The Fed Put and Monetary Policy: An Imperfect Knowledge Approach

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Snapshot

Monetary policy should take into account symmetrically and explicitly stock prices in an economic environment where

- agents have imperfect knowledge about the structure of the economy
- stock prices are driven by animal spirits

Policy Recommendation: announce 12 bp increase in policy rates for every 100% increase in stock prices

Motivation

There is growing evidence that the Fed reacts *implicitly* to stock prices: The Fed Put (Cieslack and Vissing-Jorgensen (2020))

- the stock market does cause Fed actions
- the main channel the Fed considers is through consumption wealth effects $\Longrightarrow$ aggregate demand

The magnitude of the consumption wealth effect is relevant: Di Maggio *et al.* (2020) estimate MPC between **2%-20%**

Most monetary models that study stock price targeting do not

- consider the aggregate demand channel
- have a realistic stock market and expectation dynamics

Contribution

- decoupling of stock prices from fundamentals due to imperfect information $\Longrightarrow$ wealth effects
- quantitative model replicates joint behaviour of stock prices and expectations

Main Transmission Channel

sentiment swings $\Longrightarrow$ capital gain expectations $\Longrightarrow$ booms and busts in stock prices $\Longrightarrow$ wealth effects $\Longrightarrow$ aggregate demand

Monetary policy can break these links by managing long-term stock price expectations: **transparency is crucial**

Stock Price Wealth Effect: Intuition

- simple endowment economy, continuum of identical households
- $Q_t \equiv$ stock price of an asset paying D_t
- agent i solves

$$\max_{C^i_t,B^i_t,S^i_t} E_0^{\mathcal{P}_i}\sum_{t=0}^{\infty}\delta^t\frac{(C^i_t)^{1-\sigma}}{1-\sigma}$$
$$s.t.\quad P_tC^i_t + B^i_t + S^i_tQ_t \le B^i_{t-1}(1+i_{t-1}) + S^i_{t-1}(Q_t+D_t) \tag{1}$$

where $D_t \sim \mathcal{N}(\mu,\sigma^2)$ and $i_t = \phi_\pi\pi_t$

Optimal consumption decision under Imperfect Knowledge

$$\tilde{C}_t \approx (1-\delta)E^{\mathcal{P}}_t\sum_{j=0}^{\infty}\delta^j\tilde{d}_{t+j} - \frac{\delta}{\sigma}E^{\mathcal{P}}_t\sum_{j=0}^{\infty}\delta^j(i_{t+j}-\pi_{t+j+1})$$
$$\underbrace{+\underbrace{\delta\tilde{q}_t}_{\text{Stock Prices}} \underbrace{-(1-\delta)\left[E^{\mathcal{P}}_t\sum_{j=1}^{\infty}\delta^j\tilde{d}_{t+j} - \frac{\delta}{1-\delta}E^{\mathcal{P}}_t\sum_{j=0}^{\infty}\delta^j(i_{t+j}-\pi_{t+j+1})\right]}_{\text{Discounted sum of Dividends}}}_{\textbf{Wealth Effect = 0 under Rational Expectations}}$$

- similarly to RE, agents have perfect knowledge about $\tilde{d}_t, i_t$
- agents think that inflation and stock prices follow an unobserved component model

$$x_t = \beta^x_t + \epsilon_t$$
$$\beta^x_t = \beta^x_{t-1} + \psi_t \tag{2}$$

where $x = (\tilde{q}, \pi)'$.

- *optimality condition for stock prices is of the one-step ahead form*

$$q_t = \delta E^{\mathcal{P}}_t\left[\left(\frac{C_{t+1}}{C_t}\right)^{-\sigma}(d_{t+1}+q_{t+1})\right]. \tag{3}$$

Learning Equilibrium

$$\boldsymbol{\pi_t} = \frac{\delta\sigma}{\phi_\pi}\hat{\boldsymbol{\beta}}^{\boldsymbol{q}}_{\boldsymbol{t-1}} - \left[\frac{\sigma}{\phi_\pi} - \frac{(1-\sigma)(\delta\phi_\pi-1)}{(1-\delta)\phi_\pi}\right]\hat{\boldsymbol{\beta}}^{\boldsymbol{\pi}}_{\boldsymbol{t-1}} - \underbrace{\frac{\sigma}{\phi_\pi}\tilde{\boldsymbol{d}}_{\boldsymbol{t}}}_{RE}$$

- imperfect knowledge about stock prices influences the equilibrium relation of inflation

Quantitative Model

Two Agent New Keynesian (TANK) model with a stock market + **Imperfect Knowledge**

- heterogeneity in stock market participation
- internally rational agents optimise given their belief system
- rest of model blocks standard in the learning literature
- *Shocks:* cost push, monetary policy, sentiment shock about stock prices

		Learning Model	
Business Cycle	Data Moment	Moment	t-ratio
Std. dev. of output	1.45	1.47	-0.39
Std. dev. of inflation	0.54	0.45	1
Correlation output/inflation	0.29	0.26	0.36
Financial Moments			
Average PD ratio	154	154	-0.38
Std. dev. of PD ratio	63	65	-0.34
Auto-correlation of PD ratio	0.99	0.96	0.57
Std. dev. of equity return (%)	6.02	6.05	0.04
Std. dev. real risk free rate (%)	0.72	0.8	0.59
Non-Targeted Moments			
volatility ratio stock prices/output	6.7	5.2	2
corr. Stock Prices/ output	0.5	0.45	0.53
Consumption Wealth Effect	[0.02-0.2]	0.09	
Std. dev. Expected Returns(%)	2.56	1.8	
corr. Survey Expect./ PD ratio	0.74	0.45	

Table: Model implied moments.

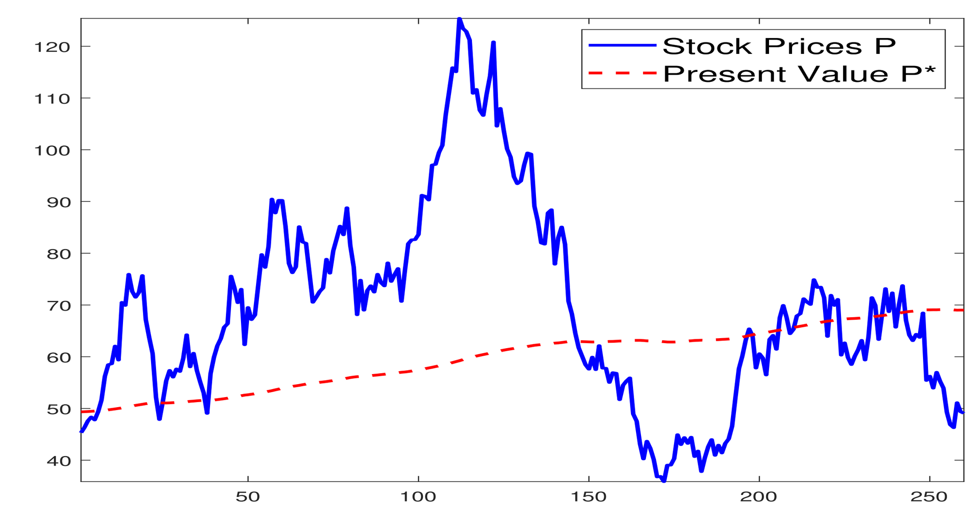

Figure: Simulation: Stock Prices vs rational prices

Policy Influence on Wealth Effects

Taylor rule: $i_t = \phi_\pi\pi_t + \phi_y\tilde{y}_t + \phi_q\tilde{q}_{t-1}$

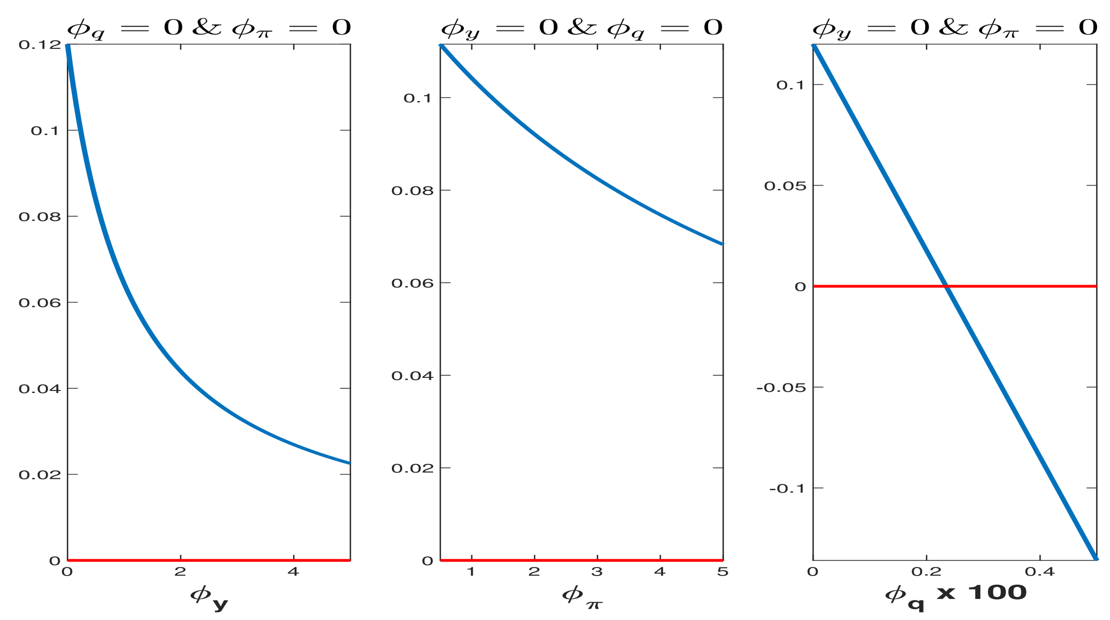

Figure: Stock Price Wealth Effects and Monetary Policy

- responding to stock prices transparently is efficient in influencing wealth effects

Welfare Analysis

$$i_t = 1.5\,\pi_t + 0.125\,\tilde{y}_t + \phi_q\,\tilde{q}_{t-1}1_{\tilde{q}_{t-1}<Q^-} \qquad \text{(Fed put)}$$
$$i_t = 1.5\,\pi_t + 0.125\,\tilde{y}_t + \phi_q\,\tilde{q}_{t-1}(1_{\tilde{q}_{t-1}<Q^-} + 1_{\tilde{q}_{t-1}>Q^+}) \qquad \text{(Fed put-call)}$$

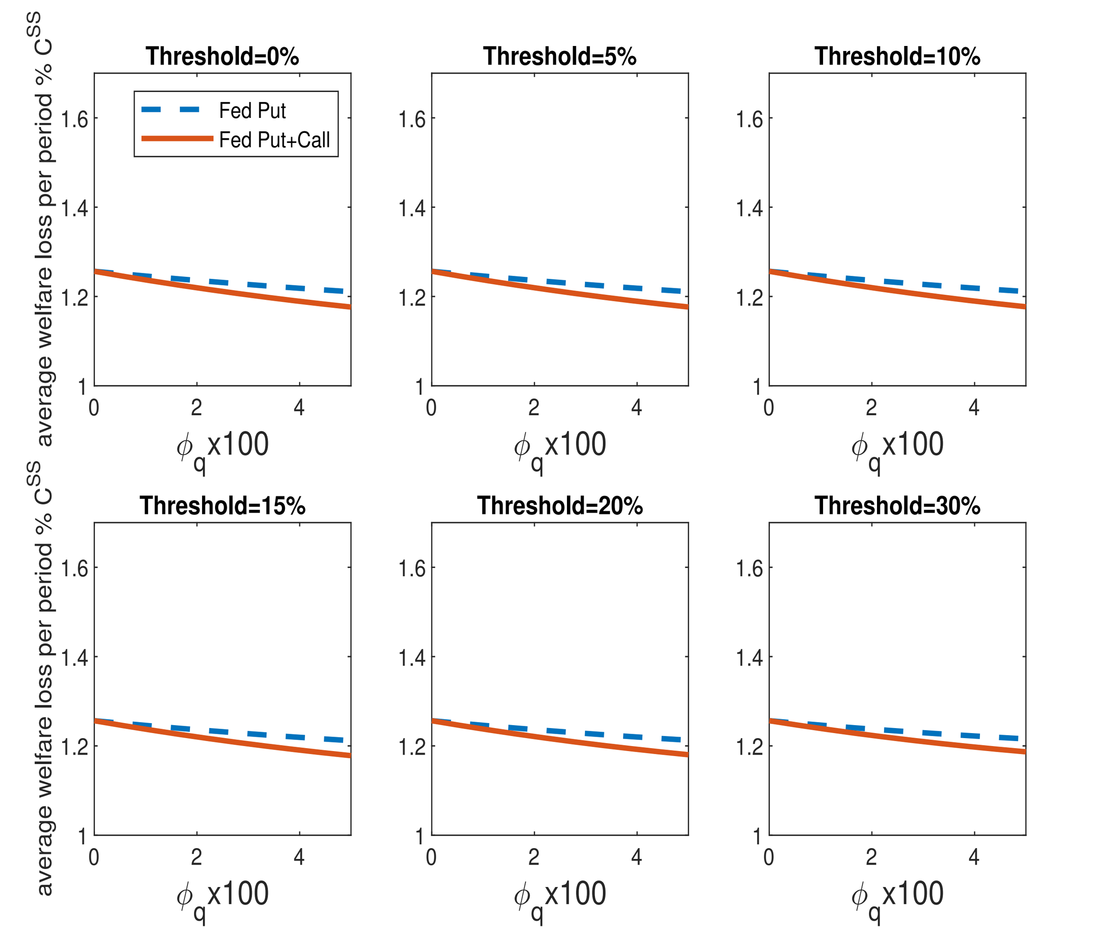

Figure: Welfare Costs of Fed Put/Call Non-Transparency

- responding in both booms and busts is superior to Fed Put even under non-transparency

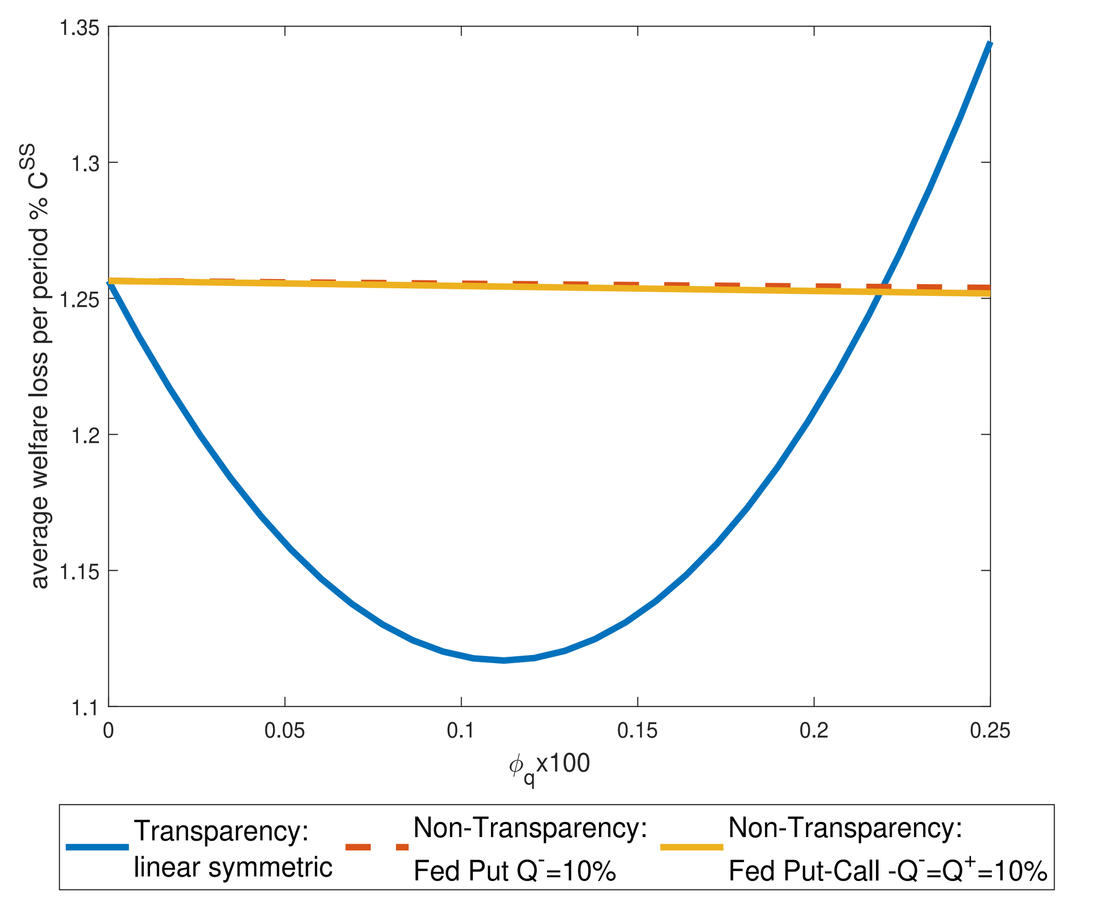

Figure: Welfare Costs of Transparency vs Non-Transparency

- responding transparently and symmetrically brings considerable efficiency gains

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