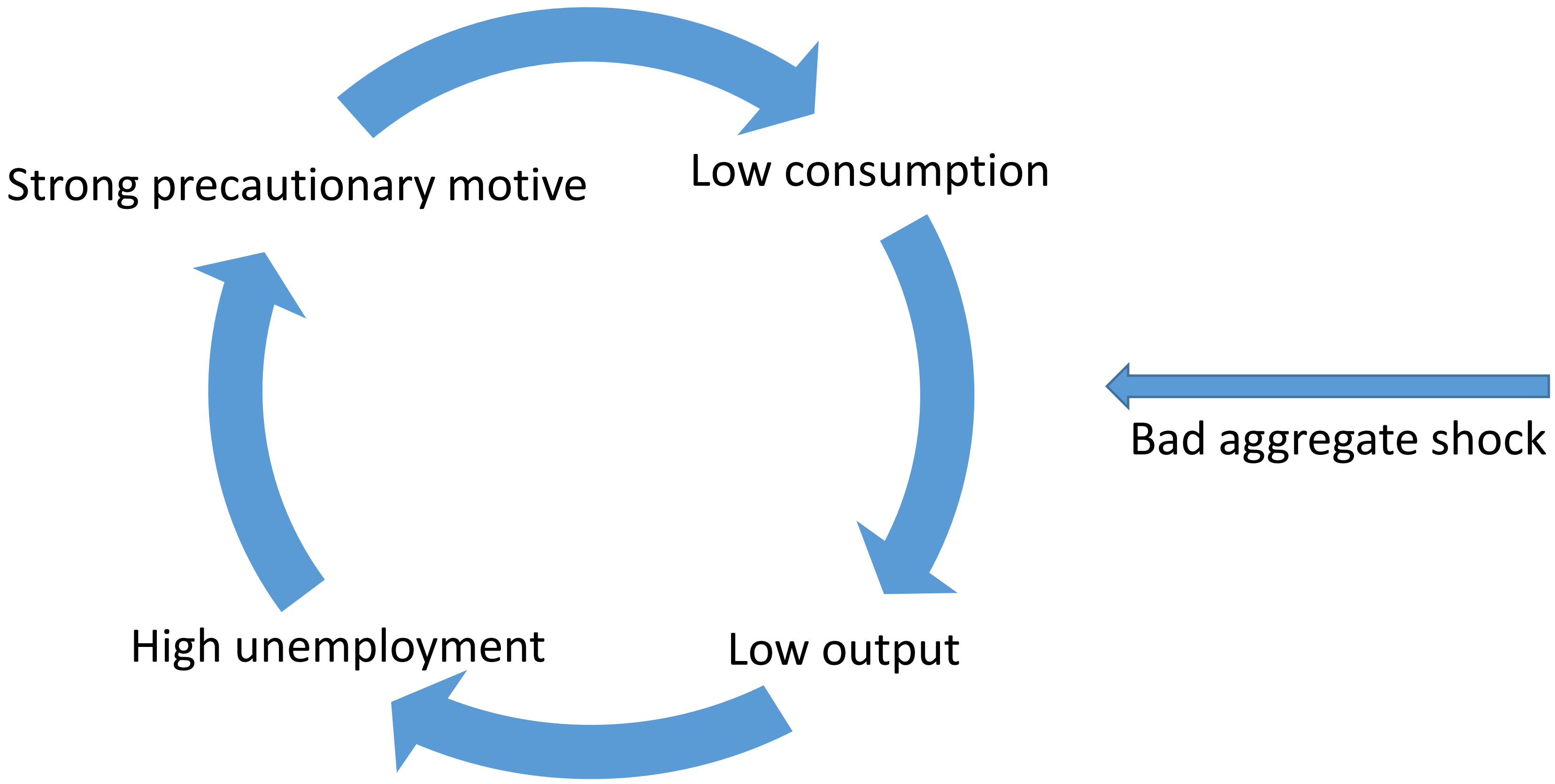
Uninsured Unemployment Risk and Optimal Monetary Policy

Edouard Challe

CREST & Ecole Polytechnique

ASSA 2018



Auclert and Rognlie (2017), Beaudry et al. (2017), Challe et al. (2017), Chamley (2014), Den Haan et al. (2017), Heathcote and Perri (2017), Kekre (2017), McKay and Reis (2017), Ravn and Sterk (2017a, 2017b), Werning (2015)…

Basic questions

- how should the central bank respond to this feedback loop?
- how much does this response differ from that under full insurance?
- how well does the optimal policy stabilise welfare-relevant aggregates (relative to full-insurance benchmark)?

Framework and main results

- tractable HANK model with endogenous unemployment
- focus on (transitory, persistent) **productivity** & **cost-push** shocks
- monetary policy should be (much) **more accomodative in recessions** (and less in expansions) than under full insurance
- policy rate should typically be **lowered** after productivity or cost-push driven recessions (opposite as in RANK)
- This is because monetary policy should **counter the rise in desired savings due to the precautionary motive**
- optimal policy **almost fully neutralises** feedback loop between aggregate demand and unemployment risk

Model overview

- 2 household types: workers, firm owners
- 3 firm types (final, wholesale, intermediate goods)
- government:
  - sets (lump sum, constant) taxes and transfers
  - balanced budget
- central bank: sets policy rate

		Firms	*Frictions*	*Taxes*
household labour	$\Rightarrow$	intermediate goods	costly search	τ^I, T, ζ_t
		$\Downarrow$		
		differentiated wholesale goods	monopolistic comp. & Calvo pricing $(p_t^*,\ \pi_t,\ \Delta_t)$	τ^W
		$\Downarrow$		
consumption & vacancy costs	$\Leftarrow$	final goods		

Households

- discount factor β, nonnegative asset wealth
- **workers**: period utility $u(c)$ ($u' > 0$, $u'' < 0$) and constraints:

$$a_{i,t} + c_{i,t} \quad = \quad e_{i,t} w_t + (1 - e_{i,t})\,\delta + R_t a_{i,t-1} \;\text{ and }\; a_{i,t} \geq 0$$

- **firm owers**: period utility $\tilde{u}(c)$ ($\tilde{u}' > 0$, $\tilde{u}'' \leq 0$) and constraints:

$$a_t^F + c_t^F = \frac{D_t + \varpi + \tau_t}{\nu} + R_t a_{t-1}^F \;\text{ and }\; a_t^F \geq 0$$

- only workers have a precautionary motive
- a = real value of nominal bond holdings; hence $R_t = \frac{1+i_{t-1}}{1+\pi_t}$

Intermediate goods firms and labor market flows

- job creation/destruction a la DMP, with matching technology

$$M_t = m\left(1-(1-\rho)\,n_{t-1}\right)^{\gamma} v_t^{1-\gamma}$$

- free-entry $c = \lambda_t J_t$, where

$$J_t = \underbrace{(1-\tau^l)(z_t\varphi_t - w_t + T - \zeta_t)}_{\text{flow profit from employ. relationship}} + (1-\rho)\,\mathbb{E}_t M^F_{t+1} J_{t+1}$$

- equivalently:

$$f_t^{\frac{\gamma}{1-\gamma}} = (1-\tau^l)\frac{m^{\frac{1}{1-\gamma}}}{c}(z_t\varphi_t - w_t + T - \zeta_t) + (1-\rho)\,\mathbb{E}_t M^F_{t+1} f_{t+1}^{\frac{\gamma}{1-\gamma}}$$

Equilibrium

- optimal choices consistent with market-clearing + free entry
- zero debt limit $\Rightarrow$ equilibrium wo. asset trades
- with common β, eq'm such that
  - employed workers precautionary-save, hence take down R_t
  - at that rate, the other households would like to borrow, but cannot
  - thus all households consume their current income
- preserves precautionary motive whilst maintaining tractability
- allows aggregation of ind. welfares into **social welfare function**

Constrained efficiency

Social welfare function

- constrained-efficient allocation solves:

$$W_t\left(n_{t-1},\Delta_{t-1},z_t\right)=\max_{p_t^*,w_t,n_t\geq 0}\left\{U_t+\beta\mathbb{E}_tW_{t+1}\left(n_t,\Delta_t,z_{t+1}\right)\right\},$$

where

$$U_t=\underbrace{n_tu\left(w_t\right)+\left(1-n_t\right)u\left(\delta\right)}_{\text{workers}}+\underbrace{\Lambda\nu\tilde{u}\left(\frac{1}{\nu}\left[\varpi+n_t\left(\frac{z_t}{\Delta_t}-w_t\right)-cv_t\right]\right)}_{\text{firm owners}}$$

- 5 potential inefficiencies:
  1. monopolistic competition ($\Rightarrow\tau^W>0$)
  2. relative price distortions ($\Rightarrow\pi_t^*=0$)
  3. congestion externalities ($\Rightarrow\tau^I>0$)
  4. **imperfect insurance** ($\Rightarrow T>0$)
  5. **income-redistributive wage** $\Rightarrow$

$$u'\left(w_t^*\right)=\Lambda\tilde{u}'\left(\nu^{-1}\left[n_t^*\left(z_t-w_t^*\right)-cv_t^*+\varpi\right]\right)$$

Constrained efficiency

Details

constrained-efficient f_t^* vs decentralised-eq'm f_t:

$$f_t^{*\frac{\gamma}{1-\gamma}} = \frac{(1-\gamma)\, m^{\frac{1}{1-\gamma}}}{c}\left[z_t - w^* + \frac{u(w_t^*) - u(\delta)}{u'(w_t^*)}\right] + (1-\rho)\,\mathbb{E}_t M_{t+1}^{F*} f_{t+1}^{*\frac{\gamma}{1-\gamma}}\left(1 - \gamma f_{t+1}^*\right)$$

$$f_t^{\frac{\gamma}{1-\gamma}} = \frac{(1-\tau^I)\, m^{\frac{1}{1-\gamma}}}{c}\left[z_t\varphi_t - w_t + T - \zeta_t\right] + (1-\rho)\,\mathbb{E}_t M_{t+1}^{F} f_{t+1}^{\frac{\gamma}{1-\gamma}}$$

- $\frac{u(w^*)-u(\delta)}{u'(w^*)}$ reflects insurance externality and calls for $T > 0$
- $1-\gamma$ & $1-\gamma f_{t+1}^*$ reflect congestion externalities and call for $\tau^I > 0$
- φ_t (≤ 1) reflects monopolistic distortions and calls for $\tau^W > 0$
- assume taxes decentralise constr.-efficient allocation **in steady state**

Full worker reallocation + risk-neutral firm owners

Linear-quadratic problem

- $\rho = 1$ and $\tilde{u}(c) = c$; then, to 2nd order max W_t is equivalent to:

$$\min L_t = \frac{1}{2}\mathbb{E}_t \sum_{k=0}^{\infty} \beta^k \left(\tilde{n}_{t+k}^2 + \Omega \pi_{t+k}^2\right), \quad \tilde{n}_t \equiv \underbrace{\hat{n}_t - \hat{n}_t^*}_{\text{employment gap}}$$

s.t.

$$\pi_t = \beta \mathbb{E}_t \pi_{t+1} + \frac{\kappa}{\Phi}\tilde{n}_t + \kappa \hat{\zeta}_t \quad \text{(NKPC)}$$

$$\Psi \mathbb{E}_t \tilde{n}_{t+1} = \hat{\imath}_t - \mathbb{E}_t \pi_{t+1} - r_t^* \quad \text{(EC)}$$

where

$$r_t^* = \Psi \Phi \mu_z \hat{z}_t$$

- EC reflects precautionary motive, with strength $\Psi \in (0, +\infty)$
- efficient rate r_t^* is affected by precautionary motive

Full worker reallocation + risk-neutral firm owners

Optimal Ramsey policy

$$i_0(\hat{z}_0, \hat{\zeta}_0) = \underbrace{\Upsilon(\alpha + \mu_\zeta - 1)\hat{\zeta}_0}_{\text{perfect-insurance response}} \underbrace{- \Psi\Upsilon\theta n(\alpha + \mu_\zeta)\hat{\zeta}_0 + \Psi\Phi\mu_z \hat{z}_0}_{\text{imperfect-insurance correction}},$$

and

$$i_{t\geq 1}(\hat{z}_0, \hat{\zeta}_0) = \underbrace{\Upsilon[\mu_\zeta^t - (1-\alpha)\textstyle\sum_{k=0}^t \alpha^k \mu_\zeta^{t-k}]\hat{\zeta}_0}_{\text{perfect-insurance response}}$$

$$\underbrace{- \Psi\Upsilon\theta n[\textstyle\sum_{k=0}^t \alpha^k \mu_\zeta^{t-k}]\hat{\zeta}_0 + \Psi\Phi\mu_z^{t+1}\hat{z}_0}_{\text{imperfect-insurance correction}}$$

- imperfect insurance **mutes down** / **reverts** interest-rate response
- implied $\{\tilde{n}_t, \pi_t\}_{t=0}^{\infty}$ is the **same as under perfect insurance**

Full worker reallocation + risk-neutral firm owners

Optimal discretionary policy

$$\hat{\imath}_t(\hat{z}_0, \hat{\zeta}_0) = \underbrace{\left(\frac{\kappa \Phi \mu_\zeta^{t+1}}{(1 - \beta \mu_\zeta)\Phi + \kappa \theta n} \right) \hat{\zeta}_0}_{\text{perfect-insurance response}}$$

$$\underbrace{- \Psi \left(\frac{\kappa \Phi \theta n \mu_\zeta^{t+1}}{(1 - \beta \mu_\zeta)\Phi + \theta n \kappa} \right) \hat{\zeta}_0 \; + \; \Psi \Phi \mu_z^{t+1} z_0}_{\text{imperfect-insurance correction}}$$

- more accomodation + replication of perfect-insurance dynamics

Partial worker reallocation + risk-averse firm owners

- solve Ramsey problem numerically for calibrated economy
- baseline: efficient wage with $\sigma = 1, \tilde{\sigma} = 0.38$ $\left(\Rightarrow \frac{d \log w}{d \log z} = 1/3\right)$

Calibration.

Parameters			*Targets*		
	Description	Value	Eq.	Description	Value
β	Discount factor	0.989	$4i$	Annual interest rate	2%
θ	Elasticity of subst.	6.000	$\frac{1}{\theta-1}$	Markup rate	20%
ω	% unchanged price	0.750	$\frac{1}{1-\omega}$	Mean price duration	1 year
c	Vacancy cost	0.044	$\frac{c}{w^*}$	Labor cost of vacancy	4.5%
w^*	Real wage	0.979	f	Job-finding rate	80%
m	matching efficiency	0.765	λ	Vacancy-filling rate	70%
ρ	Job-destruction rate	0.250	s	Job-loss rate	5%
δ	Home production	0.882	$\frac{\delta}{w^*}$	Opp. cost of empl.	90%

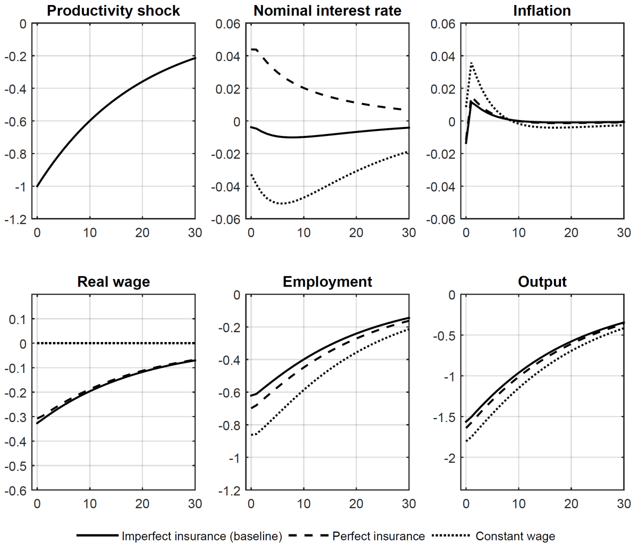


Figure: Contractionary productivity shock (imperfect vs. perfect insurance).

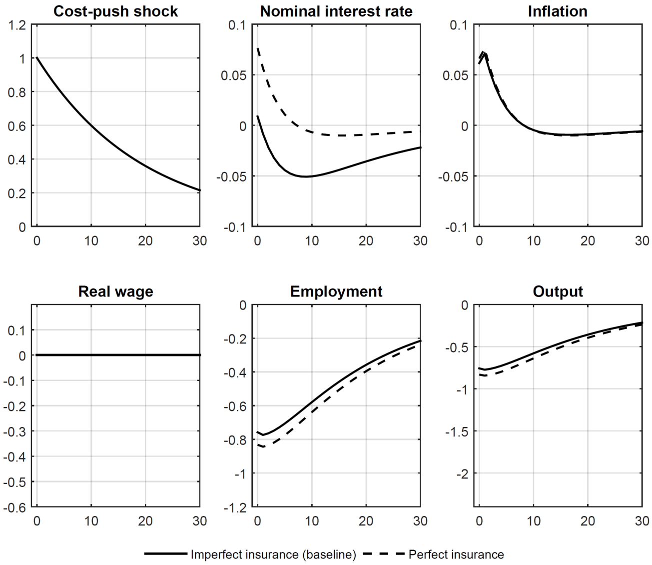


Figure: Contractionary cost-push shock (imperfect vs perfect insurance).

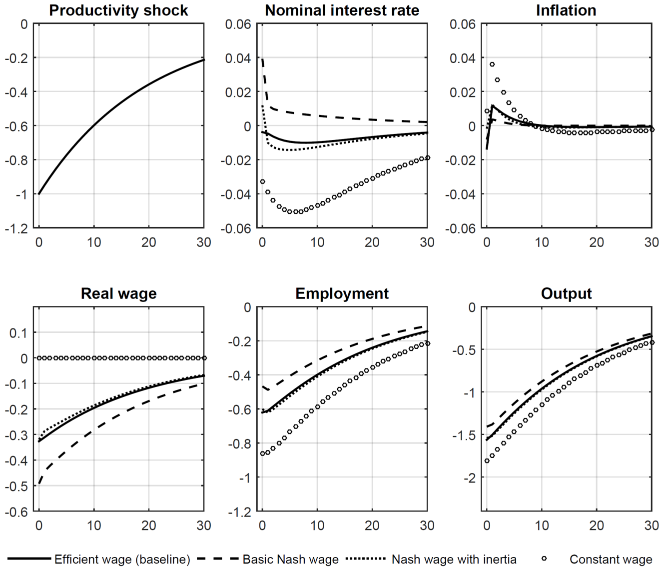


Figure: Contractionary productivity shock (alternative wage settings).

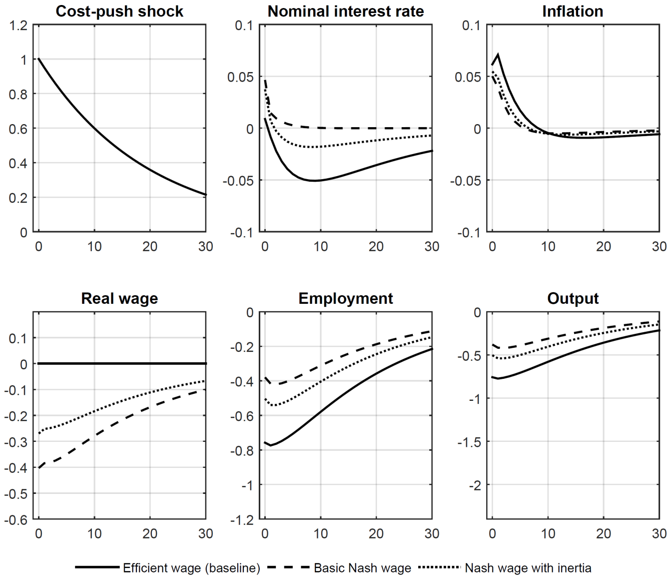


Figure: Contractionary cost-push shock (alternative wage settings).

Summary

- optimal monetary policy in NK model with endogenous unemployment risk ($\Rightarrow$ amplification through feedback loop)
- replicates RANK predictions under perfect insurance
- but policy should be much more accomodative under imperfect insurance – hence RANK predictions may be overturned
- optimal policy (almost) replicates perfect-insurance dynamics
- incomplete markets "do not matter" when monetary policy is unconstrained and optimised
- robust to various model variants
  - plausible iwage responses
  - distorted steady state
  - degree of insurance