THE OPTIMAL MONETARY POLICY RESPONSE TO TARIFFS

Javier Bianchi[1] Louphou Coulibaly[2]

[1]Federal Reserve Bank of Minneapolis

[2]University of Wisconsin-Madison and NBER

Motivation

- **How should a central bank respond to import tariffs?**
  - Tighten monetary policy to contain inflationary pressures, or...
  - Neutral monetary stance (“look-through”) and allow a one-time jump in the CPI?

Jay Powell pushes back on calls for Federal Reserve rate cuts as soon as July

US central bank chair tells congressional committee economy remains ‘solid’ but tariffs could push up prices

Jay Powell has been under fire from the US president over the Federal Open Market Committee’s decision to keep interest rates on hold © Mark Schiefelbein/AP

Top Federal Reserve official calls for rate cuts as soon as July

Governor Chris Waller says US has yet to see an inflation ‘shock’ from Donald Trump’s tariffs

Christopher Waller joined the Fed’s policy-setting panel in 2020 after being nominated by Donald Trump during his first term as president © Bloomberg

Motivation

- **How should a central bank respond to import tariffs?**
  - Tighten monetary policy to contain inflationary pressures, or...
  - Neutral monetary stance ("look-through") and allow a one-time jump in the CPI?

This paper:

- Optimal monetary policy response to tariffs is **expansionary**

Overview

- Open-economy New Keynesian model with home and imported goods
  - Macroeconomic effects depend on monetary policy

Overview

- PPI targeting: tariffs generally contractionary

Overview

flex-price allocation ("look-through")

- PPI targeting: tariffs generally contractionary

Overview

- PPI targeting: tariffs generally contractionary
- Optimal policy: **overheating** $\rightsquigarrow$ positive PPI inflation & positive output gap

Overview

- PPI targeting: tariffs generally contractionary
- Optimal policy: **overheating** $\rightsquigarrow$ positive PPI inflation & positive output gap
  - Wedge between internal and international prices (vs. terms-of-trade shock)
  - Fiscal externality $\Rightarrow$ Inefficiently depress imports

Overview

- PPI targeting: tariffs generally contractionary
- Optimal policy: **overheating** ⇝ positive PPI inflation & positive output gap
  - Wedge between internal and international prices (vs. terms-of-trade shock)
  - Fiscal externality ⇒ Inefficiently depress imports

Tariffs can lead to an expansion or contraction in output

≠ textbook cost-push shock

Overview

- PPI targeting: tariffs generally contractionary

- Optimal policy: **overheating** ⇝ positive PPI inflation & positive output gap
  - Wedge between internal and international prices (vs. terms-of-trade shock)
  - Fiscal externality ⇒ Inefficiently depress imports

Tariffs can lead to an expansion or contraction in output

↓ Trade deficit, even with permanent tariff

Monetary stimulus leads to temporary rise in output and savings

Overview

- PPI targeting: tariffs generally contractionary

- Optimal policy: **overheating** ⇝ positive PPI inflation & positive output gap
  - Wedge between internal and international prices (vs. terms-of-trade shock)
  - Fiscal externality ⇒ Inefficiently depress imports

Tariffs can lead to an expansion or contraction in output

↓ Trade deficit, even with permanent tariff

Exchange-rate depreciation, unlike conventional view

⇝ Weak dollar since April 2nd

Overview

- PPI targeting: tariffs generally contractionary
- Optimal policy: **overheating** ⇝ positive PPI inflation & positive output gap
  - Wedge between internal and international prices (vs. terms-of-trade shock)
  - Fiscal externality ⇒ Inefficiently depress imports

  Tariffs can lead to an expansion or contraction in output

  ↓ Trade deficit, even with permanent tariff

  Exchange-rate depreciation, unlike conventional view

- Extensions: temporary/anticipated, ex/endogenous TOT, supply chains

Literature on Tariffs in International Macro

- Classic question: Are tariffs expansionary or contractionary? Keynes vs. Mundell
- Recent studies: Auray, Devereux, Eyquem (2022,2024); Eichengreen (2019); Barattieri, Cacciatore and Ghironi (2021); Comin and Johnson (2021); Jeanne (2021); Jeanne-Son (2024); Bergin and Corsetti (2021); Erceg, Prestipino and Raffo (2023); Lloyd and Marin (2024)
- Bergin-Corsetti (2023): under cooperation, *contractionary* policy for tariff-imposing country

Our contribution:

- *Expansionary* policy is optimal. Fiscal externality $\Rightarrow$ tariff $\neq$ TOT shock
- Analytical results: contractionary/expansionary effects through labor supply channel
- New predictions for exchange rates and trade deficits

Literature on Tariffs in International Macro

- Classic question: Are tariffs expansionary or contractionary? Keynes vs. Mundell
- Recent studies: Auray, Devereux, Eyquem (2022,2024); Eichengreen (2019); Barattieri, Cacciatore and Ghironi (2021); Comin and Johnson (2021); Jeanne (2021); Jeanne-Son (2024); Bergin and Corsetti (2021); Erceg, Prestipino and Raffo (2023); Lloyd and Marin (2024)
- Bergin-Corsetti (2023): under cooperation, *contractionary* policy for tariff-imposing country

Our contribution:

- *Expansionary* policy is optimal. Fiscal externality ⇒ tariff ≠ TOT shock
- Analytical results: contractionary/expansionary effects through labor supply channel
- New predictions for exchange rates and trade deficits

Active agenda!

Environment

- Deterministic SOE, infinite horizon, representative household
  - Two final consumption goods: home-produced (h) and foreign-produced (f)

Environment

- Deterministic SOE, infinite horizon, representative household
  - Two final consumption goods: home-produced (h) and foreign-produced (f)
- No market power in goods or capital markets:
  - Optimal tariff is zero
  - Monetary policy does not affect terms of trade

Environment

- Deterministic SOE, infinite horizon, representative household
  - Two final consumption goods: home-produced (h) and foreign-produced (f)
- No market power in goods or capital markets:
  - Optimal tariff is zero
  - Monetary policy does not affect terms of trade
- Monetary authority: sets monetary policy optimally, taking as given tariffs $\{\tau_t\}$

Households

$$\sum_{t=0}^{\infty} \beta^t \left[U(c_t^h, c_t^f) - v(\ell_t) \right]$$

$$U(c_t^h, c_t^f) = \frac{\sigma}{\sigma - 1} \left[\omega (c_t^h)^{1-\frac{1}{\gamma}} + (1-\omega)(c_t^f)^{1-\frac{1}{\gamma}} \right]^{\frac{\gamma}{\gamma-1} \frac{\sigma-1}{\sigma}}, \quad v(\ell_t) = \omega \frac{\ell_t^{1+\psi}}{1+\psi}$$

- Budget constraint:

$$P_t^h c_t^h + P_t^f (1 + \tau_t) c_t^f + \frac{e_t b_{t+1}}{R^*} + \frac{B_{t+1}}{R_t} = e_t b_t + B_t + W_t \ell_t + T_t + D_t$$

Households

$$\sum_{t=0}^{\infty} \beta^t \Big[U(c_t^h, c_t^f) - v(\ell_t) \Big]$$

$$U(c_t^h, c_t^f) = \frac{\sigma}{\sigma - 1} \left[\omega (c_t^h)^{1-\frac{1}{\gamma}} + (1-\omega)(c_t^f)^{1-\frac{1}{\gamma}} \right]^{\frac{\gamma}{\gamma-1} \frac{\sigma-1}{\sigma}}, \quad v(\ell_t) = \omega \frac{\ell_t^{1+\psi}}{1+\psi}$$

- Budget constraint:

$$P_t^h c_t^h + P_t^f (1 + \tau_t) c_t^f + \frac{e_t b_{t+1}}{R^*} + \frac{B_{t+1}}{R_t} = e_t b_t + B_t + W_t \ell_t + T_t + D_t$$

- Law of one price (before tariffs): $P_t^h = e_t P_t^{h*}, \quad P_t^f = e_t P_t^{f*}$

Households

$$\sum_{t=0}^{\infty} \beta^t \left[U(c_t^h, c_t^f) - v(\ell_t) \right]$$

$$U(c_t^h, c_t^f) = \frac{\sigma}{\sigma - 1} \left[\omega (c_t^h)^{1-\frac{1}{\gamma}} + (1-\omega)(c_t^f)^{1-\frac{1}{\gamma}} \right]^{\frac{\gamma}{\gamma-1} \frac{\sigma-1}{\sigma}}, \quad v(\ell_t) = \omega \frac{\ell_t^{1+\psi}}{1+\psi}$$

- Budget constraint:

$$P_t^h c_t^h + P_t^f (1 + \tau_t) c_t^f + \frac{e_t b_{t+1}}{R^*} + \frac{B_{t+1}}{R_t} = e_t b_t + B_t + W_t \ell_t + T_t + D_t$$

- Law of one price (before tariffs): $P_t^h = e_t P_t^{h*}, \quad P_t^f = e_t P_t^{f*}$
- Terms-of-trade exogenous $p \equiv \frac{P_t^{f*}}{P_t^{h*}}$ $\Leftarrow$ Limit case w/ export elasticity = ∞

Firms

- Production of final home good is competitive

$$Y_t = \left(\int_0^1 y_{jt}^{\frac{\varepsilon-1}{\varepsilon}} \, dj \right)^{\frac{\varepsilon}{\varepsilon-1}}$$

- Intermediate good varieties

$$y_{jt} = \ell_{jt}$$

Firms

- Production of final home good is competitive

$$Y_t = \left(\int_0^1 y_{jt}^{\frac{\varepsilon-1}{\varepsilon}} \, dj \right)^{\frac{\varepsilon}{\varepsilon-1}}$$

- Intermediate good varieties

$$y_{jt} = \ell_{jt}$$

  - Monop. competitive w/ Rotemberg price adjustment costs φ

$$\max_{\{y_{jt}, P_{jt}\}} \sum_{t=0}^{\infty} \Lambda_{t+1} \left[(1+s) P_{jt} y_{jt} - W_t y_{jt} - \frac{\varphi}{2} \left(\frac{P_{jt}}{P_{j,t-1}} - 1 \right)^2 P_t^h y_t \right]$$

$$\text{s.t.} \quad y_{jt} = \left(\frac{P_{jt}}{P_t^h} \right)^{-\varepsilon} y_t$$

Constant subsidy to correct markup distortion

Firms

- Production of final home good is competitive

$$Y_t = \left(\int_0^1 y_{jt}^{\frac{\varepsilon-1}{\varepsilon}} \, dj \right)^{\frac{\varepsilon}{\varepsilon-1}}$$

- Intermediate good varieties

$$y_{jt} = \ell_{jt}$$

  - NK Phillips Curve

$$(1+\pi_t)\pi_t = \frac{\varepsilon}{\varphi}\left[\frac{W_t}{P_t^h} - 1\right] + \beta \frac{u_h(c_{t+1}^h, c_{t+1}^f)}{u_h(c_t^h, c_t^f)} \frac{\ell_{t+1}}{\ell_t}(1+\pi_{t+1})\pi_{t+1}$$

where $\pi_t \equiv P_t^h / P_{t-1}^h - 1$ is Producer Price Index (PPI) inflation

Competitive Equilibrium

- Optimization (households and firms) + govt. budget + labor market clearing.

$$\tau_t P_t^f c_t^f = T_t + s P_t^h y_t$$

Competitive Equilibrium

- Optimization (households and firms) + govt. budget + labor market clearing.

$$\tau_t P_t^f c_t^f = T_t + s P_t^h y_t$$

- Balance of payments:

$$\underbrace{\left(1 - \Upsilon \frac{\varphi}{2} \pi_t^2\right) \ell_t - c_t^h}_{\text{exports}} - \underbrace{p c_t^f}_{\text{imports}} = \underbrace{\frac{b_{t+1}}{R^*} - b_t}_{\text{capital outflows}}$$

Fraction of price adjustment costs that are a deadweight loss ($1 - \Upsilon$ rebated)

Competitive Equilibrium

- Optimization (households and firms) + govt. budget + labor market clearing.

$$\tau_t P_t^f c_t^f = T_t + sP_t^h y_t$$

- Balance of payments:

$$\underbrace{\left(1 - \Upsilon \frac{\varphi}{2}\pi_t^2\right)\ell_t - c_t^h}_{\text{exports}} - \underbrace{pc_t^f}_{\text{imports}} = \underbrace{\frac{b_{t+1}}{R^*} - b_t}_{\text{capital outflows}}$$

Υ → Fraction of price adjustment costs that are a deadweight loss ($1 - \Upsilon$ rebated)

- Portfolio undetermined, assume $B_0 = 0$ $\Leftarrow$ Abstract from valuation effects

Efficient Allocation

$$\max_{\left\{b_{t+1}, c_t^f, c_t^h, \ell_t\right\}} \sum_{t=0}^{\infty} \beta^t \left[u(c_t^h, c_t^f) - v(\ell_t) \right],$$

$$\text{s.t } c_t^h + p c_t^f + \frac{b_{t+1}}{R^*} = b_t + \ell_t.$$

Efficient Allocation

$$\frac{v'(\ell_t)}{u_h(c_t^h, c_t^f)} = 1$$

$$\frac{u_f(c_t^h, c_t^f)}{u_h(c_t^h, c_t^f)} = p$$

$$u_h(c_t^h, c_t^f) = \beta R^* u_h(c_{t+1}^h, c_{t+1}^f)$$

$$\ell_t - c_t^h - pc_t^f = \frac{b_{t+1}}{R^*} - b_t$$

Competitive equilibrium

$$\frac{W}{P_h} = \frac{v'(\ell_t)}{u_h(c^h, c^f)}$$

$$(1+\pi_t)\,\pi_t = \frac{\varepsilon}{\varphi}\left[\frac{v'(\ell_t)}{u_h(c_t^h, c_t^f)} - 1\right] + \frac{1}{R^*}\frac{\ell_{t+1}}{\ell_t}(1+\pi_{t+1})\,\pi_{t+1}$$

$$\frac{u_f(c_t^h, c_t^f)}{u_h(c_t^h, c_t^f)} = p(1+\tau_t)$$

$$u_h(c_t^h, c_t^f) = \beta R^* u_h(c_{t+1}^h, c_{t+1}^f)$$

$$(1 - \Upsilon \tfrac{\varphi}{2}{\pi_t}^2)\ell_t - c_t^h - p c_t^f = \frac{b_{t+1}}{R^*} - b_t$$

Efficient Allocation

$$\frac{v'(\ell_t)}{u_h(c_t^h, c_t^f)} = 1$$

$$\frac{u_f(c_t^h, c_t^f)}{u_h(c_t^h, c_t^f)} = p$$

$$u_h(c_t^h, c_t^f) = \beta R^* u_h(c_{t+1}^h, c_{t+1}^f)$$

$$\ell_t - c_t^h - p c_t^f = \frac{b_{t+1}}{R^*} - b_t$$

Competitive equilibrium

$$(1+\pi_t)\,\pi_t = \frac{\varepsilon}{\varphi}\left[\frac{v'(\ell_t)}{u_h(c_t^h, c_t^f)} - 1\right] + \frac{1}{R^*}\frac{\ell_{t+1}}{\ell_t}(1+\pi_{t+1})\,\pi_{t+1}$$

$$\frac{u_f(c_t^h, c_t^f)}{u_h(c_t^h, c_t^f)} = p(1+\tau_t)$$

$$u_h(c_t^h, c_t^f) = \beta R^* u_h(c_{t+1}^h, c_{t+1}^f)$$

$$(1-\Upsilon\tfrac{\varphi}{2}\pi_t{}^2)\ell_t - c_t^h - pc_t^f = \frac{b_{t+1}}{R^*} - b_t$$

Efficient Allocation

$$\frac{v'(\ell_t)}{u_h(c_t^h, c_t^f)} = 1$$

$$\frac{u_f(c_t^h, c_t^f)}{u_h(c_t^h, c_t^f)} = p$$

$$u_h(c_t^h, c_t^f) = \beta R^* u_h(c_{t+1}^h, c_{t+1}^f)$$

$$\ell_t - c_t^h - pc_t^f = \frac{b_{t+1}}{R^*} - b_t$$

Competitive equilibrium

$$(1+\pi_t)\,\pi_t = \frac{\varepsilon}{\varphi}\left[\frac{v'(\ell_t)}{u_h(c_t^h, c_t^f)} - 1\right] + \frac{1}{R^*}\frac{\ell_{t+1}}{\ell_t}(1+\pi_{t+1})\,\pi_{t+1}$$

$$\frac{u_f(c_t^h, c_t^f)}{u_h(c_t^h, c_t^f)} = p(1+\tau_t)$$

$$u_h(c_t^h, c_t^f) = \beta R^* u_h(c_{t+1}^h, c_{t+1}^f)$$

$$(1 - \Upsilon\tfrac{\varphi}{2}\pi_t{}^2)\ell_t - c_t^h - pc_t^f = \frac{b_{t+1}}{R^*} - b_t$$

Efficient Allocation

$$\frac{v'(\ell_t)}{u_h(c_t^h, c_t^f)} = 1$$

$$\frac{u_f(c_t^h, c_t^f)}{u_h(c_t^h, c_t^f)} = p$$

$$u_h(c_t^h, c_t^f) = \beta R^* u_h(c_{t+1}^h, c_{t+1}^f)$$

$$\ell_t - c_t^h - pc_t^f = \frac{b_{t+1}}{R^*} - b_t$$

- Tariffs: distort MRS $= p$ constraint
- Sticky prices: labor wedge & inflation costs

} Two distortions

Competitive equilibrium $\tau = 0$

$$(1+\pi_t)\,\pi_t = \frac{\varepsilon}{\varphi}\left[\frac{v'(\ell_t)}{u_h(c_t^h, c_t^f)} - 1\right] + \frac{1}{R^*}\frac{\ell_{t+1}}{\ell_t}(1+\pi_{t+1})\,\pi_{t+1}$$

$$\frac{u_f(c_t^h, c_t^f)}{u_h(c_t^h, c_t^f)} = p$$

$$u_h(c_t^h, c_t^f) = \beta R^* u_h(c_{t+1}^h, c_{t+1}^f)$$

$$(1 - \Upsilon \tfrac{\varphi}{2}\pi_t{}^2)\ell_t - c_t^h - pc_t^f = \frac{b_{t+1}}{R^*} - b_t$$

Efficient Allocation

$$\frac{v'(\ell_t)}{u_h(c_t^h, c_t^f)} = 1$$

$$\frac{u_f(c_t^h, c_t^f)}{u_h(c_t^h, c_t^f)} = p$$

$$u_h(c_t^h, c_t^f) = \beta R^* u_h(c_{t+1}^h, c_{t+1}^f)$$

$$\ell_t - c_t^h - pc_t^f = \frac{b_{t+1}}{R^*} - b_t$$

Competitive equilibrium $\tau = 0$ (with $\pi_t = 0$)

$$0 = \frac{\varepsilon}{\varphi}\left[\frac{v'(\ell_t)}{u_h(c_t^h, c_t^f)} - 1\right]$$

$$\frac{u_f(c_t^h, c_t^f)}{u_h(c_t^h, c_t^f)} = p$$

$$u_h(c_t^h, c_t^f) = \beta R^* u_h(c_{t+1}^h, c_{t+1}^f)$$

$$\ell_t - c_t^h - pc_t^f = \frac{b_{t+1}}{R^*} - b_t$$

Efficient Allocation

$$\frac{v'(\ell_t)}{u_h(c_t^h, c_t^f)} = 1$$

$$\frac{u_f(c_t^h, c_t^f)}{u_h(c_t^h, c_t^f)} = p$$

$$u_h(c_t^h, c_t^f) = \beta R^* u_h(c_{t+1}^h, c_{t+1}^f)$$

$$\ell_t - c_t^h - pc_t^f = \frac{b_{t+1}}{R^*} - b_t$$

Competitive equilibrium

$$(1+\pi_t)\,\pi_t = \frac{\varepsilon}{\varphi}\left[\frac{v'(\ell_t)}{u_h(c_t^h, c_t^f)} - 1\right] + \frac{1}{R^*}\frac{\ell_{t+1}}{\ell_t}(1+\pi_{t+1})\,\pi_{t+1}$$

$$\frac{u_f(c_t^h, c_t^f)}{u_h(c_t^h, c_t^f)} = p(1+\tau_t)$$

$$u_h(c_t^h, c_t^f) = \beta R^* u_h(c_{t+1}^h, c_{t+1}^f)$$

$$(1 - \Upsilon \tfrac{\varphi}{2}\pi_t^{\,2})\ell_t - c_t^h - pc_t^f = \frac{b_{t+1}}{R^*} - b_t$$

Efficient Allocation

$$\frac{v'(\ell_t)}{u_h(c_t^h, c_t^f)} = 1$$

$$\frac{u_f(c_t^h, c_t^f)}{u_h(c_t^h, c_t^f)} = p$$

$$u_h(c_t^h, c_t^f) = \beta R^* u_h(c_{t+1}^h, c_{t+1}^f)$$

$$\ell_t - c_t^h - pc_t^f = \frac{b_{t+1}}{R^*} - b_t$$

Competitive equilibrium

$$(1+\pi_t)\,\pi_t = \frac{\varepsilon}{\varphi}\left[\frac{v'(\ell_t)}{u_h(c_t^h, c_t^f)} - 1\right] + \frac{1}{R^*}\frac{\ell_{t+1}}{\ell_t}(1+\pi_{t+1})\,\pi_{t+1}$$

$$\frac{u_f(c_t^h, c_t^f)}{u_h(c_t^h, c_t^f)} = p(1+\tau_t)$$

$$u_h(c_t^h, c_t^f) = \beta R^* u_h(c_{t+1}^h, c_{t+1}^f)$$

$$(1-\Upsilon\frac{\varphi}{2}\pi_t{}^2)\ell_t - c_t^h - pc_t^f = \frac{b_{t+1}}{R^*} - b_t$$

Efficient Allocation

$$\frac{v'(\ell_t)}{u_h(c_t^h, c_t^f)} = 1$$

$$\frac{u_f(c_t^h, c_t^f)}{u_h(c_t^h, c_t^f)} = p$$

$$u_h(c_t^h, c_t^f) = \beta R^* u_h(c_{t+1}^h, c_{t+1}^f)$$

$$\ell_t - c_t^h - pc_t^f = \frac{b_{t+1}}{R^*} - b_t$$

Employment under Look-Through Policy

Definition: A policy of **"look-through"** targets PPI inflation, $\pi_t = 0$ for all t

- Closes labor wedge and replicates flex-price allocation

  Absent tariffs, this is optimal $\Leftarrow$ Divine coincidence

Employment under Look-Through Policy

Definition: A policy of **"look-through"** targets PPI inflation, $\pi_t = 0$ for all t

- Closes labor wedge and replicates flex-price allocation

Absent tariffs, this is optimal $\Leftarrow$ Divine coincidence

Proposition. Assume that $\beta R^* = 1, \tau_t = \tau, b_0 = 0$. Then, employment is given by

$$\ell_t(\tau) = \left[\frac{\Theta_\tau + \tau}{1+\tau}\left(\omega\Theta_\tau\right)^{\frac{\sigma-\gamma}{\gamma-1}}\right]^{\frac{1}{1+\sigma\psi}}, \qquad \text{where } \Theta_\tau \equiv 1 + \left(\frac{1-\omega}{\omega}\right)^{\gamma}\left[p(1+\tau)\right]^{1-\gamma} > 1$$

Employment under Look-Through Policy

Definition: A policy of **"look-through"** targets PPI inflation, $\pi_t = 0$ for all t

- Closes labor wedge and replicates flex-price allocation

Absent tariffs, this is optimal $\Leftarrow$ Divine coincidence

Proposition. Assume that $\beta R^* = 1, \tau_t = \tau, b_0 = 0$. Then, employment is given by

$$\ell_t(\tau) = \left[\frac{\Theta_\tau + \tau}{1+\tau}\left(\omega\Theta_\tau\right)^{\frac{\sigma-\gamma}{\gamma-1}}\right]^{\frac{1}{1+\sigma\psi}}, \qquad \text{where } \Theta_\tau \equiv 1 + \left(\frac{1-\omega}{\omega}\right)^\gamma \left[p(1+\tau)\right]^{1-\gamma} > 1$$

and

$$c_t^h(\tau) = \frac{1+\tau}{\Theta_\tau + \tau}\ell_t(\tau), \qquad c_t^f(\tau) = \frac{\Theta_\tau - 1}{p\left(\Theta_\tau + \tau\right)}\ell_t(\tau)$$

Are Tariffs Expansionary or Contractionary?

- Under look-through policy

$$\frac{d \log \ell(\tau)}{d\tau} = \overbrace{-\frac{(\Theta_\tau - 1)}{(1+\sigma\psi)(1+\tau)(\Theta_\tau + \tau)\Theta_\tau}}^{<0} \left[\sigma\Theta_\tau + (\sigma - \gamma)\tau\right]$$

Are Tariffs Expansionary or Contractionary?

- Under look-through policy

$$\frac{d \log \ell(\tau)}{d\tau} = \overbrace{-\frac{(\Theta_\tau - 1)}{(1+\sigma\psi)(1+\tau)(\Theta_\tau+\tau)\Theta_\tau}}^{<0} \left[\sigma\Theta_\tau \qquad\qquad \right] < 0$$

  - For small τ, increase in tariffs are always contractionary—even in the absence of TOT or exchange rate movements (cf. Mundell, 1961)

Are Tariffs Expansionary or Contractionary?

- Under look-through policy

$$\frac{d \log \ell(\tau)}{d\tau} = \overbrace{-\frac{(\Theta_\tau - 1)}{(1+\sigma\psi)(1+\tau)(\Theta_\tau+\tau)\Theta_\tau}}^{<0} [\sigma\Theta_\tau + (\sigma - \gamma)\tau]$$

- For small τ, increase in tariffs are always contractionary—even in the absence of TOT or exchange rate movements (cf. Mundell, 1961)
- For large τ: always contractionary if goods are Hicksian complements ($\sigma > \gamma$)
  - But may be expansionary if goods are Hicksian substitutes ($\sigma < \gamma$)

Ramsey Optimal Monetary Policy

$$\max_{\pi_t, b_{t+1}, \ell_t, c_t^f, c_t^h} \sum_{t=0}^{\infty} \beta^t \Big[u(c_t^h, c_t^f) - v(\ell_t) \Big],$$

$$\text{s.t.} \quad c_t^h + p\, c_t^f + \frac{b_{t+1}}{R^*} = b_t + \ell_t \left(1 - \Upsilon \frac{\varphi}{2} \pi_t^2 \right)$$

$$\frac{1-\omega}{\omega} \left(\frac{c_t^h}{c_t^f} \right)^{\frac{1}{\gamma}} = p\,(1 + \tau_t)$$

$$u_h(c_t^h, c_t^f) = \beta R^* u_h(c_{t+1}^h, c_{t+1}^f)$$

$$(1+\pi_t)\,\pi_t = \frac{\varepsilon}{\varphi} \left[\frac{v'(\ell_t)}{u_h(c_t^h, c_t^f)} - 1 \right] + \frac{\ell_{t+1}}{\ell_t} \frac{(1+\pi_{t+1})\pi_{t+1}}{R^*}$$

Ramsey Optimal Monetary Policy

$$\max_{\pi_t, b_{t+1}, \ell_t, c_t^f, c_t^h} \sum_{t=0}^{\infty} \beta^t \Big[u(c_t^h, c_t^f) - v(\ell_t) \Big], \qquad \Upsilon = 0,$$

Sticky prices induce costs <u>only</u> from output gap

$$\text{s.t.} \quad c_t^h + p\, c_t^f + \frac{b_{t+1}}{R^*} = b_t + \ell_t$$

$$\frac{1-\omega}{\omega} \left(\frac{c_t^h}{c_t^f} \right)^{\frac{1}{\gamma}} = p\,(1 + \tau_t)$$

$$u_h(c_t^h, c_t^f) = \beta R^* u_h(c_{t+1}^h, c_{t+1}^f)$$

$$(1 + \pi_t)\,\pi_t = \frac{\varepsilon}{\varphi} \left[\frac{v'(\ell_t)}{u_h(c_t^h, c_t^f)} - 1 \right] + \frac{\ell_{t+1}}{\ell_t} \frac{(1 + \pi_{t+1})\pi_{t+1}}{R^*}$$

Ramsey Optimal Monetary Policy

$$\max_{b_{t+1},\ell_t,c_t^f,c_t^h} \sum_{t=0}^{\infty} \beta^t \left[u(c_t^h, c_t^f) - v(\ell_t) \right], \qquad \Upsilon = 0,$$

$$\text{s.t.} \quad c_t^h + p\, c_t^f + \frac{b_{t+1}}{R^*} = b_t + \ell_t$$

$$\frac{1-\omega}{\omega} \left(\frac{c_t^h}{c_t^f} \right)^{\frac{1}{\gamma}} = p\,(1+\tau_t)$$

$$u_h(c_t^h, c_t^f) = \beta R^* u_h(c_{t+1}^h, c_{t+1}^f)$$

Ramsey Optimal Monetary Policy

$$\max_{b_{t+1}, \ell_t, c_t^f, c_t^h} \sum_{t=0}^{\infty} \beta^t \left[u(c_t^h, c_t^f) - v(\ell_t) \right], \qquad \Upsilon = 0, \tau_t = \tau, \beta R^* = 1,$$

s.t. $$c_t^h + p\, c_t^f + \frac{b_{t+1}}{R^*} = b_t + \ell_t$$

$$\frac{1-\omega}{\omega} \left(\frac{c_t^h}{c_t^f} \right)^{\frac{1}{\gamma}} = p\,(1 + \tau\ )$$

$$u_h(c_t^h, c_t^f) \ = \ \beta R^* u_h(c_{t+1}^h, c_{t+1}^f)$$

Ramsey Optimal Monetary Policy

$$\max_{\ell_t, c_t^f, c_t^h} \sum_{t=0}^{\infty} \beta^t \Big[u(c^h, c^f) - v(\ell\ ) \Big], \qquad \Upsilon = 0, \tau_t = \tau, \beta R^* = 1,$$

$$\text{s.t.} \quad c_t^h + p\, c_t^f + \frac{b_{t+1}}{R^*} = b_t + \ell_t$$

$$\frac{1-\omega}{\omega} \left(\frac{c^h}{c^f} \right)^{\frac{1}{\gamma}} = p\,(1 + \tau\ )$$

Ramsey Optimal Monetary Policy

$$\max_{\ell,c^f,c^h} \sum_{t=0}^{\infty} \beta^t \Big[u(c^h, c^f) - v(\ell) \Big], \qquad \Upsilon = 0, \tau_t = \tau, \beta R^* = 1, b_0 = 0$$

$$\text{s.t.} \quad c^h + p\, c^f = \ell$$

$$\frac{1-\omega}{\omega}\left(\frac{c^h}{c^f}\right)^{\frac{1}{\gamma}} = p\,(1+\tau)$$

Ramsey Optimal Monetary Policy

$$\max_{\ell, c^f, c^h} \; u(c^h, c^f) - v(\ell),$$

$$\Upsilon = 0, \tau_t = \tau, \beta R^* = 1, b_0 = 0$$

$$\text{s.t.} \quad c^h + p\, c^f = \ell,$$

$$\frac{1-\omega}{\omega} \left(\frac{c^h}{c^f} \right)^{\frac{1}{\gamma}} = p\,(1 + \tau)$$

Ramsey Optimal Monetary Policy

$$\max_{\ell, c^f, c^h} \; u(c^h, c^f) - v(\ell),$$

$\Upsilon = 0, \tau_t = \tau, \beta R^* = 1, b_0 = 0$

$$\text{s.t.} \quad c^h + p\, c^f = \ell,$$

$$\frac{1-\omega}{\omega} \left(\frac{c^h}{c^f} \right)^{\frac{1}{\gamma}} = p\,(1 + \tau)$$

Ramsey problem reduced to planner choosing ℓ directly, while households choose c^h, c^f

Ramsey Optimal Monetary Policy

$$\max_{\ell, c^f, c^h} \; u(c^h, c^f) - v(\ell\;),$$

$$\Upsilon = 0, \tau_t = \tau, \beta R^* = 1, b_0 = 0$$

$$\text{s.t.} \quad c^h + p\, c^f = \ell\;,$$

$$\frac{1-\omega}{\omega}\left(\frac{c^h}{c^f}\right)^{\frac{1}{\gamma}} = p\,(1+\tau\;)$$

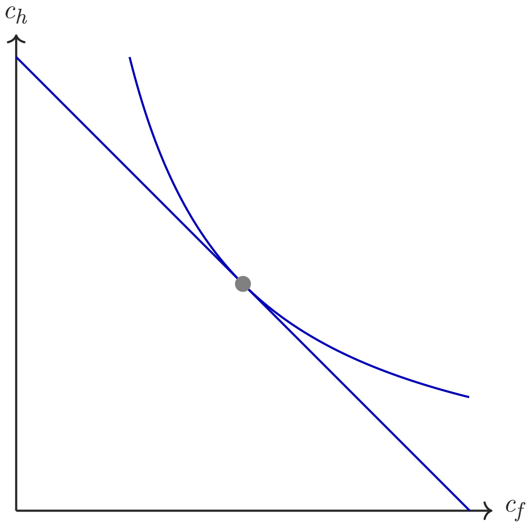
Optimal policy:

$$\ell_t^{opt}(\tau) = \left(\frac{1+\tau}{1+\Theta_\tau^{-1}\tau}\right)^{\frac{\sigma}{1+\sigma\psi}} \left[\frac{\Theta_\tau+\tau}{1+\tau}\left(\omega\Theta_\tau\right)^{\frac{\sigma-\gamma}{\gamma-1}}\right]^{\frac{1}{1+\sigma\psi}} > \ell_t^{\text{look}}(\tau).$$

Why is Stimulus Optimal?

$$\max_{c^h,\, c^f} \; u(c^h, c^f) - v(\ell)$$

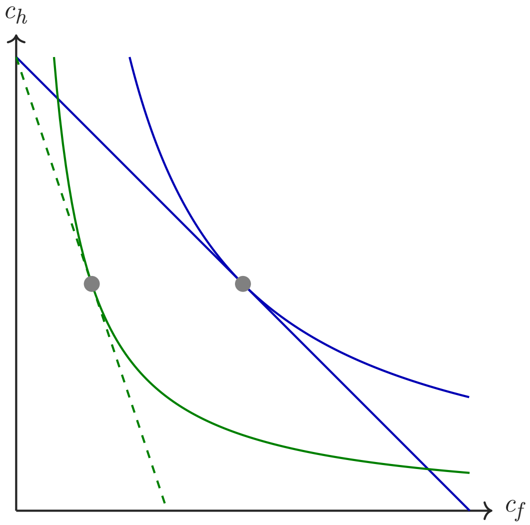
$$\text{s.t.} \quad c^h + p(1+\tau)c^f \leq w\ell + d + T$$



Why is Stimulus Optimal?

$$\max_{c^h,\, c^f} \; u(c^h, c^f) - v(\ell)$$

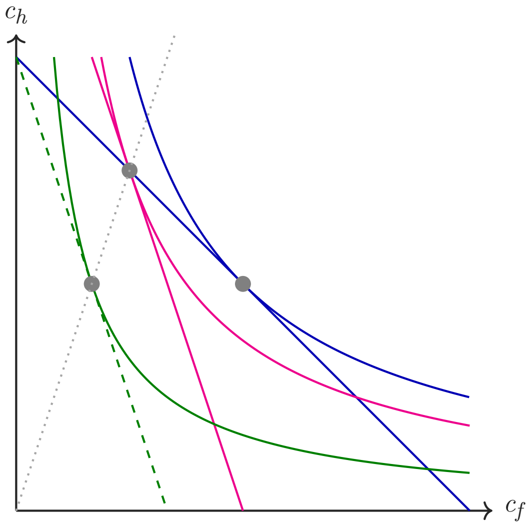
$$\text{s.t.} \quad c^h + p(1+\tau)c^f \leq w\ell + d + T$$



Why is Stimulus Optimal?

$$\max_{c^h,\,c^f}\ u(c^h, c^f) - v(\ell)$$

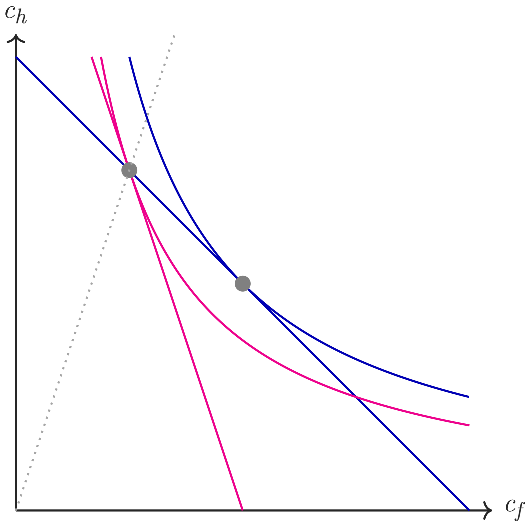
$$\text{s.t.}\quad c^h + p(1+\tau)c^f \le w\ell + d + T$$



Why is Stimulus Optimal?

$$\max_{c^h,\, c^f} \; u(c^h, c^f) - v(\ell)$$

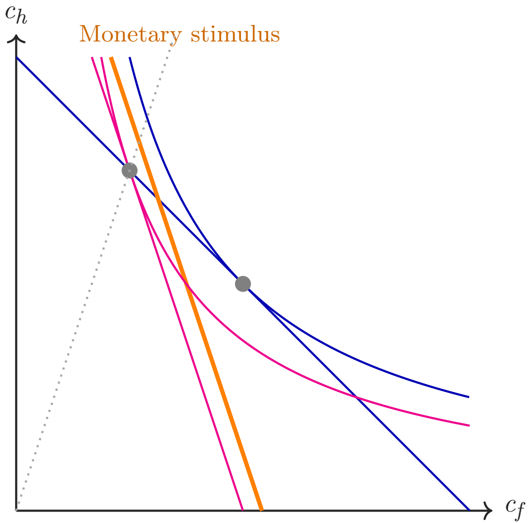
$$\text{s.t.} \quad c^h + p(1+\tau)c^f \leq w\ell + d + T$$



Why is Stimulus Optimal?

$$\max_{c^h,\, c^f} \; u(c^h, c^f) - v(\ell)$$

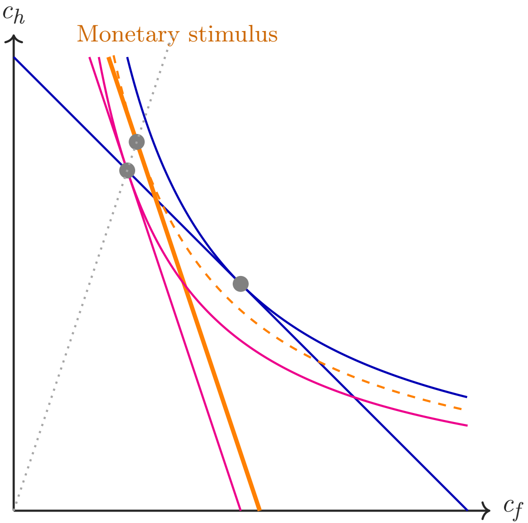
$$\text{s.t.} \quad c^h + p(1+\tau)c^f \leq w\ell + d + T(C^f)$$



Why is Stimulus Optimal?

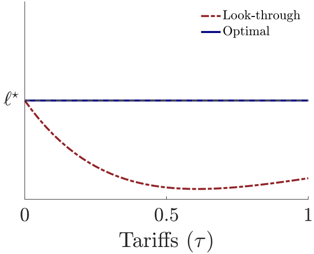
$$\max_{c^h, c^f} \; u(c^h, c^f) - v(\ell)$$

$$\text{s.t.} \quad c^h + p(1+\tau)c^f \leq w\ell + d + T(C^f)$$

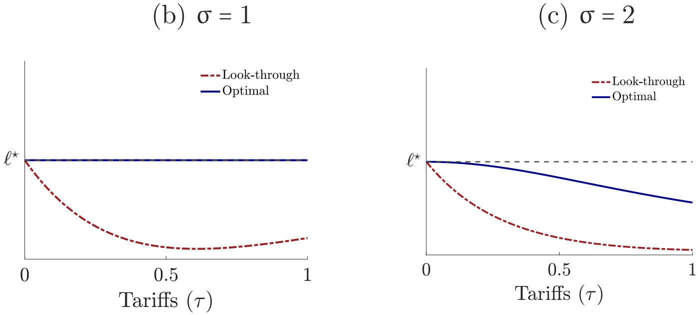


Employment Response: Optimal Policy vs. Look-through

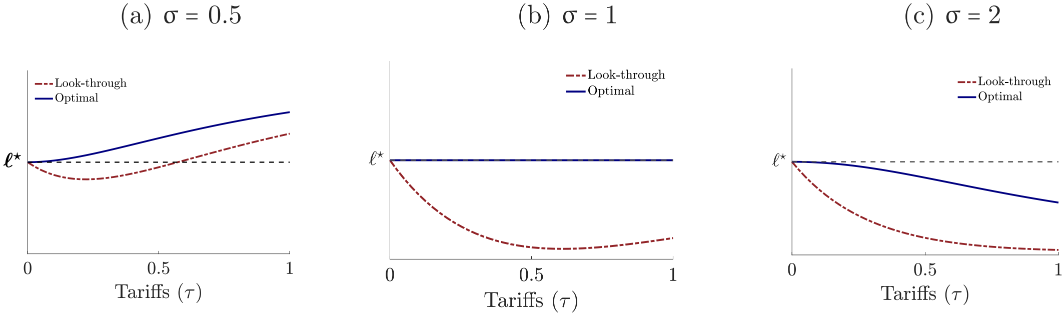
(b) σ = 1



Employment Response: Optimal Policy vs. Look-through

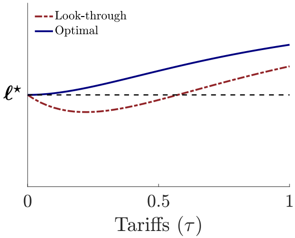


Employment Response: Optimal Policy vs. Look-through

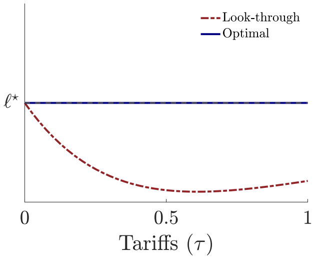


Employment Response: Optimal Policy vs. Look-through

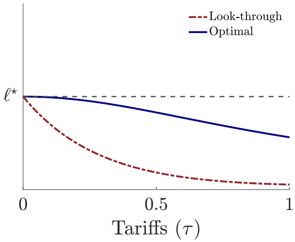
(a) σ = 0.5



(b) σ = 1



(c) σ = 2

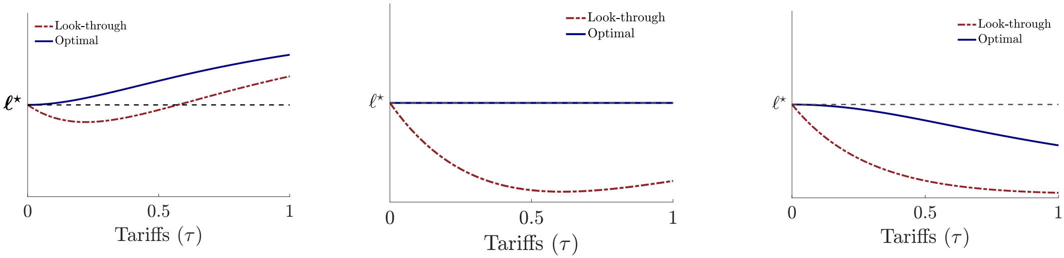


Under optimal policy, output is always above the natural level.

If $\sigma < 1$, output exceeds both natural and efficient level

Employment Response: Optimal Policy vs. Look-through

(a) $\sigma = 0.5$ (b) $\sigma = 1$ (c) $\sigma = 2$



Under optimal policy, output is always above the natural level.

If $\sigma < 1$, output exceeds both natural and efficient level

→ Unlike conventional cost-push shock

Employment under Optimal Policy

Tariffs: Expansionary or Contractionary?

$$\frac{d \log \ell^{opt}}{d\tau} = \frac{(\Theta_\tau - 1)}{(1 + \sigma\psi)(1 + \tau)(\Theta_\tau + \tau)\Theta_\tau}(1 - \sigma)\gamma\tau$$

Employment under Optimal Policy

Tariffs: Expansionary or Contractionary?

$$\frac{d \log \ell^{opt}}{d\tau} = \frac{(\Theta_\tau - 1)}{(1 + \sigma\psi)(1 + \tau)(\Theta_\tau + \tau)\Theta_\tau}(1 - \sigma)\gamma\tau$$

No first-order effect on ℓ at $\tau = 0$

- At $\tau = 0$, planner purely rebalances c^h, c^f

Employment under Optimal Policy

Tariffs: Expansionary or Contractionary?

$$\frac{d\log \ell^{opt}}{d\tau} = \frac{(\Theta_\tau - 1)}{(1+\sigma\psi)(1+\tau)(\Theta_\tau + \tau)\Theta_\tau}(1-\sigma)\gamma\tau$$

- At $\tau = 0$, planner purely rebalances c^h, c^f
- For $\tau > 0$ the consumption distortion reduces the marginal return to labor leading to substitution and income effects
  - Employment response depends entirely on the IES
    - $\uparrow \ell \iff \sigma < 1$

Quantitative Analysis

Standard NK assumption: price adjustment costs are not rebated, $\Upsilon = 1$

Quantitative Analysis

Standard NK assumption: price adjustment costs are not rebated, $\Upsilon = 1$

- With $\Upsilon = 0$, optimal policy generates a permanent output boom and inflation

Quantitative Analysis

Standard NK assumption: price adjustment costs are not rebated, $\Upsilon = 1$

- With $\Upsilon = 0$, optimal policy generates a permanent output boom and inflation
- With $\Upsilon > 0$, optimal policy remains expansionary:

Quantitative Analysis

Standard NK assumption: price adjustment costs are not rebated, $\Upsilon = 1$

- With $\Upsilon = 0$, optimal policy generates a permanent output boom and inflation
- With $\Upsilon > 0$, optimal policy remains expansionary:
  - Starting from $\pi = 0$, costs of stimulating are second order, but first-order gains from mitigating fiscal externality

Quantitative Analysis

Standard NK assumption: price adjustment costs are not rebated, $\Upsilon = 1$

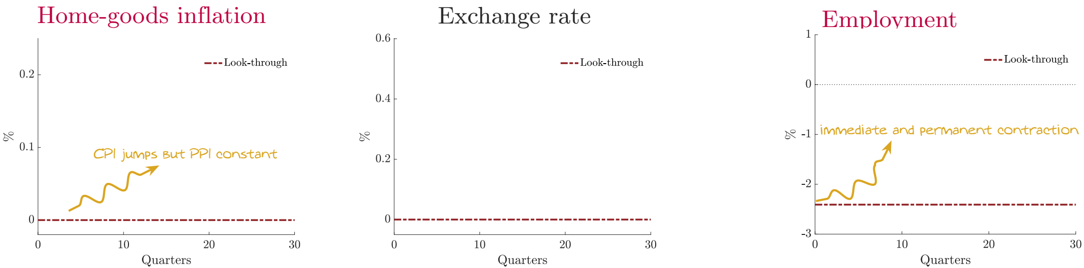
- With $\Upsilon = 0$, optimal policy generates a permanent output boom and inflation
- With $\Upsilon > 0$, optimal policy remains expansionary:
  - Starting from $\pi = 0$, costs of stimulating are second order, but first-order gains from mitigating fiscal externality
  - Stimulus only in the short-run $\Leftarrow$ inflation in the long-run is too costly

Calibration

Parameter	Description	Value
β	Discount factor	0.99
γ	Elasticity between h and f	4
σ	IES	0.5
ψ	Inverse Frisch elasticity	1
ε	Elasticity of substitution (varieties)	6

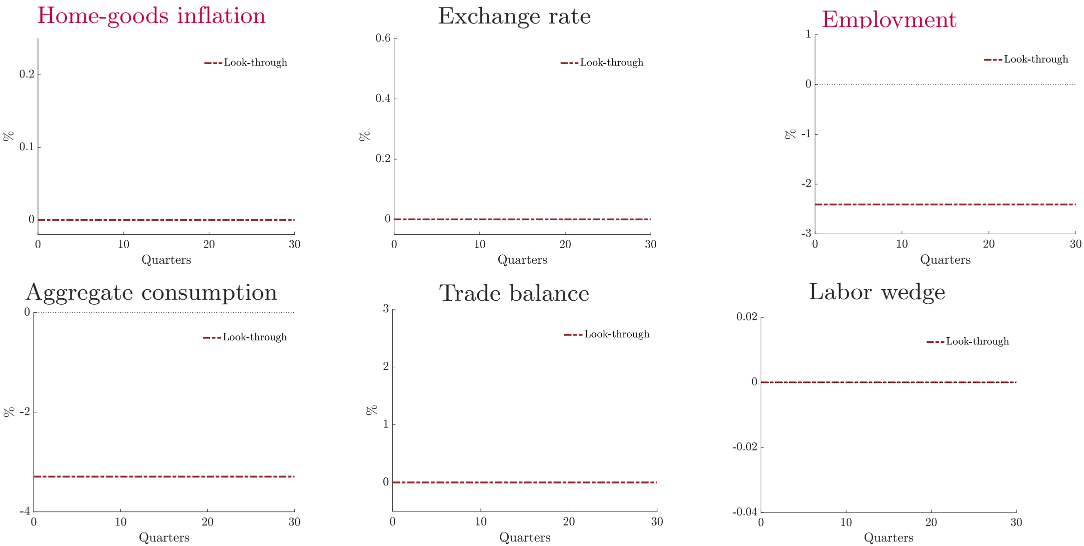
- Calibrate φ, ω to match: (i) slope of Phillips Curve $=0.0055$ (Hazell et al.); (ii) imports to tradable GDP
- Non-linear impulse response to permanent tariff $\tau_t = 0.15$ (baseline)

Permanent Tariff: Look-through



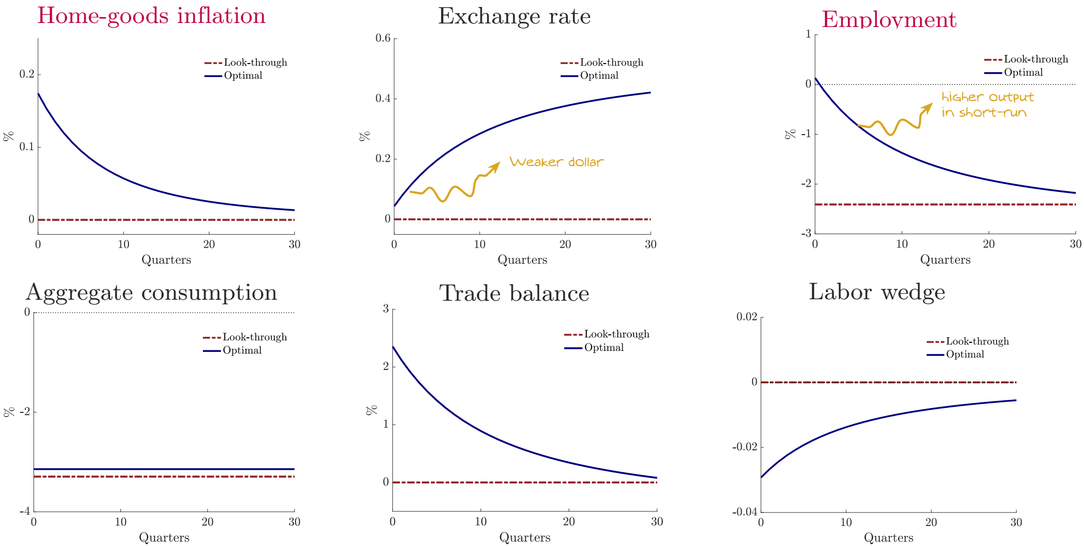
Inflation is annualized. Consumption, employment and the exchange rate are expressed in percentage deviation from the pre-tariff allocation. Trade balance are expressed as a fraction of GDP.

Permanent Tariff: Look-through vs. Optimal Policy



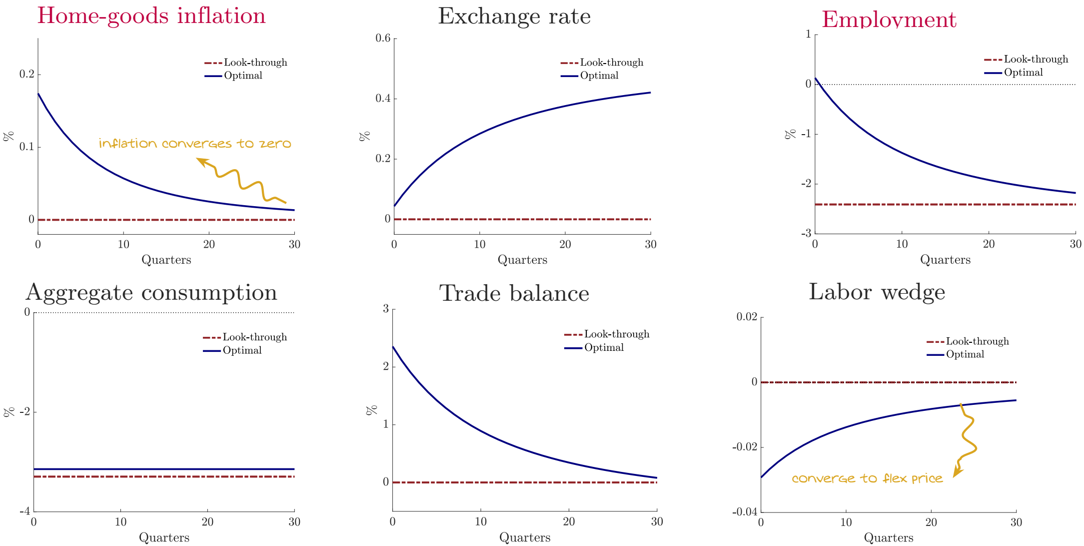
Inflation is annualized. Consumption, employment and the exchange rate are expressed in percentage deviation from the pre-tariff allocation. Trade balance are expressed as a fraction of GDP.

Permanent Tariff: Look-through vs. Optimal Policy



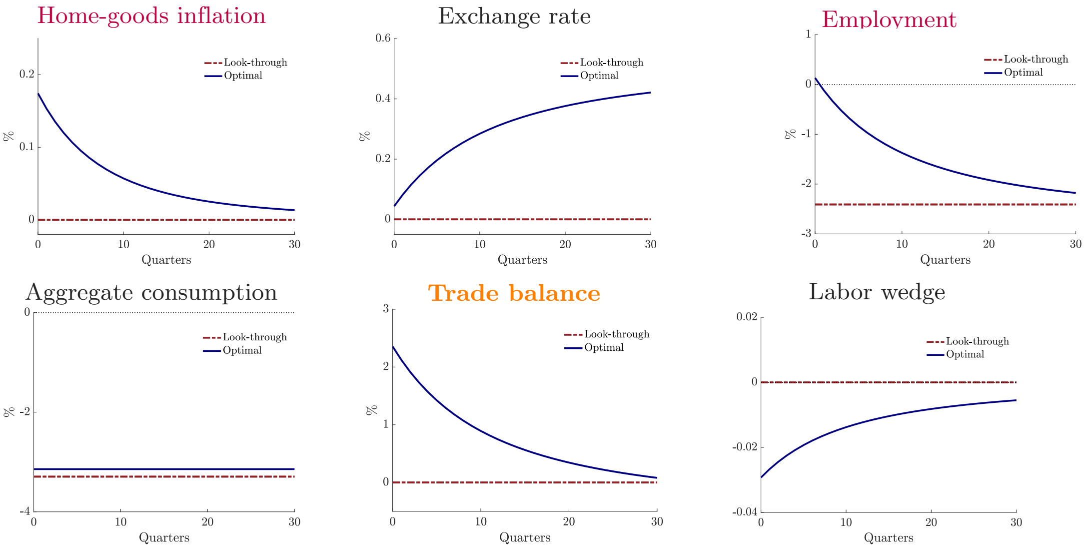
Inflation is annualized. Consumption, employment and the exchange rate are expressed in percentage deviation from the pre-tariff allocation. Trade balance are expressed as a fraction of GDP.

Permanent Tariff: Look-through vs. Optimal Policy



Inflation is annualized. Consumption, employment and the exchange rate are expressed in percentage deviation from the pre-tariff allocation. Trade balance are expressed as a fraction of GDP.

Permanent Tariff: Look-through vs. Optimal Policy



Inflation is annualized. Consumption, employment and the exchange rate are expressed in percentage deviation from the pre-tariff allocation. Trade balance are expressed as a fraction of GDP.

Taking Stock

- Optimal policy is to overheat the economy: inflation rises beyond *direct* effect of tariff
  - Increase in both imported and domestic produced goods
- Employment increases above both natural and efficient levels
- In the long-run, economy converges to flex-price allocation, with zero inflation, higher NFA position and lower employment

Taking Stock

- Optimal policy is to overheat the economy: inflation rises beyond *direct* effect of tariff
  - Increase in both imported and domestic produced goods
- Employment increases above both natural and efficient levels
- In the long-run, economy converges to flex-price allocation, with zero inflation, higher NFA position and lower employment

Additional Results in the Paper

- Permanent shocks vs transitory ⏩ Details
- Anticipated shocks: ⏩ Details
  - Respond today, but less strongly
  - Larger trade deficit on impact
- PPI vs. CPI Targeting ⏩ Details
  - Much larger losses under CPI targeting
- Main extensions
  - i) Endogenous terms-of-trade
  - ii) Imported intermediate inputs
  - iii) Distorted steady state
- Welfare

Additional Results in the Paper

- Permanent shocks vs transitory ⏩ Details
- Anticipated shocks: ⏩ Details
  - Respond today, but less strongly
  - Larger trade deficit on impact
- PPI vs. CPI Targeting ⏩ Details
  - Much larger losses under CPI targeting
- Main extensions ⇝ Next
  i) Endogenous terms-of-trade
  ii) Imported intermediate inputs
  iii) Distorted steady state
- Welfare

Endogenous TOT

- Continuum of SOE where c^f is a CES composite of goods produced abroad

$$c_{it} = \left[\omega \left(c_{it}^h\right)^{1-\frac{1}{\gamma}} + (1-\omega)\left(c_{it}^f\right)^{1-\frac{1}{\gamma}}\right]^{\frac{\gamma}{\gamma-1}}, \quad c_{it}^f = \left(\int_0^1 \left(c_{it}^k\right)^{1-\frac{1}{\theta}} dk\right)^{\frac{\theta}{\theta-1}}$$

Endogenous TOT

- Continuum of SOE where c^f is a CES composite of goods produced abroad

$$c_{it} = \left[\omega \left(c_{it}^h\right)^{1-\frac{1}{\gamma}} + (1-\omega)\left(c_{it}^f\right)^{1-\frac{1}{\gamma}}\right]^{\frac{\gamma}{\gamma-1}}, \quad c_{it}^f = \left(\int_0^1 \left(c_{it}^k\right)^{1-\frac{1}{\theta}} dk\right)^{\frac{\theta}{\theta-1}}$$

- Export demand for home good

$$p_t = A\left(y_t - c_t^h\right)^{\frac{1}{\theta}} \qquad \text{Baseline } \theta = \infty$$

Endogenous TOT

- Continuum of SOE where c^f is a CES composite of goods produced abroad

$$c_{it} = \left[\omega\left(c_{it}^h\right)^{1-\frac{1}{\gamma}} + (1-\omega)\left(c_{it}^f\right)^{1-\frac{1}{\gamma}}\right]^{\frac{\gamma}{\gamma-1}}, \quad c_{it}^f = \left(\int_0^1 \left(c_{it}^k\right)^{1-\frac{1}{\theta}} dk\right)^{\frac{\theta}{\theta-1}}$$

- Export demand for home good

$$p_t = A\left(y_t - c_t^h\right)^{\frac{1}{\theta}} \qquad \text{Baseline } \theta = \infty$$

- Optimal tariff is positive $\tau^* = \frac{1}{\theta-1}$ with $\theta > 1$

Endogenous TOT

- Continuum of SOE where c^f is a CES composite of goods produced abroad

$$c_{it} = \left[\omega\left(c_{it}^{h}\right)^{1-\frac{1}{\gamma}} + (1-\omega)\left(c_{it}^{f}\right)^{1-\frac{1}{\gamma}}\right]^{\frac{\gamma}{\gamma-1}}, \quad c_{it}^{f} = \left(\int_0^1 \left(c_{it}^{k}\right)^{1-\frac{1}{\theta}} dk\right)^{\frac{\theta}{\theta-1}}$$

- Export demand for home good

$$p_t = A\left(y_t - c_t^h\right)^{\frac{1}{\theta}} \qquad \text{Baseline } \theta = \infty$$

- Optimal tariff is positive $\tau^* = \frac{1}{\theta-1}$ with $\theta > 1$
  - Output above natural level $\iff \tau > \tau^*$.
    - Same as baseline: any increase in tariff leads to policy easing

Endogenous TOT

- Continuum of SOE where c^f is a CES composite of goods produced abroad

$$c_{it} = \left[\omega\left(c_{it}^h\right)^{1-\frac{1}{\gamma}} + (1-\omega)\left(c_{it}^f\right)^{1-\frac{1}{\gamma}}\right]^{\frac{\gamma}{\gamma-1}}, \quad c_{it}^f = \left(\int_0^1 \left(c_{it}^k\right)^{1-\frac{1}{\theta}} dk\right)^{\frac{\theta}{\theta-1}}$$

- Export demand for home good

$$p_t = A\left(y_t - c_t^h\right)^{\frac{1}{\theta}} \qquad \text{Baseline } \theta = \infty$$

- Optimal tariff is positive $\tau^* = \frac{1}{\theta-1}$ with $\theta > 1$
  - Output above natural level $\iff \tau > \tau^*$.
    - Same as baseline: any increase in tariff leads to policy easing
  - Quantitatively, modest attenuation of stimulus Results

Endogenous TOT

- Continuum of SOE where c^f is a CES composite of goods produced abroad

$$c_{it} = \left[\omega \left(c_{it}^h \right)^{1-\frac{1}{\gamma}} + (1-\omega) \left(c_{it}^f \right)^{1-\frac{1}{\gamma}} \right]^{\frac{\gamma}{\gamma-1}}, \quad c_{it}^f = \left(\int_0^1 \left(c_{it}^k \right)^{1-\frac{1}{\theta}} dk \right)^{\frac{\theta}{\theta-1}}$$

- Export demand for home good

$$p_t = A \left(y_t - c_t^h \right)^{\frac{1}{\theta}} \qquad \text{Baseline } \theta = \infty$$

- Optimal tariff is positive $\tau^* = \frac{1}{\theta - 1}$ with $\theta > 1$
  - Output above natural level $\iff \tau > \tau^*$.
    - Same as baseline: any increase in tariff leads to policy easing
  - Quantitatively, modest attenuation of stimulus Results

Tariffs on Imported Inputs

- Production of domestic varieties $y_{jt} = \ell_{jt}^{1-\nu} x_{jt}{}^{\nu}$
- NK Phillips curve:

$$(1+\pi_t)\pi_t = \frac{\varepsilon}{\varphi}\left[mc_t - 1\right] + \beta \frac{u_h(c_{t+1}^h, c_{t+1}^f)}{u_h(c_t^h, c_t^f)} \frac{y_{t+1}}{y_t}(1+\pi_{t+1})\pi_{t+1},$$

$$mc_t = \left[\frac{W_t}{(1-\nu)P_t^h}\right]^{1-\nu} \left[\frac{p(1+\tau_t^x)}{\nu}\right]^{\nu}$$

Tariffs on Imported Inputs

- Production of domestic varieties $y_{jt} = \ell_{jt}^{1-\nu} x_{jt}^{\nu}$
- NK Phillips curve:

$$(1+\pi_t)\pi_t = \frac{\varepsilon}{\varphi}\left[mc_t - 1\right] + \beta \frac{u_h(c_{t+1}^h, c_{t+1}^f)}{u_h(c_t^h, c_t^f)} \frac{y_{t+1}}{y_t}(1+\pi_{t+1})\pi_{t+1},$$

$$mc_t = \left[\frac{W_t}{(1-\nu)P_t^h}\right]^{1-\nu}\left[\frac{p(1+\tau_t^x)}{\nu}\right]^{\nu}$$

Tariffs on Imported Inputs

- Production of domestic varieties $y_{jt} = \ell_{jt}^{1-\nu} {x_{jt}}^{\nu}$
- NK Phillips curve:

$$(1+\pi_t)\pi_t = \frac{\varepsilon}{\varphi}\left[mc_t - 1\right] + \beta \frac{u_h(c_{t+1}^h, c_{t+1}^f)}{u_h(c_t^h, c_t^f)} \frac{y_{t+1}}{y_t}(1+\pi_{t+1})\pi_{t+1},$$

$$mc_t = \left[\frac{W_t}{(1-\nu)P_t^h}\right]^{1-\nu}\left[\frac{p(1+\tau_t^x)}{\nu}\right]^{\nu}$$

- Same as baseline: private cost of imported inputs exceeds social cost

  $\Rightarrow$ Optimal policy is stimulative

Tariffs on Imported Inputs

- Production of domestic varieties $y_{jt} = \ell_{jt}^{1-\nu} {x_{jt}}^{\nu}$
- NK Phillips curve:

$$(1+\pi_t)\pi_t = \frac{\varepsilon}{\varphi}\left[mc_t - 1\right] + \beta \frac{u_h(c_{t+1}^h, c_{t+1}^f)}{u_h(c_t^h, c_t^f)} \frac{y_{t+1}}{y_t}(1+\pi_{t+1})\pi_{t+1},$$

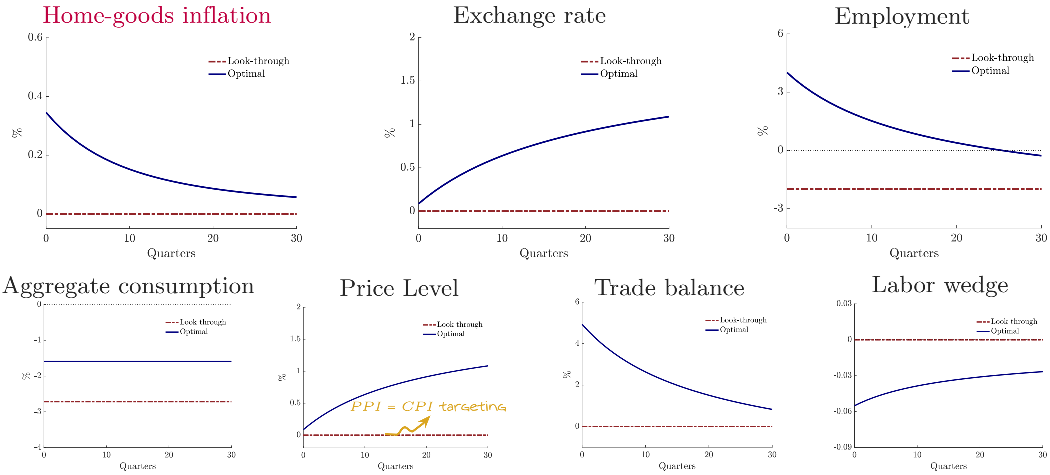
$$mc_t = \left[\frac{W_t}{(1-\nu)P_t^h}\right]^{1-\nu}\left[\frac{p(1+\tau_t^x)}{\nu}\right]^{\nu}$$

- Same as baseline: private cost of imported inputs exceeds social cost

  $\Rightarrow$ Optimal policy is stimulative

- Quantitatively, larger increases in employment and welfare gains

Tariff on Inputs Only



Calibrate ν, ω to match (i) share of intermediate inputs in total imports; (ii) imports-to-tradable GDP

⏩ results w/ tariffs on inputs and consumption

The case with distorted steady state

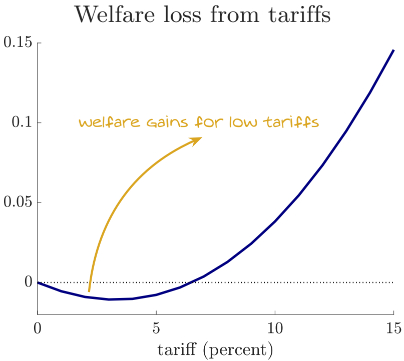
- Baseline model: labor subsidy is set to offset markup distortion

The case with distorted steady state

- Start now from $s = 0$ and use tariff revenue to subsidize labor $P_t^f \tau_t c_t^f = s_t W_t \ell_t$
  - Unambiguous increase in employment
  - Inflation is mitigated despite larger increases in output

The case with distorted steady state

- Start now from $s = 0$ and use tariff revenue to subsidize labor $P_t^f \tau_t c_t^f = s_t W_t \ell_t$
  - Unambiguous increase in employment
  - Inflation is mitigated despite larger increases in output



Welfare

	Gains Optimal Policy	Losses from Tariffs	
		Optimal Policy	Look-through
Baseline	0.009	0.99	1.00
Anticipated tariffs	0.008	0.96	0.97
Temporary tariffs	0.001	0.19	0.19
Endogenous TOT	0.007	0.68	0.69
Model w/ imported inputs			
Tariffs on c and x	0.32	1.61	1.91
Tariffs on c	0.01	1.00	1.01
Tariffs on x	0.22	0.59	0.80

Note: Welfare corresponds to permanent consumption equivalence (%).

Conclusions

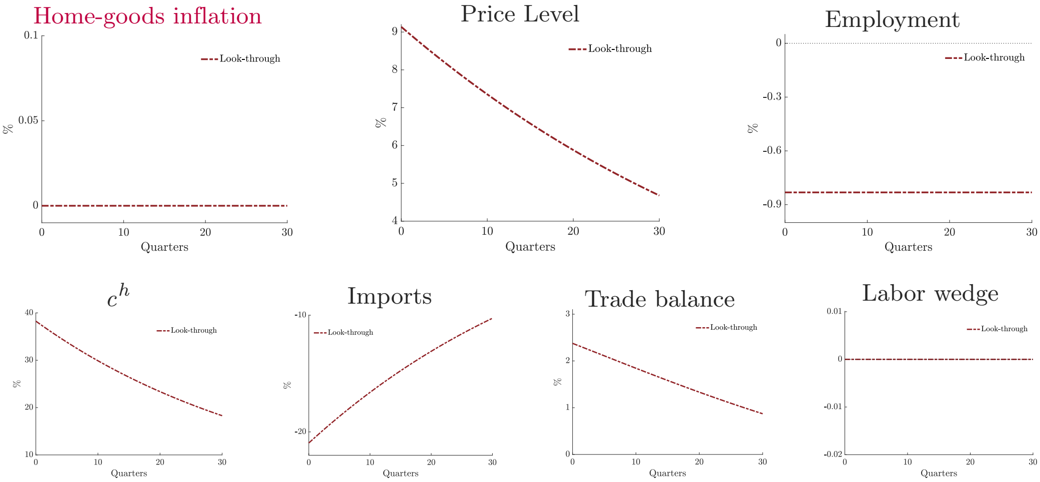
- Optimal monetary policy response to tariffs is to overheat the economy
  - Monetary stimulus to offset fiscal externality
  - Let inflation rise above and beyond the direct effects from tariffs

- Reduction in trade deficit in response to permanent tariffs
- Dollar depreciation since April 2 is not puzzling

Extra Slides

Temporary Tariff $\tau_t = 0.97 \cdot \tau_{t-1}$

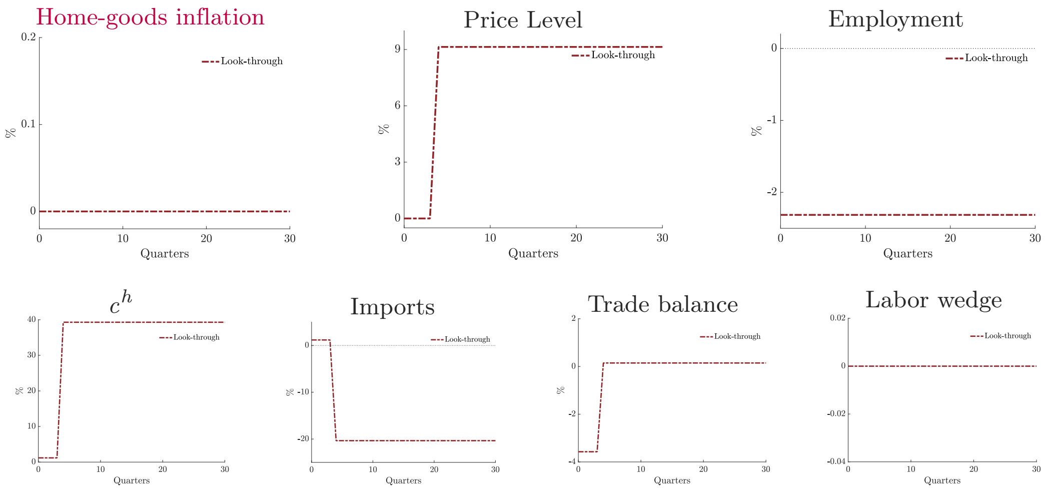
back



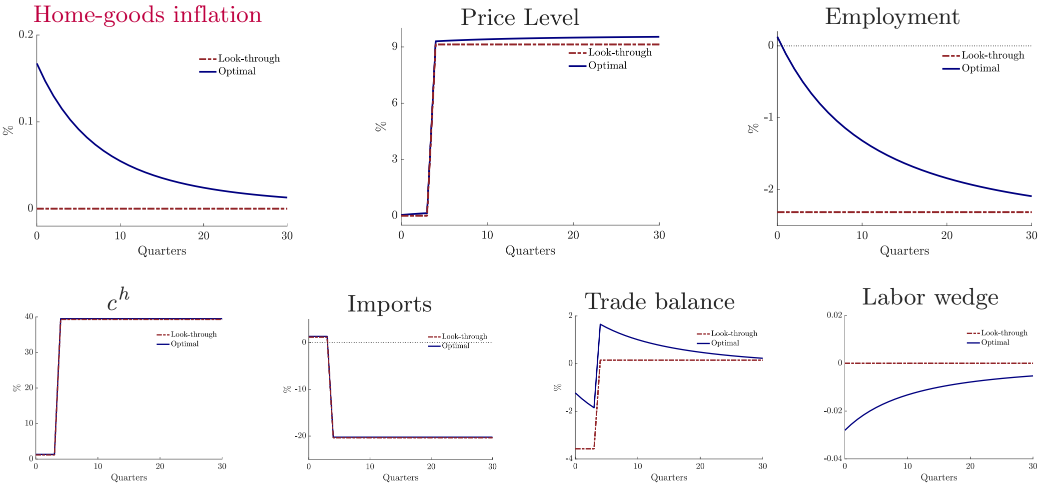
Temporary Tariff $\tau_t = 0.97 \cdot \tau_{t-1}$ ▸ back

As in the case of a permanent tariff, optimal MP stimulates the economy

Anticipation Effects ▸ back



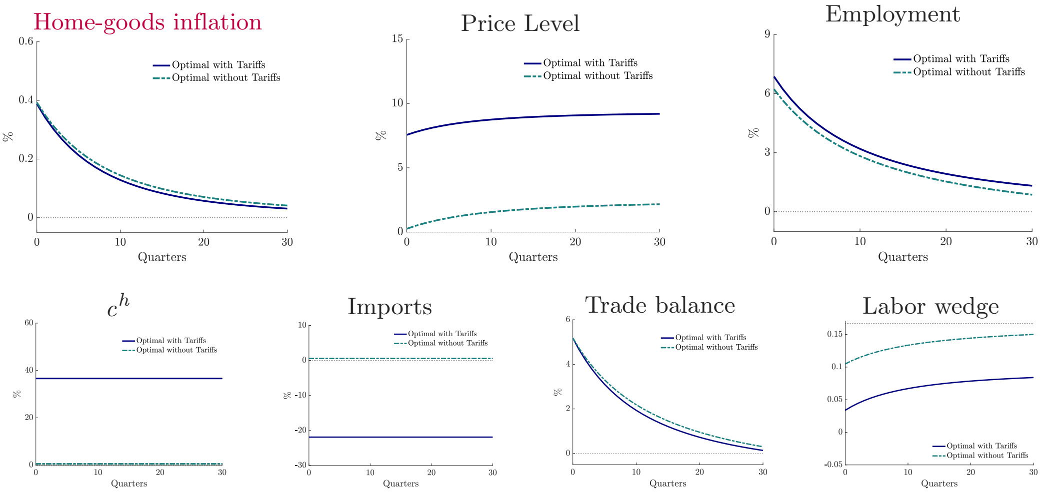
Anticipation Effects ▸ back



MP less expansionary: imports inefficiently high before tariff takes place

The Case with Distorted Steady State

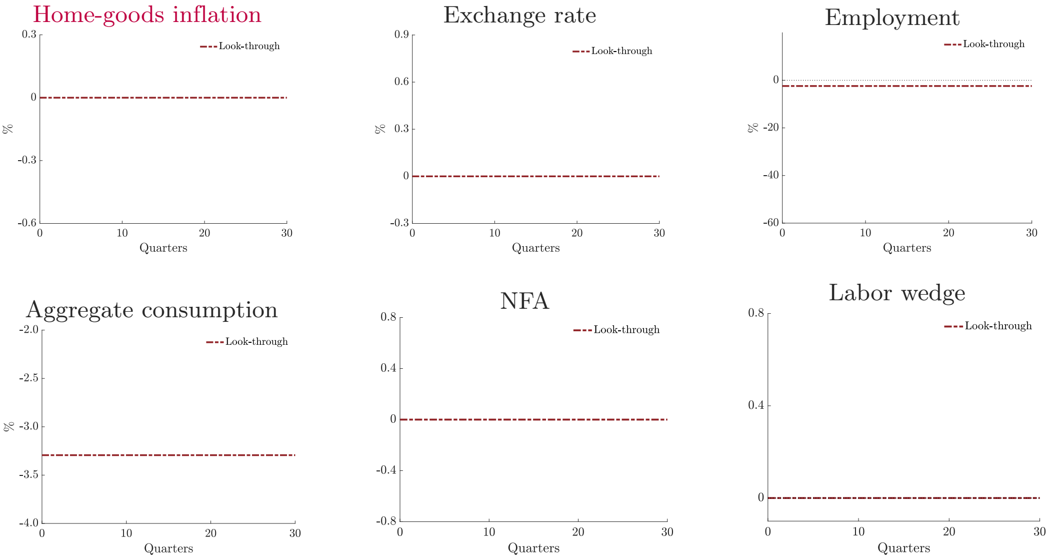
back



CPI Targeting Rule

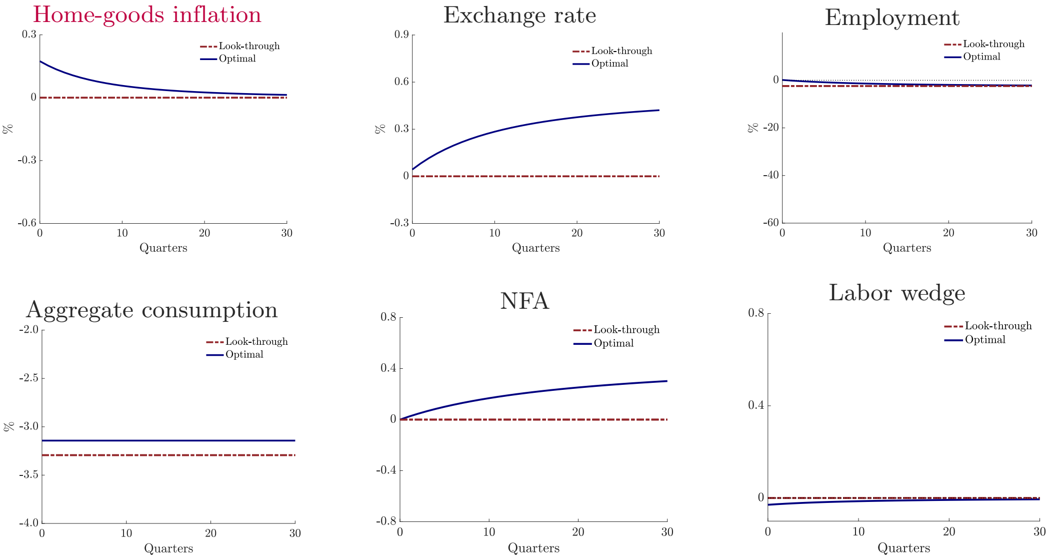
Permanent Tariff

Back



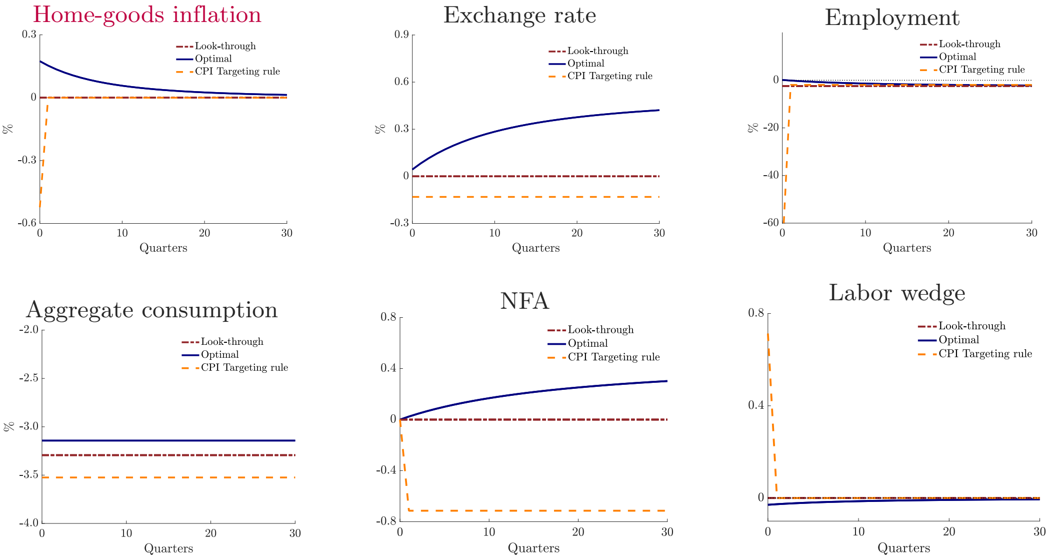
Permanent Tariff

▸▸ Back

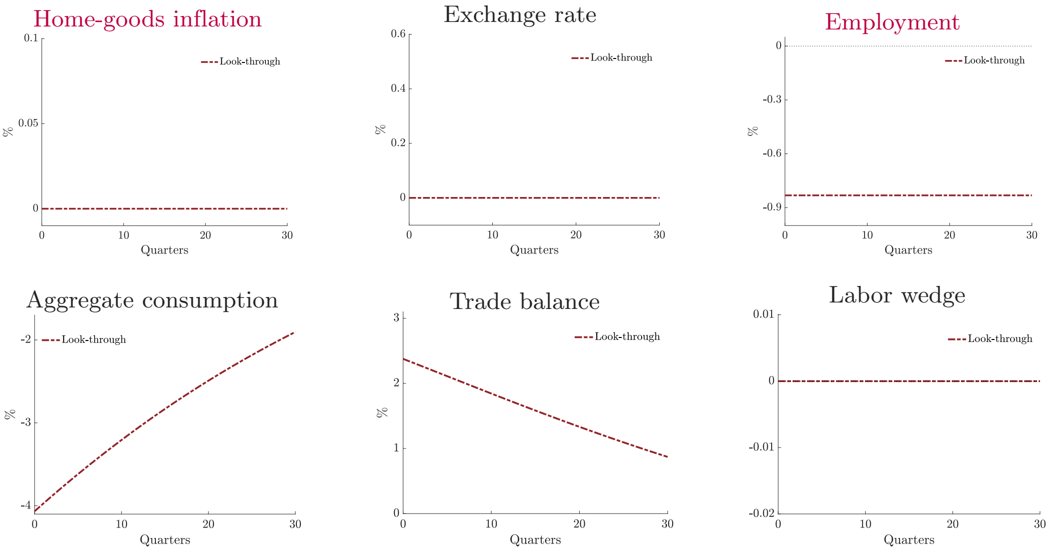


Permanent Tariff

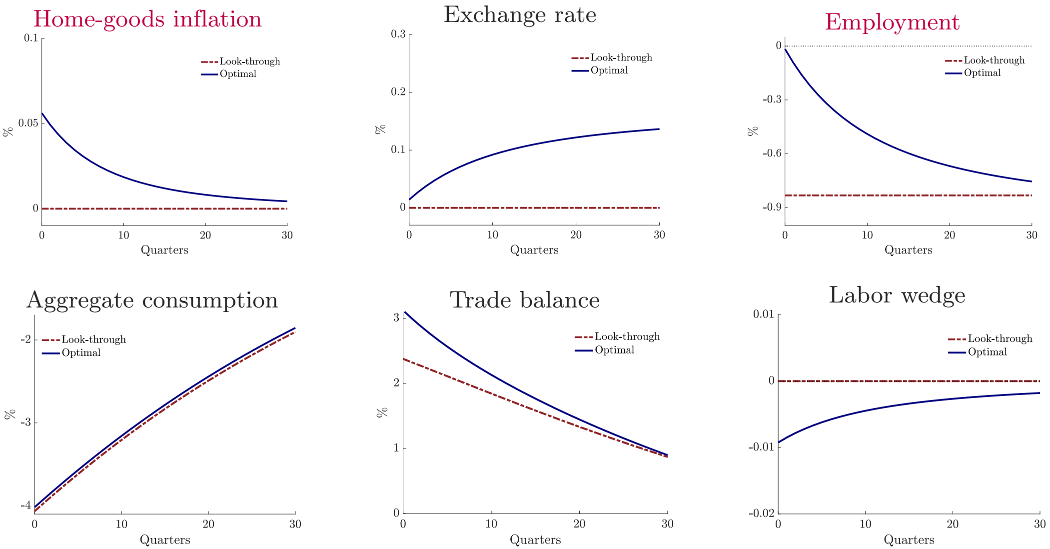
Back



Temporary Tariff $\tau_t = 0.97 \cdot \tau_{t-1}$ ▸ back



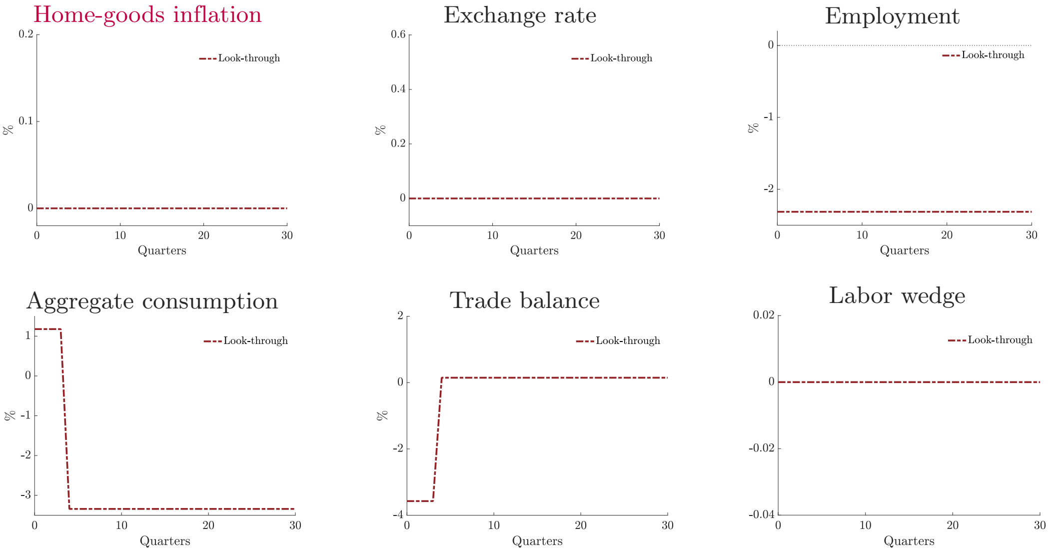
Temporary Tariff $\tau_t = 0.97 \cdot \tau_{t-1}$ ▸ back



As in the case of a permanent tariff, optimal MP stimulates the economy

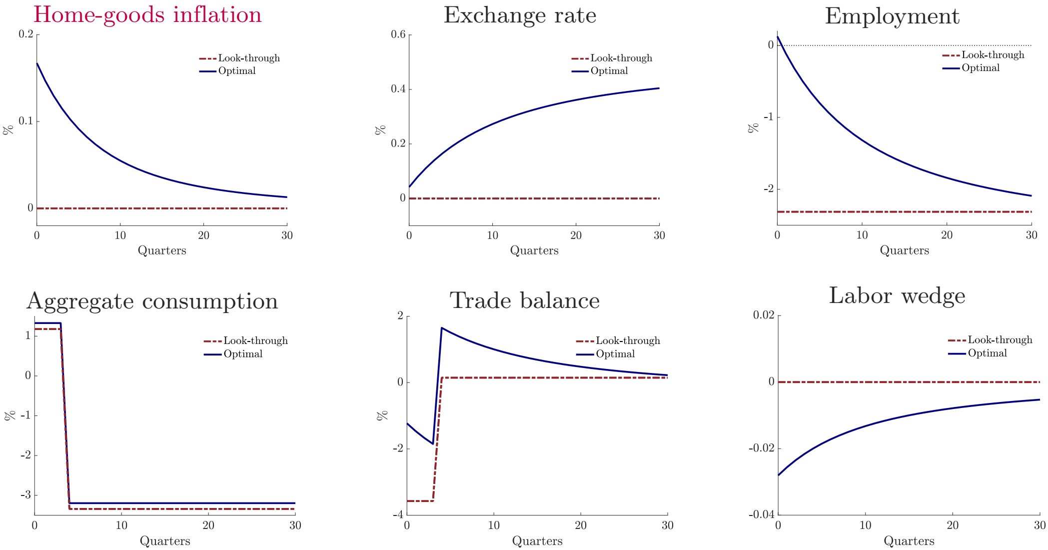
Anticipation Effects

▸ back



Anticipation Effects

back



The Case with Distorted Steady State

back