

Policy Assessment with DSGE: The Case of the Philippines

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 - Counterfactual Policy Simulation
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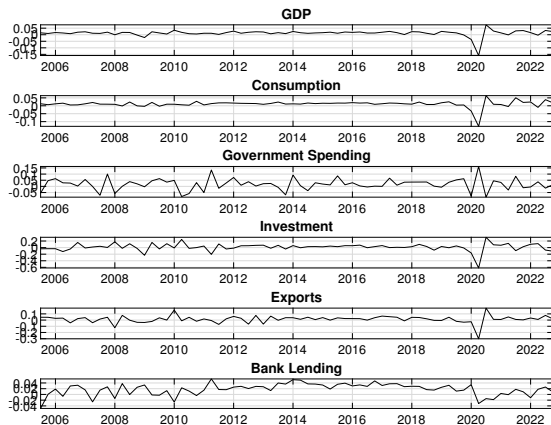
Overview

- We will give an overview of Philippine data between 2005 and 2022
- Data include the GFC and the COVID19 periods
- We then present the overall view of the model
- Model is a common framework for Philippines, Malaysia, Thailand, and South Korea
- We extract from the model estimation insights about which factors were more important for driving key variables
- Finally we examine counterfactual policy scenarios to under the effects of alternative monetary/fiscal supports

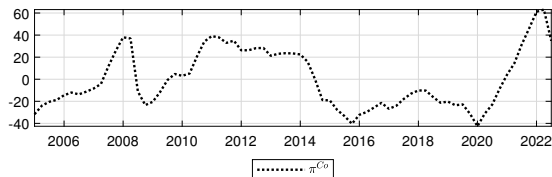
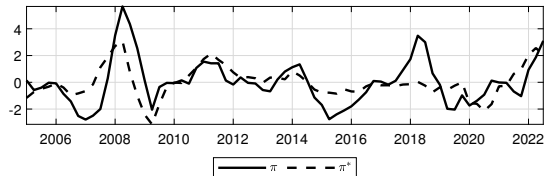
Why DSGE with Bayesian Estimation?

- Lucas criticism: if we want to do policy analysis, we have to realize that non-structural parameters are *policy dependent*.
- The deep parameters of the DSGE model are structural, which we calibrate. This allows us to do counterfactual policy simulation
- We are also interested in the effect of latent variables on the economy.
- In particular there are unobserved changes in productivity, in the disutility of labor, in time preference or social discounting and banking-sector confidence.
- With DSGE models, we can make use of model-generated proxies for these variables.
- We also want to compare actual policy programs with counterfactual optimal policy and counterfactual no-support policy. We can do so with DSGE simulation

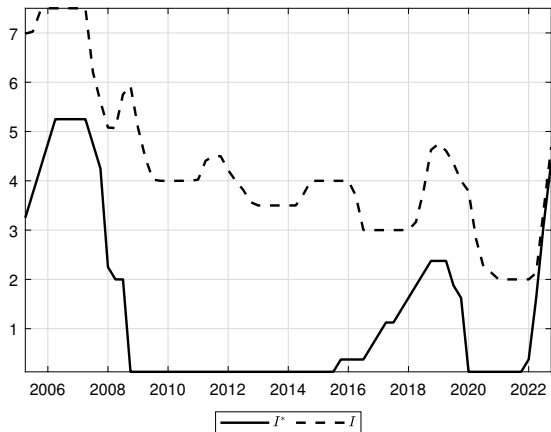
Macro-Financial Indicators



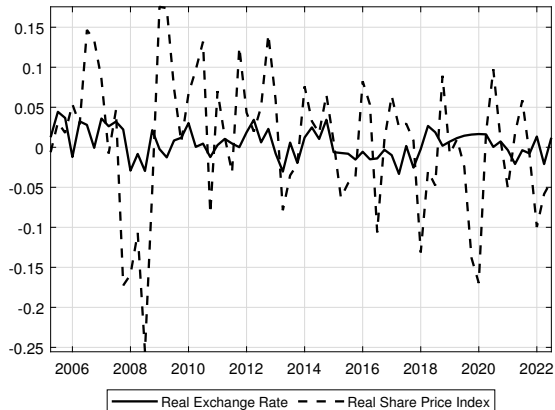
Inflation



Interest Rates



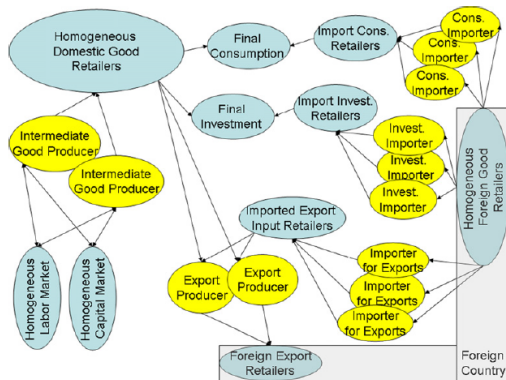
Real Market Indices



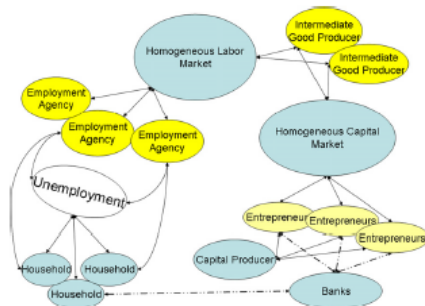
Basic Structure

- Heterogeneous consumers and heterogeneous firms
- Ricardian and rule-of-thumb consumers
- Entrepreneurial and working-capital borrowers
- Financial frictions with the Gertler-Karadi incentive compatibility constraint:
- $V_t \geq \mu_t(L_t^{WC} + L_t^L)$
- The cost to the bank of diverting assets cannot be smaller than the gain from diverting assets
- Shocks to the parameter μ_t only make this constraint more severe

Production and Consumption



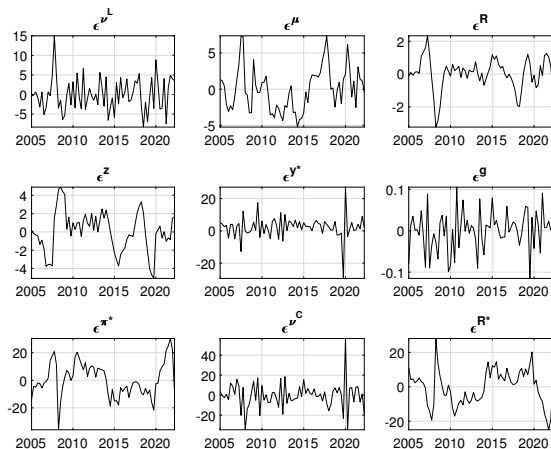
Labor and Financial Sectors



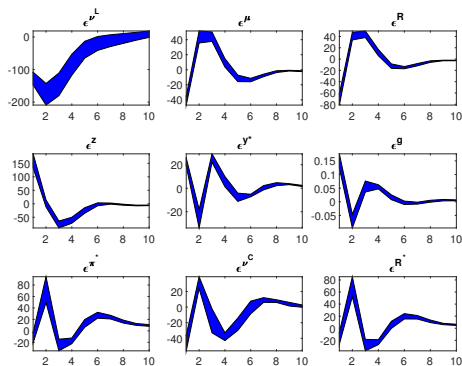
Why?

- George Box: "All models are wrong but some are useful".
- Ed Leamer: "Lets take the con out of Econometrics".
- We bring priors to the data, we know some variables have positive effects, others negative.
- Bayesian estimation is especially useful when we do not have a large number of observations. But again, there is no free lunch.
- With parameter set Ω we use Bayes' rule:
- Mix of Likelihood function $pr(y|\Omega)$ and Priors: $pr(\Omega)$.
- We use eight observables: GDP, investment, real lending, the policy rate, real government consumption, world demand and world commodity prices
- Shocks are for government spending (g), foreign demand (y^*), labor/leisure substitution (ν^L), banking sector risk (μ), foreign inflation (π^*), the policy rate (R) the foreign interest rate (R^*), short-term productivity (z) and time preference (ν^C).

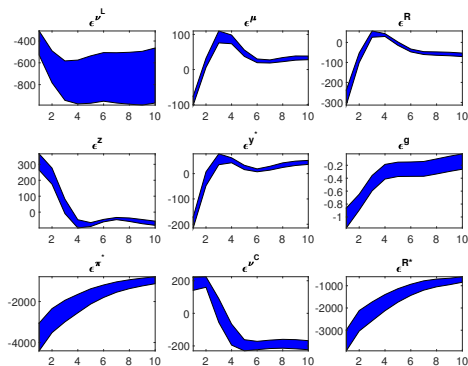
Smoothed Shocks



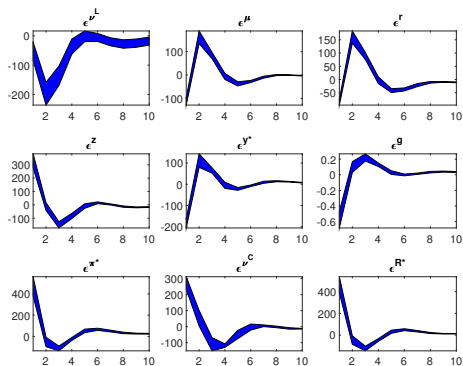
GDP Growth: Impulse Response Paths



Real Exchange Rate: Impulse Response Paths



Real Bank Lending: Impulse Response Paths



FEVD for GDP Growth

Quarterly horizon:

	1	4	8	12	16
ϵ^{ν^L}	0.314	0.513	0.505	0.505	0.513
ϵ^{μ}	0.035	0.041	0.041	0.041	0.040
ϵ^R	0.102	0.062	0.062	0.062	0.061
ϵ^Z	0.486	0.243	0.235	0.233	0.229
ϵ^{y^*}	0.010	0.013	0.014	0.014	0.013
ϵ^g	0.000	0.000	0.000	0.000	0.000
ϵ^{π^*}	0.003	0.044	0.054	0.055	0.055
ϵ^{ν^C}	0.043	0.036	0.038	0.038	0.038
ϵ^{R^*}	0.006	0.047	0.051	0.052	0.051

FEVD for the Real Exchange Rate

Quarterly horizon:

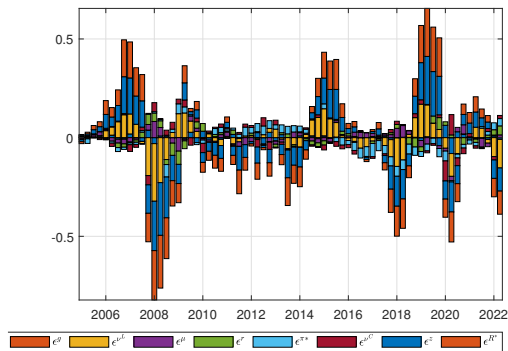
	1	4	8	12	16
ϵ^{ν^L}	0.007	0.030	0.054	0.074	0.088
ϵ^{μ}	0.000	0.000	0.000	0.000	0.000
ϵ^R	0.003	0.001	0.001	0.001	0.002
ϵ^Z	0.004	0.003	0.002	0.002	0.003
ϵ^{y^*}	0.001	0.001	0.001	0.001	0.001
ϵ^g	0.000	0.000	0.000	0.000	0.000
ϵ^{π^*}	0.518	0.525	0.522	0.514	0.507
ϵ^{ν^C}	0.001	0.002	0.003	0.005	0.006

FEVD for Bank Lending

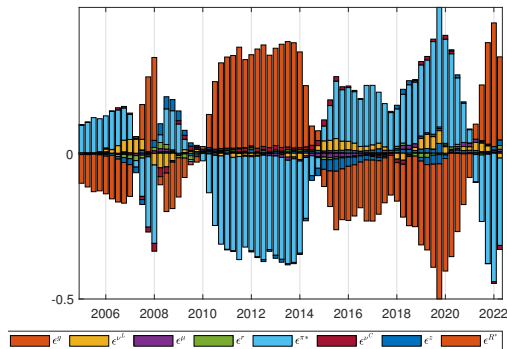
Quarterly horizon:

	1	4	8	12	16
ϵ^{ν^L}	0.004	0.070	0.070	0.071	0.071
ϵ^{μ}	0.020	0.053	0.054	0.054	0.054
ϵ^R	0.011	0.047	0.050	0.050	0.050
ϵ^Z	0.166	0.154	0.150	0.150	0.150
ϵ^{y^*}	0.049	0.054	0.053	0.053	0.053
ϵ^g	0.000	0.000	0.000	0.000	0.000
ϵ^{π^*}	0.324	0.255	0.259	0.259	0.260
ϵ^{ν^C}	0.104	0.110	0.110	0.110	0.110
ϵ^{R^*}	0.322	0.257	0.255	0.254	0.253

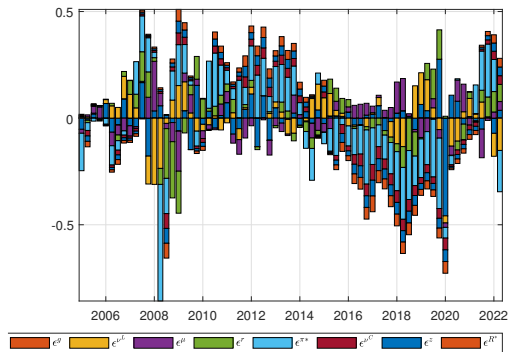
Historical Shock Decomposition: GDP



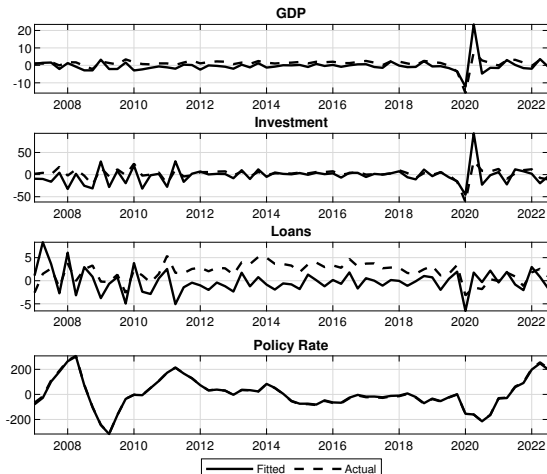
Historical Shock Decomposition: Real Exchange Rate



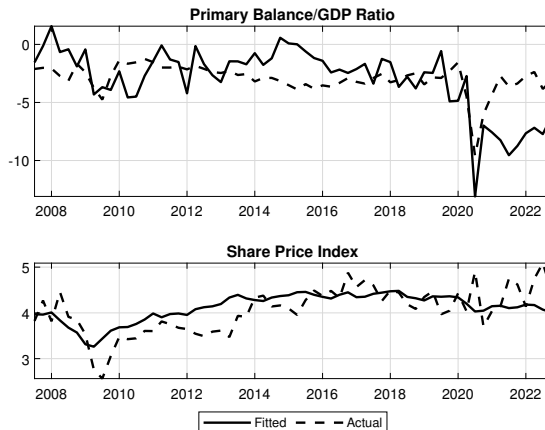
Historical Shock Decomposition: Real Bank Lending



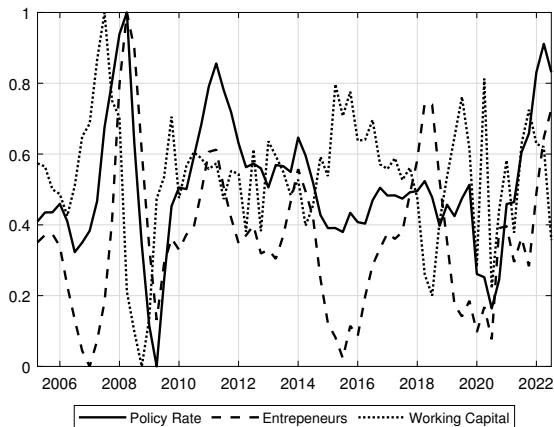
Macro Adjustment



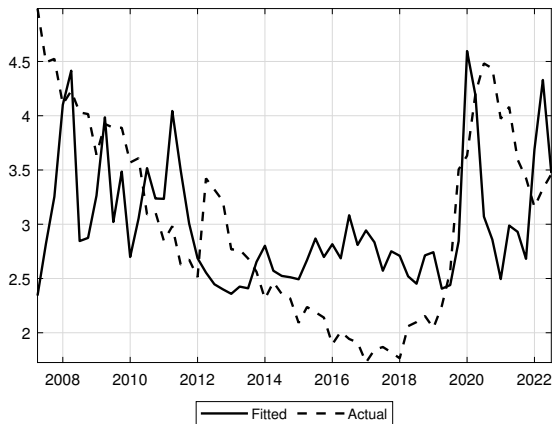
Primary Balance and Share Price Index



Policy Rate and Lending Rates



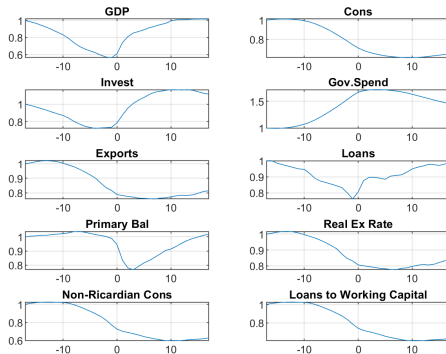
Non-Performing Loan Ratio



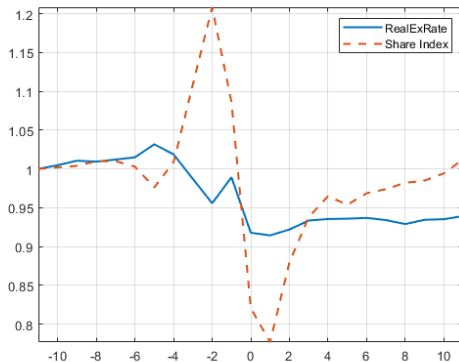
Policy Response in Crisis Periods

- We are interested in the adjustment process not just when it rains but when it pours.
- We examine the adjustment for two years (eight quarters) before and eight quarters after the worst crisis event in the long simulation, when GDP is at its absolute minimum value, over a long simulation length.
- We take 100000 quarterly observations generated by our stochastic simulations and, emulating the empirical literature on crisis events or sudden stops, identify particular sudden stop episodes.
- We then go backward and forward by eight quarters and obtain the median values of key variables leading up to and following the crisis event.
- One question: were the GFC and COVID19 really the worst of possible crisis events, given the stochastic system estimated for the model?
- Or put another way, could things have been much much worse?

Dark Corner Dynamics with Base Parameters



Dark Corner Dynamics for Financial Indices



Design of the Experiment

- We evaluate simple rules for transfers and lending forbearance
- Would they have made much of a difference, especially during the crisis periods
- Would they have made a difference for the Non-Performing Loan (NPL) ratio?
- Simple rules for transfers to Non-Ricardian household (NR) and working-capital borrowing (WC)

Simple Rules for Transfers and Taylor Rule

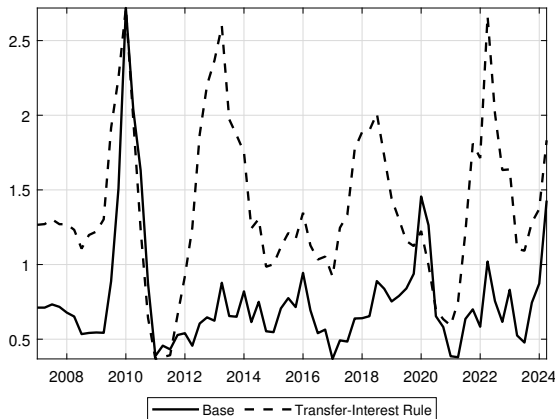
$$TR_t = \gamma_0 TR_{t-1} + \gamma_1 (C_{t-1}^{NR} - C_{ss}^{NR}) + \gamma_2 (L_{t-1}^{WC} - L_{ss}^{WC}) + \gamma_3 (\pi_{t-1} - \pi_{ss}) \quad (1)$$

$$\frac{R_t}{R} = \left(\frac{R_{t-1}}{R} \right)^{\rho_R} \left[\left(\frac{\pi_t}{\bar{\pi}} \right)^{\alpha_\pi} \left(\frac{Y_t}{Y_{t-1}} \frac{1}{a_{t-1}} \right)^{\alpha_y} \right]^{1-\rho_R} \quad (2)$$

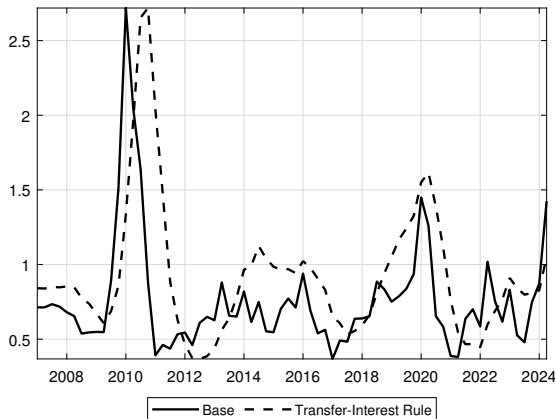
Coefficients for Transfer/Taylor Rules

Coefficient	Co-Term	TR	R
γ_0	TR_{t-1}	.558	–
γ_1	C^{NR}	-6.895	–
γ_2	L^{wc}	-10.33	–
γ_3	π	.903	–
ρ^R	R_{t-1}	–	.983
α^π	$\frac{\pi_t}{\bar{\pi}}$	–	16.909
α^y	$\frac{Y_t}{Y_{t-1}}$	–	5.740

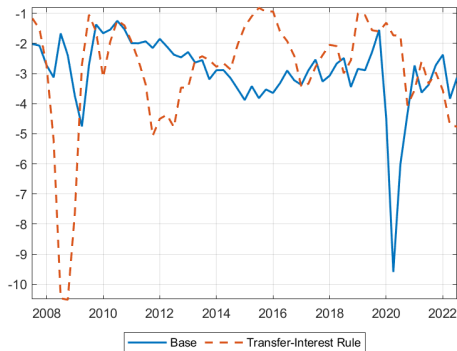
Non-Ricardian Consumption under Base and Optimal Rules



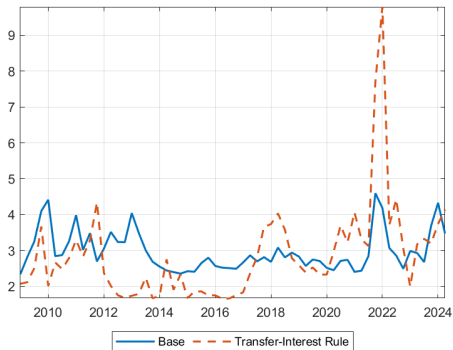
Working Capital Lending under Base and Optimal Rules



Primary Balance under Base and Optimal Rules



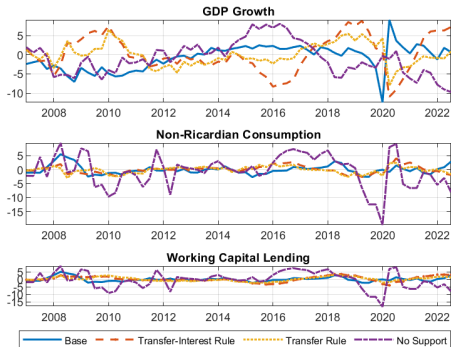
NPL Ratio under Base and Optimal Rules



Comparison of Policy Regimes vs. No Support: Design of Experiment

Regime	Parameters for Transfers (TR) and Taylor Rule (R)
Base Regime	Table 1
Optimal Transfer/Taylor Rules	TR: Table 5: Col. 2 , R: Table 5, Col. 3
Optimal Transfer/Inflation Target	TR: Table 5, Col. 2
	R: $\rho^R = .933, \alpha^\pi = 1.28, \alpha^y = 0$
No Support/Pure Inflation Target	TR: $\forall i \in [0, 3] : \gamma_i = 0$
	R: $\rho^R = .933, \alpha^\pi = 1.28, \alpha^y = 0$

Macro Adjustment under Base and Alternative Regimes



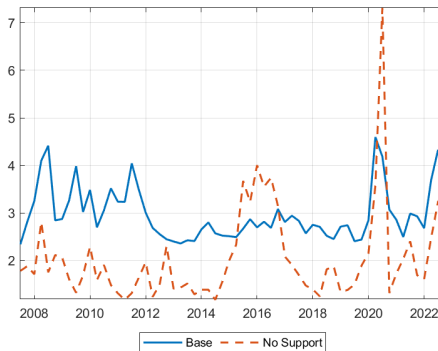
Euclidean Distance Measures of Base and Alternative Regimes for GDP Growth

Full Sample Crisis Periods

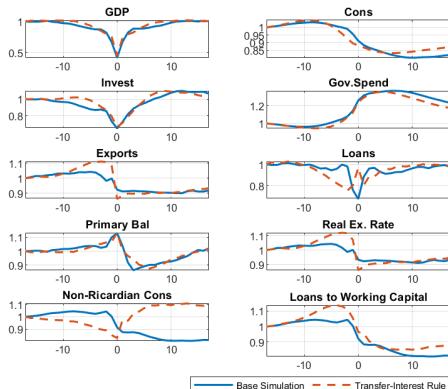
Policy Paths:

Transfer+	Interest	5.024	4.969
Pure	Transfer	3.765	3.890
No	Support	3.481	4.888

NPL Ratio under Base and No-Support Regime



Dark Corner Dynamics: Base and Optimal Rule



Takeaways

- We see that unobservables matter: the disutility of labor, especially in times of crisis
- Philippines is less open than Malaysia, so domestic policies matter.
- Monetary policy is important. The primary lending rate passes through to loans to entrepreneurs
- Targeting both non-Ricardian consumption and working capital lending are effective ways to formulate optimal policy
- The actual policy path is closer to the GDP growth path under optimal policy than the GDP growth path under a no-intervention, no support policy, in times of crisis.

Questions

- Little price stickiness in the model so the quest for the natural rate of interest is not possible
- Government transfers matter but government consumption does not
- This is true, even with the non-Ricardian consumers, which should make fiscal policy matter.