Capital Controls and Free-Trade Agreements

Annual Conference of the European Economic Association

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August 2022

The views expressed here do not necessarily reflect the position of the Bank of England.

Trade & Financial Openness Not Always Aligned

- *Bretton Woods*: Free trade promoted, but capital controls widely used

- *Post-Bretton Woods*: Increased trade and more financial openness

- *Recent Years*:
  - Growing protectionism (China-US trade war; Brexit; export restrictions post-Covid)
  - More sanguine views on capital controls (IMF's Integrated Policy Framework) and increasing 'macroprudential FX regulation'

How does conduct of capital controls change in a world with less free trade?
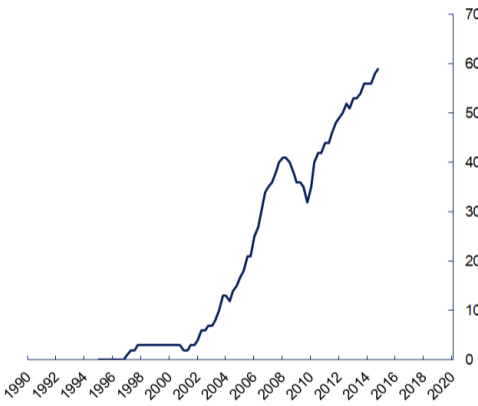
Trade & Financial Openness Not Always Aligned

Index of World Trade Policy Uncertainty
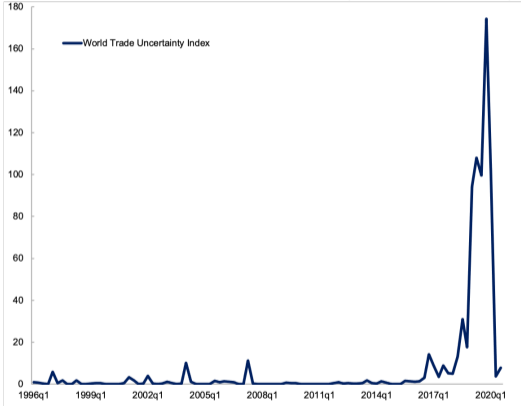
Source: Ahir, Bloom and Furceri (2018)

of Macroprudential FX Regulations

Source: Ahnert, Forbes, Friedrich and Reinhardt (2021)

This Paper: Trade-Finance Nexus

· Two-country endowment economy with **terms-of-trade externalities (ToT)**

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· Ramsey planner (Unilateral & Nash) maximises domestic welfare, manipulating interest rates and relative goods prices using capital flow taxes...

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$\Rightarrow$ Size in both goods and financial markets drives policy in open economies

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How does size in financial (goods) markets affect the conduct of trade (financial) policy?

Related Literature

Non-Exhaustive

- **Capital Controls**: Costinot, Lorenzoni and Werning (2014); Bianchi (2011); Farhi and Werning (2016); Bianchi and Lorenzoni (2021); ...
    - Over-/under-borrowing due to size externalities

- **Trade Policy**: Lerner (1936); Broda, Limão and Weinstein (2008); Costinot and Werning (2019); Corsetti and Bergin (2020); Caliendo, Feenstra, Romalis and Taylor (2021); ...
    - Optimal trade tariffs usually derived without trade in assets

- **Integrated Policy Analysis**: Ostry et al. (2010); Basu et al. (2020); Auray, Devereux and Eyquem (2020), Jeanne (2022)

Key Findings

1. Capital controls and tariffs balance inter- and intra-temporal **incentives** to manipulate ToT
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   - Absent FTA, weakly higher welfare using tariffs in addition to capital controls

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3. Mechanisms persist in strategic setting (Nash), with **capital-control and tariff wars** following 'inverse elasticity rule'
4. Domestic **welfare** gains more than offset by losses abroad from **spillovers**

Model-in-a-Slide

- *Countries*: Home H and Foreign F (*). *Goods*: 1 and 2.

- *Time*: $t = 0, 1, ..., \infty$. No uncertainty. Zero assets at $t = 0$.

- *Preferences*: $U_0 = \sum_{t=0}^{\infty} \beta^t u(C_t)$, where $\beta \in (0,1)$, C_t aggregate consumption, and $u(C) = \frac{C^{1-\sigma}-1}{1-\sigma}$ with $\sigma > 0$

- Households consume both goods 1 and 2:

$$C_t \equiv g(\mathbf{c}_t) = \left[\alpha_1^{\frac{1}{\phi}} c_{1,t}^{\frac{\phi-1}{\phi}} + (1-\alpha_1)^{\frac{1}{\phi}} c_{2,t}^{\frac{\phi-1}{\phi}} \right]^{\frac{\phi}{\phi-1}}$$

where $\mathbf{c}_t = [c_{1,t}, c_{2,t}]$, $\alpha_1 \in (0.5, 1]$, and $\phi > 0$ is 'elasticity of trade'

- *Exogenous* country endowments: $\mathbf{y}_t^{(*)} = [y_{1,t}^{(*)}, y_{2,t}^{(*)}]$

- Real Exchange Rate $Q = \frac{P^*}{P}$ and Terms of Trade $S = \frac{p_2}{p_1}$

Key Friction: Terms-of-Trade Externality

- Large countries affect prices when making consumption decisions: $\frac{\mathrm{d}C^*}{\mathrm{d}C} \neq 0$, $\frac{\mathrm{d}c_1^*}{\mathrm{d}c_1} \neq 0$

- Planner has incentive to exercise monopoly/monopsony power in goods markets both statically and dynamically [Costinot, Lorenzoni and Werning, 2014]
    - Inter-temporal: tax capital inflows when borrowing is relatively high ($R \downarrow$)
    - Intra-temporal: subsidise c_1 when selling relative more of good 1 ($p_1 \uparrow$)

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+ Terms of trade underpin important frictions in the literature:
  - **Borrowing constraints** [Bianchi, 2011]
  - ELB and other monetary constraints [Farhi and Werning, 2016]
  - Market segmentation and limits to arbitrage [Fanelli and Straub, 2018; Marin, 2020]
  - Heterogeneous cons. baskets [Cravino and Levchenko, 2017, Fanelli and Straub, 2018]

Incentives

Optimal Unilateral Policy: Setup

- Home country sets capital flow taxes to maximise welfare of domestic representative agent

- **Primal Approach**: Home planner chooses $\{\mathbf{c}_t\}$ in order to maximise welfare of representative agent U_0, taking as given:

    1. Foreign consumer maximising U_0^* subject to intertemporal budget constraint

    $$\sum_{t=0}^{\infty} \mathbf{p}_t \cdot (\mathbf{c}_t^* - \mathbf{y}_t^*) \leq 0$$

    where $\mathbf{p}_t = [p_{1,t}, p_{2,t}]$ is vector of world prices

    ▸ Foreign Maximisation

    2. Goods market clearing

    $$y_{1,t} + y_{1,t}^* = c_{1,t} + c_{1,t}^* \qquad y_{2,t} + y_{2,t}^* = c_{2,t} + c_{2,t}^*$$

Optimal Allocations with FTA

With FTA [Costinot, Lorenzoni, Werning, 2014]

- Choose C given FTA

- 1 FOC + 1 Instrument

$$\underbrace{\frac{\mathrm{d}\mathcal{L}}{\mathrm{d}C}}_{FOC=0} = \frac{\partial\mathcal{L}}{\partial c_1}\underbrace{c_1'(C)}_{FTA} + \frac{\partial\mathcal{L}}{\partial c_2}\underbrace{c_2'(C)}_{FTA}$$

- $u'(C_t) = \mu\mathcal{MC}_t^{FTA}$

$\Rightarrow$ Trade off $\frac{\partial\mathcal{L}}{\partial c_1}$ and $\frac{\partial\mathcal{L}}{\partial c_2}$, with c_1 and c_2 constrained by FTA

Optimal Allocations with and without FTA

With FTA [Costinot, Lorenzoni, Werning, 2014]

· Choose C given FTA

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Without FTA

⋆ Choose c_1 and c_2, given $C = g(\mathbf{c})$

⋆ 2 FOCs + 2 Instruments

$$\frac{\mathrm{d}\mathcal{L}}{\mathrm{d}C} = \underbrace{\frac{\partial\mathcal{L}}{\partial c_1}}_{FOC=0}c_1'(C) + \underbrace{\frac{\partial\mathcal{L}}{\partial c_2}}_{FOC=0}c_2'(C)$$

⋆ $u'(c_{i,t}) = \mu\mathcal{MC}_{i,t}^{nFTA}$ for $i = 1, 2$

$\Rightarrow$ C optimal for Home planner and can violate FTA constraint

Relaxing FTA Can Increase Home Welfare

Proposition

Suppose preferences are symmetric, $\alpha_1 = \alpha_2^*$ and $\alpha_2 = \alpha_1^*$, then in general:
$C^{nFTA} \geq C^{FTA}$

(i) When $C^{nFTA} > C^{FTA}$: optimal nFTA allocation violates Pareto frontier

(ii) $C^{nFTA} = C^{FTA}$ when endowments are proportional to preferences: $y_1 \propto \alpha_1$, $y_2 \propto \alpha_2$, $y_1^* \propto \alpha_1^*$ and $y_2^* \propto \alpha_2^*$

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<u>Intuition</u>

- Departing from FTA, planner can manipulate relative goods prices favourably (as long as endowments are not already proportional to preferences)
- With two instruments, no need to strike compromise across inter- and intra-temporal margins

Visual Intuition: Allocations with FTA

Feasible combinations of $\{c_1, c_2\}$ given F

FTA $\Rightarrow H$ cannot impose good-specific taxes $\Rightarrow (\mathbf{c}_t, \mathbf{c}_t^*)$ is Pareto efficient
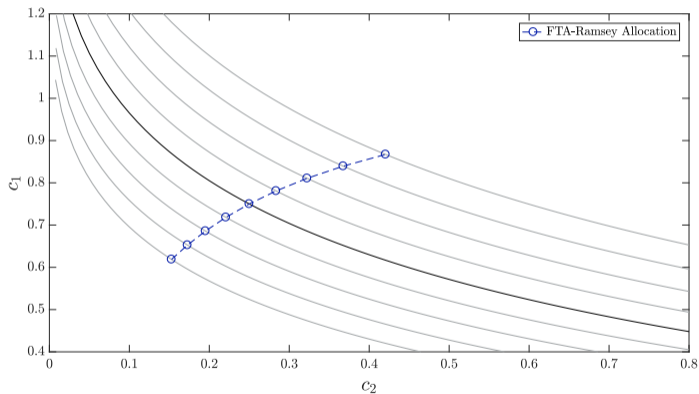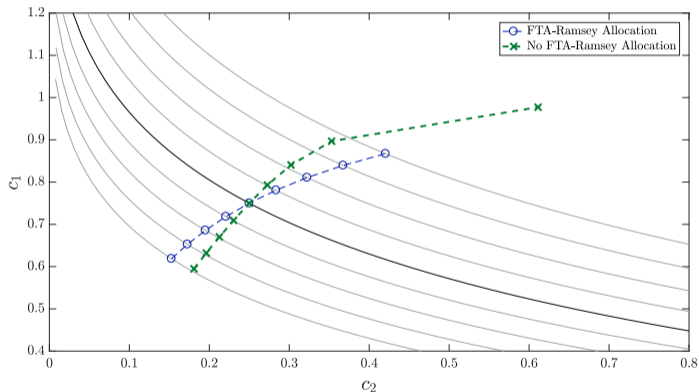

Note: $\phi = 1.5$, $\alpha_1 = \alpha_2^* = 0.75$, $y_1 = \alpha_1 \pm 0.25$, $y_2 = \alpha_2$, $y_i^* = 1 - y_i$ for $i = 1, 2$.

Visual Intuition: Relaxing FTA

Feasible combinations of $\{c_1, c_2\}$ **given** F

No FTA $\Rightarrow H$ sets optimal import tariffs $\Rightarrow$ unconstrained by Pareto frontier

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Instruments

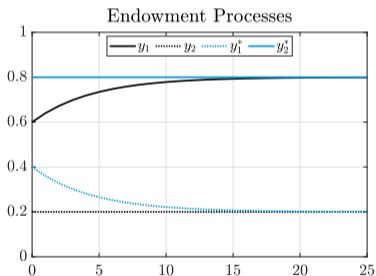## What Drives Optimal Policy? Two Deterministic Simulations

- Implement allocation with **capital inflow tax** $\theta < 0$ and **import tariff** $\tau > 0$
- Equalise steady states (via exo. tax) to focus on welfare gains along transition
- $\sigma = 2$, $\beta = 0.96$, $\phi = 1.5$, $\rho = 0.8$, $\alpha_1 = \alpha_2^* = 0.6$ and $\overline{y}_1 = \overline{y}_2^* = 0.8$

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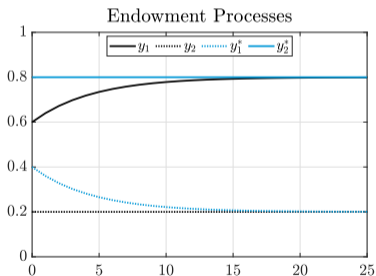
#1: Growing Endowment of Home-Bias Good 1

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#1: Growing Endowment of Home-Bias Good 1

Endowment Processes

Legend: y_1 .... y_2 .... y_1^* —— y_2^*

Inter-temporal incentives:

H endowment low today $\Rightarrow$ Incentive to borrow
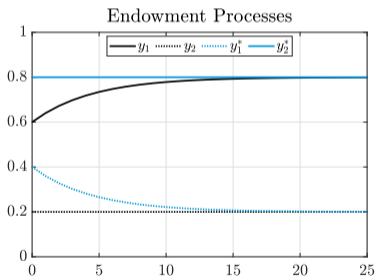
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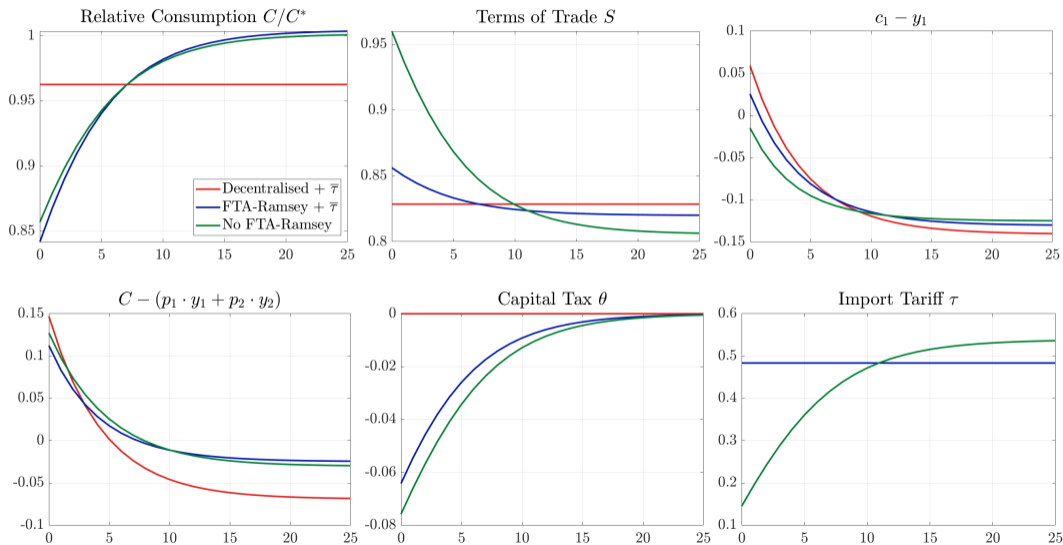

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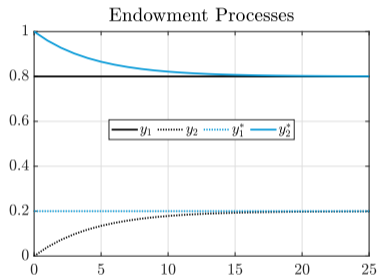
Intra-temporal incentives:

Good 1 endowment low today $\Rightarrow$ Sell less to Foreign

$\Rightarrow$ Incentive to subsidise imports of good 2 to $\downarrow p_1$

$\Rightarrow$ Will also dis-incentivise borrowing $\downarrow R$

Growing Endowment of Home-Bias Good


Relative Consumption C/C^* · Terms of Trade S · $c_1 - y_1$ · $C - (p_1 \cdot y_1 + p_2 \cdot y_2)$ · Capital Tax θ · Import Tariff τ

Legend:
- Decentralised + $\overline{\tau}$
- FTA-Ramsey + $\overline{\tau}$
- No FTA-Ramsey

What Drives Optimal Policy? Two Deterministic Simulations

#2: Growing Endowment of 'Foreign' Good 2

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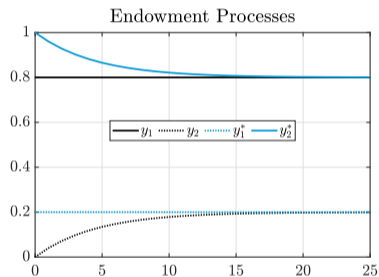
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Legend: y_1, y_2, y_1^*, y_2^*

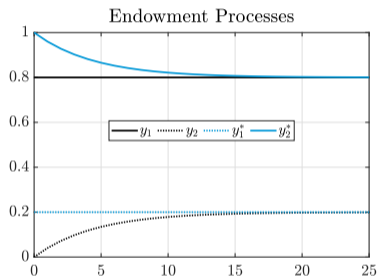Inter-temporal incentives:

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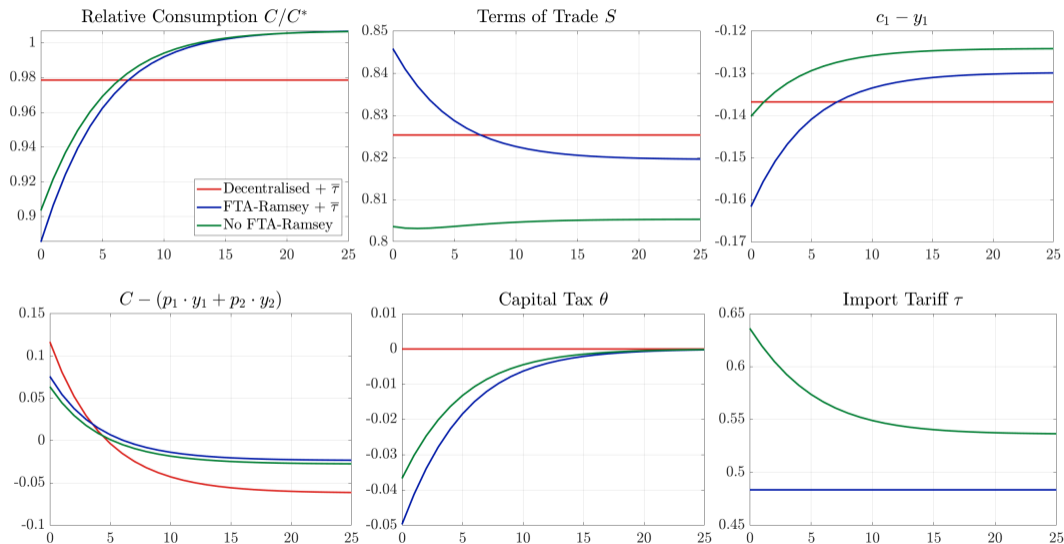
Intra-temporal incentives:

Good 1 endowment relatively high today

$\Rightarrow$ Sell more to Foreign

$\Rightarrow$ Incentive to tax imports of good 1 to $\uparrow p_1$

$\Rightarrow$ But this will incentivise borrowing $\uparrow R$

Growing Endowment of 'Foreign' Good

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- Decentralised + $\overline{\tau}$ (red)
- FTA-Ramsey + $\overline{\tau}$ (blue)
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Interplay Between Capital Controls and Tariffs

#1: Growing Endowment of Home-Bias Good 1: inter- and intra-incentives **aligned**

- Capital-inflow tax $\theta < 0$ drives down borrowing $\downarrow R$ and price of good 1 $\downarrow p_1$
- Subsidy on imports drives down p_1 and reduces need to borrow $\downarrow R$

$\Rightarrow$ *Without FTA*: higher capital-inflow tax to exploit departures from Pareto frontier

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#2: Growing Endowment of 'Foreign' Good 2: inter- and intra-incentives **mis-aligned**

- · Capital-inflow tax $\theta < 0$ drives down borrowing $\downarrow R$ and price of good 1 $\downarrow p_1$

- · Tax on imports bids up p_1 and increases incentives to borrow $\uparrow R$

$\Rightarrow$ *Without FTA*: optimal tariffs result in lower capital-flow taxes

Country Size and Financial Frictions

Potential critique:

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But, within simple static model of financial frictions, SOE ($C^* \to Y_2$) still has incentives to manipulate ToT, and especially so when the frictions are large: [Bianchi, 2011]

$$\sum_s \mathbf{p}(s) \cdot \mathbf{a}(s) + \underbrace{\phi(\mathbf{a}(s), Q(s))}_{\text{cost of borrowing}} \leq 0 \qquad \text{(ex ante)}$$

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Financial cost lower if **either** borrowing lower ($C \downarrow$) or appreciation ($c_1 \uparrow$)
$\Rightarrow$ **Import tariff can substitute for capital inflow tax in SOE**

Capital-Control and Tariff Wars: Welfare and Spillovers

Spillovers Dwarf Domestic Gains, Especially **with Tariffs**

Proposition

- ⋆ *Global Cooperative Optimum*: No intervention

- ⋆ *Unilateral*: Welfare gain in H small relative to loss in F, esp. without FTA

- ⋆ *Nash*: Larger aggregate losses with capital control and tariff wars

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Table: Welfare Gains and Spillovers: expressed in terms of $\%$ cons. eq.

Experiment 1	H	F	Global $\sum_{H,F}$
FTA (Unilateral)	$+0.13$	-0.23	-0.05
without FTA (Unilateral)	$+0.22$	-0.27	-0.03
with FTA (Nash)	-0.07	-0.07	-0.07
without FTA (Nash)	-1.71	-1.58	-1.65

Conclusion

Cannot separate discussions around capital controls and trade protectionism

▶ Policy prescriptions for trade and financial openness interlinked

　　· Interaction between capital controls and tariffs stems from over/under-borrowing and their influence on relative prices

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  1. When inter-/intra-temporal incentives aligned (specialisation), capital inflow tax and tariff *complementary*

  2. When inter-/intra incentives **mis-**aligned capital inflow tax and tariff *substitutes*

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- · Interaction between capital controls and tariffs stems from over/under-borrowing and their influence on relative prices
- 1. When inter-/intra-temporal incentives aligned (specialisation), capital inflow tax and tariff *complementary*
- 2. When inter-/intra incentives **mis-**aligned capital inflow tax and tariff *substitutes*

▶ In SOE with financial frictions, tariffs act as a **substitute** for capital-inflow taxes

▶ Domestic gains from capital controls and tariffs are small, but spillovers large

Appendix

Foreign Consumer Maximisation

· Representative Foreign consumer problem:

$$\max_{\{\mathbf{c}_t^*\}} \quad U_0^* = \sum_{t=0}^{\infty} \beta^t U^*(C_t^*) \quad \text{s.t.} \quad \sum_{t=0}^{\infty} \mathbf{p}_t \cdot (\mathbf{c}_t^* - \mathbf{y}_t^*) \leq 0$$

$\Rightarrow$ Optimality conditions:

$$\beta^t U^{*\prime}(C_t^*) \nabla g_c^*(\mathbf{c}_t^*) = \lambda^* \mathbf{p}_t$$

$$\sum_{t=0}^{\infty} \mathbf{p}_t \cdot (\mathbf{c}_t^* - \mathbf{y}_t^*) = 0$$

where $\nabla g_c^*(\mathbf{c}_t) = \left[\frac{\partial g^*(\mathbf{c}_t^*)}{\partial c_{1,t}^*}, \frac{\partial g^*(\mathbf{c}_t^*)}{\partial c_{2,t}^*} \right]$

▸ Back

Unilateral Home Planning Problem

With FTA [Costinot, Lorenzoni & Werning, 2014]

$$\max_{\{C_t\}} \quad \sum_{t=0}^{\infty} \beta^t u(C_t) \tag{P-FTA}$$

$$\text{s.t.} \quad \sum_{t=0}^{\infty} \boldsymbol{\rho}(C_t) \cdot [\mathbf{c}_t - \mathbf{y}_t] = 0 \tag{IC}$$

$$\mathbf{c}_t = \mathbf{c}_t(C_t), \quad \mathbf{c}_t^* = \mathbf{c}_t^*(C_t) \tag{FTA}$$

where $\boldsymbol{\rho}(C_t) \equiv \beta^t u^{*\prime}(C_t^*)\nabla g_c^*(\mathbf{c}_t^*(C_t))$

▸ Back

Unilateral Home Planning Problem
Without FTA

$$\max_{\{\mathbf{c}_t\}} \quad \sum_{t=0}^{\infty} \beta^t u(C_t) \qquad \text{(P-nFTA)}$$

$$\text{s.t.} \quad \sum_{t=0}^{\infty} \boldsymbol{\rho}(C_t) \cdot [\mathbf{c}_t - \mathbf{y}_t] = 0 \qquad \text{(IC)}$$

$$C_t = g(\mathbf{c}_t) \qquad \text{(nFTA)}$$

where $\boldsymbol{\rho}(C_t) \equiv \beta^t u^{*\prime}(C_t^*) \nabla g_c^*(\mathbf{c}_t^*(C_t))$