2.8% of 2019 GDP)
  - Consists of different facilities aimed at larger firms
  - Banks originate, retain 5-15% share (85-95% guaranteed)
  - LIBOR + 3% interest rate
  - No principal forgiveness

Government Lending Programs

- Paycheck Protection Program (PPP): \$671 billion (3.1% of 2019 GDP)
- Main Street Lending Program (MSLP): \$600 billion (2.8% of 2019 GDP)
- Corporate Credit Facilities: \$850 billion (3.9% of 2019 GDP)
  - Consists of different facilities aimed at the largest firms
  - Mainly purchases of investment-grade corporate bonds in primary and secondary markets
  - Market interest rates

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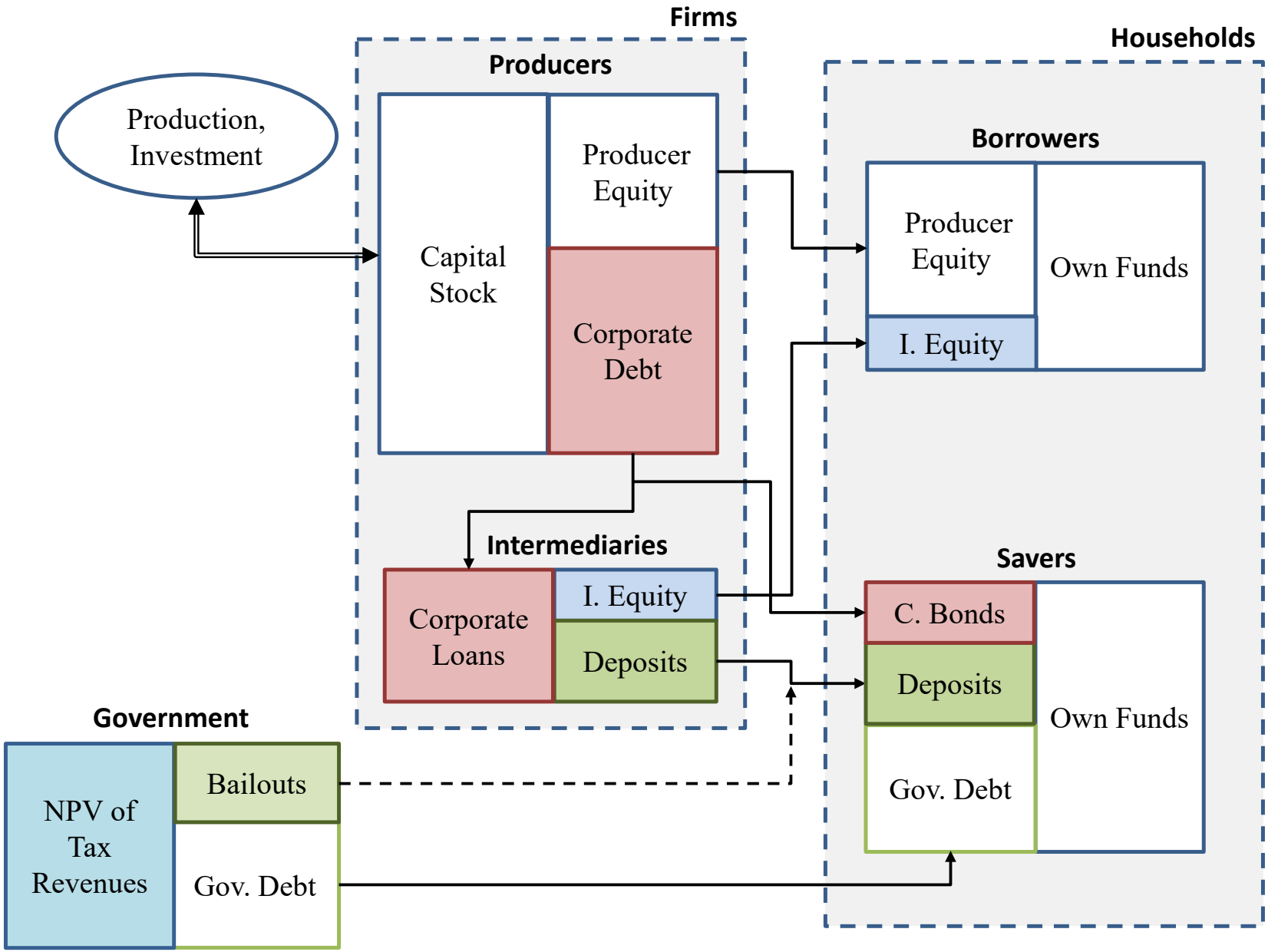
- Corporate Credit Facilities: \$850 billion
  (3.9% of 2019 GDP)
- Model is well-suited laboratory to evaluate these interventions

Model Overview



The Covid Shock

- Exogenous aggregate state variables
  - Persistent TFP Z_t
  - Persistent dispersion of idiosyncr. productivity (*uncertainty*) $\sigma_{\omega,t}$
  - In ELVN, transition to low TFP + high uncertainty regime generates deep recessions by setting off double financial accelerator

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- Covid crisis: transition to high $\sigma_{\omega,t}$ regime + "MIT shock"
  1. Uncertainty shock from $\sigma_{\omega,L}$ to $\sigma_{\omega,H}$
  2. Unexpectedly high uncertainty $\sigma_{\omega,covid} > \sigma_{\omega,H}$
  3. Average firm productivity $\mu_{\omega,covid} \downarrow 5\%$
  4. Labor supply $\downarrow 5\%$
  5. New normal: ($\mu_{\omega,covid}$, $\sigma_{\omega,covid}$, low labor supply) occurs with $p_{covid} = 1\%$. Once pandemic hits, expected to last 2 years.

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- Why this combination?
  - Low productivity & labor supply: economic shutdowns
  - Additional dispersion: some firms benefit (grocery, tech, pharma), others suffer (airlines, hotels, retail) relative to the *average* decline (Bloom et al. 2020)

Corporate Default and Bridge Loans

- Timing of producer problem within period
  1. TFP shock. Firms choose labor input and pay fixed costs.
  2. Idiosyncratic shocks, production. Liquidity default.
  3. Failed producers replaced. Dividend, capital, equity & debt decisions.

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- Flow profit at stage 2 pre-tax

$$\pi_t(\omega_t) = \omega_t Z_t k_t^{1-\alpha} l_t^{\alpha} - \underbrace{\sum_j w_t^j l_t^j}_{\text{wage bill}} - \underbrace{a_t}_{\text{debt serv}} - \underbrace{\varsigma k_t}_{\text{fixed cost}}$$

$\Rightarrow$ threshold ω_t^* s.t. $\pi_t(\omega_t^*) = 0$

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- Bridge loans: banks extend loan prop. to wage bill at stage 2
  - Needs to be repaid with interest at stage 3, junior to old debt a_t

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- Bridge loans: banks extend loan prop. to wage bill at stage 2
  - Needs to be repaid with interest at stage 3, junior to old debt a_t
  - New default threshold $\hat{\omega}_t^* < \omega_t^*$

$$\hat{\omega}_t^* = \frac{(1-\bar{A})\sum_j w_t^j l_t^j + a_t + \varsigma k_t}{Z_t k_t^{1-\alpha} l_t^{\alpha}}$$

Lending Programs in the Model

- As in real-world programs, model bridge loans feature
  - government guarantees of losses for banks $I_g \in [0, 1]$
  - debt forgiveness for firm borrowers $I_f \in [0, 1]$
  - Both policies can be partial and interact

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- Policies in model simulation
  1. PPP: 3.1% of GDP, 1% interest, $I_g = 1$, $I_f = 1$
  2. MSLP: 2.8% of GDP, 3% interest, $I_g = .95$, $I_f = 0$
  3. CCF: government purchases of corporate bonds, 3.9% of GDP
  4. Combo program: PPP, MSLP, CCF simultaneously

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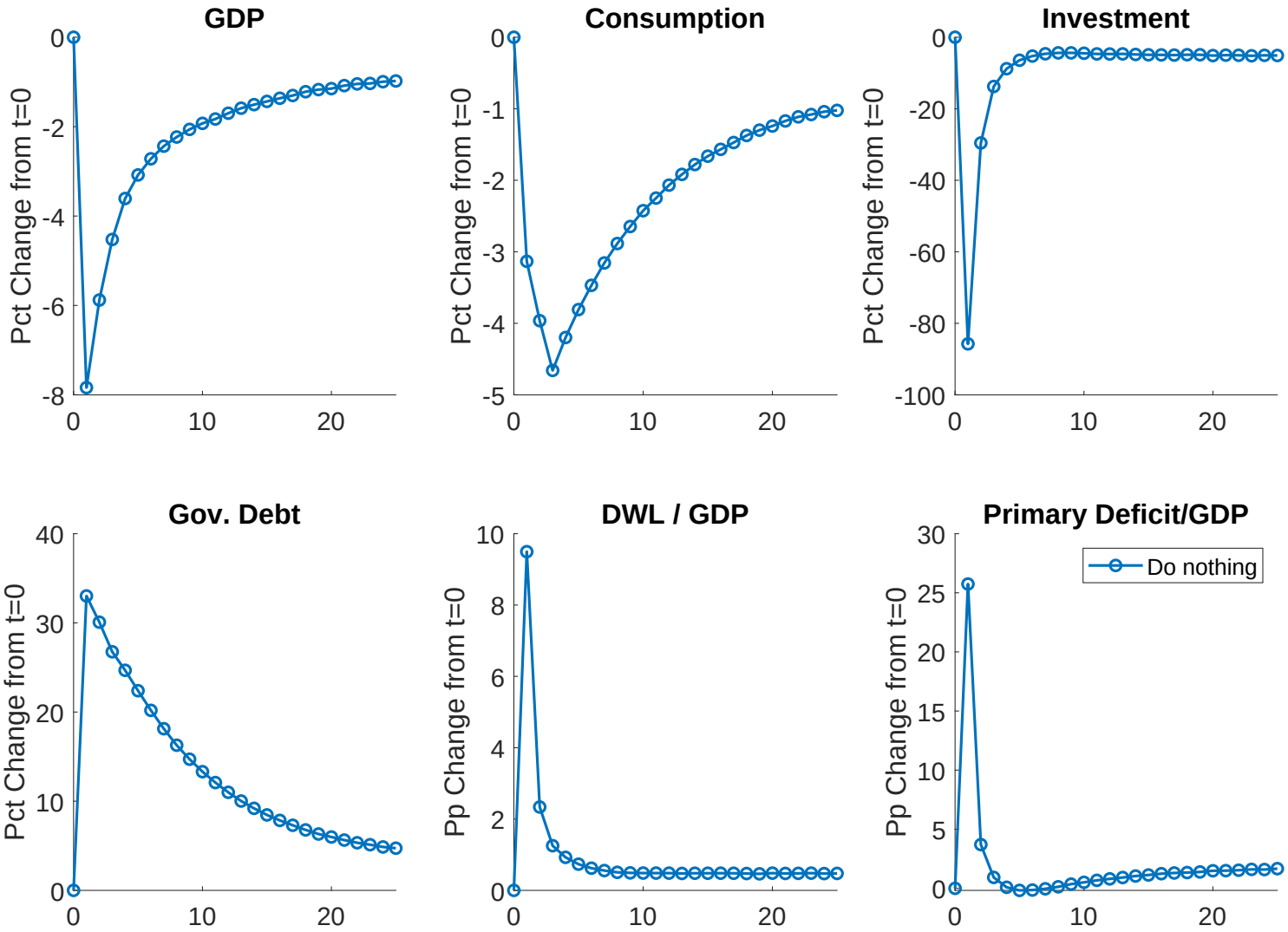
- Also consider a Conditional Bridge Loan (CBL) program
  - Conditions both
    - extensive (who receives loan?) and
    - intensive (how much?)

    margins of bridge loan program on idiosync. productivity $\omega_{i,t}$
  - Perfect targeting of funds to most distressed firms
  - Theoretically motivated benchmark

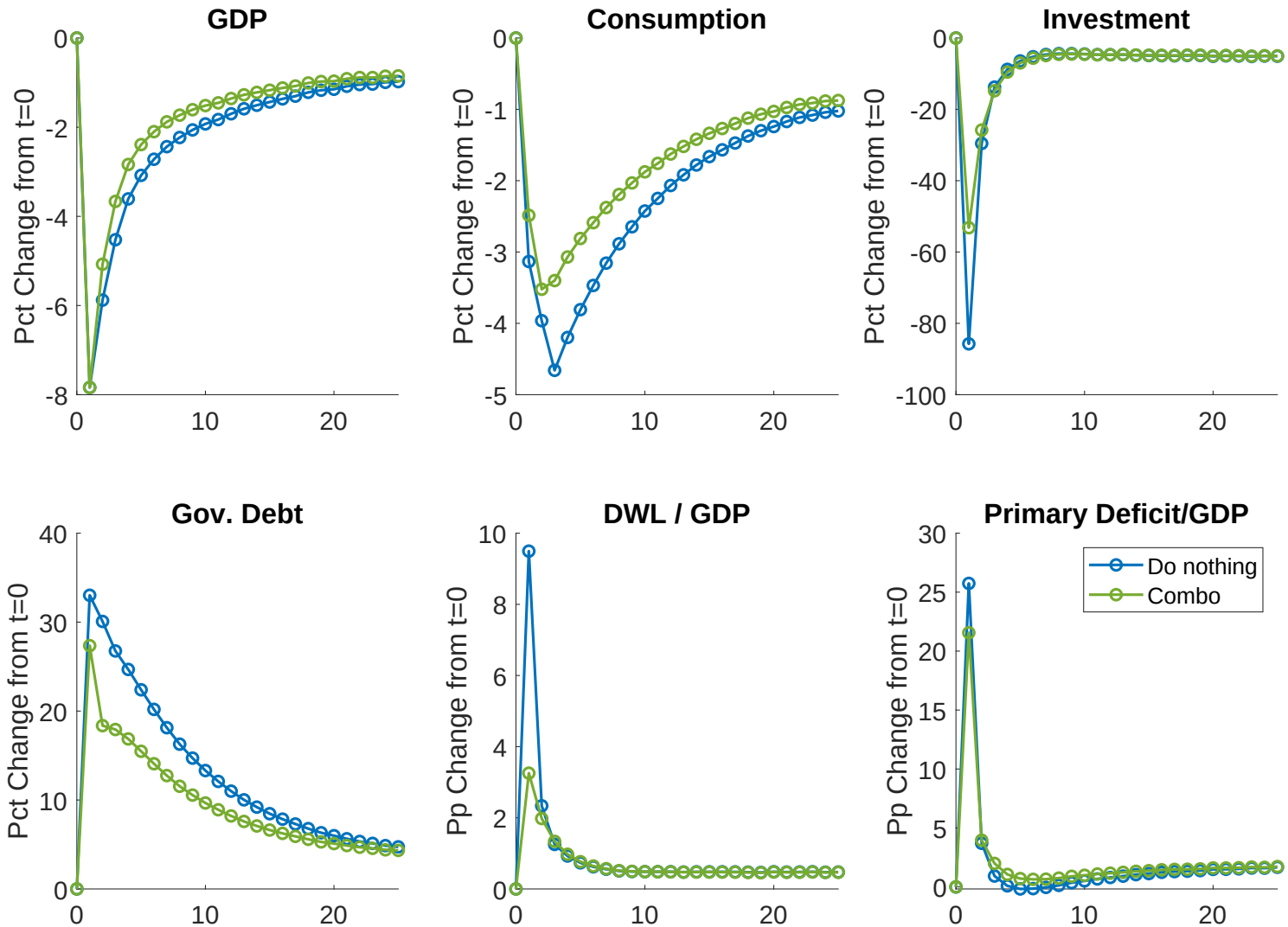
Macro Effects of Combined Policies

- Do-nothing: Covid-shock without interventions (counterfactual)



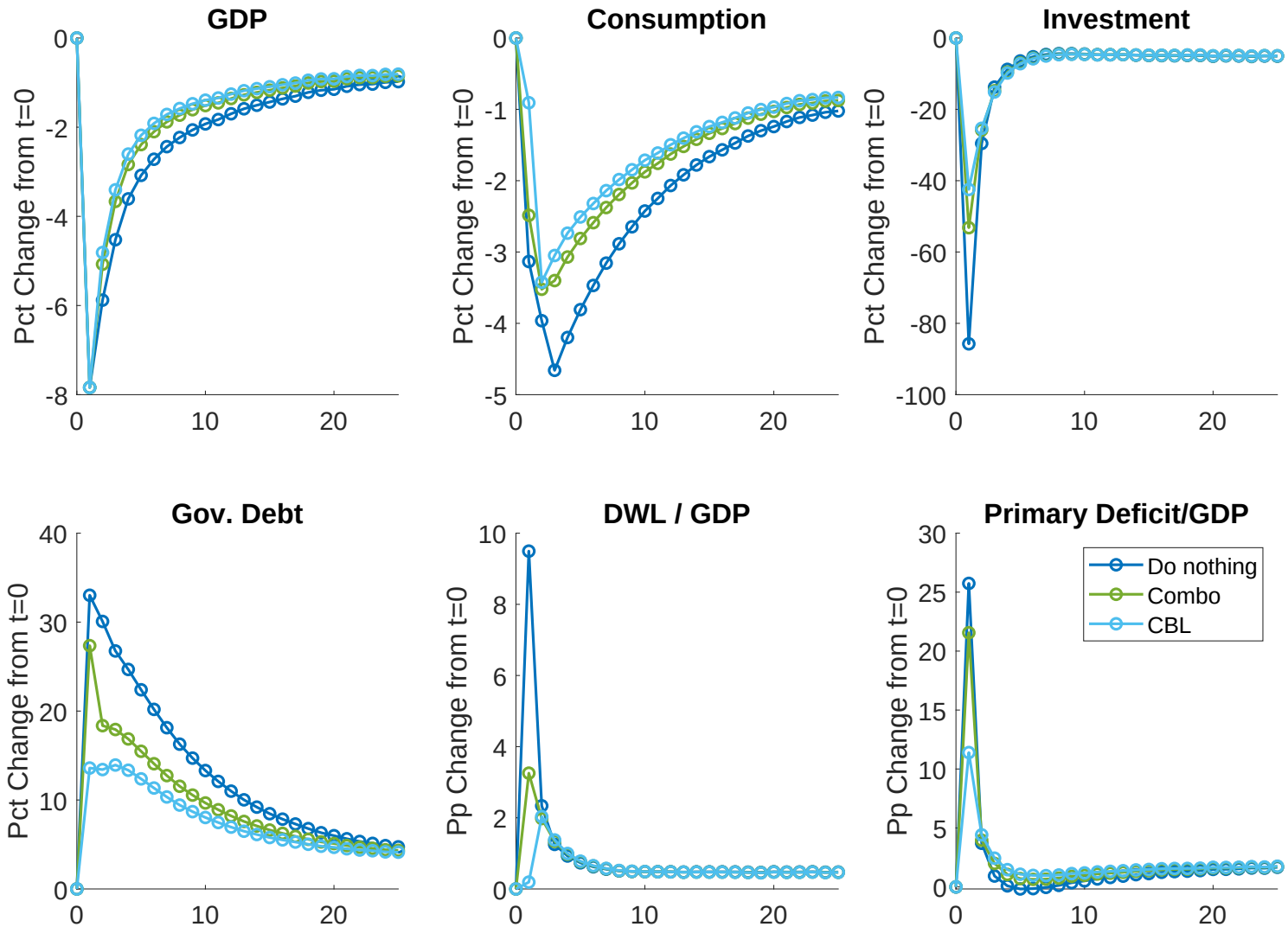
Macro Effects of Combined Policies

- Policy combo: 50% drop in inv., lower gov. debt



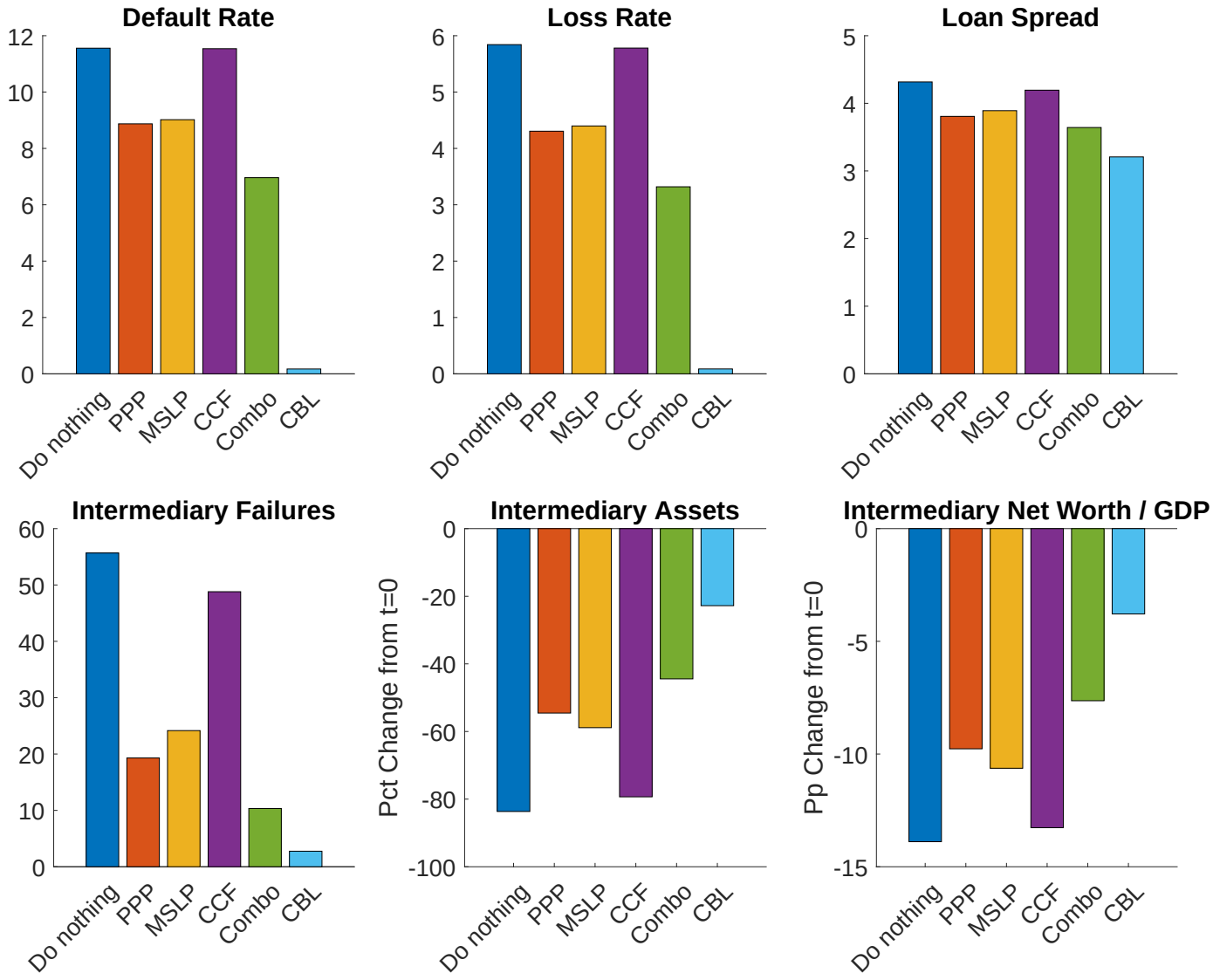
Macro Effects of Combined Policies

- CBL ideal policy: 40% drop in inv., much smaller cost



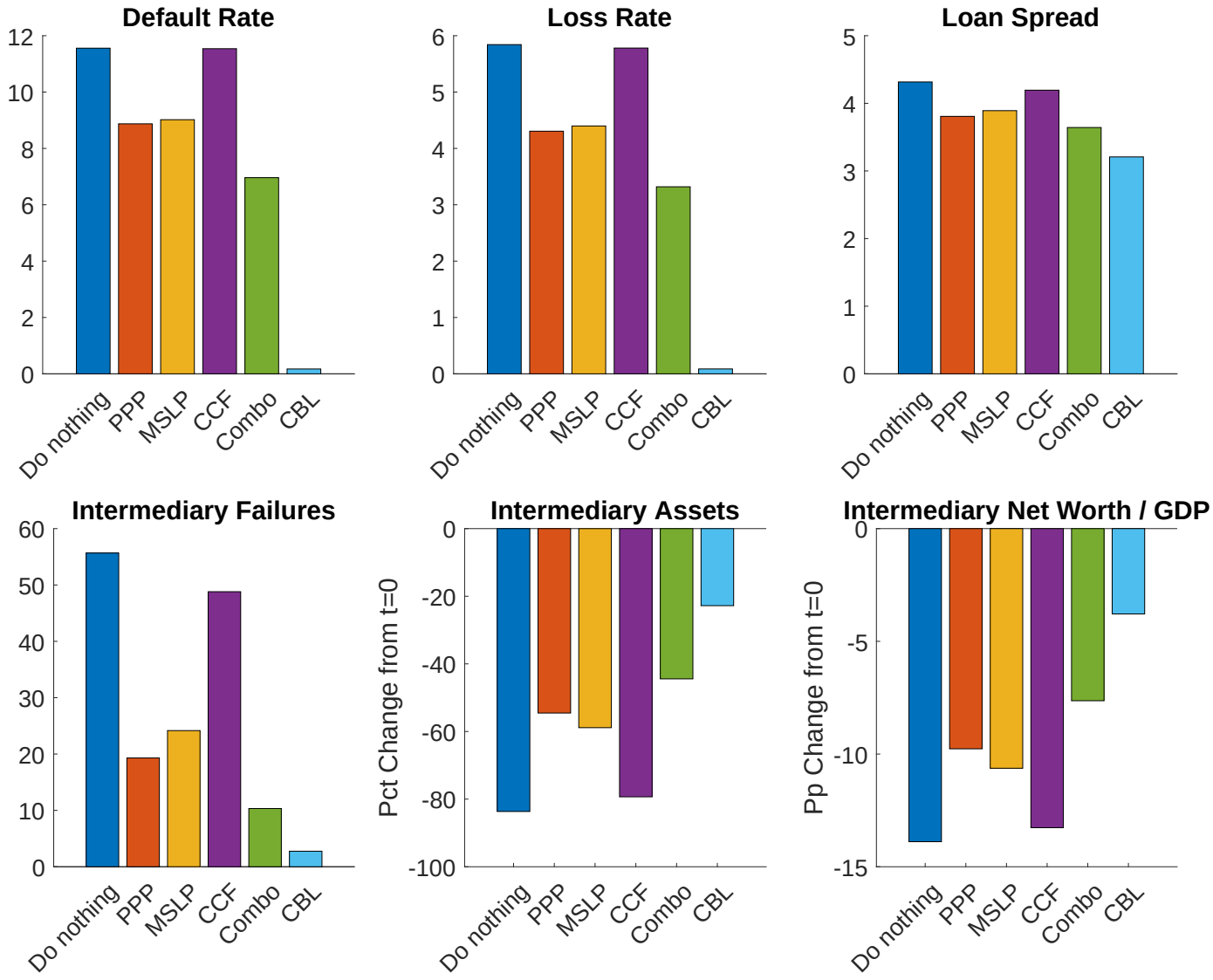
Financial Effects by Program

- PPP and MSLP lower default rate enough to stabilize intermediation sector



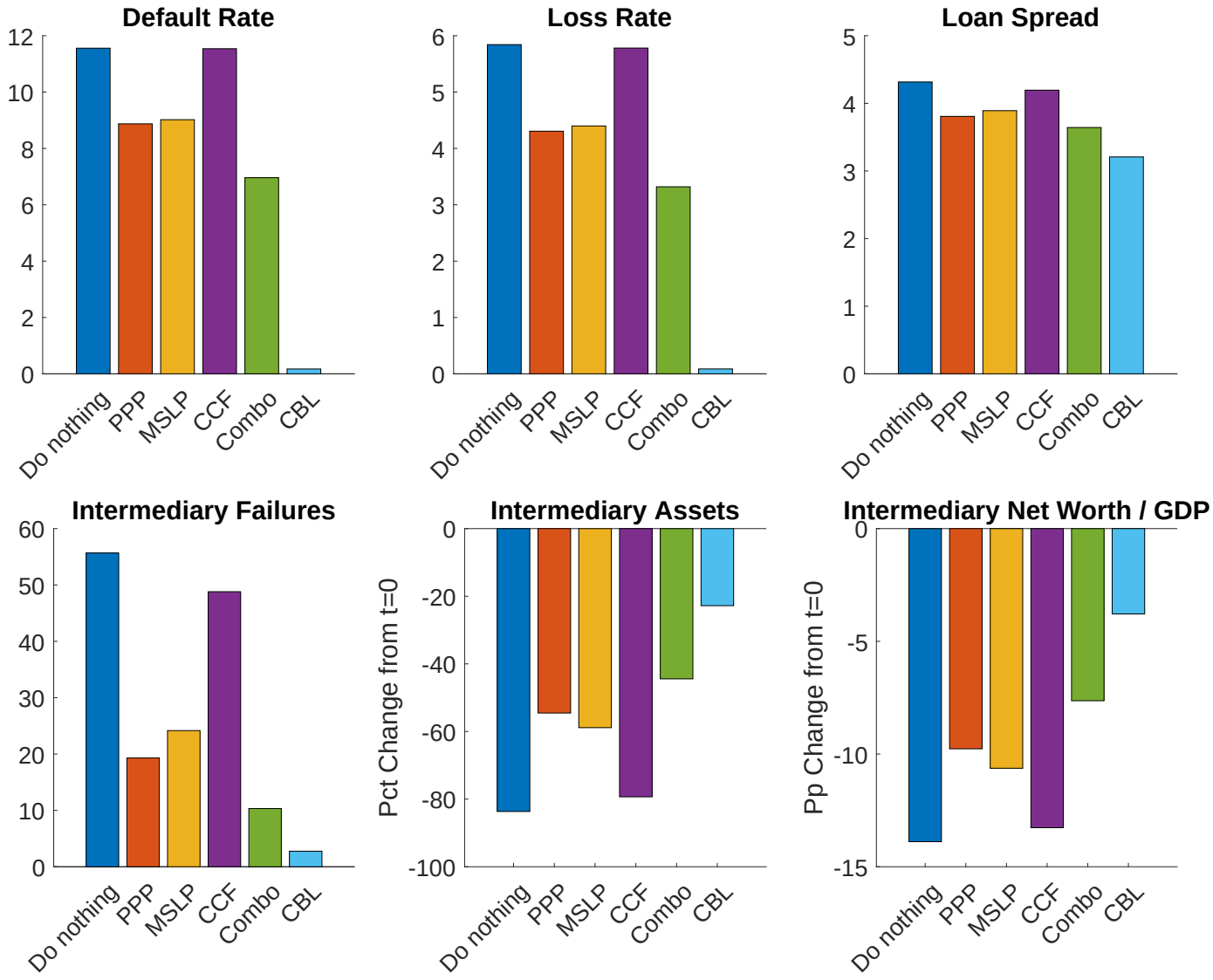
Financial Effects by Program

- CCF ineffective at lowering defaults, but price effect lifts intermediary assets



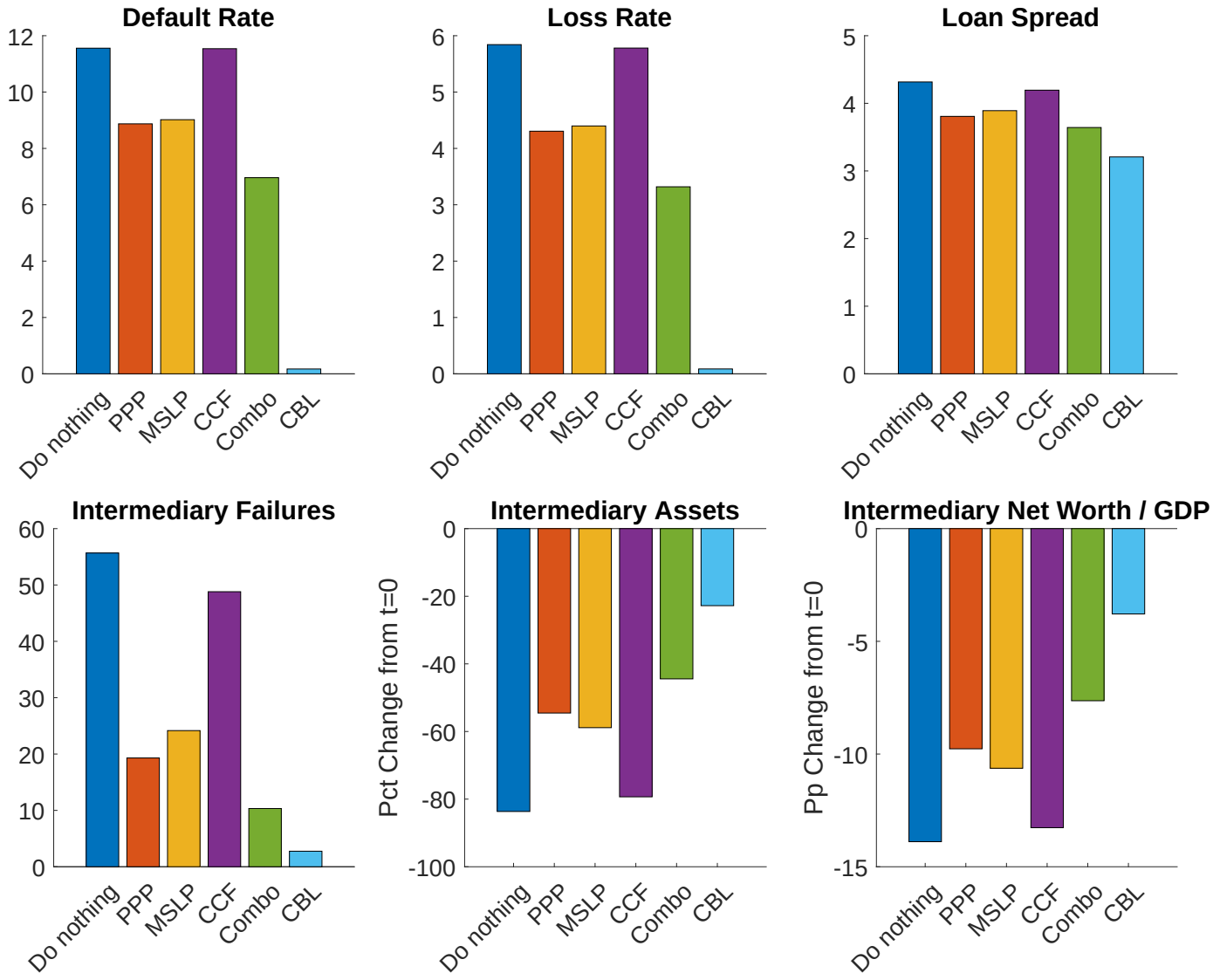
Financial Effects by Program

- Combo program: 1pp smaller loan spread, 4/5 intermediary failures prevented



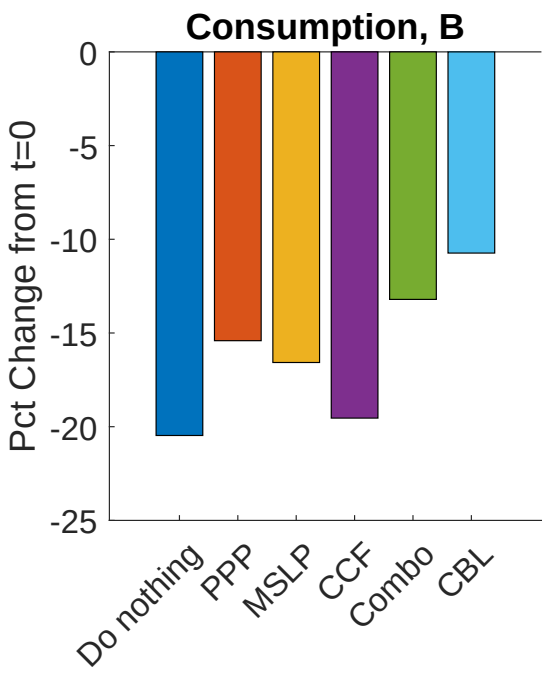
Financial Effects by Program

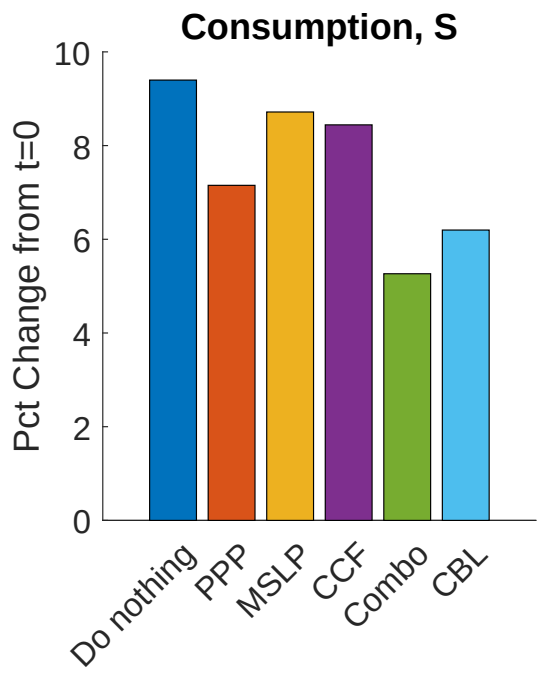
- Perfectly targeted CBL benchmark prevents (almost) all defaults

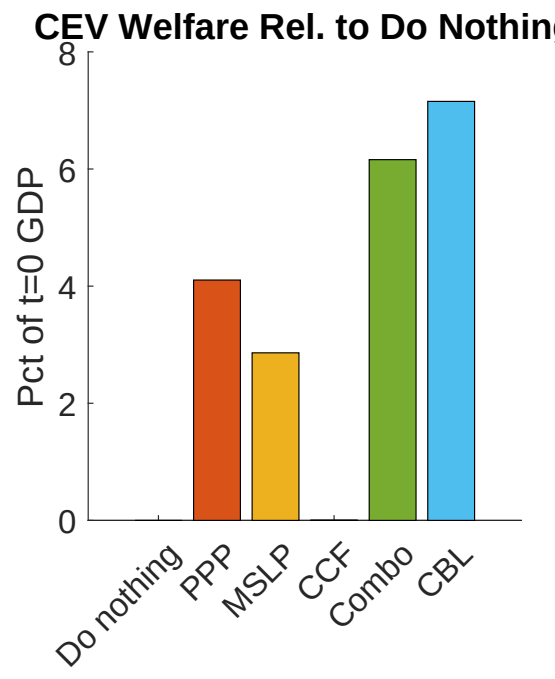


Welfare

- Shareholder (B) consumption falls by 20% in "do-nothing"
- Benefit greatly from lending programs

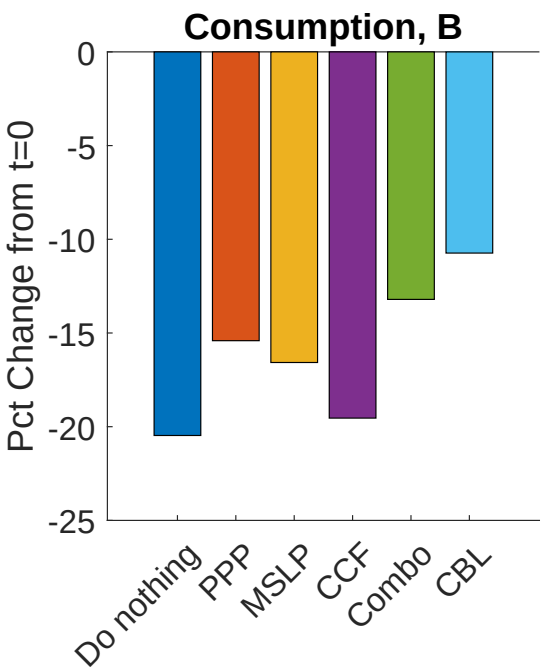


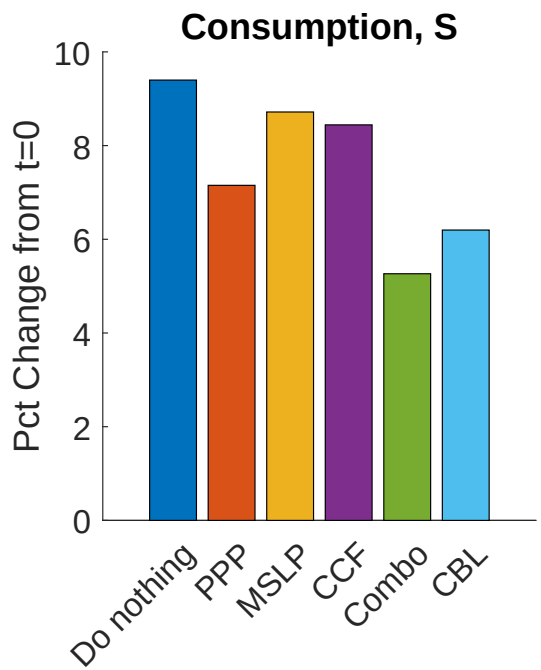


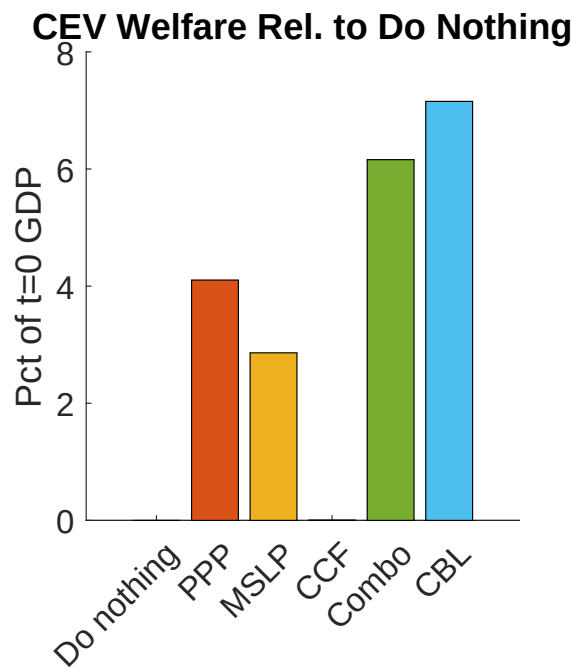


Welfare

- Saver consumption moves inverse to investment
- When fin. system breaks down, savers cannot save $\Rightarrow$ consume instead (IES $= 2$)

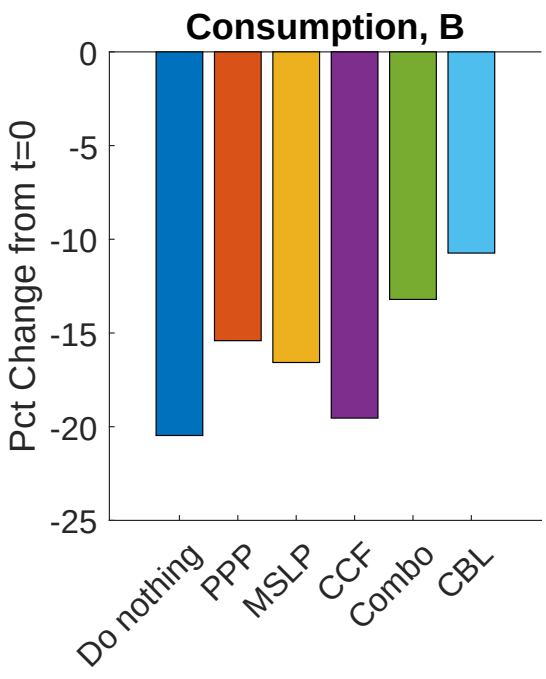


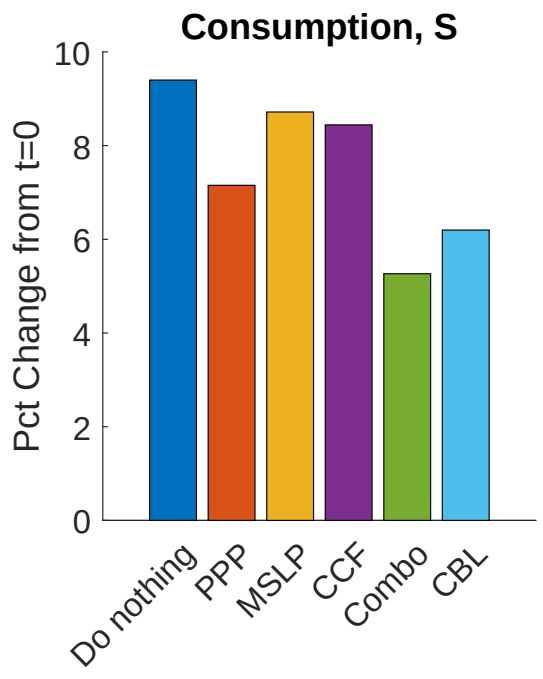


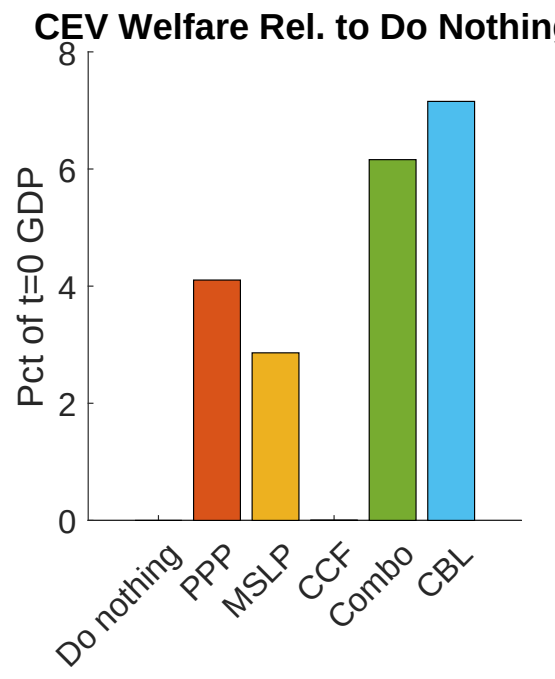


Welfare

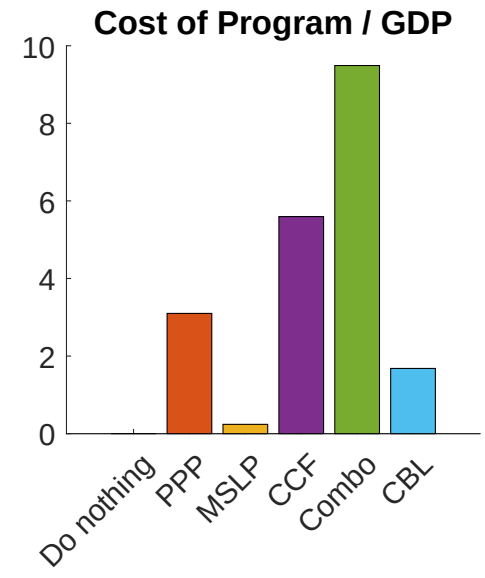
- Households willing to pay 6.2% of pre-Covid GDP for government combo program
- Combo program welfare close to CBL despite imperfections

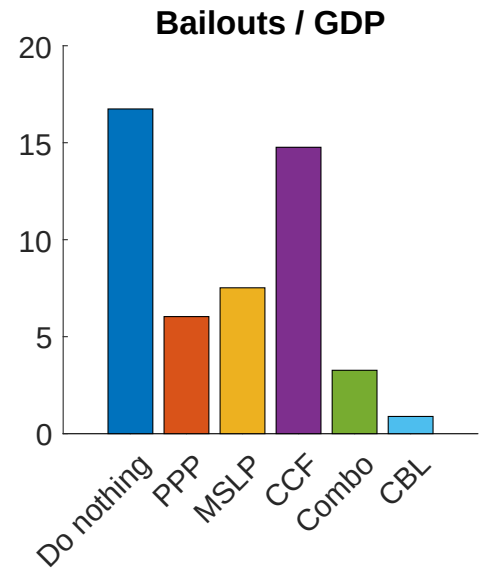


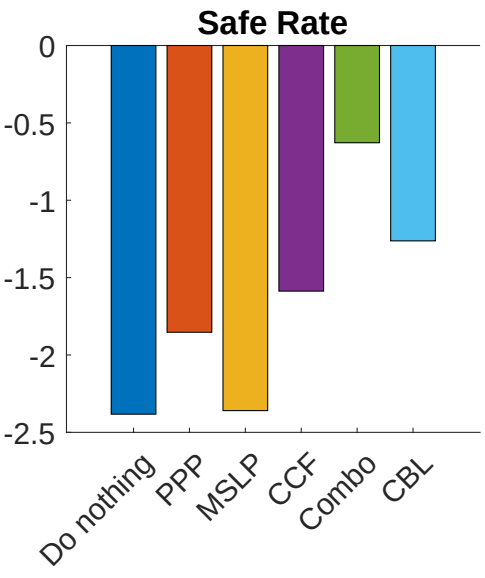


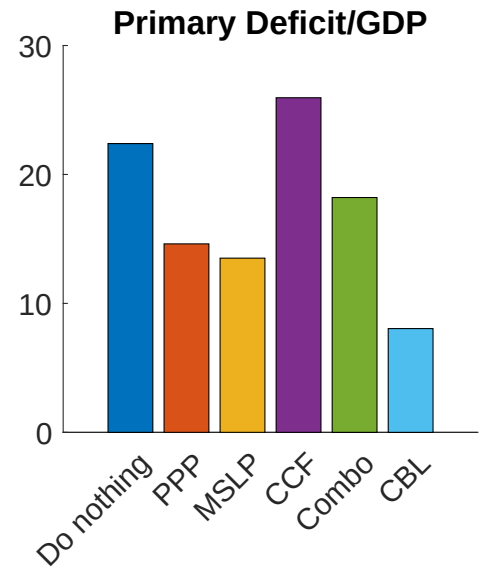


Fiscal Impact by Program









- Do-nothing: 16% for intermed. bailouts (liabilities)
- Combo: 9% of GDP for lending programs, same primary deficit
- Model predicts large safe rate increase from massive government borrowing
  - No convenience yield in model
  - Collapse of financial sector in "Do-nothing" depresses safe rate

Conclusion

- Quantitative evaluation of government lending programs
  - Overall, effective at short-circuiting financial sector collapse
  - The off-the-charts downturn of the "do-nothing" scenario remains counterfactual
- Tight mapping of real-world programs to model
  - PPP: fully guaranteed forgivable bridge loans
  - MSLP: partially guaranteed bridge loans
  - CCF: mainly secondary bond market purchases
  - PPP most effective, but synergies with other programs in GE
  - More targeted program would have been less than 50% the cost
- Model predicts 15pp rise in primary deficit/GDP
  - But bailing out financial system would cost at least as much
  - Large rise in interest rates ahead?
- Extensions: two sectors, labor market frictions

Intermediary Problem

$$\tilde{V}^I(N_t^I, \mathcal{S}_t) = \max_{e_t^I, B_{t+1}^I, A_{t+1}^I} \phi_0^I N_t^I - e_t^I + \mathrm{E}_t \left[\mathcal{M}_{t,t+1}^B \max \left\{ \tilde{V}^I(N_{t+1}^I, \mathcal{S}_{t+1}) + \epsilon_{t+1}^I, 0 \right\} \right]$$

subject to:

$$\begin{aligned}
&(1-\phi_0^I) N_t^I + e_t^I - \Psi^I(e_t^I) \geq q_t^m A_{t+1}^I - (q_t^f + \tau^{\Pi} r_t^f - \kappa) B_{t+1}^I, \\
&N_{t+1}^I = \left[\left(M_{t+1} + (1 - F_{\omega,t+1}(\omega_{t+1}^*))(1 - \tau^{\Pi} + \delta q_{t+1}^m) \right) A_{t+1}^I - B_{t+1}^I \right], \\
&q_t^f B_{t+1}^I \geq -\xi q_t^m A_{t+1}^I, \\
&A_{t+1}^I \geq 0, \\
&\mathcal{S}_{t+1} = h(\mathcal{S}_t).
\end{aligned}$$

$$M_t = \frac{F_{\omega,t}(\omega_t^*)}{A_t^P} \left[(1-\zeta^P) \left(\mathrm{E}_{\omega,t} \left[\omega \,|\, \omega < \omega_t^* \right] Y_t + ((1-\delta_K) p_t - \varsigma) K_t \right) - \sum_j w_t^j \bar{L}^j \right]$$

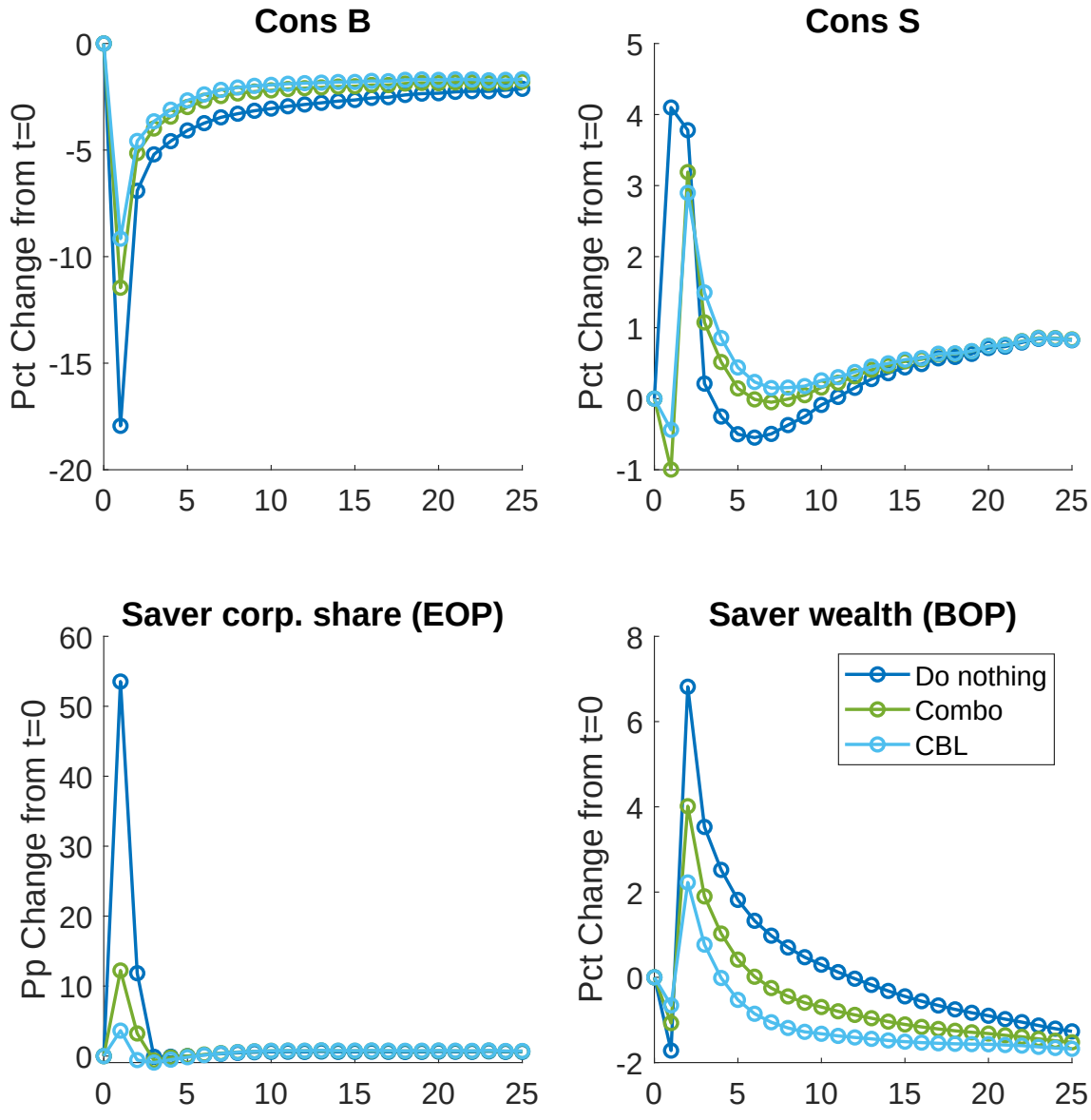
Pre-set Parameters

Par	Description	Value	Source
	Exogenous Shocks		
$\{p^{\omega}_{LL}, p^{\omega}_{HH}\}$	transition prob	0.91, 0.8	Bloom et al. (2012)
	Population and Labor Income Shares		
ℓ^i	pop. shares $\in \{S, B\}$	71.1,28.9%	Population shares SCF 95-13
γ^i	inc. shares $\in \{S, B\}$	64,36%	Labor inc. shares SCF 95-13
	Corporate Loans and Intermediation		
δ	average life loan pool	0.937	Duration fcn. in App. C.5
θ	principal fraction	0.582	Duration fcn. in App. C.5
η^P	% bankr. loss is DWL (producers)	0.2	Bris et al 2006
η^I	% bankr. loss is DWL (banks)	36.2	Bennet & Unal 2015
$\bar{\zeta}^I$	% Resolution cost failed banks	33.2	Bennet & Unal 2015
ϕ^I_0	target bank dividend	0.068	Avg bank div
ϕ^P_0	target firm dividend	0.078	Avg nonfin firm div
ϕ^P_1	firm equity iss. cost	0	Baseline
	Preferences		
$\sigma^B = \sigma^S$	risk aversion B S	1	Log utility
ν^B	IES B	1	Log utility
ν^S	IES S	2	Safe rate vol
	Government		
τ^D	interest rate income tax rate	13.2%	tax code; see text
κ	deposit insurance fee	0.00084	Deposit ins rev/bank assets
ξ	max. intermediary leverage	0.88	Post-crisis cap req

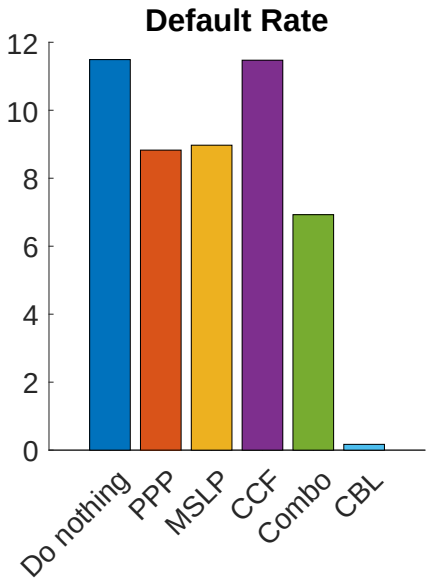
Calibrated Parameters

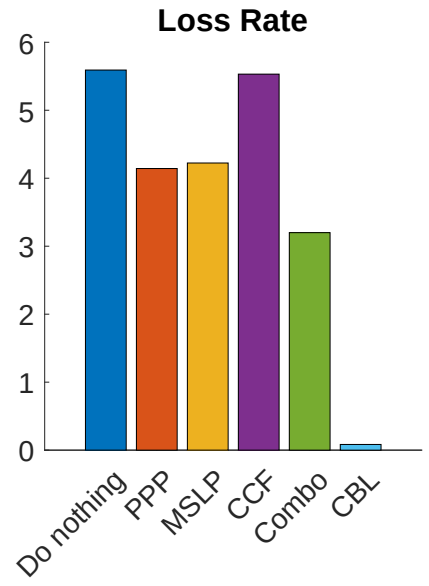
Par	Description	Value	Target	Model
		Exogenous Shocks		
ρ_A	persistence TFP	0.4	AC(1) HP-detr GDP 53-14	0.52
σ_A	innov. vol. TFP	2.3%	Vol HP-detr GDP 53-14	2.50%
$\sigma_{\omega,L}$	low uncertainty	0.1	Avg. corporate default rate	1.90%
$\sigma_{\omega,H}$	high uncertainty	0.18	Avg. IQR firm-level prod	5.00%
		Production		
ψ	marginal adjustment cost	2	Vol. log investment 53-14	8.33%
α	labor share in prod. fct.	0.71	Labor share of output	66.35%
δ_K	capital depreciation rate	8.25	Investment-to-output ratio, 53-14	17.71%
ς	capital fixed cost	0.004	Capital-to-GDP ratio 53-14	215%
		Corporate Loans and Intermediation		
ζ^P	Losses on defaulting loans	0.6	Corporate loan/bond LGD 81-15	48.67%
Φ	maximum LTV ratio	0.4	FoF non-fin sector leverage 85-14	35.07%
σ_ϵ	cross-sect. dispersion ϵ_t^I	1.9%	FDIC failure rate	0.01%
ϕ_1^I	bank equity issuance cost	7	Bank net payout rate	6.17%
φ_0	Saver holdings target	0.0113	M(corp.debt) outside lev fin sector	15.54%
φ_1	Saver holdings adj cost	0.14	Vol(corp.debt) outside lev fin sector	3.00%
		Preferences		
β^B	time discount factor B	0.94	Corporate net payout rate	6.63%
β^S	time discount factor S	0.982	Mean risk-free rate 76-14	2.21%
		Government Policy		
G^o	discr. spending	17.2%	BEA discr. spending to GDP 53-14	17.50
G^T	transfer spending	2.52%	BEA transfer spending to GDP 53-14	3.15%
τ	labor income tax rate	29.3%	BEA pers. tax rev. to GDP 53-14	18.96%
τ^Π	corporate tax rate	20%	BEA corp. tax rev. to GDP 53-14	3.56%
b_o	cyclicality discr. spending	-2	Cov(discr. sp./GDP, GDP growth)	-0.91
b_T	cyclicality transfer spending	-20	Cov(transfer sp./GDP ,GDP growth)	-9.13
b_τ	cyclicality lab. inc. tax	4.5	Cov(tax/GDP,GDP growth)	0.93

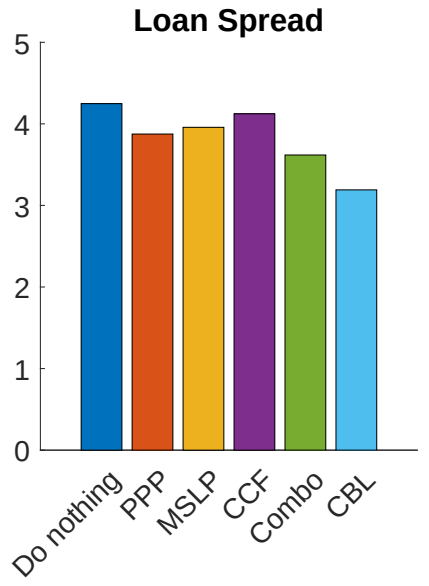
Consumption Dynamics

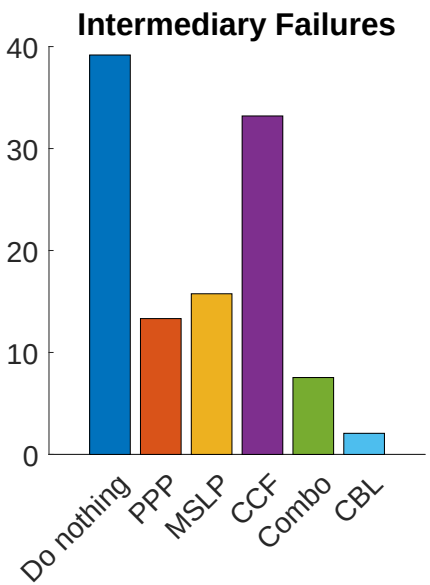


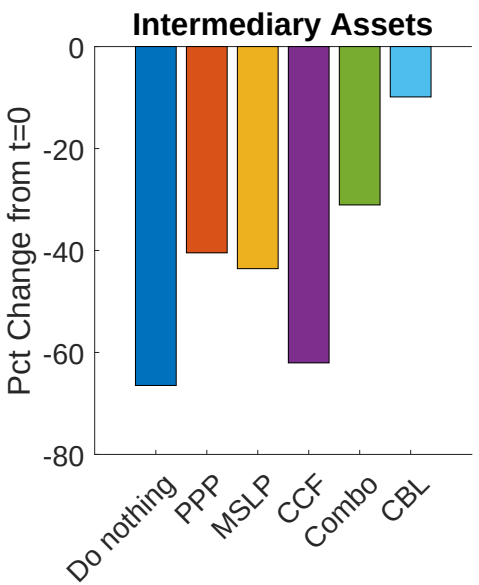
No Recurring Pandemics: Financial Effects

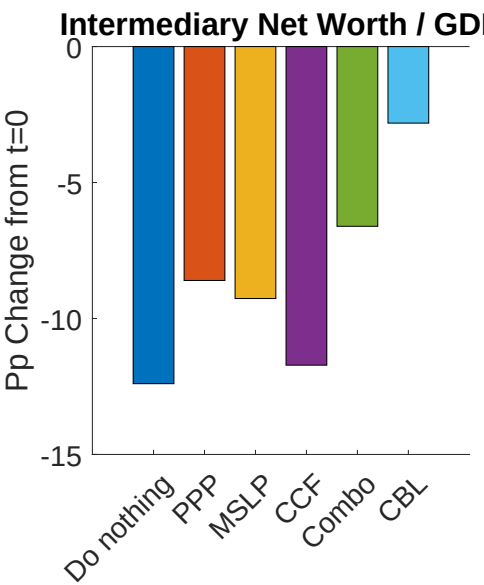




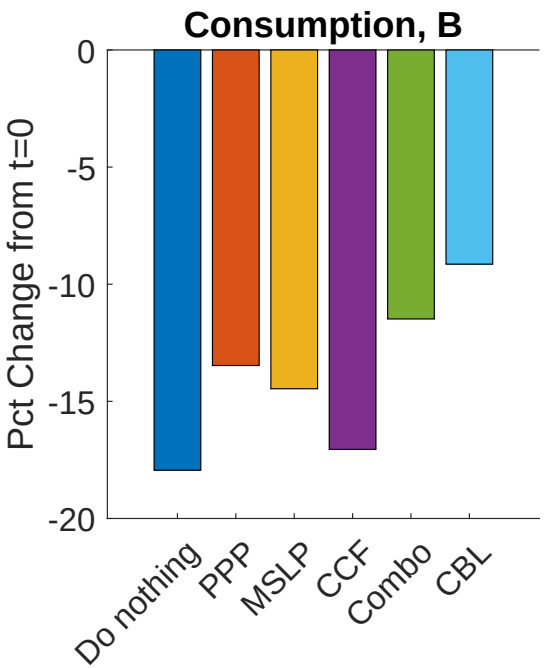


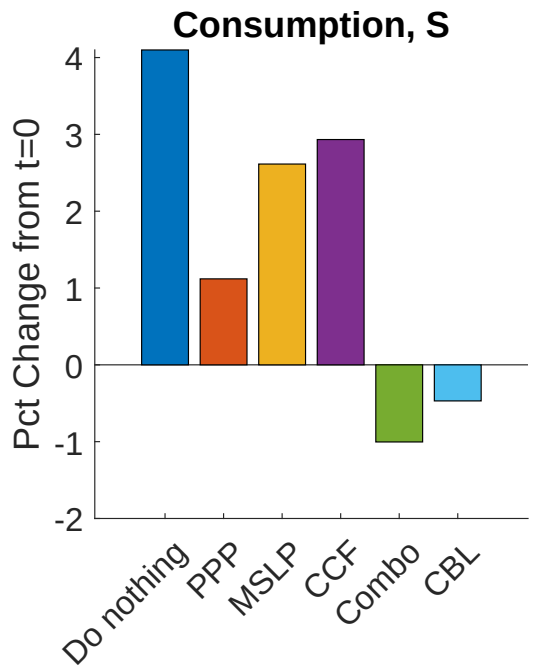


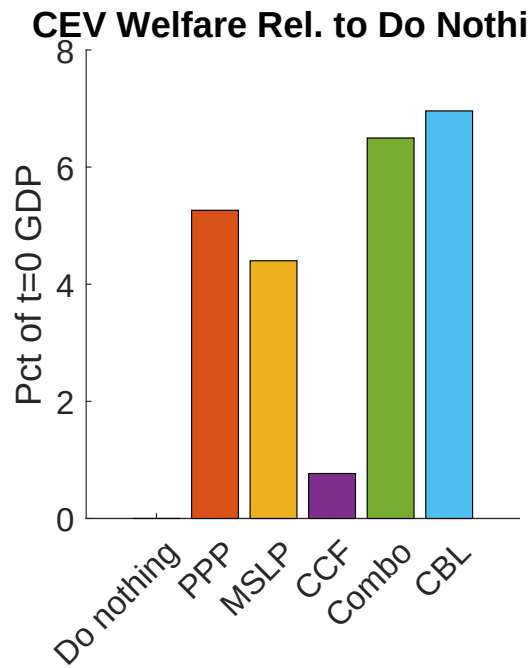




No Recurring Pandemics: Welfare







No Recurring Pandemics: Fiscal Impact