No Credit, No Gain: Trade Liberalization Dynamics, Production Inputs, and Financial Development

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Virtual International Trade and Macro Seminar
November 18th, 2021

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What are the effects of trade liberalization?

One channel: Cheaper access to capital and intermediates

- Allows firms to accumulate capital and increase productivity
  (Amiti and Konings 2007, Wacziarg and Welch, 2008, Estevadeordal and Taylor, 2013)
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- Financial frictions limit capital accumulation and induce misallocation
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- Financial frictions distort trade flows
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This paper: Quantify impact of financial development on the gains from cheaper access to capital and intermediates

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Study effects of reducing tariffs on physical capital and intermediate inputs

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  1. **International trade** subject to costs
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  3. **Consumption and capital goods sectors**
- Quantify impact of **trade liberalization**
  - Contrast economies with low and high financial development
  - Investigate aggregate, distributional and welfare effects
  - Quantify impact of Colombia's trade liberalization in the 1990s

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  1. Financial development **increases** long-run effects and **speeds up** transition.
  2. Financial development **increases** welfare gains.
  3. **Productive and wealthy** agents benefit most irrespective of financial development.
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  4. Gains **more equally distributed** in financially developed economy.
- Reduction in tariffs on capital goods in Colombia in 1991...
  1. 1.1pp higher GDP by 1996 (23% growth in 1991-1996).
  2. 1.4pp higher GDP by 1996 (**Additional** 12% growth in 1991-1996), had Colombia been financially developed.

Contributions + Related Literature

Our paper is at the intersection of:

1. **Trade liberalization on inputs and capital goods**

   Amiti and Konings (2007), Estevadeordal and Taylor (2013), Kohn et al. (2021), Topalova and Khandelwal (2015), Schor (2004)...

2. **Quantitative evaluation of gains from trade liberalization**

   Alessandria and Avila (2020), Alessandria, Arkolakis and Ruhl (2020), Alessandria and Choi (2014), Alessandria, Choi and Ruhl (2018), Atkeson and Burstein (2010), Burstein and Melitz (2011), Fieler, Eslava and Xu (2018), Kehoe, Pujolas and Rossbach (2017), Melitz (2003)...

3. **Financial frictions and trade**

   Brooks and Dovis (2020), Caggese and Cunat (2013), Kohn, Leibovici and Szkup (2016,2020), Leibovici (2021)...

In contrast to previous studies, we:

- Study interaction of finance with trade liberalization on capital/intermediates
- Document differences in trade liberalization dynamics by financial development
- Use dynamic model to quantify impact of financial development

Roadmap

1. Cross-country evidence
2. Model
3. Quantitative analysis
   - 3.1 Aggregate effects
   - 3.2 Welfare and distributional effects
   - 3.3 Colombia's trade liberalization
   - 3.4 Consumption vs. capital/intermediate goods tariffs
4. Conclusions

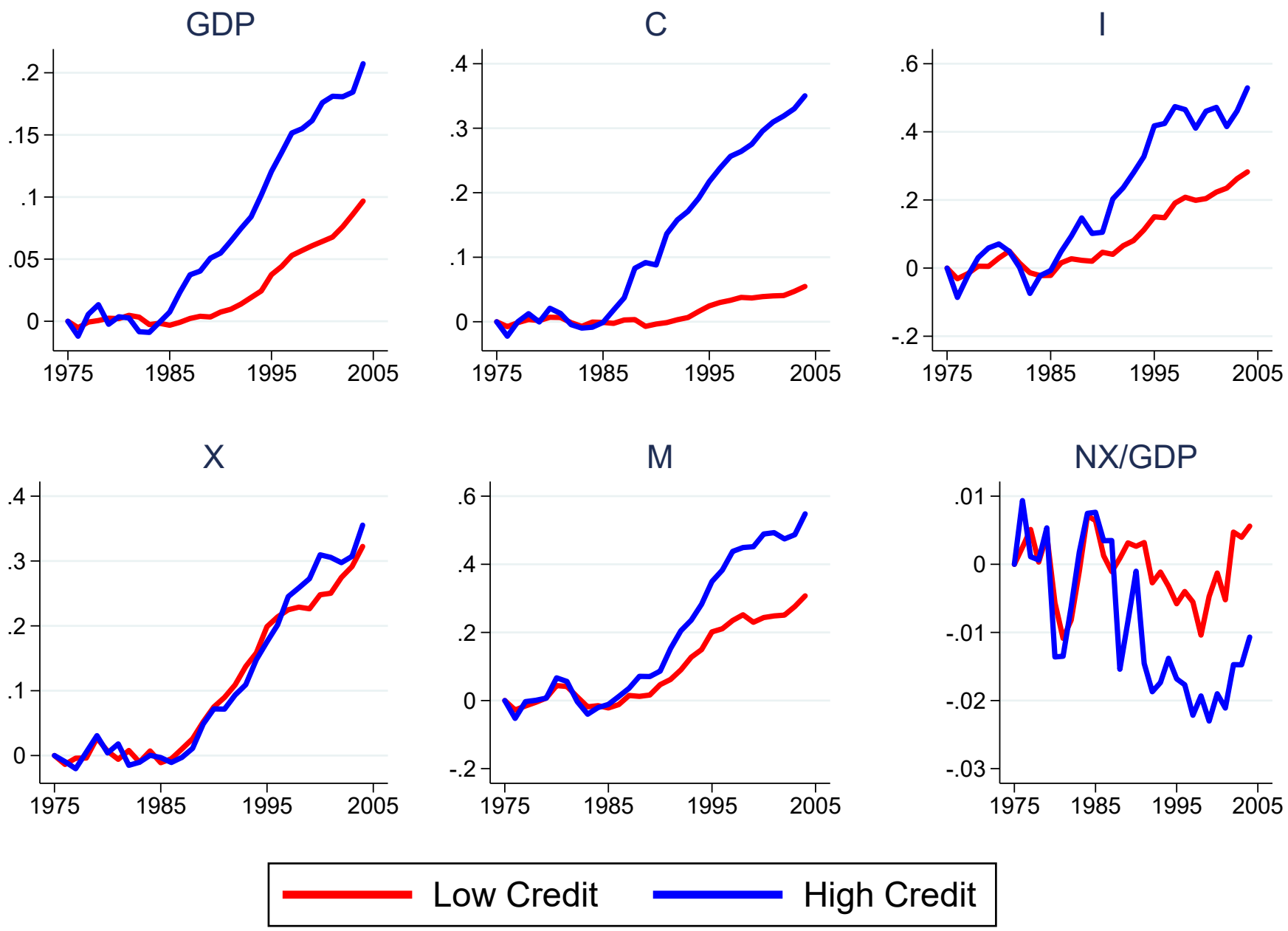
Trade Liberalization Dynamics and Financial Development

Q: Financial development $\Rightarrow$ Trade liberalization dynamics?

How we answer this question:

- We extend Estevadeordal and Taylor (2013) to study role of financial development
- Financial development:
  - Focus on Credit/GDP
  - Partition countries into low (below median) vs. high (above median)
- Trade policy: Focus on avg. tariffs to maximize # of countries
- For each country group:
  - Estimate elasticity of key aggregates to changes in tariffs (75-89 vs. 90-04)
  - Plot log-change of each variable relative to 10pp decline in avg. tariffs

Trade Liberalization Dynamics and Financial Development



Trade Liberalization Dynamics and Financial Development

	Δ ln GDP	Δ ln C	Δ ln I	Δ ln X	Δ ln M	Δ NX/GDP
Baseline						
$-\Delta$ Tariff	0.28	-0.02	0.28	0.75	0.46	0.05
$-\Delta$ Tariff $\times$ High credit	1.43^{**}	2.96^{***}	3.71^{**}	1.35	2.86^{*}	-0.21
R-sq	0.13	0.24	0.11	0.11	0.11	0.01
Obs.	80	80	80	80	80	80

Note: Changes computed across 90-04 vs. 75-89 periods. Outcome variables are computed as the average change over each time period. Both specifications control for high credit dummy.

Trade Liberalization Dynamics and Financial Development

Robust to controlling for institutions (legal and property rights index)

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R-sq	0.13	0.24	0.11	0.11	0.11	0.01
Obs.	80	80	80	80	80	80
Control for institutions						
−Δ Tariff	0.28	0.23	0.31	0.54	0.47	0.06
−Δ Tariff × High credit	1.64**	3.52***	4.32**	2.48***	2.82	−0.19
R-sq	0.14	0.30	0.11	0.22	0.11	0.01
Obs.	79	79	79	79	79	79

Note: Changes computed across 90-04 vs. 75-89 periods. Outcome variables are computed as the average change over each time period. Both specifications control for high credit dummy. The bottom panel also controls for good institutions dummy and the interaction between good institutions and −Δ Tariff.

Trade Liberalization and Financial Development: Evidence

Cross-country evidence:

- Trade liberalization $\Rightarrow$ higher increase in GDP, C, I and M among financially developed economies.
- Robust to controlling for institutions and economic development.

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- We focus on reduction in tariffs to capital and intermediate goods.
  - Directly affected by financial frictions.
  - Very different effects between consumption and capital goods tariffs in both data and model (*to be shown*).

Setup

- **Small open economy**
- **Agents:**
  - A unit measure of entrepreneurs/workers
    - Produce domestic variety and decide how much to sell domestically and abroad
  - Sectoral good producers
    - Produce composite consumption and investment goods
  - Rest of the world
- **Investment goods are used:**
  - As intermediate inputs in production, and
  - To build up capital

Entrepreneurs

Preferences

$$\mathbb{E}\left[\sum_{t=0}^{\infty}\beta^t\frac{c^{1-\gamma}}{1-\gamma}\right]$$

Technologies

- Produce differentiated domestic variety:
  - $y_t = z_t\left(k_t^{\alpha}n_t^{1-\alpha}\right)^{1-\alpha_m}m_t^{\alpha_m}$
  - $\ln z_t = \rho_z \ln z_{t-1} + \varepsilon_t$, where $\varepsilon_t \sim N(0,\sigma_\varepsilon)$
  - Sold to consumption and capital good producers, and rest of the world
  - Exports subject to fixed cost F and variable cost $\tau \geq 1$
- Accumulate capital internally
- Supply one unit of labor inelastically

Entrepreneurs (cont.)

Financial markets

- One-period risk-free bonds, interest rate r given internationally

An entrepreneur with states (k_t, d_t, z_t) chooses...

- Prices, quantities, labor, materials, and whether to export or not to maximize:

$$\pi(k_t, z_t) = p_{h,t} y_{h,t} + e_t \xi_t p_{f,t} y_{f,t} - w_t n_t - P_{k,t} m_t - e_t w_t F$$

Static Problem

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Static Problem

- Consumption and next period's net worth subject to:

$$c_t + a_{t+1} + d_t = w_t + (1 - \delta) P_{k,t} k_t + \pi(k_t, z_t) + \mathcal{T}_t$$

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Then, choose capital and debt given net worth:

- Internal vs. external financing of capital: $P_{k,t} k_{t+1} = a_{t+1} + \frac{d_{t+1}}{1+r}$
- Borrowing constraint: $\boldsymbol{d_{t+1} \leq \theta \times (P_{k,t} k_{t+1})}$

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Entrepreneurs (cont.)

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Dynamic Problem

Rest of the Economy

Consumption good producers

- Aggregate varieties to produce a consumption good using CES technology
- Imports subject to a tariff τ_c

Capital/intermediate good producers

- Aggregate varieties to produce a capital good using CES technology
- Imports subject to a tariff τ_k
- Used for investment and as an intermediate input to production

Full Problem

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Rest of the world

- Supply foreign varieties: Perfectly elastic at price $p_{m,c}$ and $p_{m,k}$
- Demand domestic varieties: Exogenous CES demand
- Trade bonds with entrepreneurs at given interest rate

Competitive Equilibrium

A **recursive stationary competitive equilibrium** of this economy consists of prices $\{w, \xi, P_k\}$, policy functions $\left\{d', k', e, c, m, n, y_h, y_f, p_h, p_f, Y_c, Y_k, y_{m,c}, y_{m,k}\right\}$, value functions v and g, and a measure $\phi : \mathcal{S} \to [0, 1]$ such that:

1. Policy and value functions solve the entrepreneurs' problem
2. Policy functions solve the final good producers' problem
3. Labor market clears: $\int_{\mathcal{S}} [n(s) + e(s)F] \, \phi(s) ds = 1$
4. Market for consumption good clears: $\int_{\mathcal{S}} c(s)\phi(s) ds = Y_c$
5. Market for capital good clears: $\int_{\mathcal{S}} [x(s) + m(s)] \, \phi(s) ds = Y_k$
6. Measure ϕ is stationary

Notation:

- State space: $\mathcal{S} := \mathcal{K} \times \mathcal{D} \times \mathcal{Z}$
- Entrepreneur state: $s \in \mathcal{S}$

Quantitative Analysis

Question: How does financial development affect the gains from trade liberalization?

- Consider a trade liberalization as in Colombia 1988-1992
  - Large drop in import tariffs on capital and intermediates: $\tau_k \downarrow$ 32% to 12% Tariffs
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  - Annual Manufacturing Survey (10+ workers)
- Study **aggregate** and **distributional** effects of trade liberalization
  - Contrast **Baseline** (Credit/GDP=24%) vs. **Financially developed** (125%)
  - Both economies calibrated separately.

Calibration: Baseline Economy

Table: **Pre-Assigned Parameters**

Parameter	Value	Description	Parameter	Value	Description
γ	2	Risk aversion	α	0.6	Share of capital in production
τ	1	Iceberg trade costs	α_m	0.5	Share of intermediate inputs
σ	4	Elasticity of substitution	τ_m, τ_c, τ_x	0.32	Tariffs
δ	0.1	Capital depreciation rate	$p_{m,c}, p_{m,k}$	1	Price of $y_{m,c}, y_{m,k}$
r	0.06	Interest rate	P_f	1	Foreign price index

Table: **Calibrated Parameters**

Parameter	Value	Target moment	Target value	Model
F	0.48	Share of exporters	0.11	0.11
σ_ε	0.19	Exporters' domestic sales premium	5.68	5.68
ρ_z	0.86	AR(1) total sales	0.87	0.87
ω_c	0.21	C imports share	0.27	0.27
ω_k	0.28	Imports / GDP	0.12	0.12
θ	0.21	Credit / GDP	0.24	0.24
β	0.81	Net exports / GDP	-0.03	-0.03

Calibration: Financially Developed Economy

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F	0.74	Share of exporters	0.11	0.11
σ_ε	0.15	Exporters' domestic sales premium	5.68	5.68
ρ_z	0.89	AR(1) total sales	0.87	0.87
ω_c	0.25	C imports share	0.27	0.27
ω_k	0.33	Imports / GDP	0.12	0.12
θ	0.79	Credit / GDP	1.25	1.25
β	0.81	Baseline		

Mechanism: Discussion

A decrease in τ_k decreases the cost of capital and intermediates:

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Gradual aggregate adjustment in economy with financial frictions

Aggregate results: Steady State

	Baseline
Real GDP	2.6%
Capital	6.5%
Consumption	3.3%
Real exports	40.8%
Price of capital	-1.7%
Wage	6.2%
Real exchange rate	5.4%

Large and **positive effect** of a decrease in τ_k on **economic activity**

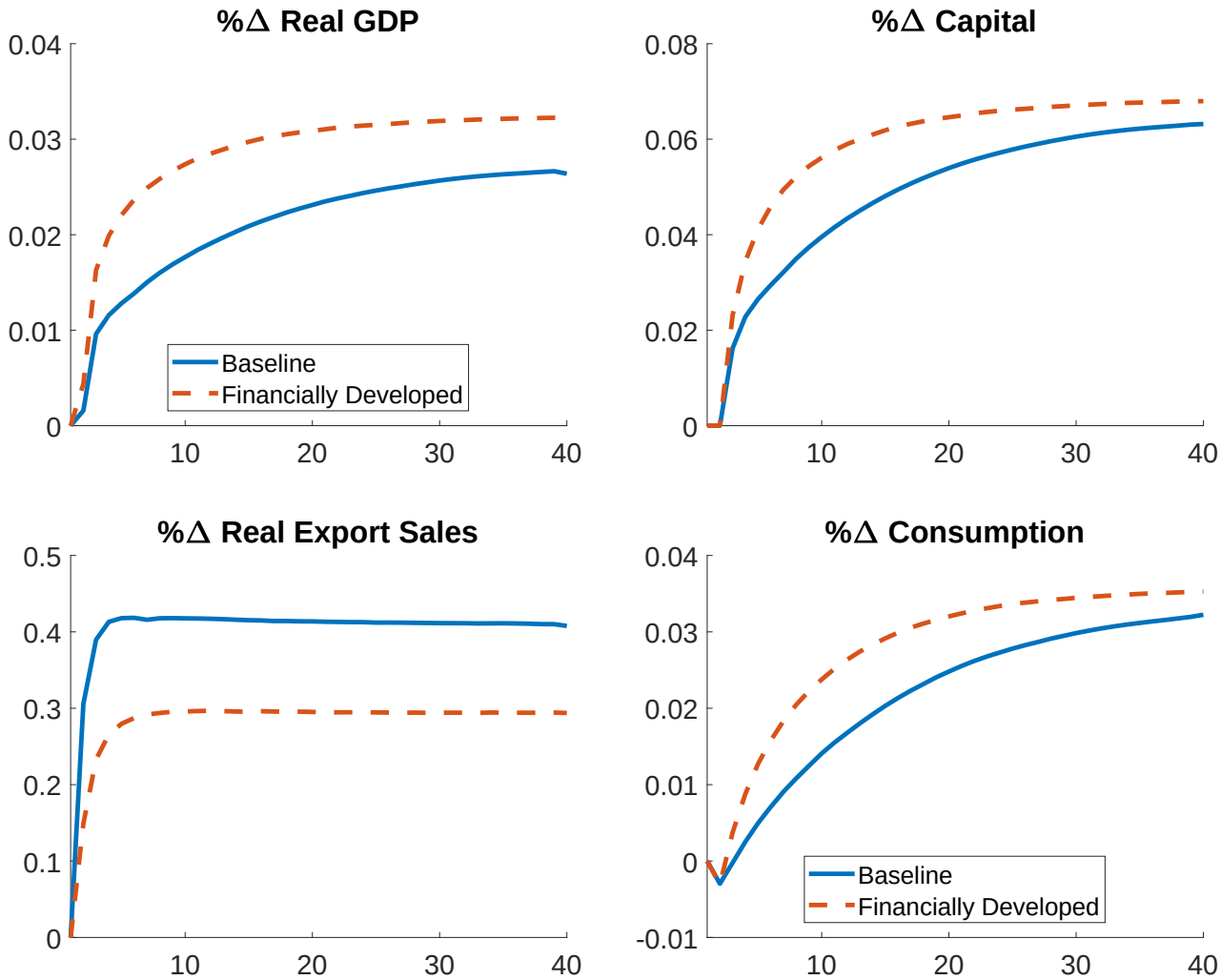
Aggregate results: Steady State

	Baseline	Financially Developed
Real GDP	2.6%	3.2%
Capital	6.5%	6.8%
Consumption	3.3%	3.5%
Real exports	40.8%	29.4%
Price of capital	-1.7%	-1.8%
Wage	6.2%	6.6%
Real exchange rate	5.4%	4.3%

Large and **positive effect** of a decrease in τ_k on **economic activity**

- **Larger long-run effects** in financially developed economy.

Aggregate Effects of Trade Liberalization ($\tau_k \downarrow$)



Large and **positive effect** of a decrease in τ_k on **economic activity**

- Faster adjustment in financially developed economy Speed of Convergence

Aggregate Effects of Trade Liberalization ($\tau_k \downarrow$)

Taking stock:

- **Large and positive long-run effects** on real GDP, capital and consumption.
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- **Larger long-run effects in financially developed economy.**
- **Faster adjustment in financially developed economy**:
  - After 10 periods: GDP, K and C covered 87%, 85% and 71% of long-run change.
  - Baseline: 70%, 66%, and 48%, respectively.
  - **Consistent with cross-country evidence.**

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  - **Consistent with cross-country evidence.**
- We now explore the **welfare and distributional implications**

Welfare and Distributional Effects of Trade Liberalization

We use a "consumption-equivalent" welfare measure:

- Let $v_0(s)$ be the value function of entrepreneur if the trade liberalization **does not** occur when her state is s
- Let $v_T(s)$ be the value function of entrepreneur if the trade liberalization **does** occur when her state is s

The aggregate welfare gains *G* are computed as:

$$G = \left(\frac{\int_{\mathcal{S}} v_T(s)\phi_0(s)ds}{\int_{\mathcal{S}} v_0(s)\phi_0(s)ds} \right)^{\frac{1}{1-\gamma}} - 1$$

where $\phi_0(s)$ is the initial stationary measure (see Mendoza et al., 2009)

Analogous measure to aggregate across groups of agents

Aggregate Welfare

- **Larger long-run gains** in **financially developed** economy, but modest difference
  - Additional gains from asset accumulation and relaxation of borrowing constraints

ΔWelfare ($\tau_k \downarrow$)

	Baseline	Financially Developed
Excluding transition	2.57%	2.87%

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ΔWelfare ($\tau_k \downarrow$)

	Baseline	Financially Developed
Excluding transition	2.57%	2.87%
Overall	0.16%	0.86%

- **Total welfare gains** larger in **financially developed** economy
  - Lower gains in Baseline economy due to slower transition

Distributional Effects

	Baseline	Financially Developed
Winners	0.26%	0.91%
Losers	-0.01%	— %
Exporters	1.01%	1.48%
Non-exporters	0.16%	0.83%
Entrepreneurs	0.63%	1.19%
Workers	0.11%	0.82%
Wealthy	0.70%	1.20%
Poor	0.20%	0.87%

- Exporters/Entrepreneurs/Wealthy/Productive gain more.

Further Results

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- Exporters/Entrepreneurs/Wealthy/Productive gain more.
- Trade liberalization gains **more equally distributed in Financially Developed.**

Further Results

Distributional and Welfare Effects of Trade Liberalization

Taking stock:

- **Gains in aggregate welfare**
  - Larger in financially developed economy.
  - Lower gains in baseline economy due to slow transition.

Distributional and Welfare Effects of Trade Liberalization

Taking stock:

- **Gains in aggregate welfare**
  - Larger in financially developed economy.
  - Lower gains in baseline economy due to slow transition.
- **More equally distributed gains in financially developed economy**
  - Wealthy/productive agents benefit most in both economies.
  - Some poor/unproductive agents experience losses in Baseline.
  - Tariff revenue drop partially offsets positive effects of depreciation and $\downarrow P_k$.
  - Real wages redistribute welfare gains to poorer agents ($+$ if financially developed).

Welfare Decomposition

Quantifying Colombia's Trade Liberalization

Questions:

- How important was the impact of trade liberalization in Colombia?
- How much higher would it have been if Colombia was financially developed?

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- But now:
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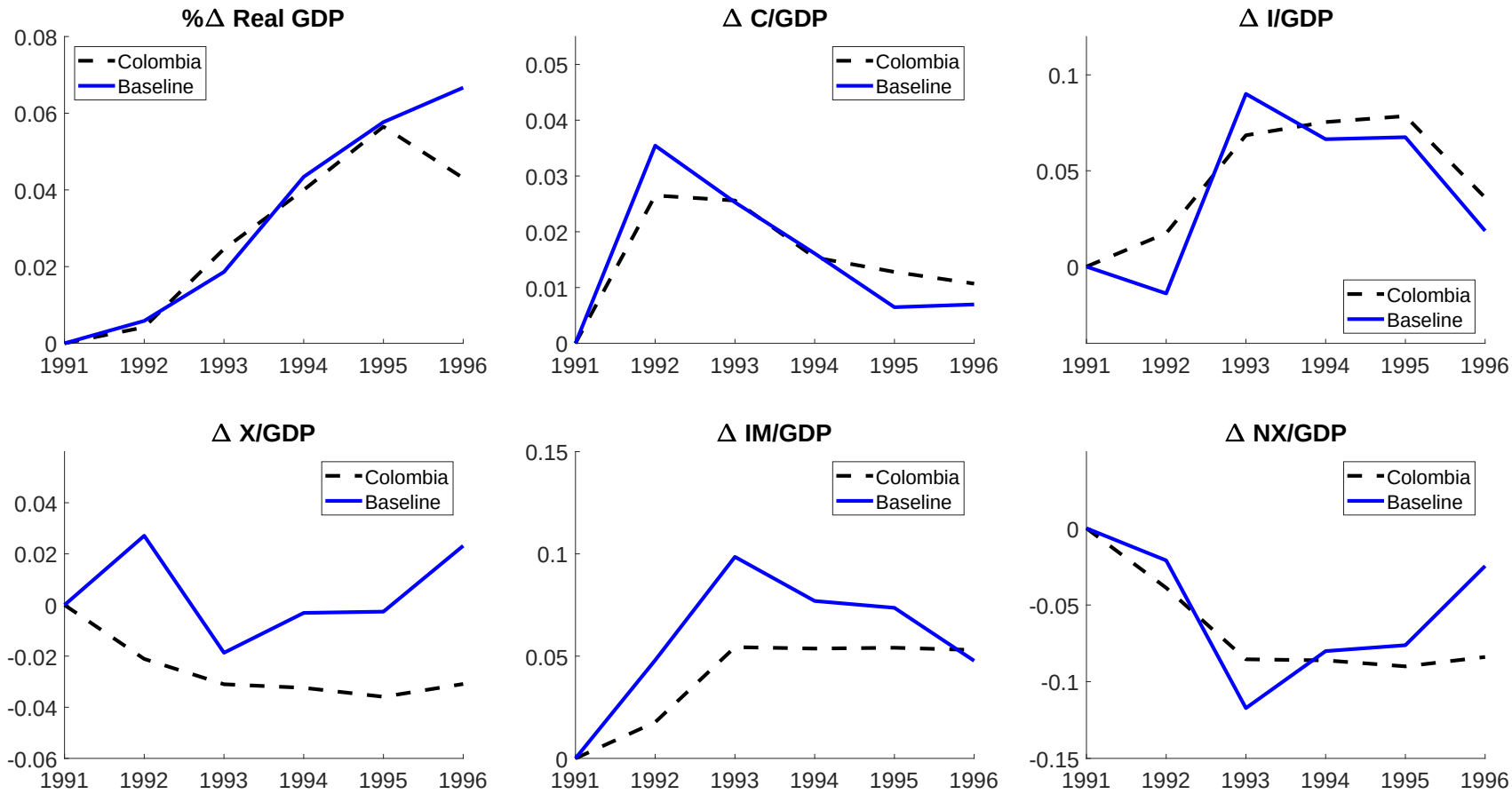
  - Calibrate shocks separately for both economies (same targets).
- Quantify impact of trade liberalization and financial development.
  - Contrast baseline economy vs. data.
  - Contrast baseline economy vs. economy without reduction in τ_k.
  - Contrast baseline economy vs. financially developed.

Aggregate Effects of Trade Liberalization ($\tau_k \downarrow$)



- We choose shocks to target GDP, C/GDP and I/GDP in 1991-1995.

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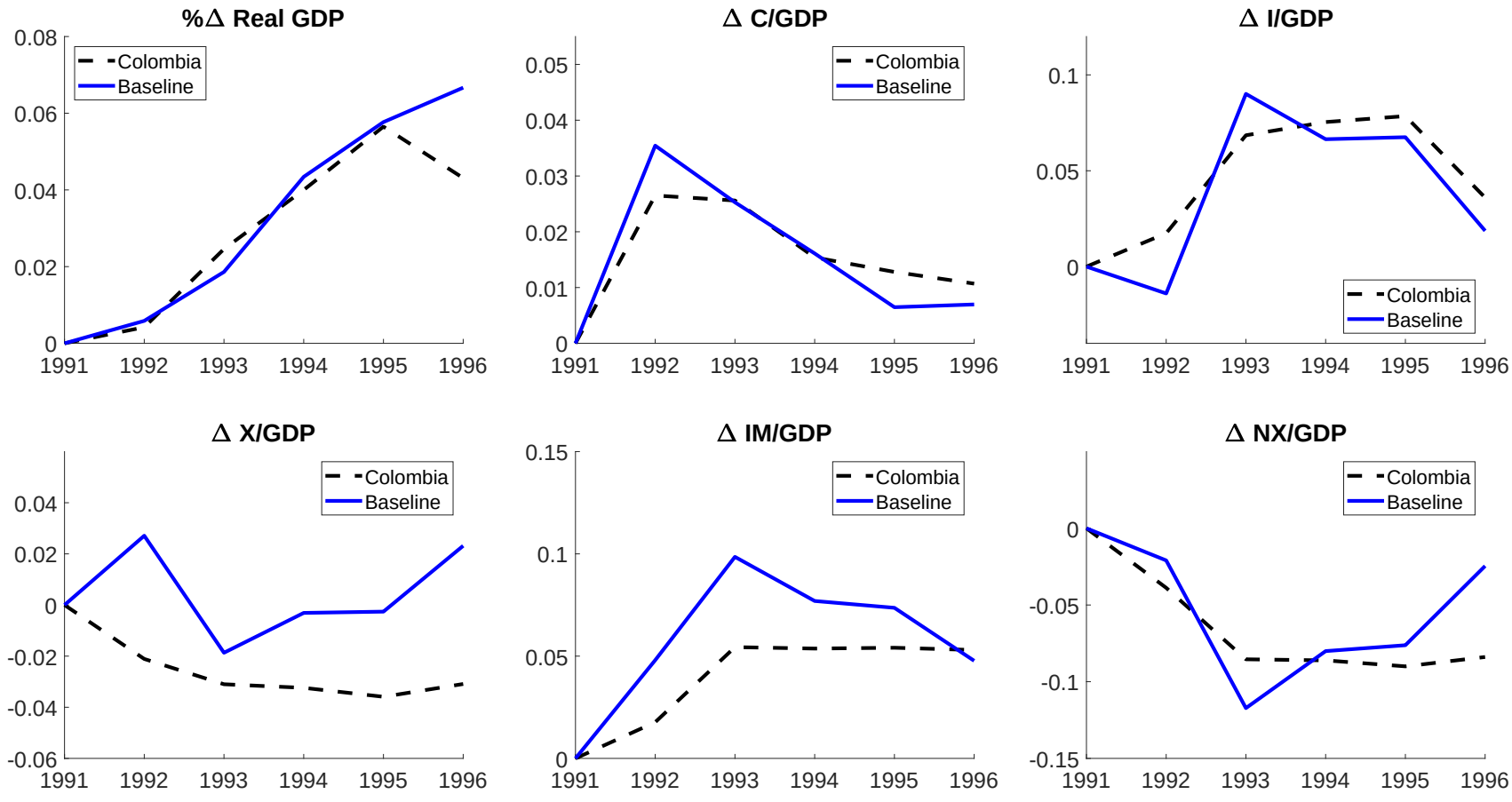
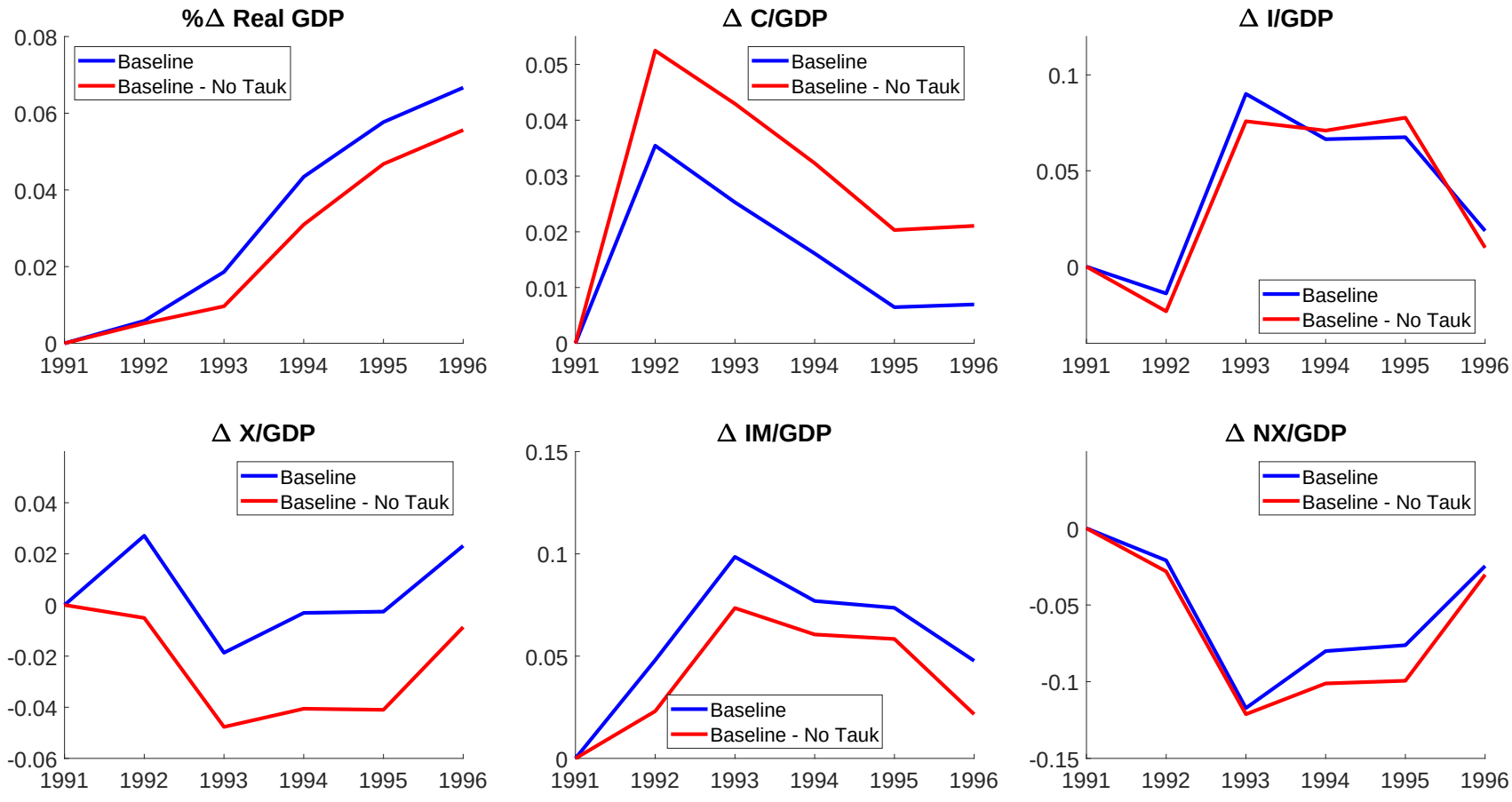


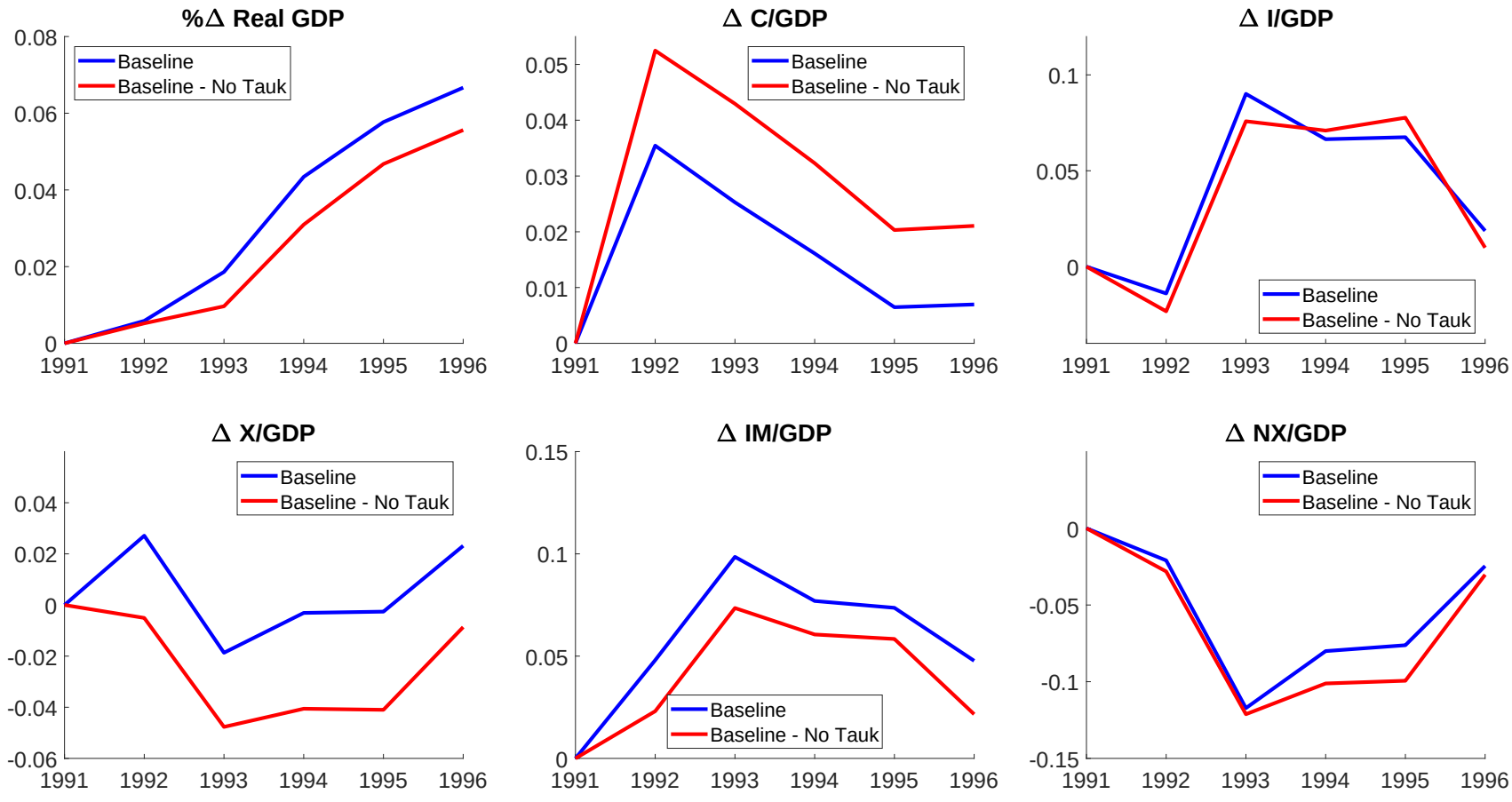
- We choose shocks to target GDP, C/GDP and I/GDP in 1991-1995.
- Model implies trade dynamics (X/GDP,M/GDP,NX/GDP) close to data.

Aggregate Effects of Trade Liberalization ($\tau_k \downarrow$)



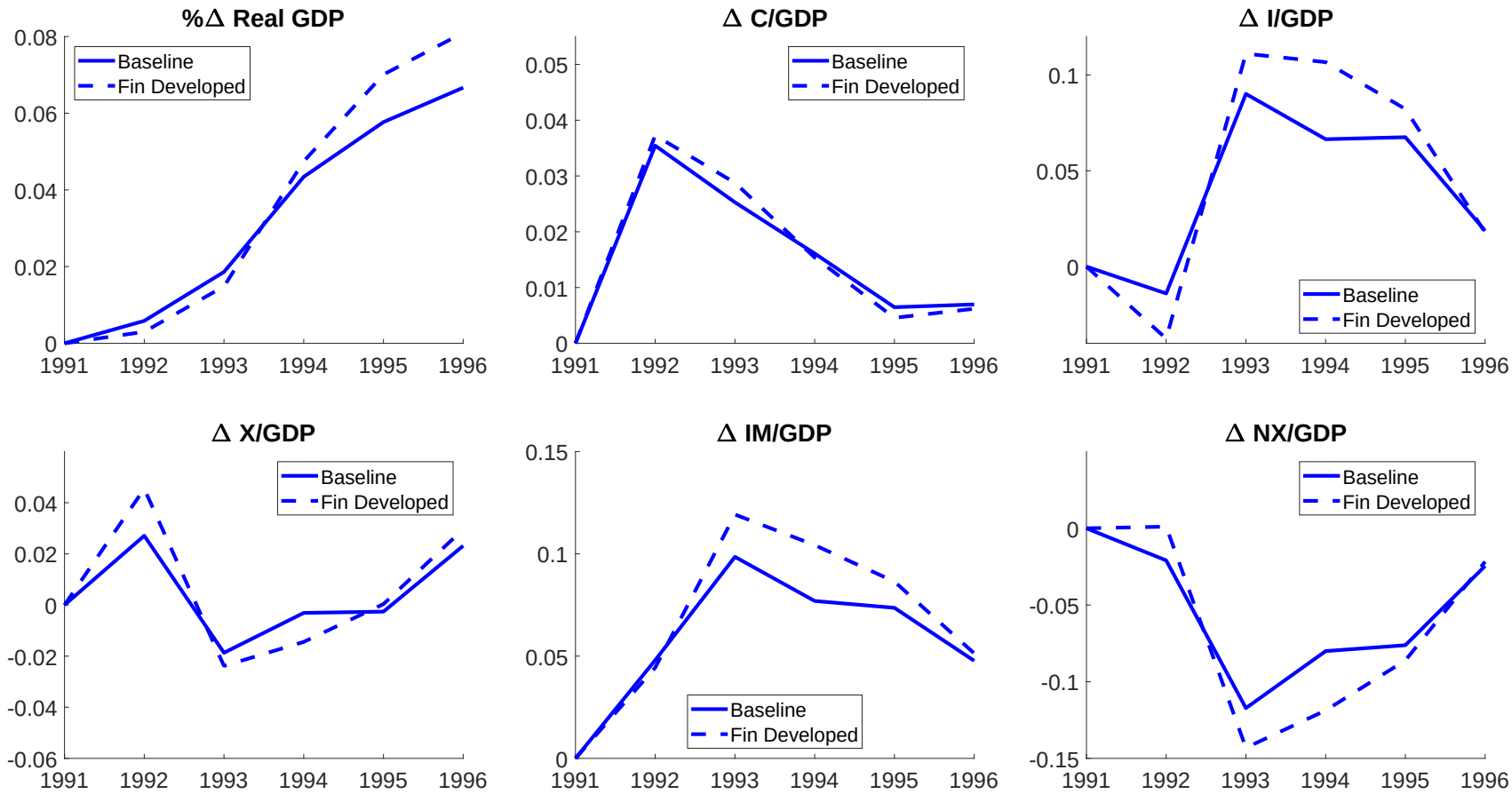
- $\downarrow \tau_k \Rightarrow$ 1.1pp higher real GDP in 1996 (23% of growth in 1991-1996).

Aggregate Effects of Trade Liberalization ($\tau_k \downarrow$)



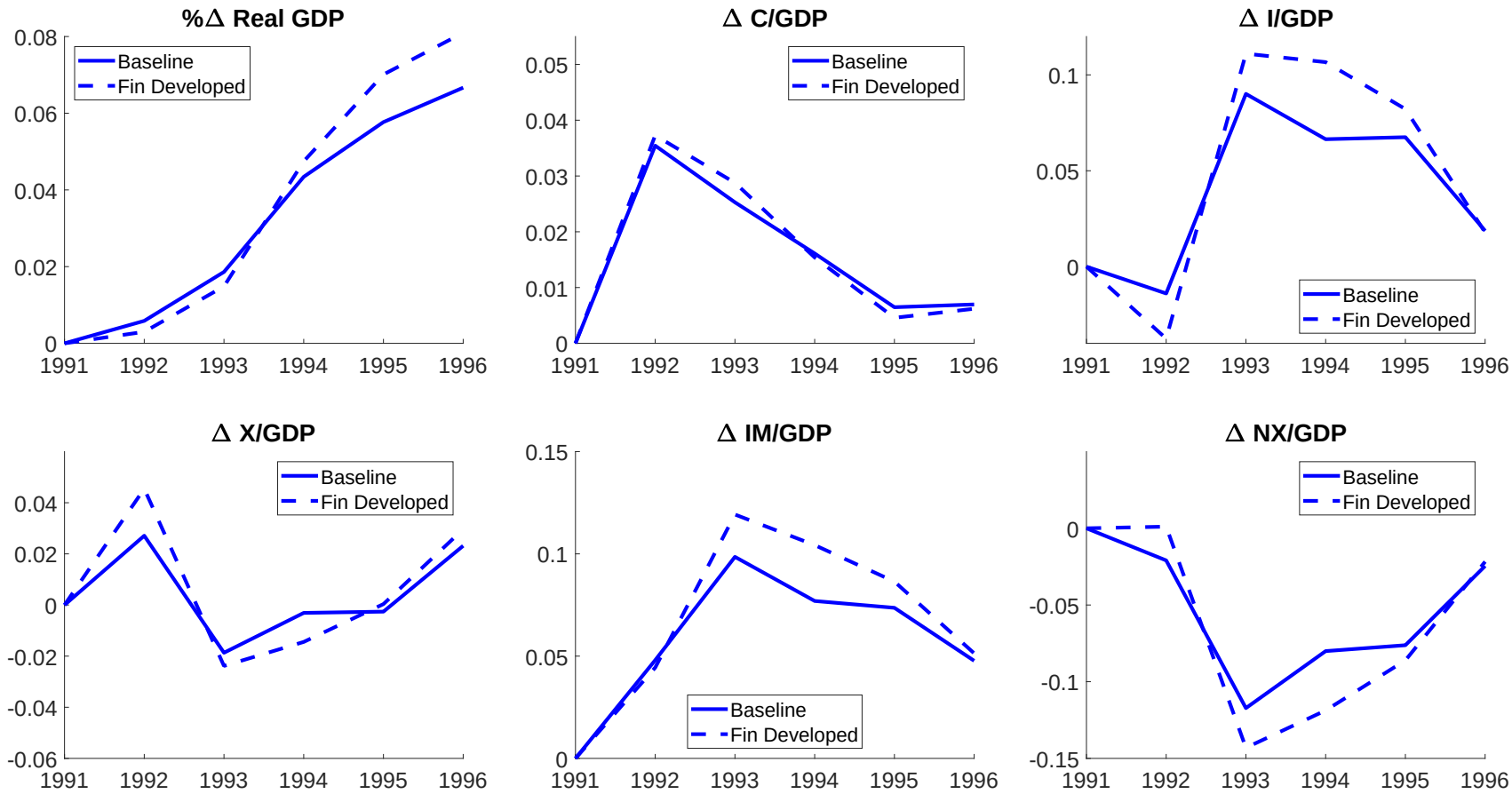
- $\downarrow \tau_k \Rightarrow$ 1.1pp higher real GDP in 1996 (23% of growth in 1991-1996).
- C increases less than GDP, I as much, X and IM more, NX/GDP slightly improves.

Aggregate Effects of Trade Liberalization ($\tau_k \downarrow$)



- Fin. development $\Rightarrow$ 1.4pp higher GDP in 1996 (12% of growth in 1991-1996).

Aggregate Effects of Trade Liberalization ($\tau_k \downarrow$)



- Fin. development $\Rightarrow$ 1.4pp higher GDP in 1996 (12% of growth in 1991-1996).
- Same increase for C and X, I and M even more, NX/GDP falls more.

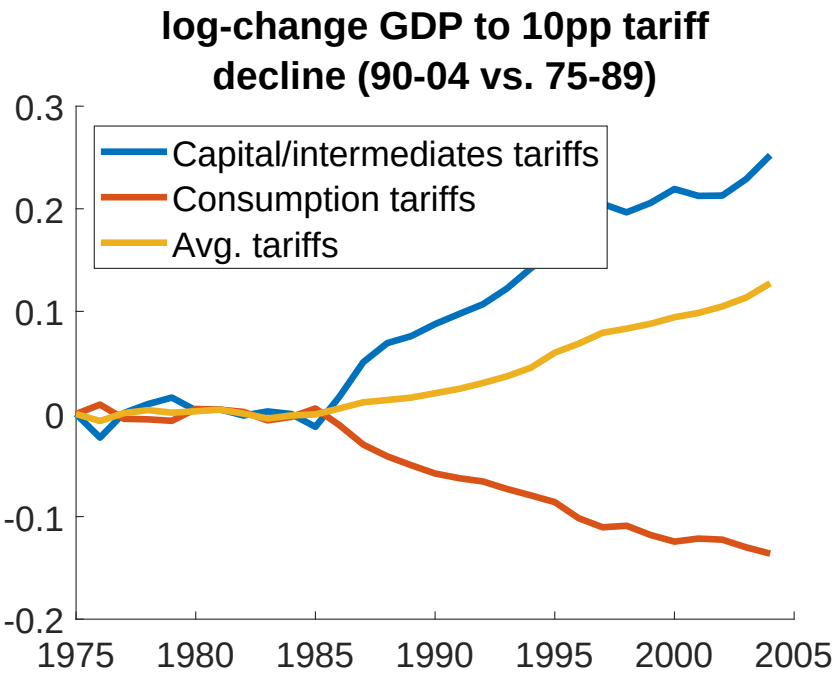
Trade Liberalization Dynamics by Type of Goods

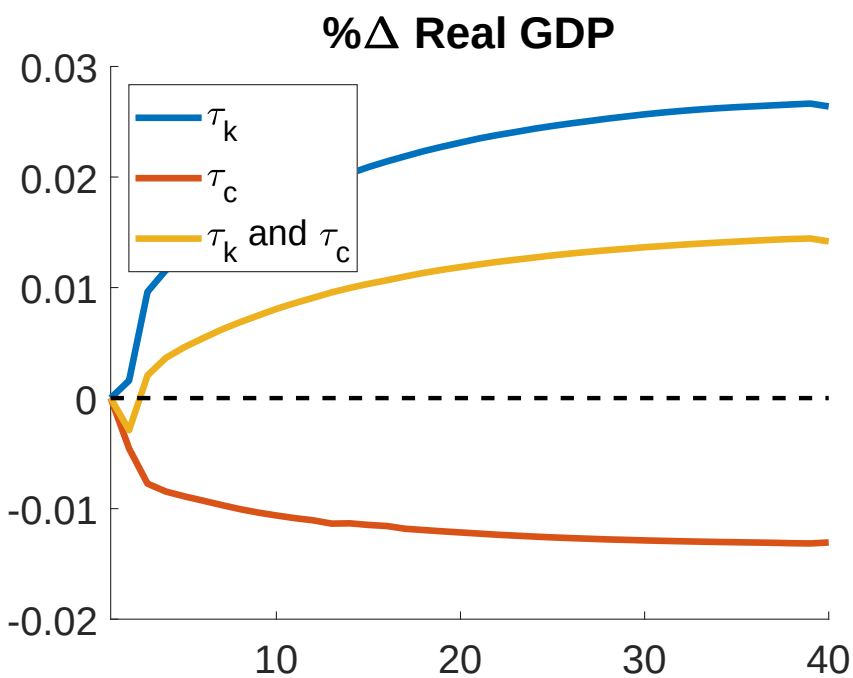
Q: Consumption vs. capital/intermediate tariffs $\Rightarrow$ Trade liberalization dynamics?

How we answer this question:

- Estimate elasticity of key aggregates to changes in tariffs on:
  - Consumption goods
  - Capital/intermediates
- Trade policy data: Estevadeordal and Taylor (2013)
  - Tariffs by types of goods for 75-89 and 90-04
  - Fewer countries available (46)

Trade Liberalization Dynamics by Type of Goods





Model and data: Trade liberalization dynamics depend on goods affected

- Lower tariffs on consumption goods: Contractionary
- Lower tariffs on capital and intermediates: Expansionary

Further Results

Conclusions

Question: How does **financial development** impact **gains from trade liberalization**?

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Financial development matters when tariffs on capital goods are reduced:

- Financial development **increases** long-run growth and **speeds up** transition
- Higher financial development **increases** welfare gains
- **Productive and wealthy** agents benefit most irrespective of financial development
- More **equally distributed gains in Fin. Developed** due to higher increase in wages

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We analyze other types of trade liberalizations:

- Changes in tariffs to consumption goods τ_c, all goods τ_{kc}, bilateral trade liberalizations τ_{kcx}, foreign trade liberalizations τ_x, expected changes in tariffs $\tau_{k\ \text{Expected}}$, fixed tariffs revenue $\tau_{k,\ FixedTI}$...
- Robust: **Financial development** $\Rightarrow$ **Faster transition and larger welfare gains**.

Thank You!

Appendix

Cross-Industry Evidence from Colombia

Cross-industry dynamics during Colombian trade liberalization:

- Classify industries on finance-intensity (median firm-level debt-to-sales ratio)
- (H_0) Finance-intensive industries grew relatively less following trade liberalization
  - Key assumption: Credit use captures differences in demand for external finance
- Estimate:

$$\Delta y_j^{\text{Post}} - \Delta y_j^{\text{Pre}} = \alpha + \left(\tau_j^{\text{Post}} - \tau_j^{\text{Pre}}\right) \times \left(\beta + \gamma \times \text{Finance-intensity}_j\right) + \varepsilon_j$$

  - $j = 1, ..., J$ indexes industries, Δy_j^t denotes median firm-level growth in industry j and $\Delta \tau_j^t$ denotes change in inputs tariffs for period $t \in \{\text{Pre}, \text{Post}\}$.
  - Pre-liberalization and post-liberalization periods are 1982-1988 and 1995-1997.

Cross-Industry Evidence from Colombia

Dependent variable: Change in median sales growth (pre- vs. post-liberalization period)		
	(1)	(2)
Δ Input tariffs	-1.65	-0.75
	(0.043)	(0.073)
Δ **Input tariffs** $\times$ **Debt-to-sales**$_j$	**6.85**	
	(0.036)	
Δ Input tariff, med finance		0.68
		(0.180)
Δ **Input tariff, high finance**		**1.63**
		(0.019)
R-squared	0.114	0.142
Observations	44	44

Cross-Industry Evidence from Colombia

Dependent variable: Change in median sales growth (pre- vs. post-liberalization period)				
	(1)	(2)	(3)	(4)
Δ Input tariffs	-1.65	-0.75		
	(0.043)	(0.073)		
Δ Input tariffs × Debt-to-sales$_j$	6.85			
	(0.036)			
Δ Input tariff, med finance		0.68		
		(0.180)		
Δ Input tariff, high finance		1.63		
		(0.019)		
Δ Input tariffs × Intermediate share			-2.42	-1.11
			(0.168)	(0.415)
Δ Input tariffs × Intermediate share × Debt-to-sales$_j$			**10.45**	
			(0.099)	
Δ Input tariffs × Intermediate share, med finance				0.69
				(0.628)
Δ Input tariffs × Intermediate share, high finance				**2.66**
				(0.077)
R-squared	0.114	0.142	0.060	0.077
Observations	44	44	44	44

Cross-Industry Evidence from Colombia

Interpretation of results:

- Among firms with low debt, a **reduction** of input tariffs is associated with **higher** growth after trade liberalization
  - Industries at 10th percentile of debt-to-sales distribution ($debt/sales = 0.12$)

    1 pp. **decline** of input tariffs $\Rightarrow$ 0.80 pp. **increase** in sales growth rate

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- Finance-intensive industries are estimated to experience relatively **lower** growth following trade liberalization
  - Industries at 90th percentile of debt-to-sales distribution ($debt/sales = 0.37$)

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  - Industries at 90th percentile of debt-to-sales distribution ($debt/sales = 0.37$)

    1 pp. **decline** of input tariffs $\Rightarrow$ 0.92 pp. **decline** in sales growth rate

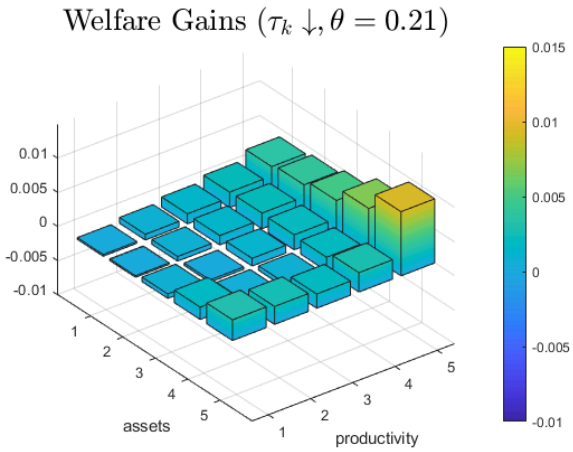
Finance-intensive industries in economies with low financial development operate closer to borrowing constraint $\Rightarrow$ Slower growth following trade liberalization

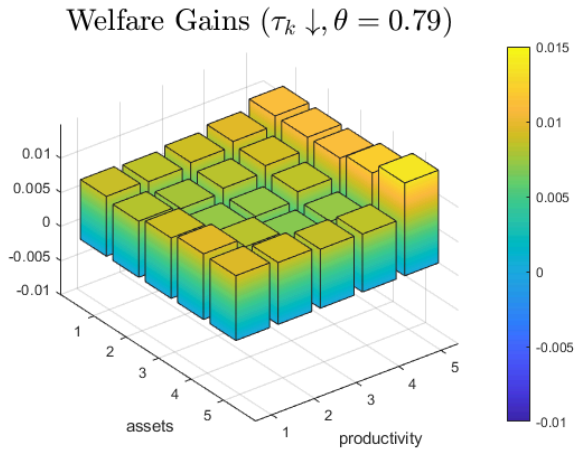
Cross-Industry Evidence with Rajan & Zingales(1998) EFD

Dependent variable: Change in median sales growth (pre- vs. post-liberalization period)				
	(1)	(2)	(3)	(4)
Δ Input tariffs	-0.36	-0.56		
	(0.379)	(0.172)		
Δ Input tariffs $\times$ EFD_j	**0.89**			
	(0.324)			
Δ Input tariff, med finance		0.77		
		(0.298)		
Δ Input tariff, high finance		**1.58**		
		(0.044)		
Δ Input tariffs $\times$ Intermediate share			-0.17	-0.68
			(0.826)	(0.456)
Δ Input tariffs $\times$ Intermediate share $\times$ EFD_j			**1.68**	
			(0.289)	
Δ Input tariffs $\times$ Intermediate share, med finance				1.10
				(0.444)
Δ Input tariffs $\times$ Intermediate share, high finance				**2.84**
				(0.059)
Constant	-0.50	-0.46	-0.49	-0.47
	(0.000)	(0.000)	(0.000)	(0.000)
R-squared	0.036	0.104	0.022	0.068
Observations	42	42	42	42

Industry

Distributional Effects

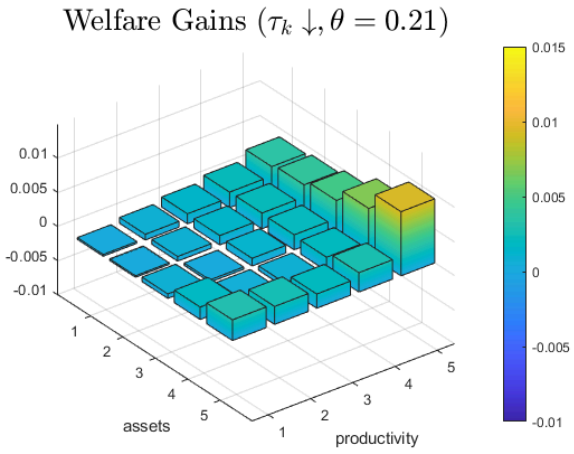


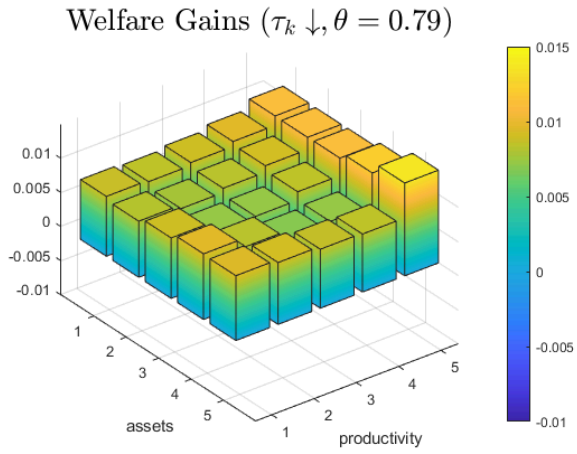


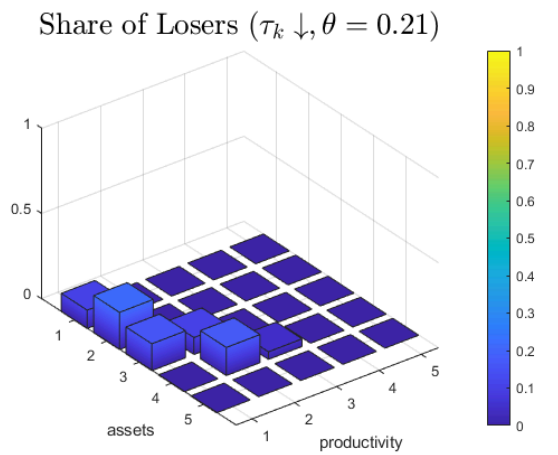
- **Larger gains** in **financially developed** economy.
- **High assets** and **high productivity** agents **benefit most** in both.

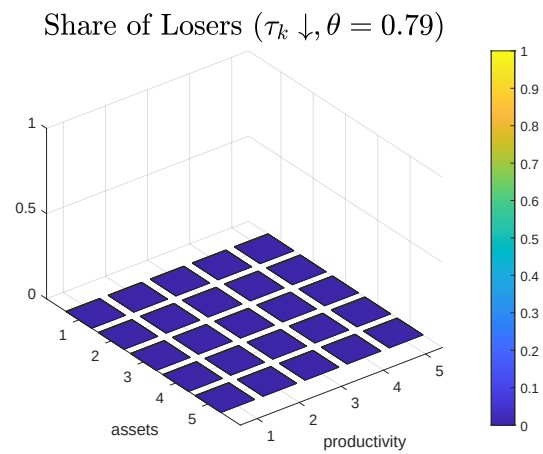
Back

Distributional Effects





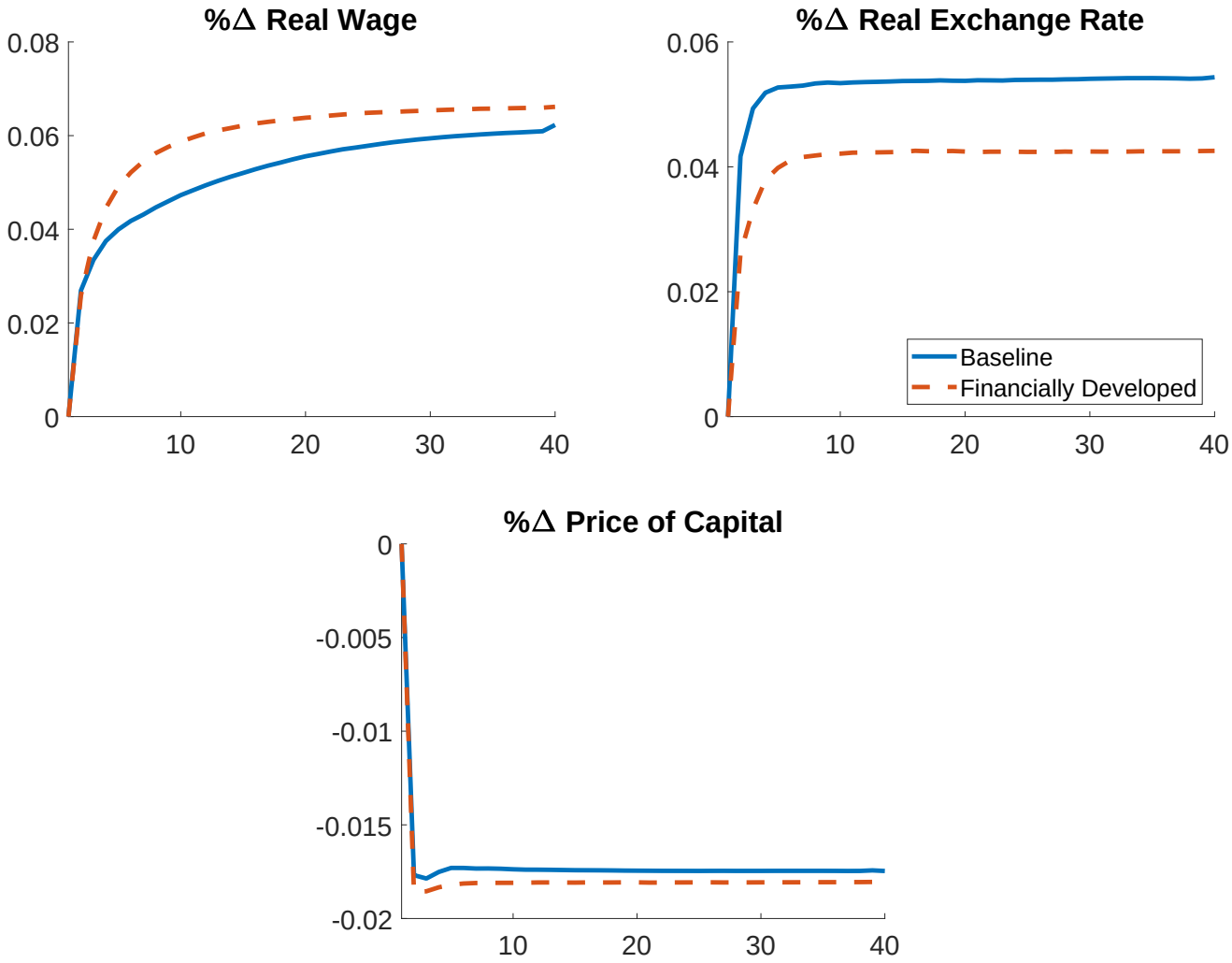




- **Larger gains** in **financially developed** economy.
- **High assets** and **high productivity** agents **benefit most** in both.
- **Everyone wins** in **financially developed** economy, not in baseline.

Back

Aggregate Effects of Trade Liberalization ($\tau_k \downarrow$)



Large and **positive effect** of a decrease in τ_k on **economic activity**

- Faster adjustment in financially developed economy Speed of Convergence

Back

Speed of Adjustment to Final S.S.

Figure: **The measure of the speed of transition following a reduction in τ_k**

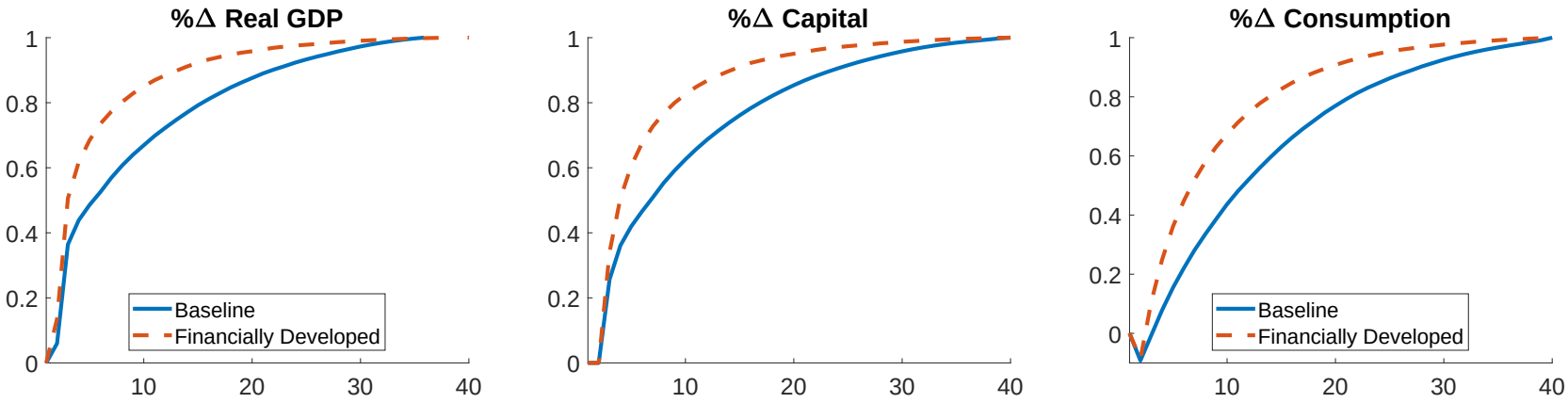
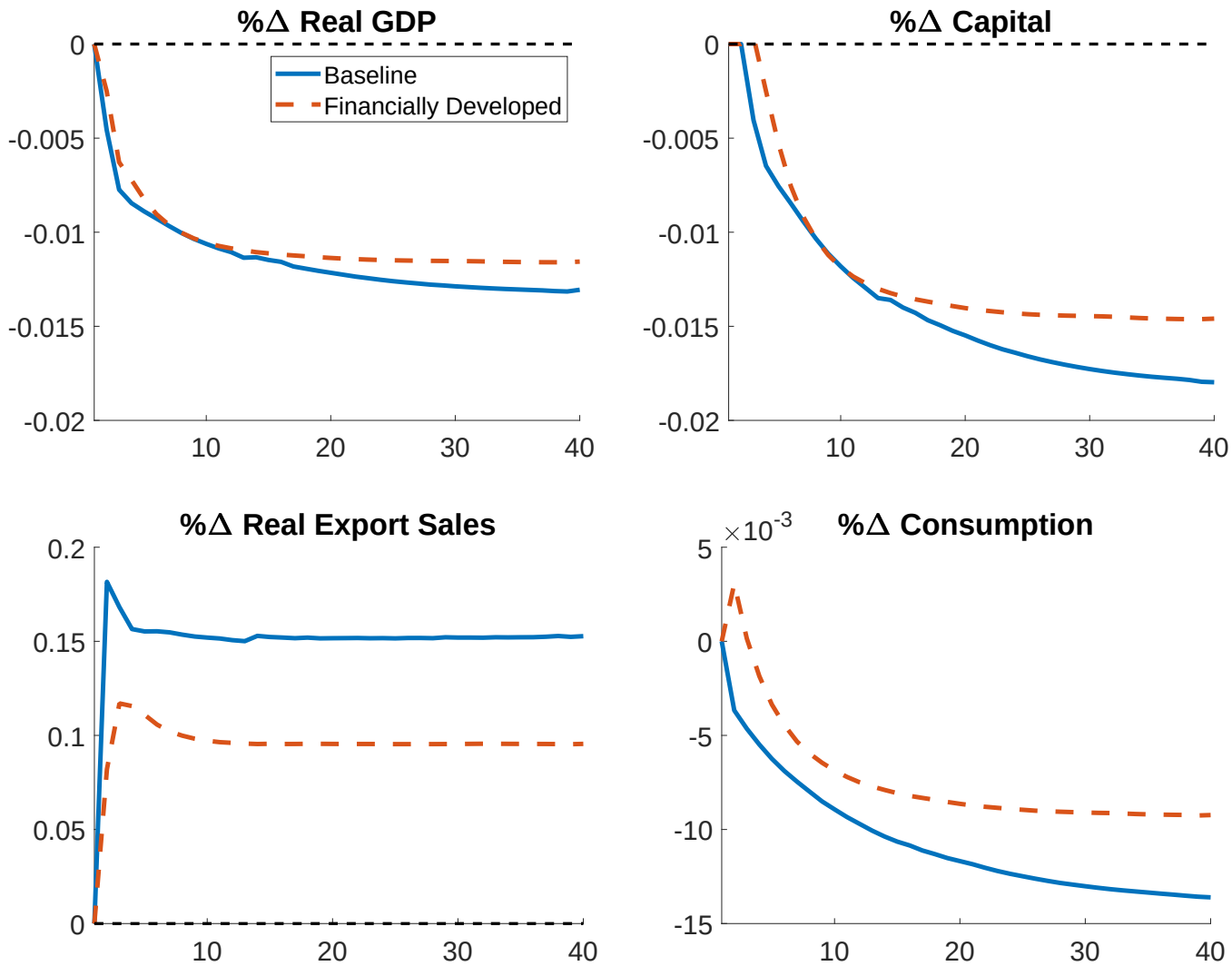


Table: **The extent of convergence after 10 periods ($\tau_k \downarrow$)**

	Real GDP	Capital	Consumption
$\theta = 0.21$	70%	66%	48%
$\theta = 0.79$	87%	85%	71%

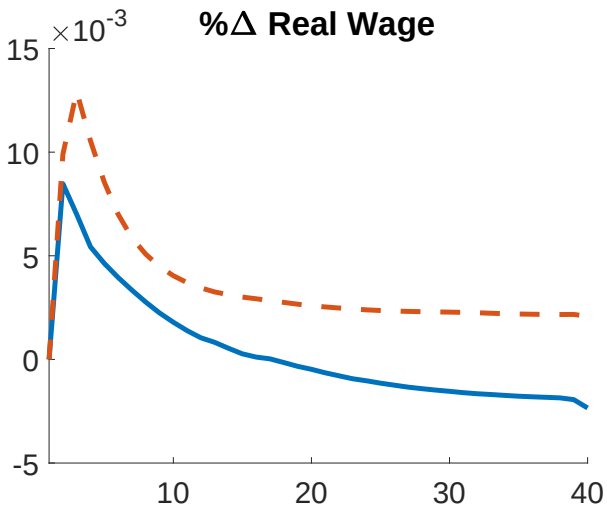
Back

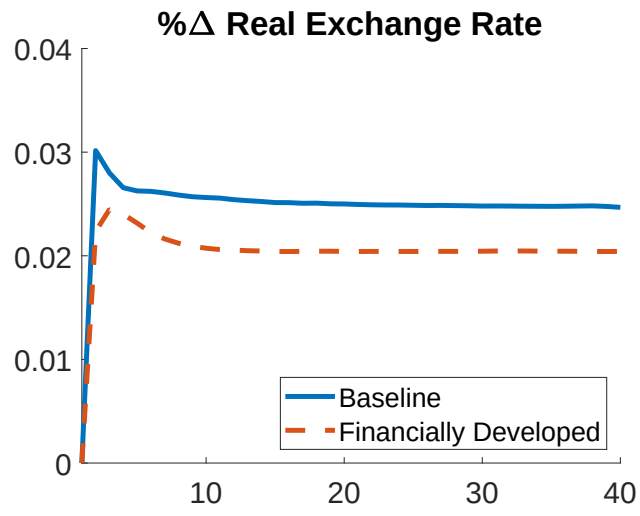
Aggregate Effects of Trade Liberalization, τ_c

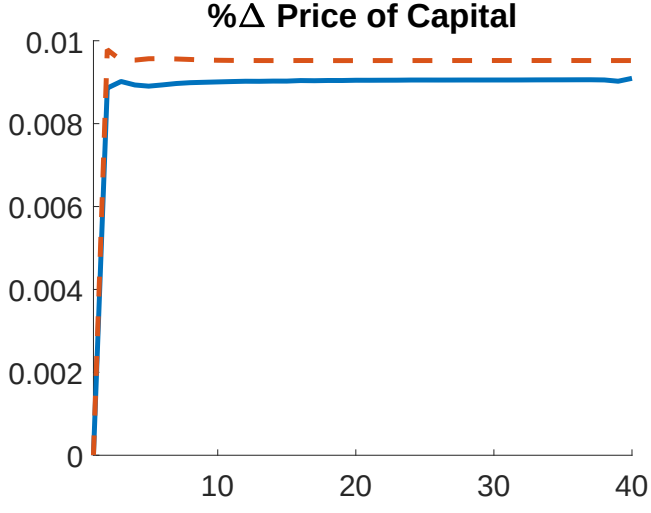


Conclusions

Aggregate Effects of Trade Liberalization, τ_c

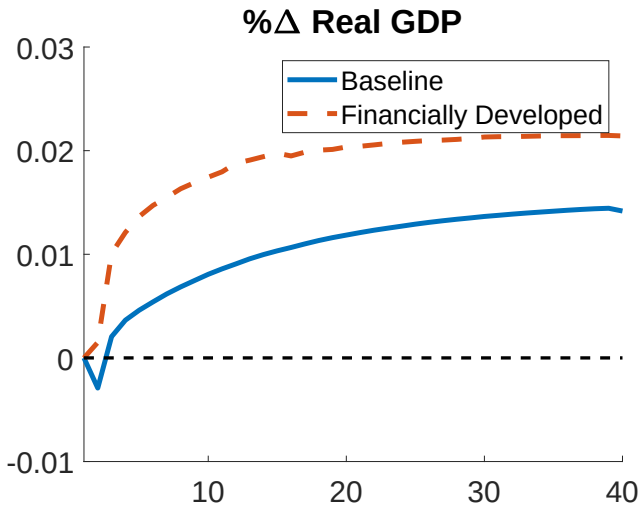


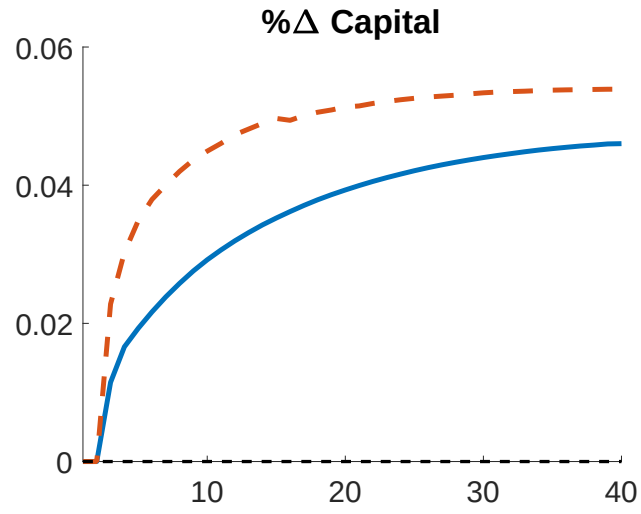


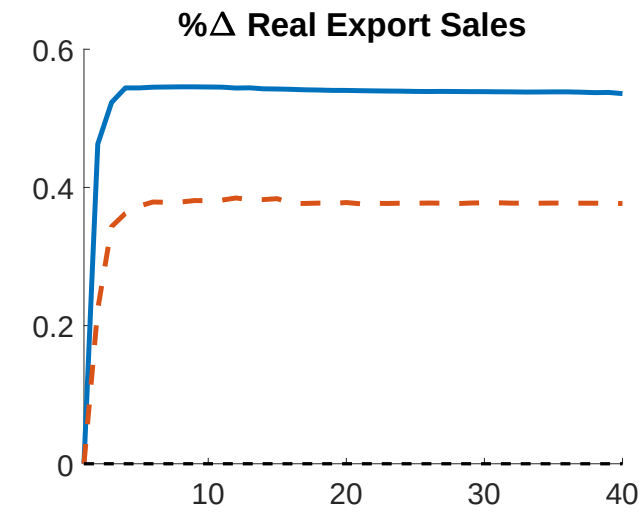


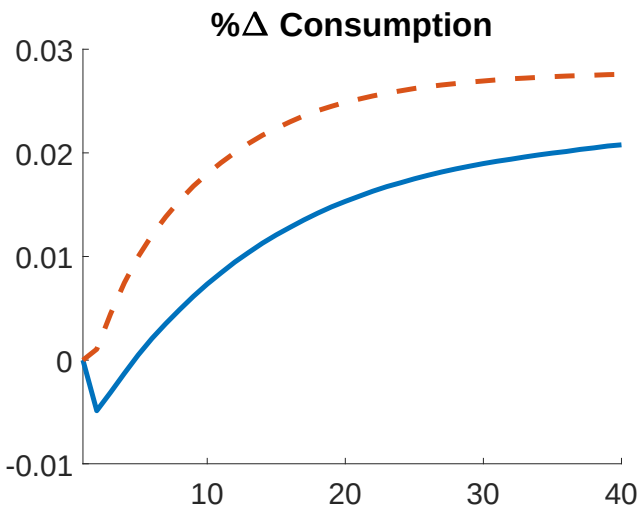
Conclusions

Aggregate Effects of Trade Liberalization, τ_k and τ_c



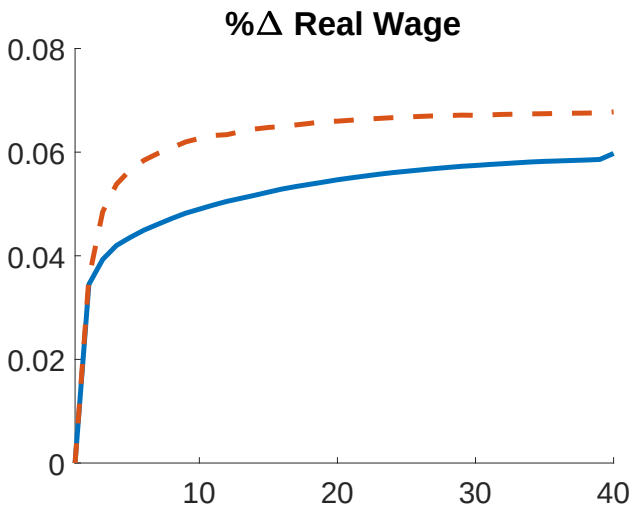


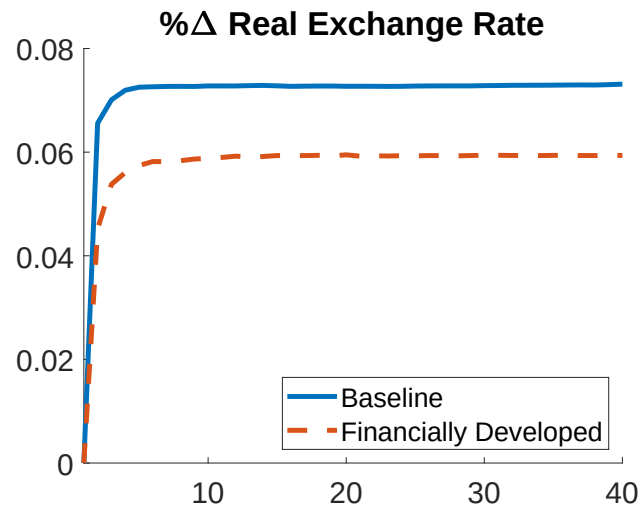


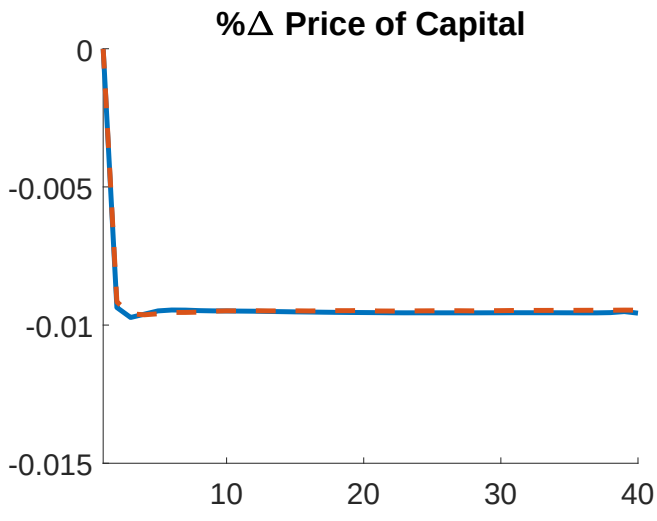


Conclusions

Aggregate Effects of Trade Liberalization, τ_k and τ_c

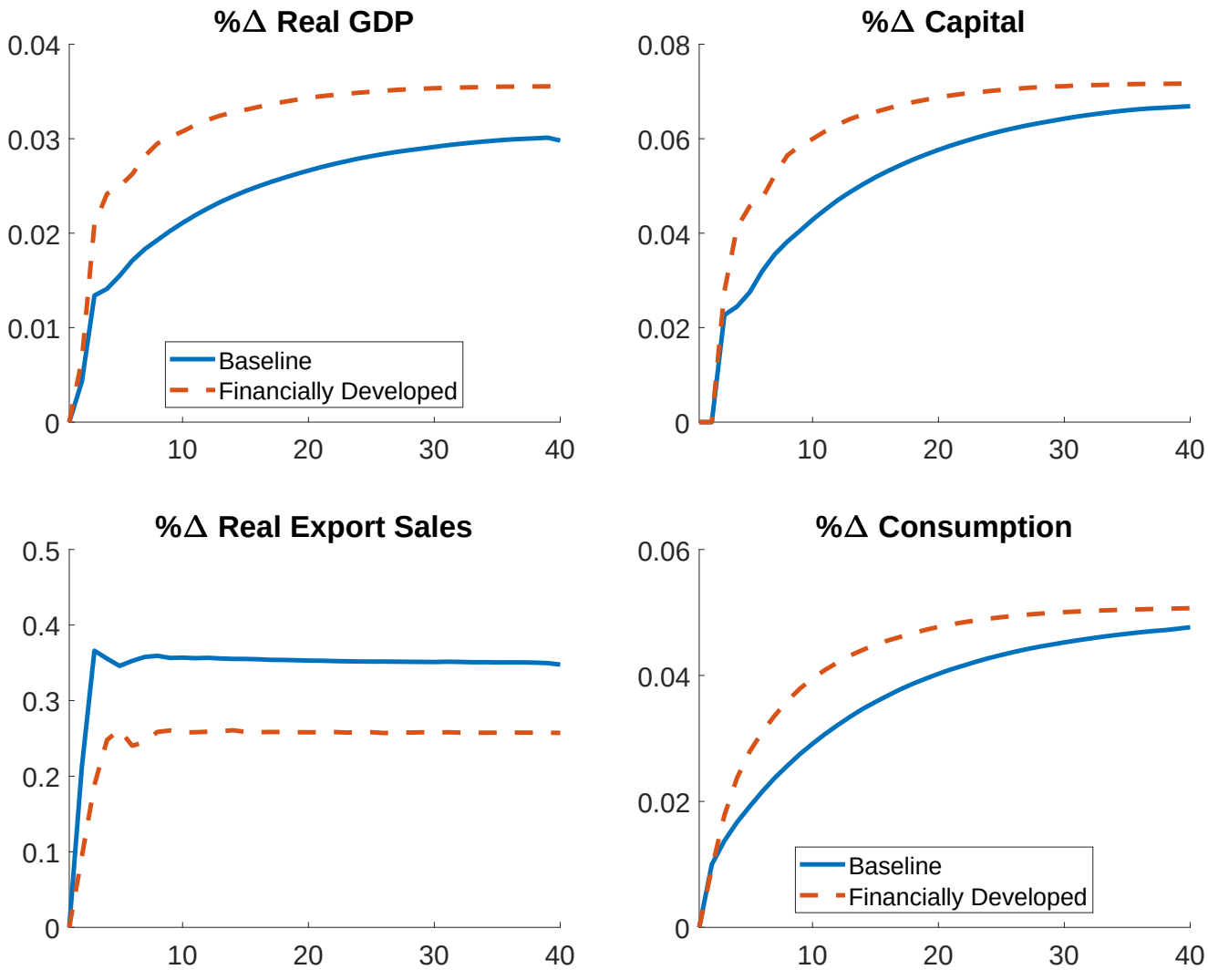






Conclusions

Aggregate Effects of Trade Liberalization, Fixed Tariffs Income



Conclusions

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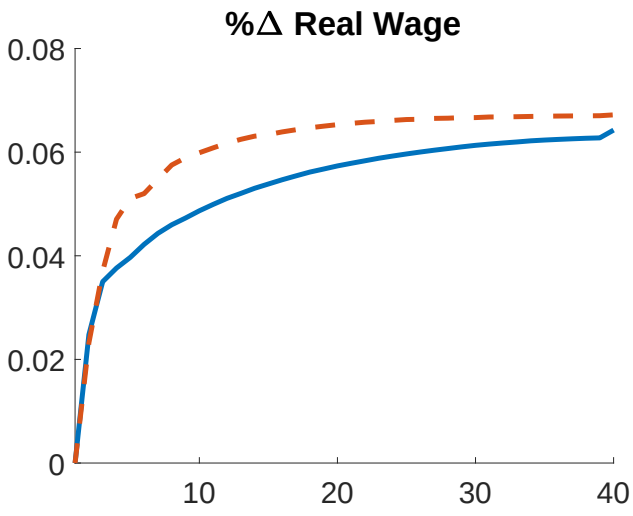
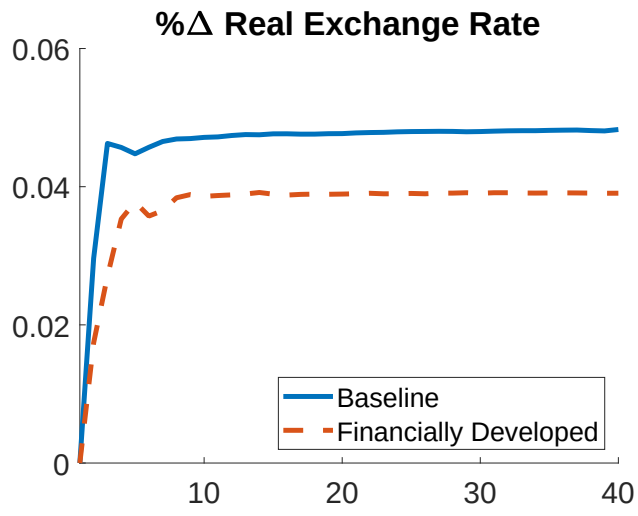
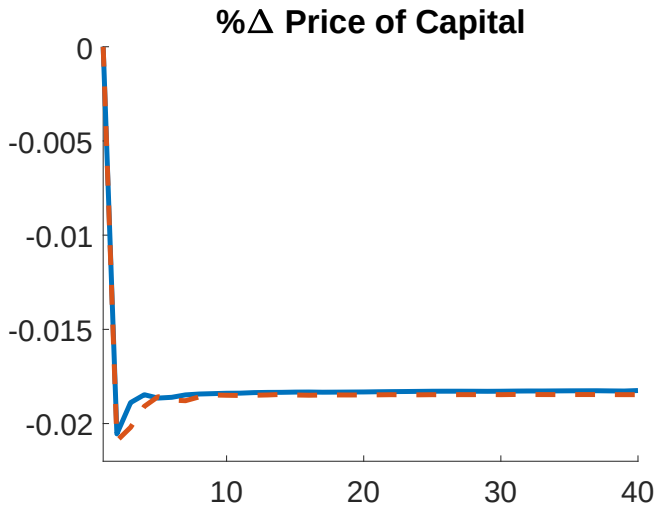
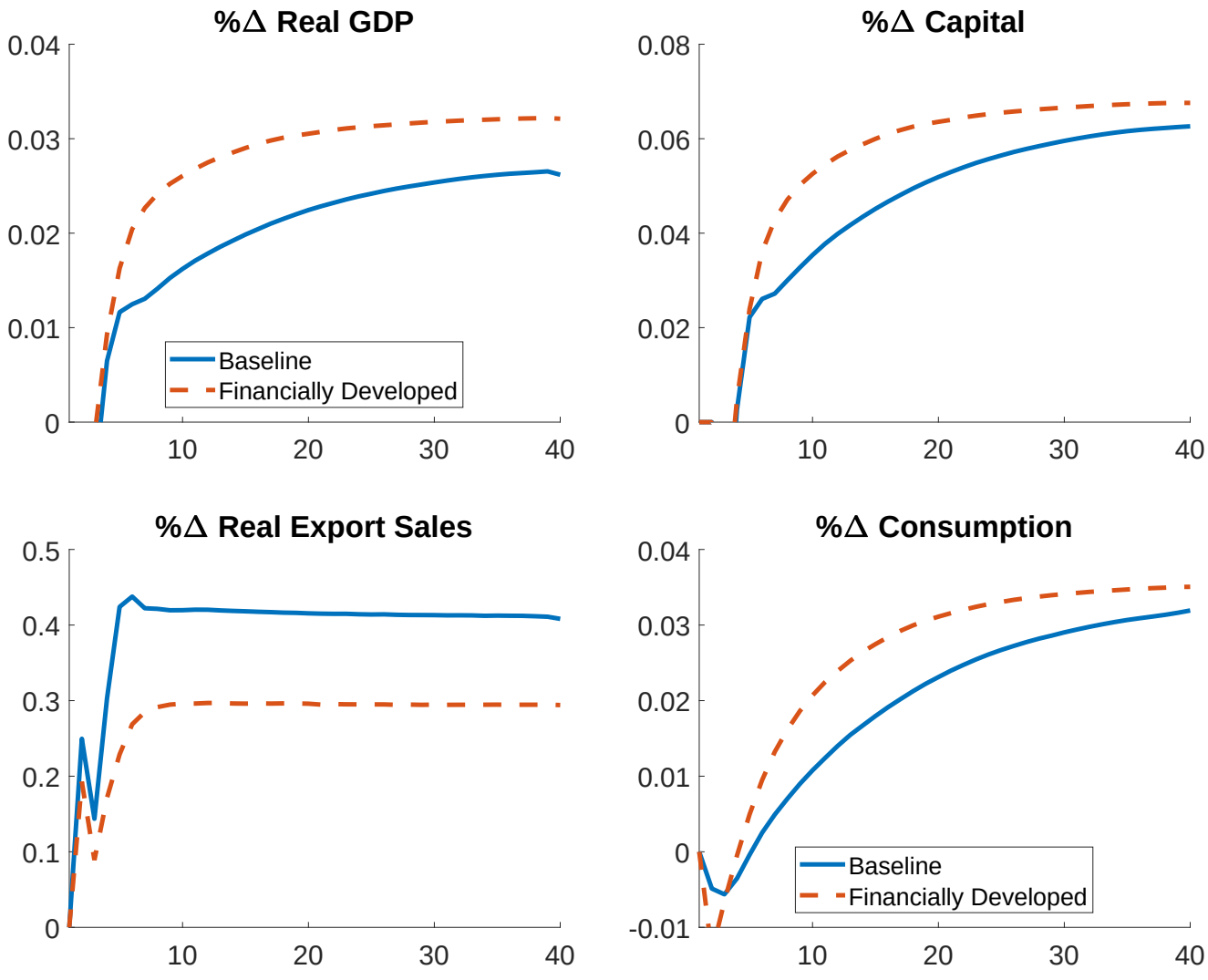






Conclusions

Aggregate Effects of Trade Liberalization, τ_k expected



Conclusions

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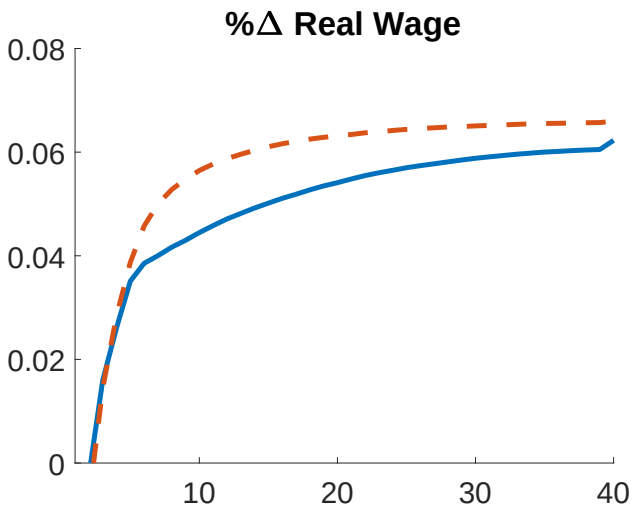
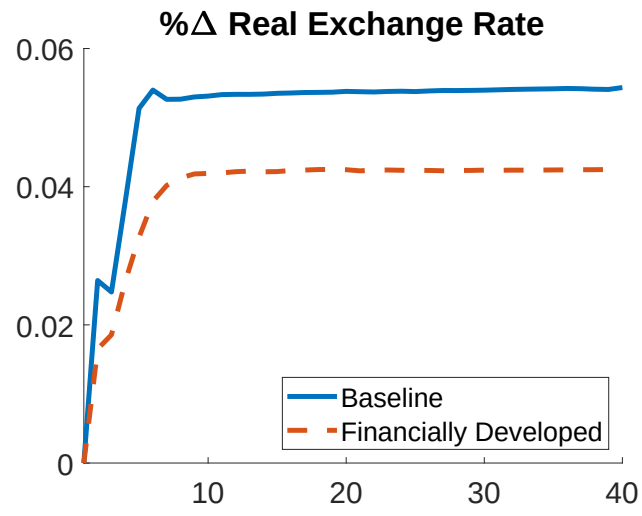
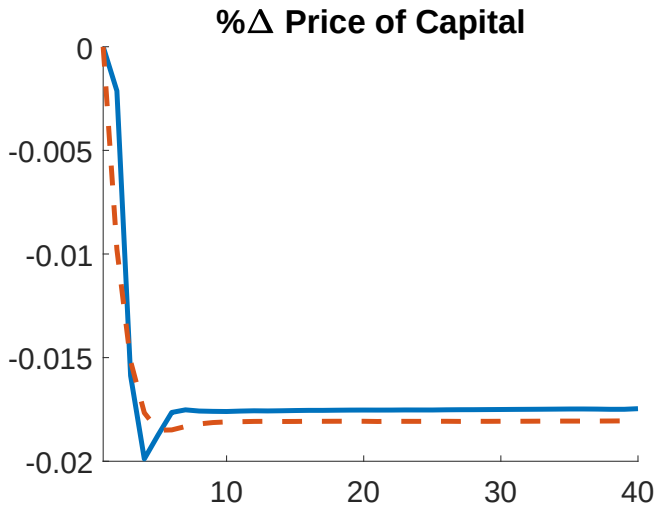
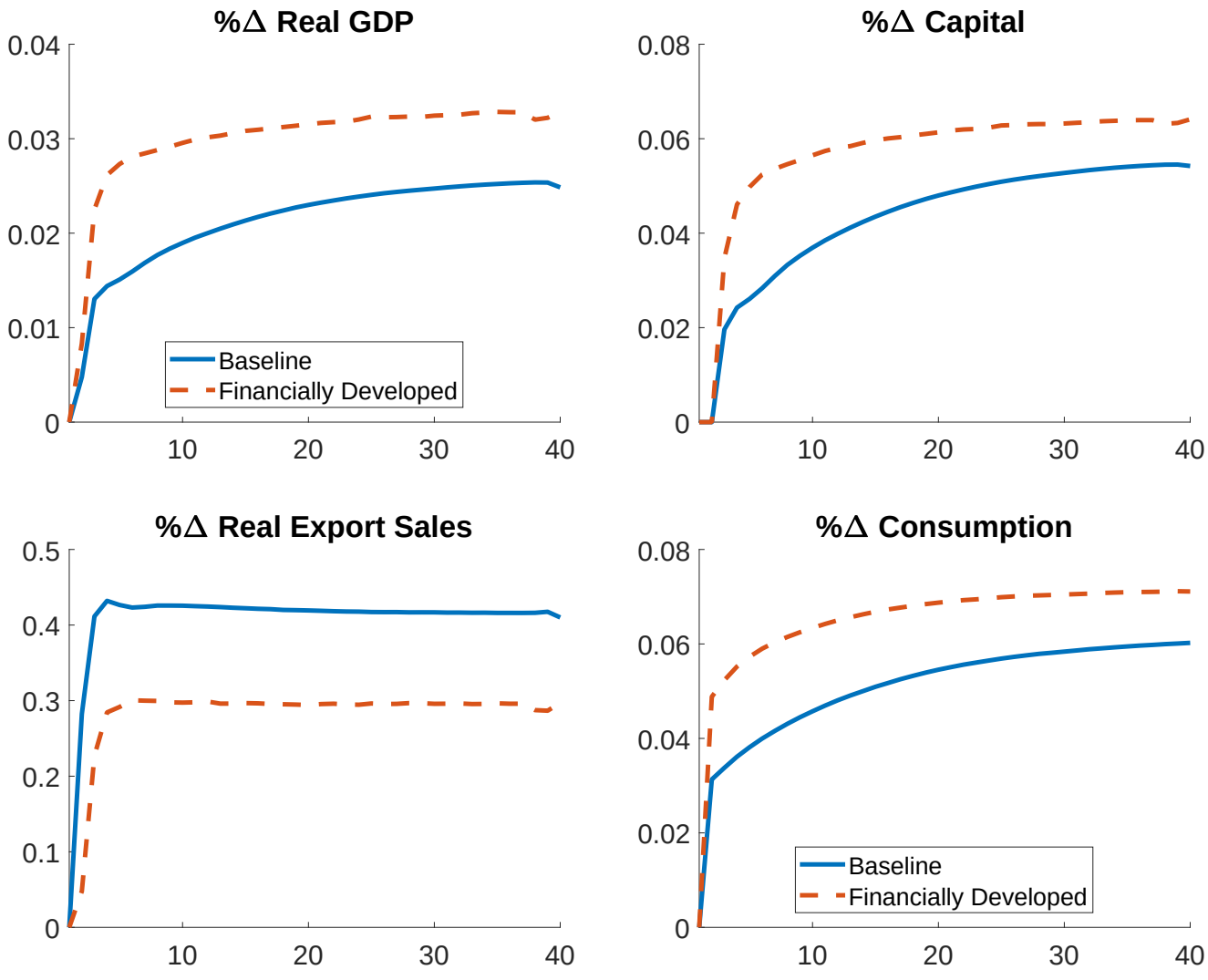






Conclusions

Aggregate Effects of Trade Liberalization, τ_x

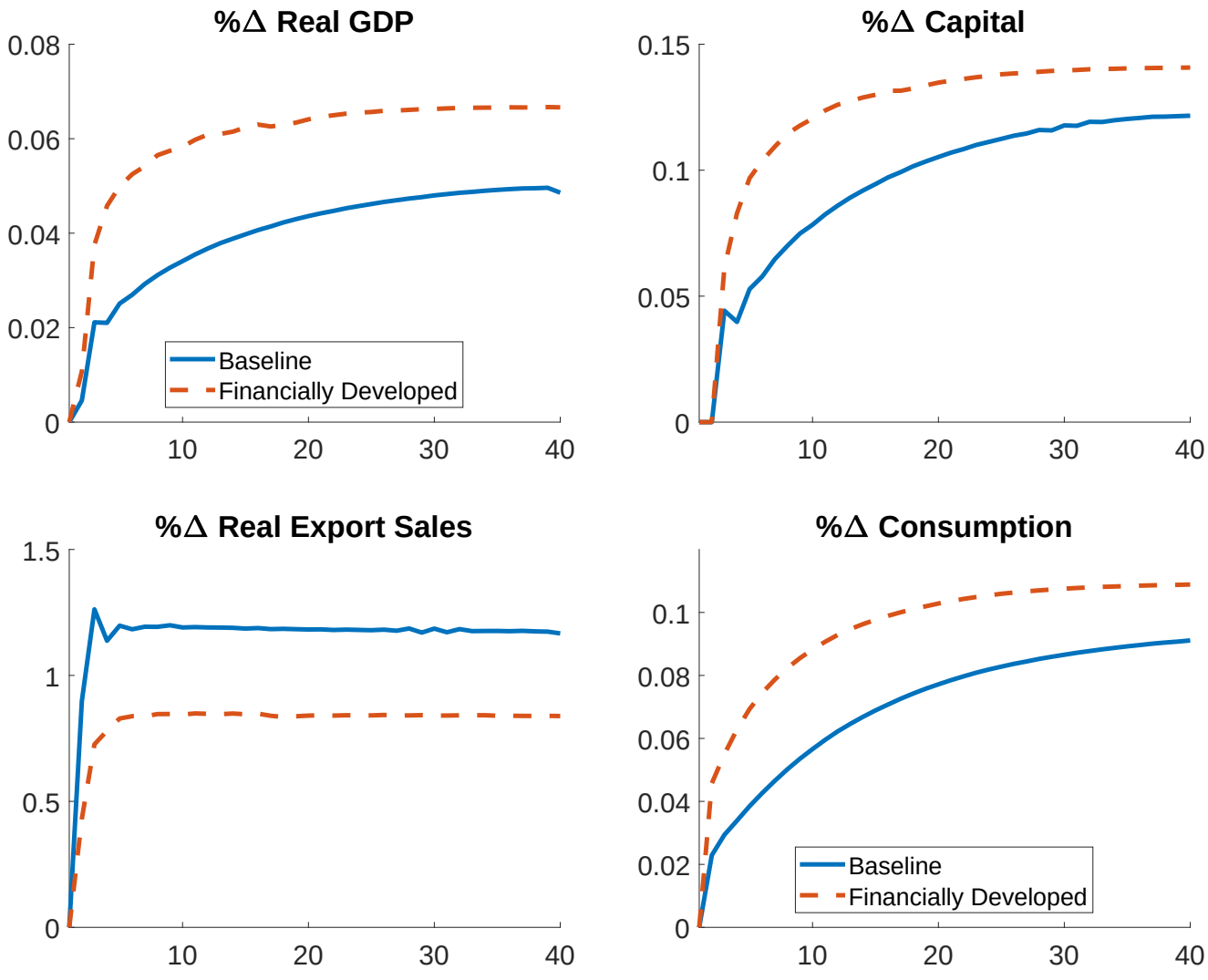


Conclusions

Aggregate Effects of Trade Liberalization, τ_x

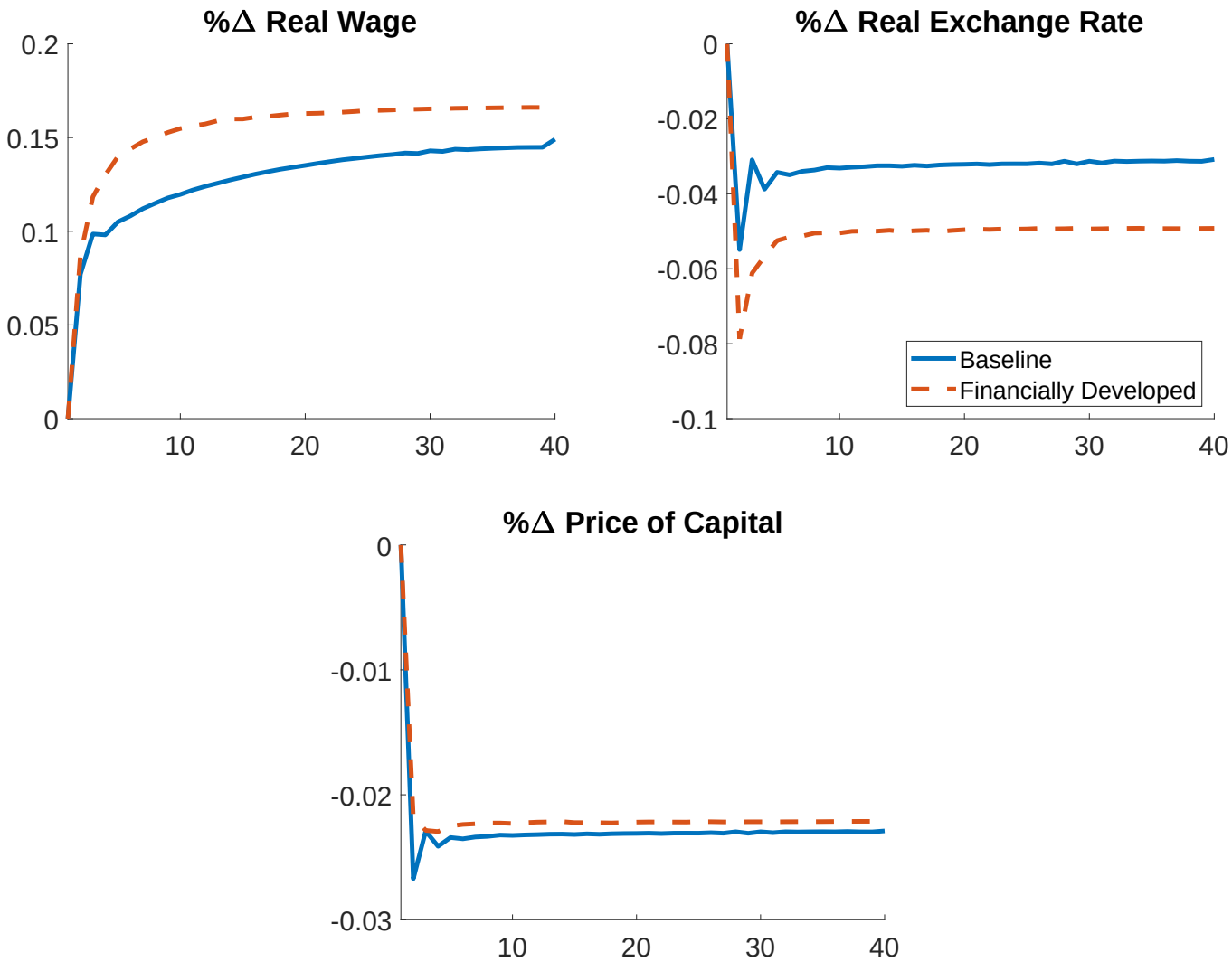
Conclusions

Aggregate Effects of Trade Liberalization, τ_k, τ_c and τ_x



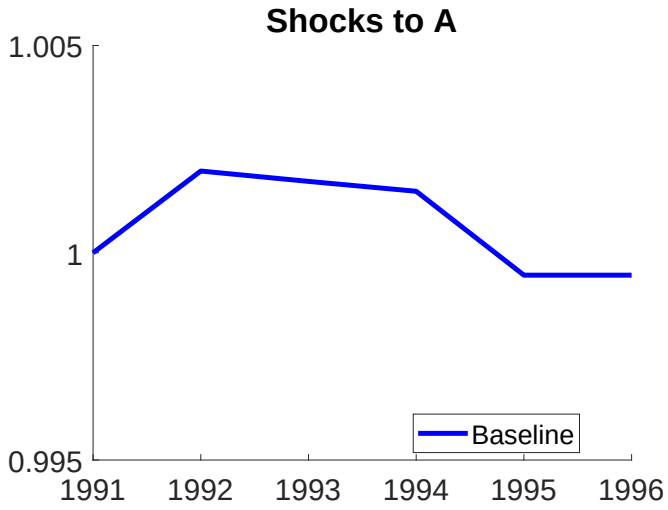
Conclusions

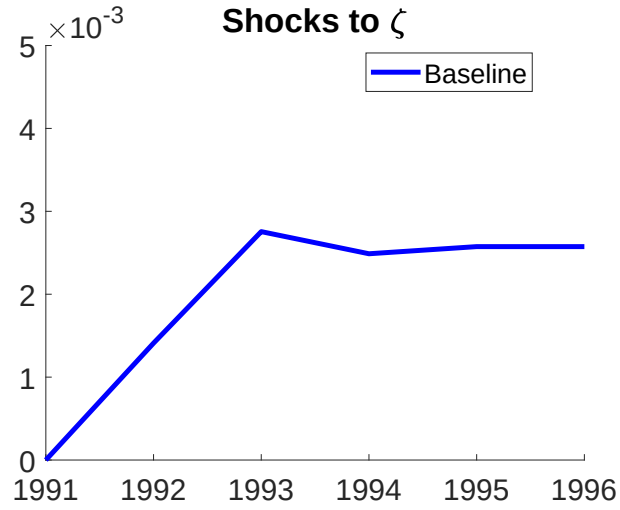
Aggregate Effects of Trade Liberalization, τ_k, τ_c and τ_x

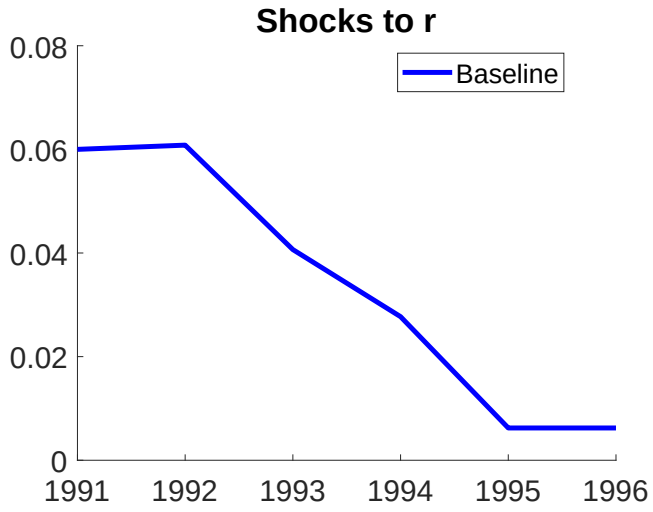


Conclusions

Colombia's Trade Liberalization, Baseline Shocks







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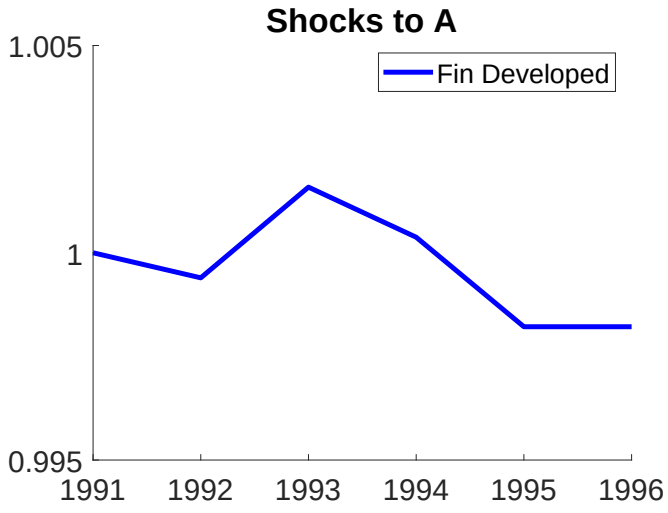
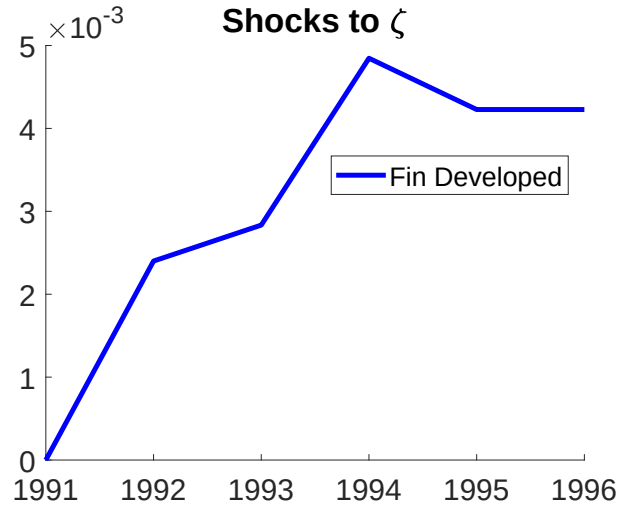
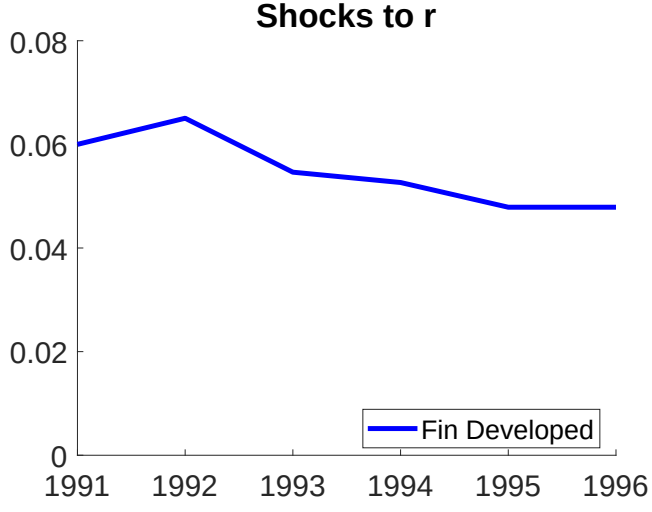
Colombia's Trade Liberalization, High Theta Shocks







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Final Good Producers

Consumption good producers

- Aggregate varieties to produce a consumption good:

$$\max_{y_{h,c}(i),y_{m,c}} Y_c - \int_0^1 p_h(i) y_{h,c}(i) di - (\mathbf{1} + \boldsymbol{\tau_c}) \xi p_{m,c} y_{m,c}$$

$$\text{s.t. } Y_c = \left[\int_0^1 y_{h,c}(i)^{\frac{\sigma-1}{\sigma}} di + \omega_c y_{m,c}^{\frac{\sigma-1}{\sigma}} \right]^{\frac{\sigma}{\sigma-1}}$$

- Y_c used for consumption

Capital/Intermediate good producers

- Aggregate varieties to produce a capital good:

$$\max_{y_{h,k}(i),y_{m,k}} P_k Y_k - \int_0^1 p_h(i) y_{h,k}(i) di - (\mathbf{1} + \boldsymbol{\tau_k}) \xi p_{m,k} y_{m,k}$$

$$\text{s.t. } Y_k = \left[\int_0^1 y_{h,k}(i)^{\frac{\sigma-1}{\sigma}} di + \omega_k y_{m,k}^{\frac{\sigma-1}{\sigma}} \right]^{\frac{\sigma}{\sigma-1}}$$

- Y_k used for investment and as an intermediate input to production

Back

Entrepreneurs: Dynamic Decisions

$$v(k,d,z) = \max_{c,a'} \frac{c^{1-\gamma}}{1-\gamma} + \beta \mathbb{E}_{z'} \left[g\left(a', z'\right) \right]$$

subject to

$$c + a' + d = w + (1-\delta) P_k k + \pi(k,z) + \mathcal{T}$$

$$a' \geq 0$$

where:

$$g(a', z') = \max_{k', d'} v(k', d', z')$$

subject to

$$P_k k' = a' + \frac{d'}{1+r}$$

$$d' \leq \theta k' P_k$$

Back

Entrepreneurs: Static Decisions

Profit maximization

$$\pi(k,z) = \max_{p_h,y_h,p_f,y_f,n,e\in\{0,1\}} p_h y_h + e\xi p_f y_f - wn - mP_k - ewF$$

subject to

$$y_h + e\tau y_f = z\left(k^{\alpha} n^{1-\alpha}\right)^{(1-\alpha_m)} m^{\alpha_m}$$

$$y_h = p_h^{-\sigma}\left(Y_c + P_k^{\sigma} Y_k\right)$$

$$y_f = \left(p_f(\mathbf{1}+\boldsymbol{\tau_x})\right)^{-\sigma} Y_f$$

Back

Entrepreneurs: Dynamic Decisions

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subject to

$$c+a'+d=w+(1-\delta)P_k k+\pi(k,z)+\mathcal{T}+\zeta$$

$$a'\geq 0$$

where:

$$g(a',z')=\max_{k',d'}v(k',d',z')$$

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subject to

$$y_h + e\tau y_f = \boldsymbol{A}z\left(k^{\alpha}n^{1-\alpha}\right)^{(1-\alpha_m)} m^{\alpha_m}$$

$$y_h = p_h^{-\sigma}\left(Y_c + P_k^{\sigma}Y_k\right)$$

$$y_f = \left(p_f(1+\tau_x)\right)^{-\sigma} Y_f$$

Back

Colombia 1980-2000, Tariffs

Substantial reduction in tariffs' level (simple industry average) and dispersion

- Tariffs fell from 32% in 1988 to 12% in 1992, stayed constant afterwards
- Dispersion of tariffs fell by roughly 66%

(Roberts and Tybout, 1997; Eslava et al., 2013) Back

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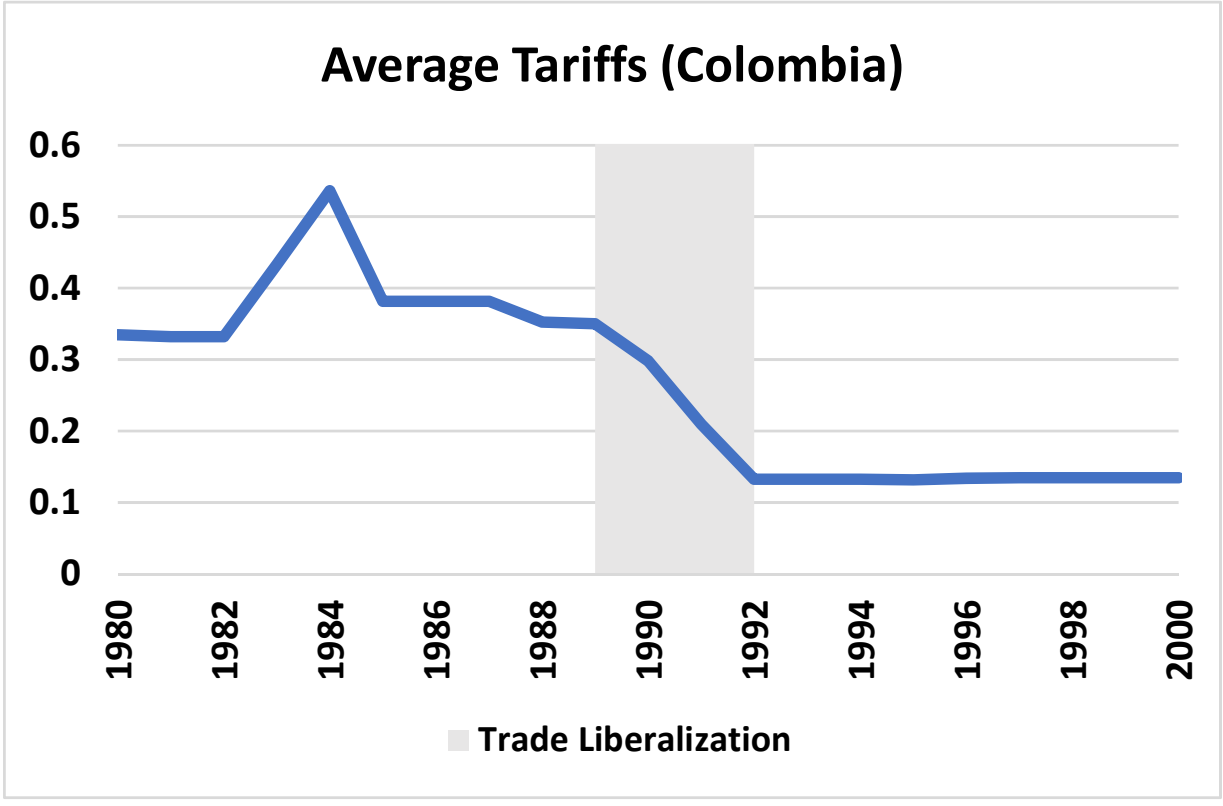

Colombia 1980-2000, Context

Colombia implemented deep reforms between 1984 and 1992

- Macroeconomic Adjustment Program (1984-86)
- Economic Modernization Plan (EMP) (adopted in 1990)
- Export Development Program (1992)

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Trade and financial liberalization:

1. Elimination of majority of non-tariff barriers (1984-1986)
2. Tariff and export/import taxes reduction (1988-1992)
3. Liberalization of financial markets (1984-1990)

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However, according to World Bank report on Colombia in 1992: *"Financial markets in Colombia remain characterized by lack of Credit and under-developed capital markets. (...) It raises concern that the export response expected from trade liberalization under EMP is* ***seriously constrained by the existing financial sector****."*

Financial Development and Trade Liberalization

Developing economies are less financially developed

	Low Income	Low Middle Income	High Middle Income	High Income
Credit/GDP, 1992	9%	25%	56%	128%
Credit/GDP, 2017	21%	44%	115%	149%

Source: Domestic Credit over GDP, World Bank.

Financial frictions induce capital misallocation

(Buera, Kaboski and Shin, 2011; Midrigan and Xu, 2013; Moll, 2014)

...and distort trade flows

(Egger and Kesina, 2013; Greeneway et al. 2007; Kohn et al., 2016; Manova, 2008 & 2013; Manova and Yu, 2016; Minetti and Zhu, 2011; Muuls, 2015)

Does financial development affect gains from trade liberalizations?

Back

Welfare Decomposition

- Decompose: (i) Tariffs; (ii) Price of capital; (iii) Exchange rate; (iv) Wages

	Tariffs income $(\mathcal{T})$	Investment (P_k, Y_k)	Exchange rate (ξ, Y_c)	Wage (w)	Total
			Baseline		
All agents	-1.6%	0.7%	0.3%	0.9%	0.3%
Winners	-1.6%	0.7 %	0.3%	0.8%	0.3%
Losers	-2.1%	0.4 %	0.1%	1.6%	-0.01%
Exporters	-0.7%	0.9%	1.2%	-0.4%	1.0%
Non-exporters	-1.7%	0.6%	0.2%	1.0%	0.2%
Wealthy	-0.7%	0.7%	0.9%	-0.1%	0.7%
Poor	-1.7%	0.6%	0.3%	1.0%	0.2%
Entrepreneurs	-0.9%	0.9%	0.7%	0.0%	0.7%
Workers	-1.8%	0.6%	0.2%	1.2%	0.1%

$*$ Wealthy: Top 10% of asset distribution. Poor: Bottom 90%.

Welfare Decomposition

- Decompose: (i) Tariffs; (ii) Price of capital; (iii) Exchange rate; (iv) Wages

	Tariffs income $(\mathcal{T})$	Investment (P_k, Y_k)	Exchange rate (ξ, Y_c)	Wage (w)	Total
			Financially Developed		
All agents	-1.6%	0.8%	0.5%	1.2%	0.9%
Winners	-1.6%	0.8%	0.5%	1.2%	0.9%
Losers	—	—	—	—	—
Exporters	-0.8%	1.2%	1.6%	-0.4%	1.5%
Non-exporters	-1.7%	0.8%	0.3%	1.4%	0.9%
Wealthy	-0.8%	1.0%	1.2%	-0.1%	1.3%
Poor	-1.6%	0.8%	0.4%	1.4%	0.9%
Entrepreneurs	-1.0%	1.2%	1.1%	0.0%	1.24%
Workers	-1.7%	0.8%	0.3%	1.6%	0.94%

$*$ Wealthy: Top 10% of asset distribution. Poor: Bottom 90%.

Welfare Decomposition

- Loss in tariffs revenue hurts all agents, especially poor ones.

	Tariffs income $(\mathcal{T})$	Investment (P_k, Y_k)	Exchange rate (ξ, Y_c)	Wage (w)	Total
			Baseline		
Wealthy	**-0.7%**	0.7%	0.9%	-0.1%	0.7%
Poor	**-1.7%**	0.6%	0.3%	1.0%	0.2%
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Wealthy	**-0.8%**	1.0%	1.2%	-0.1%	1.3%
Poor	**-1.6%**	0.8%	0.4%	1.4%	0.9%

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Welfare Decomposition

- Positive effects from P_k and ξ, especially on wealthy agents

	Tariffs income ($\mathcal{T}$)	**Investment** (P_k, Y_k)	**Exchange rate** (ξ, Y_c)	Wage (w)	Total
			Baseline		
Wealthy	-0.7%	**0.7%**	**0.9%**	-0.1%	0.7%
Poor	-1.7%	**0.6%**	**0.3%**	1.0%	0.2%
			Financially Developed		
Wealthy	-0.8%	**1.0%**	**1.2%**	-0.1%	1.3%
Poor	-1.6%	**0.8%**	**0.4%**	1.4%	0.9%

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Welfare Decomposition

- Wages redistribute gains to poor agents, especially in financially developed

	Tariffs income ($\mathcal{T}$)	Investment (P_k, Y_k)	Exchange rate (ξ, Y_c)	**Wage** (w)	Total
			Baseline		
Wealthy	-0.7%	0.7%	0.9%	**-0.1%**	0.7%
Poor	-1.7%	0.6%	0.3%	**1.0%**	0.2%
			Financially Developed		
Wealthy	-0.8%	1.0%	1.2%	**-0.1%**	1.3%
Poor	-1.6%	0.8%	0.4%	**1.4%**	0.9%

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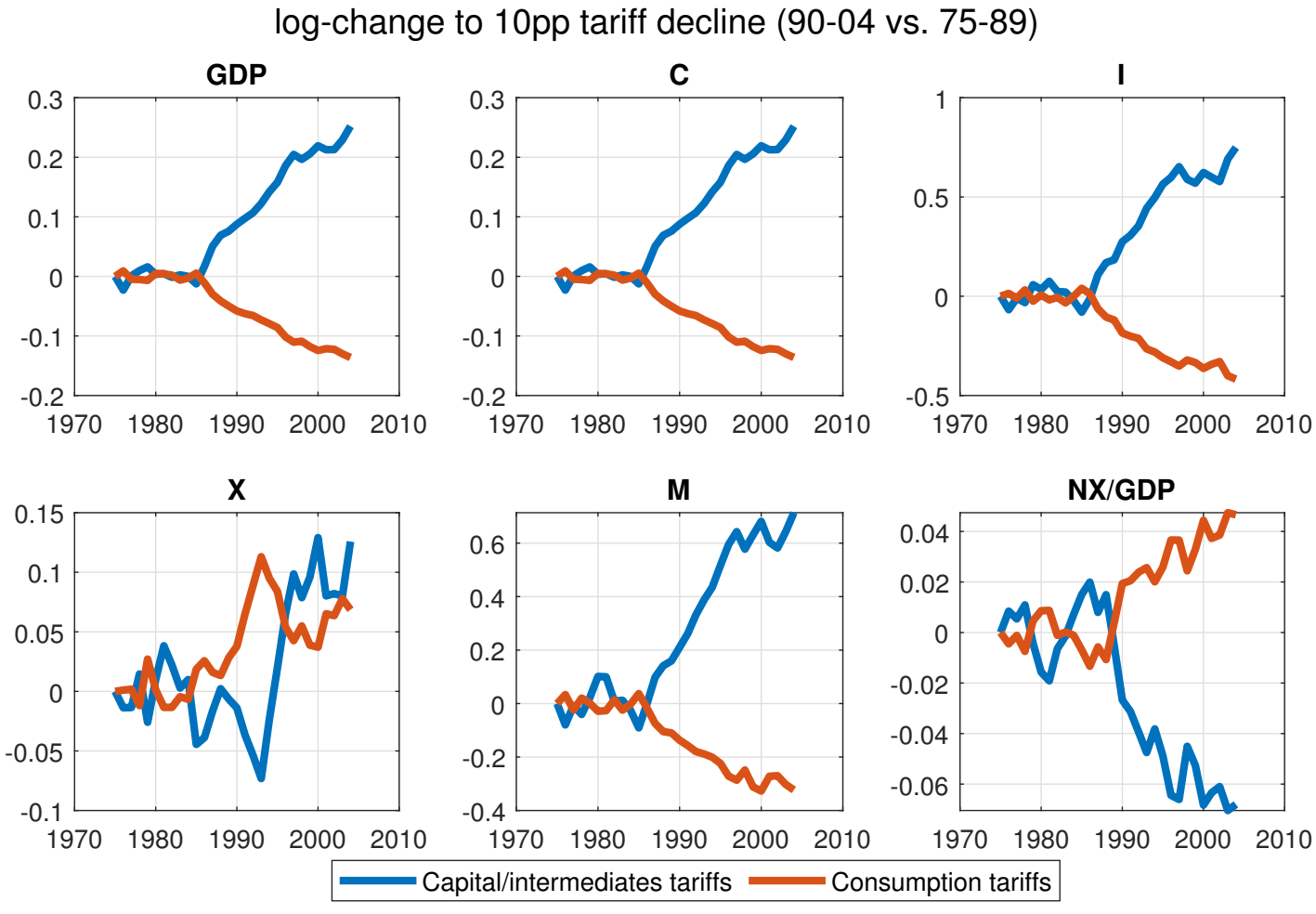
Trade Liberalization Dynamics by Type of Goods



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