

# Monetary Policy and Redistribution in Open Economies

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*The views in this paper are those of the authors and do not reflect those of the Bank of Canada.*

# Motivation

- **Redistributional** effects of globalization has featured prominently in policy debates
  - Increasingly influential view, “*Globalization and its Discontents*” Stiglitz 02,17 :
    - international integration has **asymmetric effects** on households
    - macro policies can amplify the resulting inequality
- Large academic advances in trade & labor e.g. Goldberg Pavcnik (07), Autor Dorn Hanson (16)
  - Less known in international macro

## This paper:

- **Distributional effects** of external shocks in open economies w/ **uneven integration**
- How does **monetary policy** affect the distributional effects?

# Key Takeaways from a Small Open-economy HANK Model

## 1. How “macro matters for inequality”:

- Heterogeneity in hhs' integration **key source of unequal C responses** to external shocks
- Real: C of hhs working in tradable sectors more sensitive to external demand shocks
- Financial: C of hhs holdings foreign securities more sensitive to foreign monetary policy

## 2. How “inequality matters for macro”:

- Trade-off btw **aggregate stabilization & inequality** for MP facing external shocks
- Fixed-exchange-rate **amplifies agg C response** but leads to **less unequal C responses**

# Related Literature

## 1. Monetary policy in open economies

- Obstfeld Rogoff (00), Clarida Gali Gertler (01), Chari Kehoe McGrattan (02), Devereux Engel (03), Corsetti Pesenti (05), Gali Monacelli (05)
- Engel (06), Gopinath Itskhoki Rigobon (10), Corsetti Dedola Leduc (10), Burstein Gopinath (14), Gopinath et al (20), Mukhin (20), Egorov Mukhin (20)
- Schmitt-Grohe Uribe (11), Gabaix Maggiori (15), Rey (15), Hassan Mertens Zhang (16), Giovanni Kalemli-Ozcan Ulu Baskaya (17), Gourinchas (18), Itskhoki Mukhin (19,20), Arellano Bai Mihalache (20)

## 2. Consumption inequality & redistributive effects of macro policies

- Attanasio Battistin Ichimura (04), Doepke Schneider (06), Krueger Perri (06), Aguiar Bills (15), Quadrini Rios-Rull (15), Ahn et al (18), Auclert (19), Kaplan Moll Violante (18)

## 3. Households' heterogeneity in open economies

- De Ferra Mitman Romei (20), Cugat (20), Auclert Rognlie Souchier Straub (20), Zhou (20), Guntin Ottonello Perez (20)

**Model**

# Households: Decision Problem

**Choices:** labor ( $l$ ), consumption ( $c$ ), and saving/borrowing ( $\mathbf{b}' \equiv [b'_D, b'_E]$ )

- Consumption: home ( $c_H$ ), foreign ( $c_F$ ), and non-tradable ( $c_N$ ) Gali Monacelli (05)
  - Synthesized through CES aggregators:  $c_T = \mathcal{C}_{HF}(c_H, c_F)$ ,  $c = \mathcal{C}_{TN}(c_T, c_N)$
- Saving/borrowing: domestic ( $b'_D$ ) and external assets ( $b'_E$ )

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**Recursive problem:**

$$V_t(\mathbf{b}, z, o_R, o_F) = \max_{c_H, c_F, c_N, l, \mathbf{b}' \in \mathcal{B}(o_F)} u(c, l) + \beta \mathbb{E}_t [V_{t+1}(\mathbf{b}', z', o'_R, o'_F)]$$

$$\text{s.t. } \sum_{a \in \{D, E\}} b_a + \underbrace{z(1 - \tau_t)W_t(o_R)l + T_t(z)}_{\text{labor income}} = \underbrace{\sum_{s \in \{H, F, N\}} P_{st}c_s}_{\text{consumption expenditure}} + \underbrace{\sum_{a \in \{D, E\}} q_{at} \cdot b'_a}_{\text{savings in local currency}} + \underbrace{\Phi(\mathbf{b}', o_F)}_{\text{portfolio adj. cost}}$$

- $W_t(o_R)$ ,  $\tau_t$ ,  $T_t(z)$ : nominal wage, labor income tax, transfers (government & firms)

# Households: 3 Sources of Heterogeneity

**Real integration:** work in tradable or non-tradable sectors

- $o_R = \{\text{integrated (**tradable**), non-integrated (**non-tradable**)\}$
- Exogenous transition [extension: endogenous transition]

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# Households: 3 Sources of Heterogeneity

**Financial integration:** the access to domestic and external bond

- $o_F = \{\text{integrated (both types of bond)}, \text{non-integrated (only domestic bond)}\}$
- Exogenous transition [extension: endogenous transition; foreign currency denomination]

**Recursive problem:**

$$V_t(\mathbf{b}, z, o_R, \mathbf{o}_F) = \max_{c_H, c_F, c_N, l, \mathbf{b}' \in \mathcal{B}(\mathbf{o}_F)} u(c, l) + \beta \mathbb{E}_t [V_{t+1}(\mathbf{b}', z', o'_R, o'_F)]$$

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$\mathbf{o}_F$	Portfolio option set $\mathcal{B}(o_F)$	Portfolio adj. cost $\Phi(\mathbf{b}', o_F)$
Integrated	$q_{Et} \cdot b'_E + q_{Dt} \cdot b'_D \geq \underline{b}$	$\frac{\psi}{2} \cdot (b'_D / (b'_D + b'_E) - \alpha)^2 \cdot  b'_D + b'_E $
Non-Integrated	$b'_E = 0, q_{Dt} \cdot b'_D \geq \underline{b}$	0

# Households: 3 Sources of Heterogeneity

## Idiosyncratic productivity: $z$

- Feature realistic income distribution
- Heterogeneity in MPCs (by including borrowing constraint)

## Recursive problem:

$$V_t(\mathbf{b}, \mathbf{z}, o_R, o_F) = \max_{c_H, c_F, c_N, l, \mathbf{b}' \in \mathcal{B}(o_F)} u(c, l) + \beta \mathbb{E}_t [V_{t+1}(\mathbf{b}', z', o'_R, o'_F)]$$

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- $T_t(\mathbf{z})$ : transfer of firms' profit proportional to  $z$  Kaplan, Moll and Violante (18)

# Supply Side (Firm), Government and Rest of the World

**Firms:** H & NT sectors

- **Final goods:** CES technology w/ intermediate inputs
- **Intermediate goods:** CRS technology w/ labor
  - Monopolistic competition: pricing in local currency, w/ adj costs à la Rotemberg

**Government:**

- **Monetary:** Taylor rule for domestic interest rate → price of domestic bond
- **Fiscal:** fixed domestic bond issuance and transfer; variable labor tax rate  $\tau_t$

**Rest of the World:**

- **Financial:** international interest rate → price of foreign bond
- **Real:** completely elastic supply of F goods and demand for H goods  $(\frac{P_{Ht}^*}{P_{Ft}^*})^{-\eta} Y_{Ft}^*$

# Shocks and Exchange-rate Regimes

## Aggregate shocks: one domestic and two external

1. Domestic monetary policy shock  $\Rightarrow$  Taylor rule
2. Foreign demand shock  $\Rightarrow Y_{F,t}^*$
3. Foreign monetary policy shock  $\Rightarrow i_t^*$

## Alternative exchange-rate regimes:

1. Flexible (benchmark)
2. Fixed

# Calibration

# Calibration Strategy

1. **Standard pre-determined parameters** (hhs preferences, government, firms) ▶ Parameters
2. **Idiosyncratic risk** ▶ Parameters ▶ Income dynamics moments ▶ Average MPC by wealth
  - Process for  $z$ : match high-order moments of income dynamics
  - Borrowing constraint  $\underline{b}$ : match median MPC of 15%
3. **International integration** ▶ Details of measurement
  - Transition probabilities: match the share of integrated hhs and the persistence of their status
  - Home bias  $\alpha$ : match the avg. portfolio choice of financially integrated hhs
4. **Aggregate responses** ▶ Parameters ▶ Conditional moments
  - Target responses of agg variables to macro shocks

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# Results

## Focusing on Foreign Demand Shock

1. Dispersion of C Responses: Size, Source, and Mechanism
2. How does Exchange-rate Regime Shape the Dispersion?

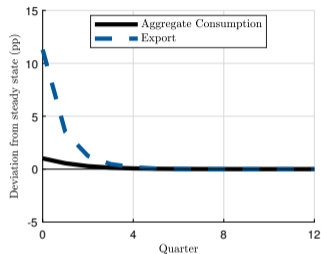
# Results

## Focusing on Foreign Demand Shock

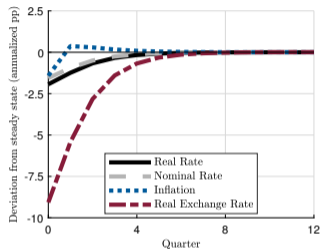
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Higher Foreign Demand  $\Rightarrow$  Agg C  $\uparrow$ , Currency Appreciation, C Dispersion

(a) Agg Quantities



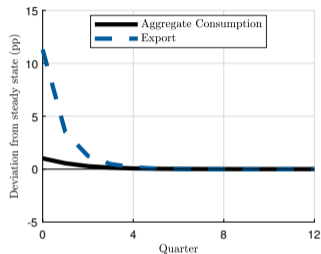
(b) Interest Rates and Inflation



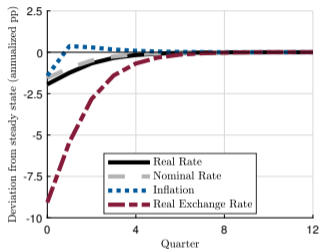
- 1 Higher demand for H goods  $\Rightarrow$  output  $\uparrow$  and wage  $\uparrow$  in T sector  $\Rightarrow$  agg demand  $\uparrow$
- 2 Currency appreciation and expenditure switching

# Higher Foreign Demand $\Rightarrow$ Agg C $\uparrow$ , Currency Appreciation, C Dispersion

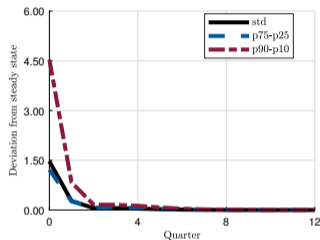
(a) Agg Quantities



(b) Interest Rates and Inflation



(c) C Dispersion



- 1 Higher demand for H goods  $\Rightarrow$  output  $\uparrow$  and wage  $\uparrow$  in T sector  $\Rightarrow$  agg demand  $\uparrow$
- 2 Currency appreciation and expenditure switching
- 3 Sizable dispersion: std. of individual C responses  $\approx 1.5\times$  agg C response

## Key Source of C Response Dispersion: International Integration

### Share of C Dispersion Explained (%)

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Real integration	<b>54.4</b>
Financial integration	0.8
Net wealth	2.8
Idiosyncratic income	0.4

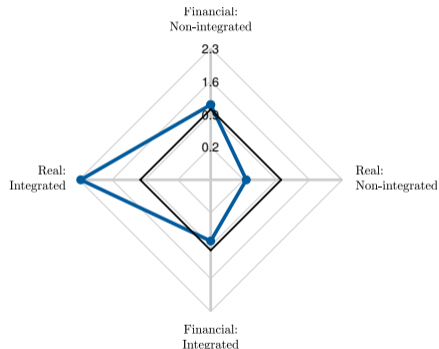
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## C Response: Integrated vs. Non-integrated



► More details

# Key Channel for C Response Dispersion: Exposure to Different Prices

By Real Integration	Non-Int.	Integrated
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C (relative to agg)	0.26	2.26
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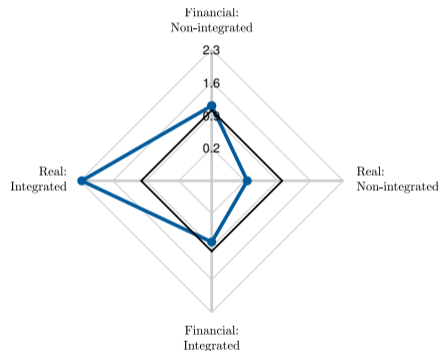
## *Decomposition by Channels*

Real interest rate	0.42	0.42
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Labor income	<b>-0.27</b>	<b>1.74</b>
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Others	0.10	0.10
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## C Response: Integrated vs. Non-integrated



► More details

# Results

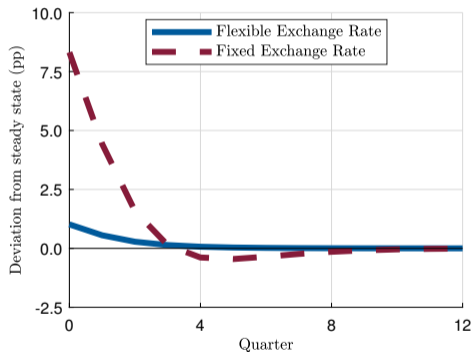
## Focusing on Foreign Demand Shock

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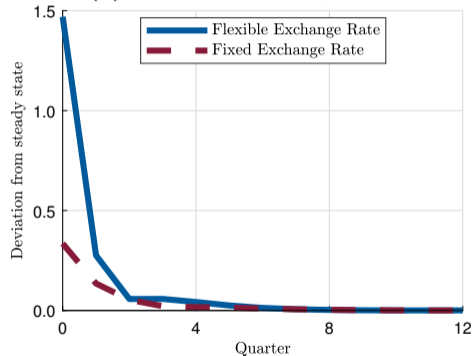


# Exchange-rate Regimes: Trade-off btw Agg Stabilization & Inequality

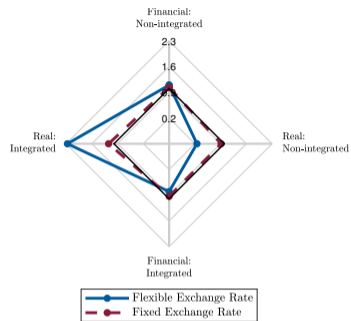
(a) Aggregate Consumption



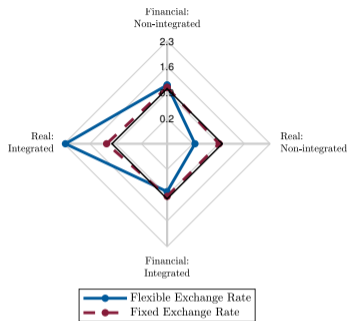
(b) Consumption Dispersion



# Fixed ER: More Equal $C$ Responses

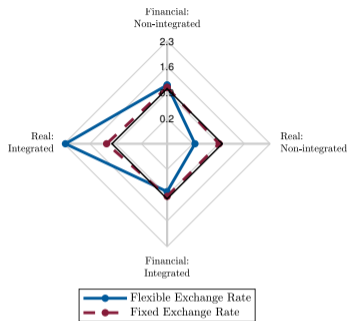


# Fixed ER: More Equal $C$ Responses due to Less Different $W$ Responses



Real Integration	Flexible		Fixed	
	Non-Int.	Int.	Non-Int.	Int.
Cons (relative to agg)	0.26	2.26	0.91	1.15
<i>Decomposition by Channels</i>				
Real interest rate	0.42	0.42	0.44	0.44
Labor income	<b>-0.27</b>	<b>1.74</b>	<b>0.28</b>	<b>0.51</b>
Others	0.10	0.10	0.19	0.19

# Fixed ER: More Equal $C$ Responses due to Less Different $W$ Responses



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	Non-Int.	Int.	Non-Int.	Int.
Cons (relative to agg)	0.26	2.26	0.91	1.15
<i>Decomposition by Channels</i>				
Real interest rate	0.42	0.42	0.44	0.44
Labor income	<b>-0.27</b>	<b>1.74</b>	<b>0.28</b>	<b>0.51</b>
Others	0.10	0.10	0.19	0.19

- Wage response diff.  $\frac{\Delta w_H}{\Delta w_N}$ :  $\frac{5.7\%}{-0.8\%} \approx -7$  vs.  $\frac{13.3\%}{6.8\%} \approx 2$  ▶ Agg prices

- Fixed-rate regime:

- Monetary authority lowers interest rate to avoid currency appreciation
- Stimulated aggregate demand increases the real wage in non-tradable sector

# Extensions and Robustness Checks

## Extensions [▶ Details](#)

1. Endogenous transitions for international integration
2. Dollar pricing for tradable firms
3. Foreign asset denominated in foreign currency
4. Financially integrated households w/o home bias

## Robustness Checks

1. Correlation between international integration and level of net wealth [▶ Details](#)
2. Role of international integration [▶ Details](#)
3. Comparison with open-economy RANK & closed-economy HANK [▶ Details](#)

# Conclusion

## Conclusion

We study how monetary policy shapes asymmetric effects of external shocks in open economies

- HHs' international integration relevant for asymmetric responses to external shocks
- Trade-off btw maintaining aggregate stability & reducing income, cons inequalities

# Appendix



Parameter	Description	Value
<i>Households</i>		
$\xi$	Exit rate	$\frac{1}{82.5 \times 4}$
$1/\nu_c$	Intertemporal elasticity of substitution	1
$1/\nu_l$	Frisch elasticity of labor supply	1
$\psi$	Disutility of labor	3.46
$\beta$	Discount factor	0.96
<i>Government</i>		
$\tau$	Income tax rate	0.20
$T_{ss}$	Total transfer	0.12
$B_{ss}$	Government debt	0.86
$i_{ss}^*$	Steady-state international interest rate, annualized	0.01
<i>Firms</i>		
$\epsilon$	Elasticity of substitution for final goods aggregator	10
$\theta$	Adjustment cost of goods price	100

*Notes:* The values for  $T_{ss}$  and  $B_{ss}$  are expressed in the unit of households' quarterly average labor income in steady state.

- Idio. prod. as a sum of two Markov processes:  $\ln z = z_1$  (persistent) +  $z_2$  (transitory)
  - $z_1$  and  $z_2$  constructed using Rouwenhorst method

Parameter	Description	Value
$\rho_1$	Persistent idiosyncratic income, autocorrelation	0.75
$\sigma_1$	—, unconditional standard deviation	0.78
$skew_1$	—, unconditional skewness	-4.07
$\rho_2$	Transitory idiosyncratic income, autocorrelation	0.25
$\sigma_2$	—, unconditional standard deviation	0.31
$skew_2$	—, unconditional skewness	-2.05
$\underline{b}$	Borrowing constraint	-0.21

*Notes:* The value of  $\underline{b}$  is expressed in the unit of households' quarterly average labor income in steady state.

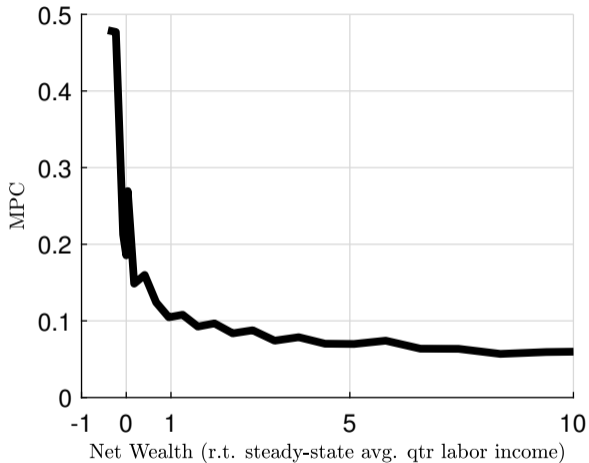
## Targeted Moments for Log Annual Earnings

	<u>1-year Change</u>		<u>5-year Change</u>	
	Model	Data	Model	Data
Variance	0.47	0.49	0.71	0.69
Skewness	-0.27	-0.81	-0.29	-0.71
Kurtosis	15.56	15.55	13.33	10.33

*Notes:* Data moments from Bowlus, Gouin-Bonenfant, Liu, Lochner and Park (2020).

# Average MPC Conditional on Net Wealth in Model

[▶ Return](#)



Parameter	Description	Value
<i>Transition Probability of Integration Status</i>		
$\lambda_F^1$	Financial integration, probability of remaining integrated	92%
$\lambda_F^0$	—, probability of remaining nonintegrated	96.06%
$\lambda_R^1$	Real integration, probability of remaining integrated	96%
$\lambda_R^0$	—, probability of remaining integrated	97.65%
<i>Preferences (steady state with equalized wage)</i>		
$\omega_T$	Fraction of tradable goods in consumption basket	0.33
$\omega_H$	Fraction of home goods in tradable goods consumption basket	0.60

Parameter	Description	Value
<i>Households and government</i>		
$\psi$	Portfolio adjustment cost	0.80
$\eta$	Intratemporal elasticity of substitution	6.19
$\phi_\pi$	Taylor rule, coefficient of inflation	1.10
$\phi_i$	—, coefficient of lagged nominal interest rate	0.87
<i>Aggregate shocks</i>		
$\rho_m$	Domestic monetary shock, persistence	0.68
$\sigma_m$	—, std.	0.25%
$\rho_{m^*}$	Foreign monetary shock, persistence	0.81
$\sigma_{m^*}$	—, std.	0.25%
$\rho_{y^*}$	Foreign demand shock, persistence	0.50
$\sigma_{y^*}$	—, std.	15%

## Targeted Moments for Aggregate Impulse Responses (%)

	Data	Model
<i>Response to Domestic Monetary Shock</i>		
Consumption	[0.5, 1.5]	0.54
Nominal Interest Rate	[-1.2, -0.5]	-0.03
UIP Deviation	[-1.4, 0.5]	-0.44
Relative Price	[-1.5, 1.0]	-0.06
<i>Response to Foreign Demand Shock</i>		
Consumption	[0.8, 1.6]	1.02
Exchange Rate	[-4, -2]	-2.62
Export	[8, 12]	11.30

*Notes:* The reported 65% confidence interval of peak responses are from Champagne and Sekkel (2018) and Charnavoki and Dolado (2014).

**Measure** the international integration of Canadian households [▶ Real: StatCan](#) [▶ Fin.: OSFI-GQ+CFM](#)

- **Real:** 37% working in tradable sectors, qtr persistence 96% Loungani and Rogerson (89)
  - **Financial:** 33% w/ foreign asset share above avg (10%), annual persistence 73.5%
    - Household-level portfolio: Canadian Financial Monitor (survey data)
    - Financial-institute-level foreign asset share: GQ Return (regulatory filing data)
- ⇒ Financially integrated hhs hold 21% of their portfolio in foreign bond on average.



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**Calibrate**  $\alpha = 1 - 21\%$  and the transition probabilities of integration status [▶ Parameters](#)

- Independent Markov processes  $\Rightarrow$  avg share of integrated hhs and their persistence

- Non-tradable sectors
  - Utilities; real estate, rental, and leasing; construction; transportation and warehousing
  - Accommodation and food services; retail trade; other private services; public administration
- Tradable sectors
  - Agriculture, mining and energy; manufacturing
  - Information, culture and recreation; finance and insurance; professional and technical services; wholesale trade

## Share of Tradable Sectors in Canadian Economy (%)

Employment	GDP	Labor Compensation
<b>37</b>	45	42

Source: Statistics Canada

## Data Source (2014Q4-2018Q4)

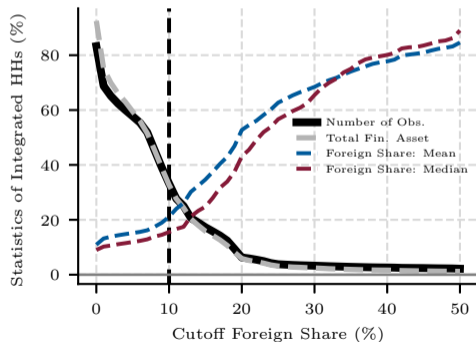
### 1. Canadian Financial Monitor

- Monthly survey of households' portfolio
- Key information: hhs' asset by financial institutes

### 2. GQ Return

- Quarterly regulatory filing of financial institutes' asset
- Key information: financial institutes' asset by geographical location

## Integrated hhs at Different Cutoffs



# International Spillovers: Decomposing C Response by Channels

[▶ Return](#)

	Foreign Demand Shock				Foreign Monetary Shock			
	By Real Int.		By Fin. Int.		By Real Int.		By Fin. Int.	
	N	I	N	I	N	I	N	I
Cons (relative to agg)	0.26	2.27	1.11	0.79	1.92	-0.56	-0.47	3.99
Real interest rate channel	0.42	0.42	<b>0.53</b>	<b>0.21</b>	1.70	1.70	<b>0.23</b>	<b>4.69</b>
Labor income channel	<b>-0.27</b>	<b>1.74</b>	0.47	0.47	<b>0.33</b>	<b>-2.14</b>	-0.59	-0.58
Others channels	0.10	0.10	0.10	0.10	-0.12	-0.12	-0.12	-0.12

## Share of Dispersion Explained by Source of Heterogeneity

	Domestic Monetary Shock	Foreign Demand Shock	Foreign Monetary Shock
Real Integration	1.1	<b>54.5</b>	16.7
Financial Integration	1.5	0.9	<b>31.7</b>
Net Wealth	<b>36.5</b>	2.8	17.2
Idiosyncratic Labor Income	33.9	0.4	0.7

- Setup:
  - Fixed cost to adjust their type of integration
  - Preference shocks following extreme value dist.  $\Rightarrow$  Logit model conditional on adjustment

## Consumption Responses to Aggregate Shocks: Baseline vs. Extension

	<u>Domestic Monetary</u>		<u>Foreign Demand</u>		<u>Foreign Monetary</u>	
	Baseline	Extension	Baseline	Extension	Baseline	Extension
Aggregate (%)	0.51	0.51	1.10	1.08	0.06	0.06
Diff. by Real Int.	0.03	0.03	<b>-1.93</b>	<b>-1.84</b>	0.94	0.94
Diff. by Fin. Int.	0.35	0.34	0.80	0.78	<b>-5.78</b>	<b>-5.64</b>

- Setup: price adjustment cost based on the price in foreign currency

### Consumption Responses to Aggregate Shocks: Baseline vs. Extension

	Domestic Monetary		Foreign Demand		Foreign Monetary	
	Baseline	Extension	Baseline	Extension	Baseline	Extension
Aggregate (%)	0.51	0.37	1.10	2.80	0.06	0.10
Diff. by Real Int.	0.03	1.00	<b>-1.93</b>	<b>-2.46</b>	0.94	-0.62
Diff. by Fin. Int.	0.35	0.26	0.80	0.78	-5.78	-3.08

- Setup: representative capital producer transforming foreign goods into capital goods

## Consumption Responses to Aggregate Shocks: Baseline vs. Extension

	Domestic Monetary		Foreign Demand		Foreign Monetary	
	Baseline	Extension	Baseline	Extension	Baseline	Extension
Aggregate (%)	0.51	0.29	1.10	0.80	0.06	0.20
Diff. by Real Int.	0.03	-1.55	<b>-1.93</b>	<b>-0.55</b>	0.94	0.94
Diff. by Fin. Int.	0.35	-0.14	0.80	-0.05	-5.78	-9.06



## Consumption Responses to Domestic Monetary Shock in Alternative Models

	Open-economy HANK	Closed-economy HANK	Open-economy RANK
Aggregate (%)	0.51	0.58	0.25
Std.	0.29	0.23	-
Diff. by Net Wealth	0.38	0.29	-
<i>Decomposition of Aggregate Consumption Response (%)</i>			
Real Interest Rate	36	37	83
Labor Income	54	48	19
Others	10	15	-2

# Role of Intl Integration: Less integration → more inequality in C responses

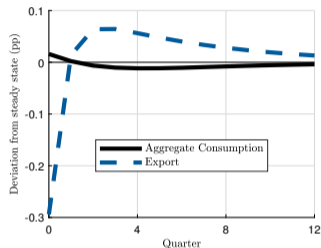
▶ Return

	Canada intl int. (36%,18%)	Lower intl int. (15%,5%)
<hr/>		
<i>Aggregate cons responses</i>		
Domestic monetary shock	0.51	0.55
Foreign demand shock	1.09	0.16
Foreign monetary shock	0.06	0.01
<i>Dispersion of cons responses</i>		
Domestic monetary shock	0.29	0.26
Foreign demand shock	<b>1.18</b>	<b>2.53</b>
Foreign monetary shock	<b>2.39</b>	<b>8.56</b>

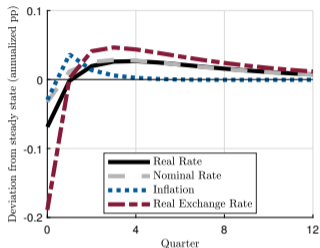
- Weaker agg rsp to external shocks → weaker policy and GE rsp to mitigate the price gaps

# Expansionary Foreign Mon Pol Shock $\Rightarrow$ Agg C $\uparrow$ , Appreciation, C Dispersion

(a) Agg Quantities



(b) Interest Rates and Inflation

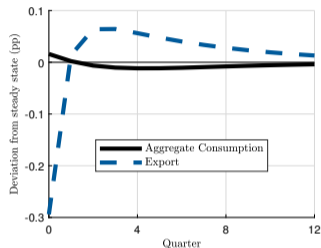


a Lower intl interest rate  $\Rightarrow$  C of fin. integrated hhs  $\uparrow \Rightarrow$  agg demand  $\uparrow$

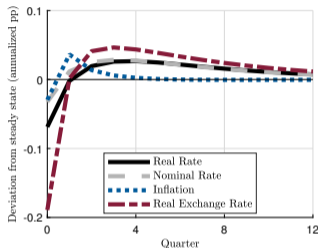
b Currency appreciation and expenditure switching

# Expansionary Foreign Mon Pol Shock $\Rightarrow$ Agg C $\uparrow$ , Appreciation, C Dispersion

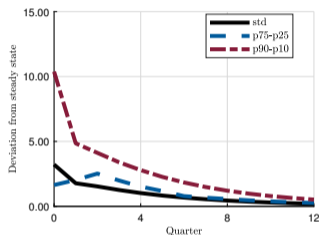
(a) Agg Quantities



(b) Interest Rates and Inflation



(c) C Dispersion



a Lower intl interest rate  $\Rightarrow$  C of fin. integrated hhs  $\uparrow \Rightarrow$  agg demand  $\uparrow$

b Currency appreciation and expenditure switching

c Sizable dispersion: std. of individual C responses  $\approx 3 \times$  agg C response

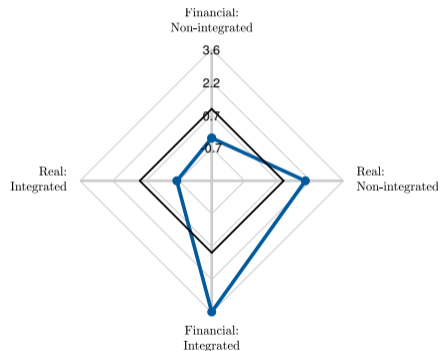
# Key Source of C Response Dispersion: International Integration

## Share of C Dispersion Explained (%)

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Real integration	16.7
Financial integration	31.7
Net wealth	17.2
Idiosyncratic income	0.7

## C Response: Integrated vs. Non-integrated



► More details

# Key Channel for C Response Dispersion: Exposure to Different Prices

By Real Integration	Non-Int.	Integrated
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C (relative to agg)	-0.47	3.99
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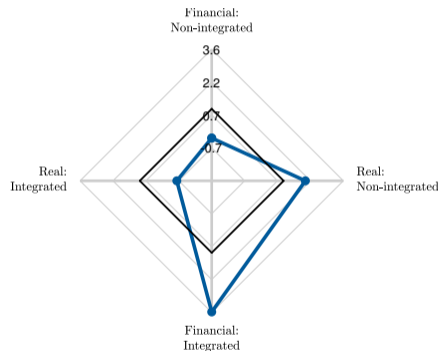
## *Decomposition by Channels*

Real interest rate	<b>0.23</b>	<b>4.69</b>
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Labor income	-0.59	-0.58
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Others	-0.12	-0.12
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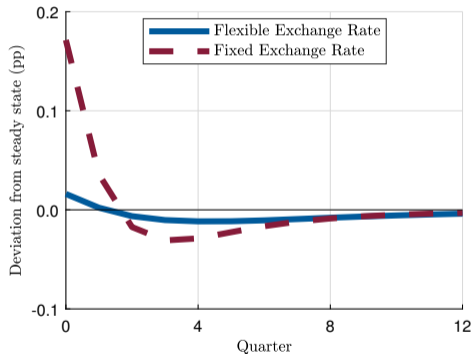
## C Response: Integrated vs. Non-integrated



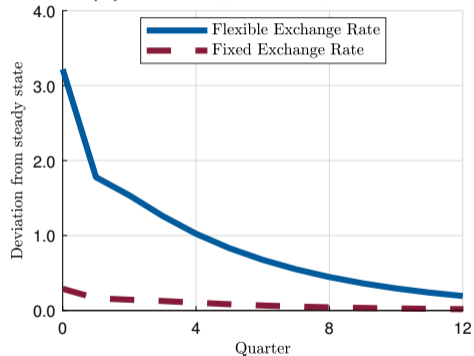
► More details

# Exchange-rate Regimes: Trade-off btw Agg Stabilization & Inequality

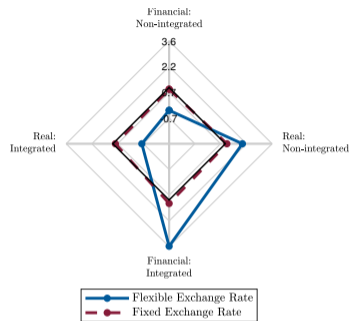
(a) Aggregate Consumption



(b) Consumption Dispersion

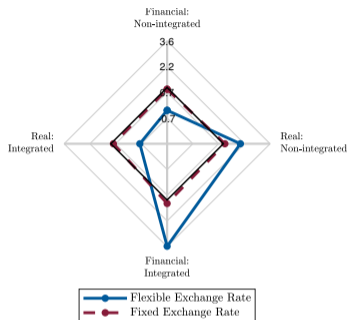


# Fixed ER: More Equal $C$ Responses



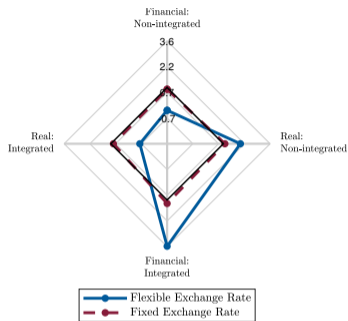


# Fixed ER: More Equal $C$ Responses due to Less Different $W$ Responses



Real Integration	Flexible		Fixed	
	Non-Int.	Int.	Non-Int.	Int.
Cons (relative to agg)	-0.47	3.99	0.88	1.24
<i>Decomposition by Channels</i>				
Real interest rate	<b>0.23</b>	<b>4.69</b>	<b>0.47</b>	<b>0.83</b>
Labor income	-0.59	-0.58	0.17	0.17
Others	-0.12	-0.12	0.25	0.25

# Fixed ER: More Equal $C$ Responses due to Less Different $W$ Responses



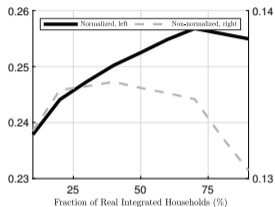
Real Integration	Flexible		Fixed	
	Non-Int.	Int.	Non-Int.	Int.
Cons (relative to agg)	-0.47	3.99	0.88	1.24
<i>Decomposition by Channels</i>				
Real interest rate	<b>0.23</b>	<b>4.69</b>	<b>0.47</b>	<b>0.83</b>
Labor income	-0.59	-0.58	0.17	0.17
Others	-0.12	-0.12	0.25	0.25

- Interest rate response diff.  $\frac{\Delta(i^* + \mathbb{E}[d\mathcal{E}'] - \mathbb{E}[\pi'])}{\Delta(i - \mathbb{E}[\pi'])}$ :  $\frac{-1.1\%}{-0.03\%} \approx \mathbf{36}$  vs.  $\frac{-1.0\%}{-0.4\%} \approx \mathbf{3}$  ▶ Agg prices
- Fixed-rate regime:
  - Monetary authority lowers interest rate to avoid currency appreciation
  - Lower domestic interest rate stimulates fin. non-int. hhs' consumption

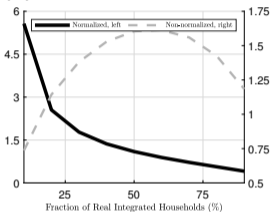
	Baseline	Endogenous Transition	International Pricing	Foreign Denomination	No Home Bias
Domestic Monetary Shock					
Agg C	0.54	0.54	0.41	0.54	0.45
C Dispersion	0.24	0.25	0.56	0.24	0.34
Gap by Real Int.	0.08	0.09	0.83	0.10	-0.05
Gap by Fin. Int.	0.08	0.08	0.07	0.08	0.34
Foreign Demand Shock					
Agg C	1.27	1.26	3.48	1.26	1.01
C Dispersion	0.95	0.91	1.36	0.99	1.36
Gap by Real Int.	-1.55	-1.48	-2.05	-1.60	-2.13
Gap by Fin. Int.	0.14	0.12	0.14	0.15	0.70
Foreign Monetary Shock					
Agg C	0.02	0.02	0.03	0.02	0.12
C Dispersion	2.47	2.40	1.61	2.51	1.59
Gap by Real Int.	0.68	0.50	-0.75	0.71	0.86
Gap by Fin. Int.	-4.78	-4.63	-2.95	-4.83	-2.81

## Dispersion of Consumption Responses under Alternative Degrees of Real Integration

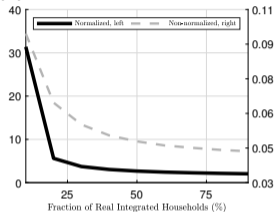
(a) Domestic Monetary Shock



(b) Foreign Demand Shock

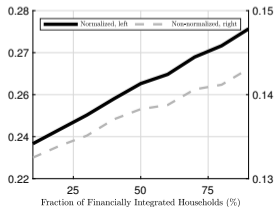


(c) Foreign Monetary Shock

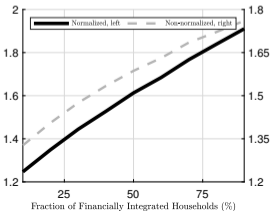


## Dispersion of Consumption Responses under Alternative Degrees of Financial Integration

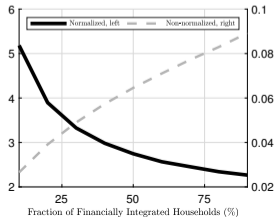
(d) Domestic Monetary Shock



(e) Foreign Demand Shock



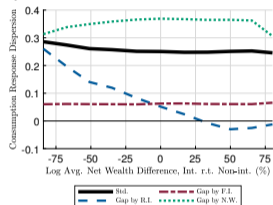
(f) Foreign Monetary Shock



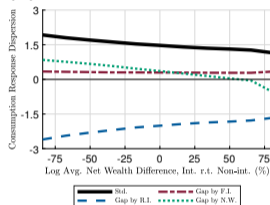
# Correlation between International Integration and Wealth

## Dispersion of Consumption Responses when Real Integration Correlates with Net Wealth

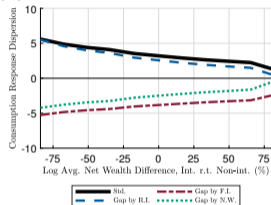
(a) Domestic Monetary Shock



(b) Foreign Demand Shock

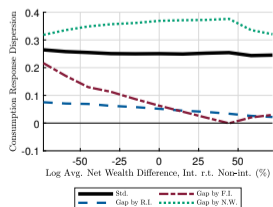


(c) Foreign Monetary Shock

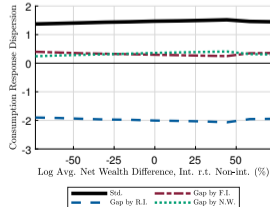


## Dispersion of Consumption Responses when Financial Integration Correlates with Net Wealth

(d) Domestic Monetary Shock



(e) Foreign Demand Shock



(f) Foreign Monetary Shock

