A Monetary Policy Asset Pricing Model

Caballero & Simsek (March 8, 2023)

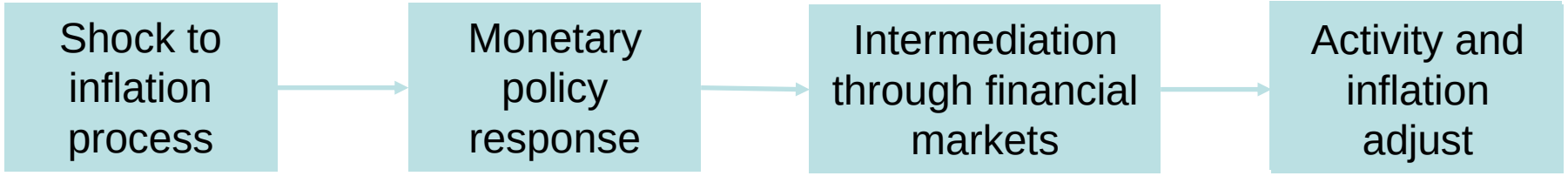
(https://www.dropbox.com/s/m9zsyrxxwettjzz/MPAPpublic.pdf)

Discussion by Benjamin Mandel (August 29, 2023)

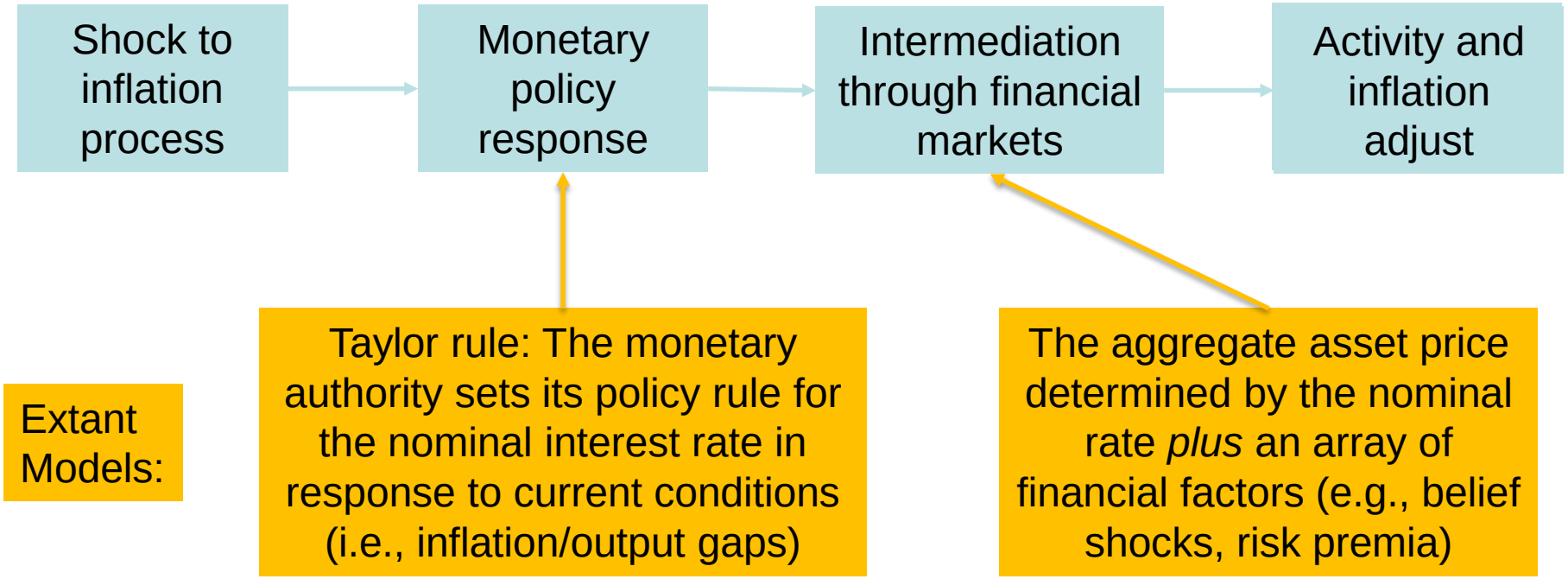
Why this paper?

- 100% theoretical
- Rich and relevant behavior: Interactions between the monetary authority and financial market
- Pièce de résistance: Particularly relevant for Brazil?

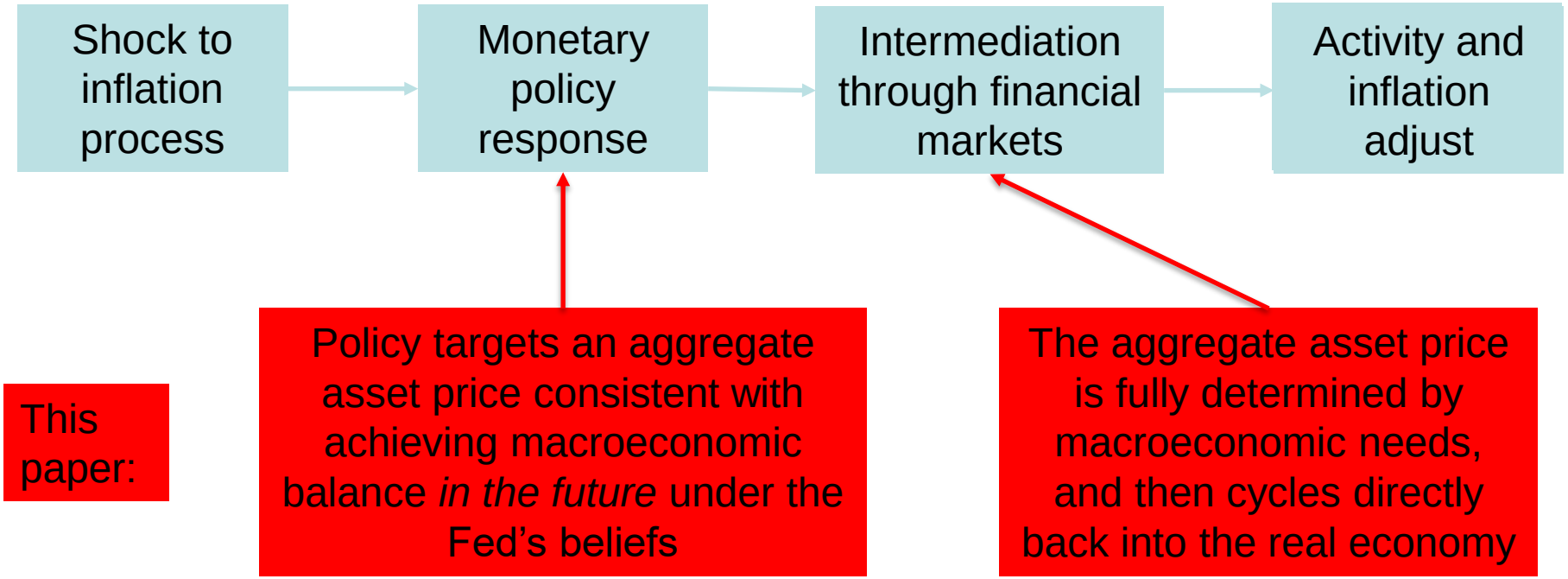
Motivation: How does monetary policy affect the economy?



Motivation: How does monetary policy affect the economy?



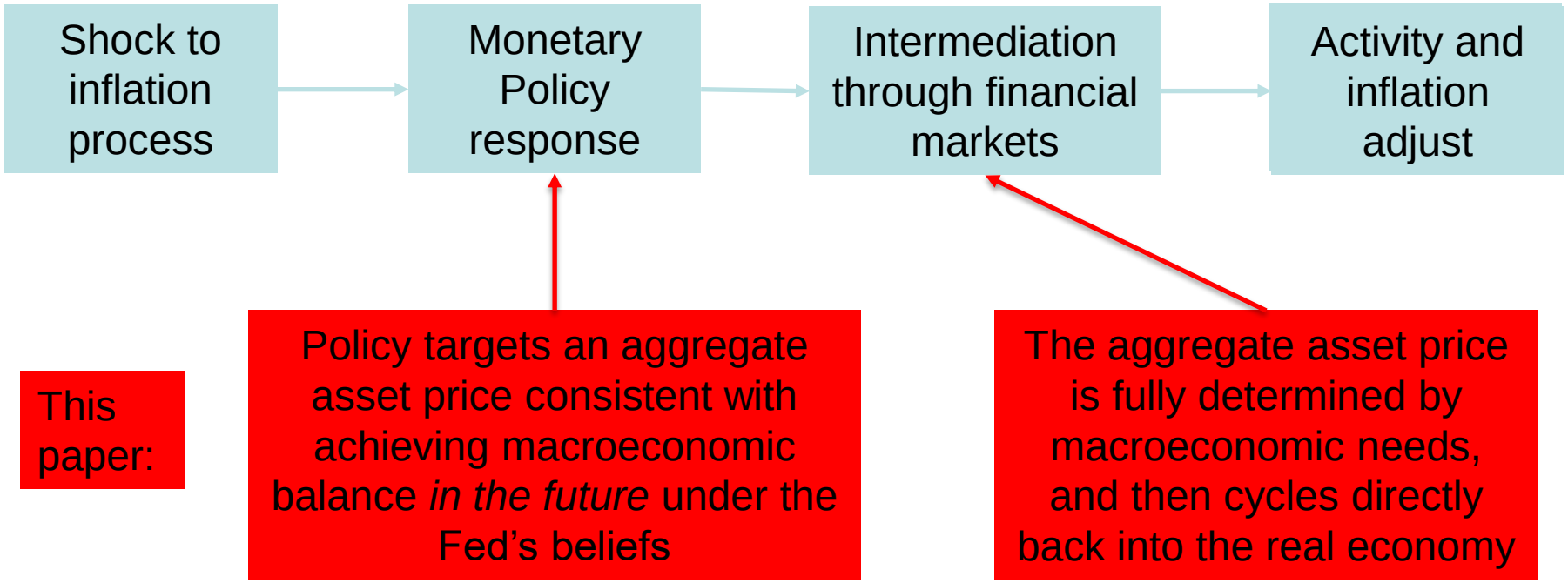
Motivation: How does monetary policy affect the economy?



Motivation: How does monetary policy affect the economy?

What does this buy us?

1. Characterize rich interaction btw policy and asset prices
2. Pins down key covariances (asset price w output gap, inflation, …)
3. A framework for *disagreement* between Fed and market



Literature

- Spillover effects from financial markets to the economy
  - Caballero and Simsek (2020, 2021a, 2021b, 2021c, 2022); Pflueger et al. (2020); Caballero and Farhi (2018)
- The Fed affects asset prices
  - Caballero and Simsek (2020); Kekre and Lenel (2021); Pflueger and Rinaldi (2020)
- The Fed operates through asset prices
  - Jensen et al. (1996), Thorbecke (1997), Jensen and Mercer (2002), Rigobon and Sack (2004), Ehrmann and Fratzscher (2004), Bernanke and Kuttner (2005), Bauer and Swanson (2020), Cieslak and Vissing-Jorgensen (2020)
- Excess volatility in asset prices
  - Shiller (2014) … … … Cochrane (2011); Campbell (2014); Gabaix and Koijen (2021)
- Negative correlation of market returns with inflation
  - Cieslak and Pflueger (2022), Fang et al. (2022)

Model: Household Consumption & Demand shocks

- Households follow consumption rules – they consume a share of their wealth each period
- Deviations from this rule, δ, constitute demand shocks

$$C_t^H = (1-\beta)(D_t + K_t).$$

$$C_t^H = (1-\beta)(D_t + K_t \exp(\delta_t)), \quad \text{where } \delta_t \sim N\left(0, \sigma_\delta^2\right).$$

Model: Supply

- Output evolves according to an aggregate supply shock

$$y^*_{t+1} = y^*_t + z_{t+1}, \quad \text{where } z_{t+1} \sim N\left(0, \sigma_z^2\right).$$

- But financial markets believe it to be:

$$z_{t+1} \sim N\left(b_t, \sigma_z^2\right), \quad \text{where } b_t \sim N\left(0, \sigma_b^2\right).$$

- The parameter b is a *belief* shock about future cash flows, capturing financial forces like time-varying expectations or risk premia

Model: Financial markets

- The market portfolio, whose return is a claim on the firm's share of output, plus a capital gain

$$R_{t+1} = \frac{\alpha Y_{t+1} + P_{t+1}}{P_t}.$$

- There is a risk-free asset = gross return set by the Fed
- And optimality conditions set by maximizing expected household wealth

$$\max_{\omega_t} E_t^M \left[\log \left(W_t \left(R_t^f + \omega_t \left(R_{t+1} - R_t^f \right) \right) \right) \right].$$

Model: Central bank

- Fed sets the risk-free rate to minimize the discounted sum of future output gaps

$$\min_{R_t^f} E_t^F \left[\sum_{h=0}^{\infty} \beta^h \tilde{y}_{t+h}^2 \right].$$

Equilibrium conditions: Output-Asset Price Relation

- In equilibrium, output depends on wealth (P), the MPC of wealth (1-β), the Keynesian multiplier (1/αβ), and the demand shock:

$$Y_t \quad = \quad (1-\beta)\frac{1}{\alpha\beta}P_t \exp(\delta_t)$$

- The Fed targets an output gap of zero, which implies the following "pystar" (i.e., the market price level per unit of potential output):

$$(py)_t^* \equiv p_t^* - y_t^* = -m - \delta_t. \qquad \text{where } m \equiv \log\left(\frac{1-\beta}{\alpha\beta}\right)$$

Equilibrium conditions: Policy rule

- How does the Fed achieve "pystar"? By adjusting the risk-free rate, i:

$$i_t = \rho + \delta_t + b_t - \frac{1}{2} rp_t \quad \text{and} \quad rp_t = \sigma_z^2 + \beta^2 \sigma_\delta^2.$$

Result #1: Macroeconomics alone drives the agg. asset price

- The aggregate asset price depends on macroeconomic variables and shocks (m and δ), but not on financial forces such as beliefs for future cash flows (b).

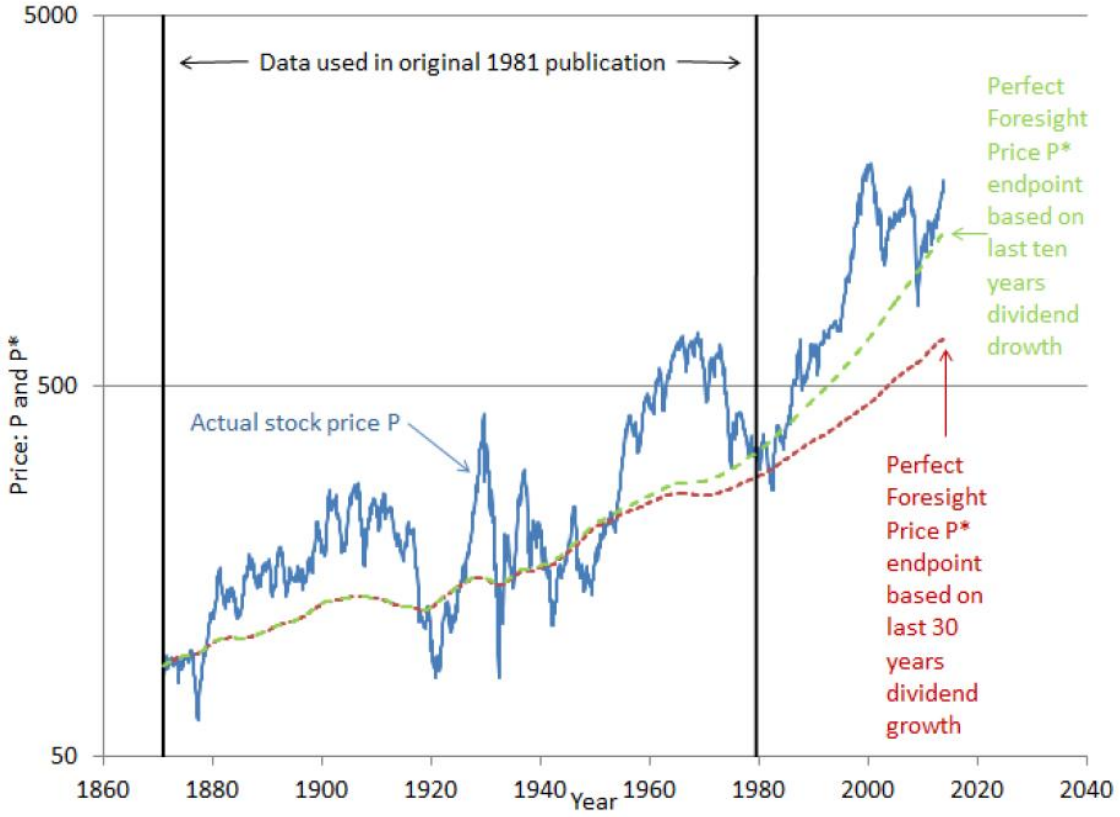
$$(py)_t^* \equiv p_t^* - y_t^* = -m - \delta_t.$$

- Those belief shocks (as well as risk premia shocks) are absorbed by the interest rate

$$i_t = \rho + \delta_t + b_t - \frac{1}{2} r p_t$$

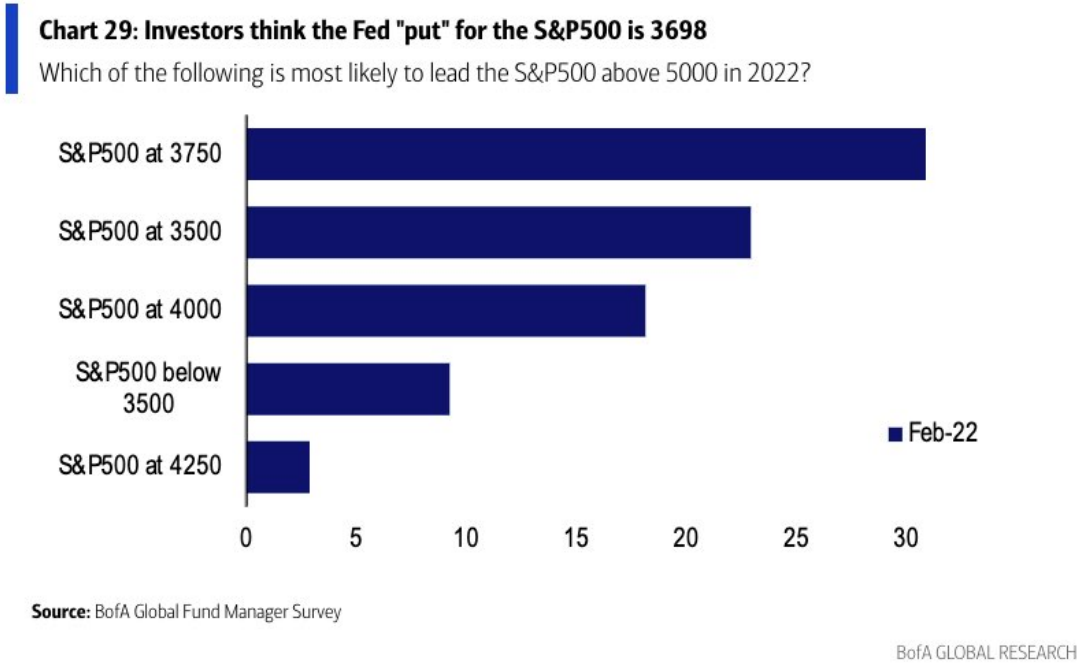
Result #1: Macroeconomics alone drives the agg. asset price

- **Reflects "Excess Vol" of asset prices**
- The Fed mitigates demand shocks, but in doing so increases asset price vol and the risk premium. Thus, demand shocks create policy-induced excess vol



Result #1: Macroeconomics alone drives the agg. asset price

- Reflects the "Fed Put"
- Belief shocks do not affect pystar; they get absorbed in i
- The vol of the asset price and risk premium do not depend on the volatility of the belief shock, b. They are insulated by the Fed



Ancillary results when adding *transmission lags*

- In practice, monetary policy has much less control over demand; the full effect on output builds over several quarters
- Inertia is a realistic feature arising from microeconomic frictions such as adjustment costs or habit formation

$$C_t^H = (1-\beta)\, D_t + \eta\beta C_{t-1}^H + (1-\eta)\,(1-\beta)\, K_{t-1} \exp(\delta_t)$$

Transmission lag: households respond to the lagged value of the capital portion of their wealth

Internal inertia: households partly repeat their own (past) spending behavior.

- The Fed now targets: $(py)_t^* = p_t^* - y_t^* = -E_t^F\left[\tilde{\delta}_{t+1}\right] - m$

Ancillary results when adding *transmission lags*

- *Excess volatility, redux*: More precise news reduces the volatility of output but increases the volatility of the price of the market portfolio.
- *Asset price overshooting*: The equilibrium features a Fed-induced asset price overshooting: in response to a negative current output gap, the Fed targets a higher-than-average pystar (vice versa for a positive output gap).
- *Correlation of activity & market price*: Both demand and supply shocks both induce a negative conditional covariance between the output gap and asset prices.

Result #2: Inflation and the asset price are negatively correlated

- Textbook setup in which inflation is determined by a New-Keynesian Phillips Curve. In equilibrium, inflation depends only on the current output gap, thus asset prices are also always negatively correlated with inflation.

$$cov_t\left(\pi_{t+1}, p_{t+1}\right) = \kappa cov_t\left(\tilde{y}_{t+1}, p_{t+1}\right) = -\kappa\left(\frac{\eta}{1-\eta}\sigma_{\delta}^2 + \frac{1}{1-\eta}\sigma_z^2\right)$$

Result #2: Inflation and the asset price are negatively correlated

- You get a closed-form solution for the inflation risk premium:

$$irp_t = -cov_t\left(\pi_{t+1}, r_{t+1}\right) = \kappa \frac{\beta}{1-\eta}\sigma_z^2 + \kappa\left(\beta\frac{\eta}{1-\eta} - (1-\beta)\right)\sigma_\delta^2$$

- Supply shocks always induce inflation risk premium > 0
- Demand shocks could go either way depending on relative magnitude of effect on p and y
- Positive if and only if:

$$\frac{\frac{\sigma_z^2}{\sigma_\delta^2} + \eta}{1-\eta} > \frac{1-\beta}{\beta}$$

Result #3: Disagreement between Fed and market beliefs

- Fed still implements the pystar that is appropriate under its own belief. However, with disagreements, the market anticipates policy "mistakes" that have implications for the risk premium and the interest rate.
  - The anticipation of future disagreements and mistakes increases the risk premium, a "policy risk premium"
  - Current disagreements induce a "behind-the-curve" phenomenon in which the market expects the Fed to reverse course

Result #3: Disagreement between Fed and market beliefs

- What is a policy risk premium?
  - Each agent thinks the other agent's posterior belief is a noisy version of her own belief
  - Hence, disagreements about future conditions increase the market's perceived future asset price volatility and return volatility
  - In turn, the market perceives greater future price and return volatility and demands a higher risk premium

Result #3: Disagreement between Fed and market beliefs

- What does it mean to be behind-the-curve?
  - A demand-optimistic market thinks: "once the positive output gap develops, the Fed will realize its mistake and will have to reverse course, implementing a low future pystar.
  - The market thinks the Fed will switch from setting too low rates (lower than what is ideal under the market belief) to too high rates

Open questions

- Who controls the aggregate asset price, the market or the Fed?

- How would one operationalize this framework empirically? It requires some measure of beliefs (both market and Fed)
  - The inflation risk premium seems like a promising approach

- How does this view of the world interact with policymakers' objective of transparent/predictable decision making?
  - Shocks to the Fed's belief or the market's perception of it are equivalent to monetary policy shocks