Fed's interest rate normalization: Does it matter who borrows from abroad in EME?

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[1]The views expressed herein are those of the author and do not necessarily reflect those of the Inter-American Development Bank. I wrote this paper while I was a Researcher at the General Directorate of Economic Research at Bank of Mexico.

Motivation

As a result of the latest financial crisis, monetary authorities in AEs took interest rates to the lowest historical levels.

Permissive financial conditions $\Rightarrow$ K flew to EMEs (debt security markets) $\Rightarrow$ **"second phase of global liquidity"** (Shin, 2013)

Large K inflows can lead to increased vulnerabilities, we focus on:

- The risks stemming from the large **external exposure of the corporate sector** once the Federal Reserve starts normalizing the nominal interest rate.
  - does the hedging of the firms when issuing debt in foreign currency matter?
  - what will happen with domestic credit?
  - will large firms that were borrowing from abroad crowd out small firms?

This paper

What will happen with the financial stability of EMEs when interest rates start increasing in AE?

Does it matter which sector is borrowing from abroad? What can EMEs policy makers do to mitigate the effects?

1. Empirical Evidence
2. SOE-DSGE model
   - banking sector *à la* Gertler and Kiyotaki (2010)
   - exporting sector
   - who borrows from abroad?
     1. Domestic firms, non-hedged firms
     2. Exporting firms, natural hedged firms
3. Non-conventional policy in the EME to mitigate the volatility

- **<u>Contribution</u> Interaction between exporting firms, foreign borrowing, and non-conventional policy in EME**

Results

1. An **increase in the foreign interest rate** $\Rightarrow$ makes foreign borrowing more expensive and prompts financial instability in the EME
   - Financial mechanism $\downarrow$ foreign borrowing, $\uparrow$ domestic borrowing but $\downarrow$ bank lending to the other sector, $\downarrow$ asset price, $\downarrow$ investment
   - Real exchange rate mechanism $\uparrow$ exchange rate, $\uparrow$ exports, $\downarrow$ imports, $\downarrow$ consumption, $\downarrow$ output
   - $\uparrow$ volatility in the EME when **non-hedged** firms borrow from abroad
2. **Non-conventional policy** in the EME: the financial authority lends to the firms affected when foreign borrowing is more expensive
   - $\downarrow$ the volatility of the macro variables relative to the initial shock
   - households are better-off with the policy than without it

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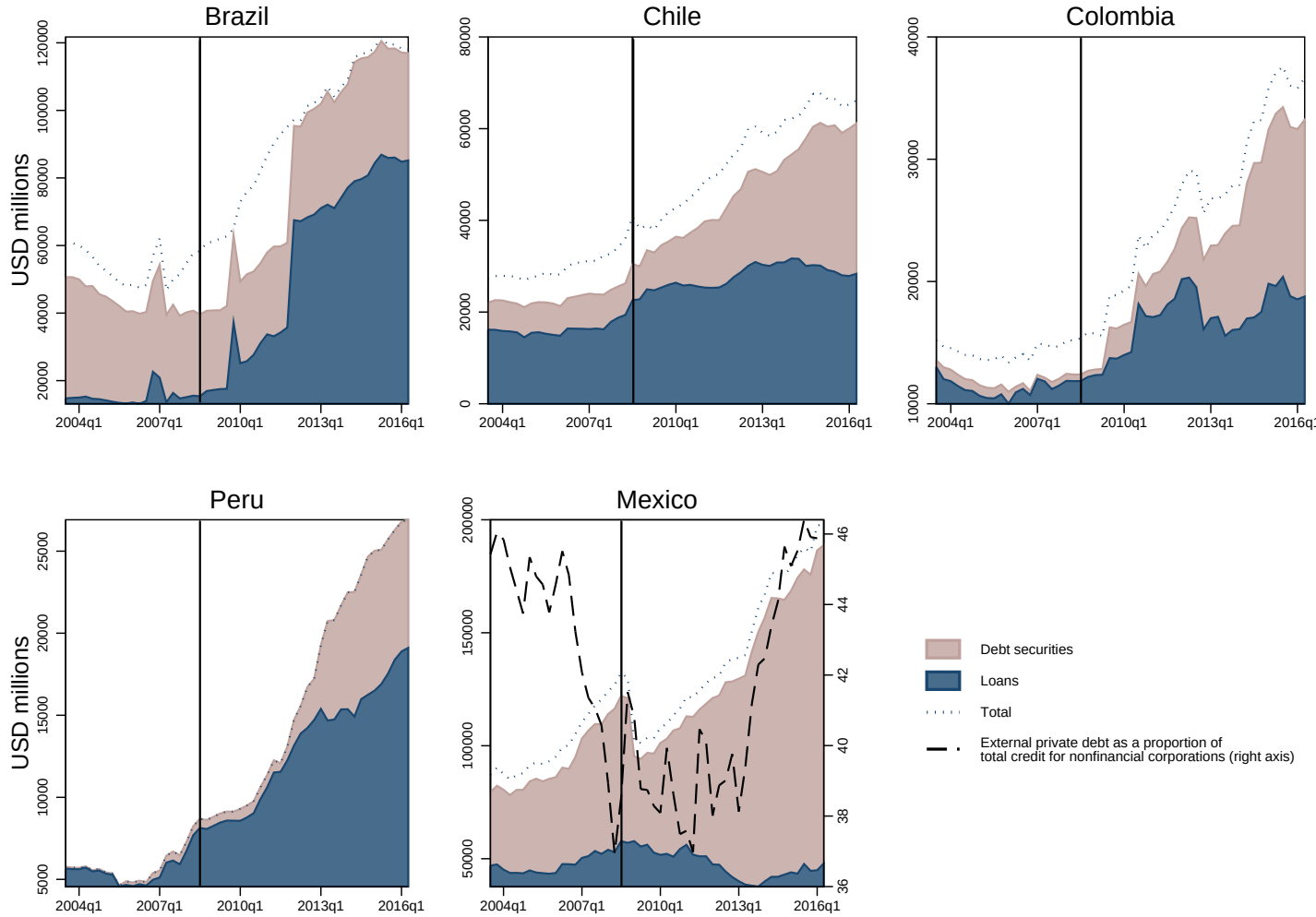
Empirical Evidence

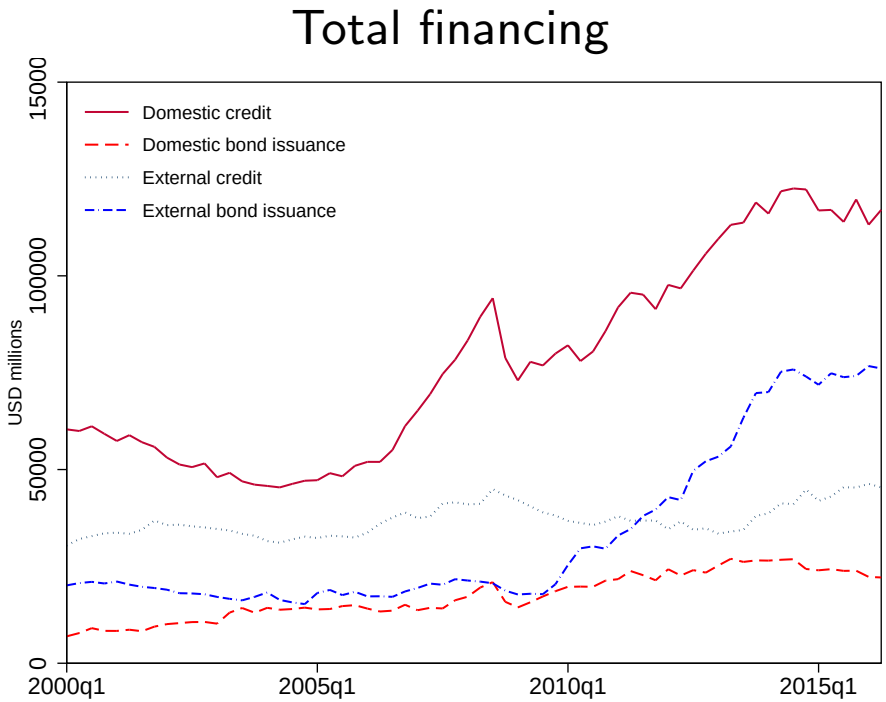
Empirical Evidence Corporate Gross External Debt Position

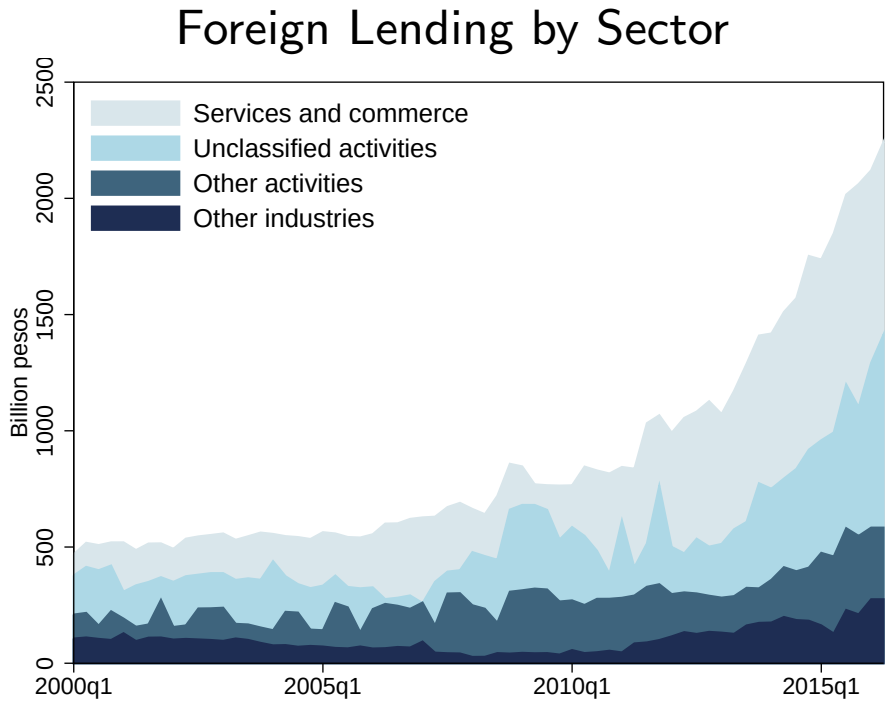


Source: Quarterly External Debt Statistics/SDDS, World Bank, BIS, and IMF. Haver Analytics.
Note: The sum of debt securities and loans represent the external debt position.

- EME corporate debt markets have quadrupled between 2004 and 2014 (IMF, 2015)
- Financial crisis $\Rightarrow$ external financing of the corporate sector in the big five countries of LA has changed its trend

Empirical Evidence Mexican private non-financial corporations





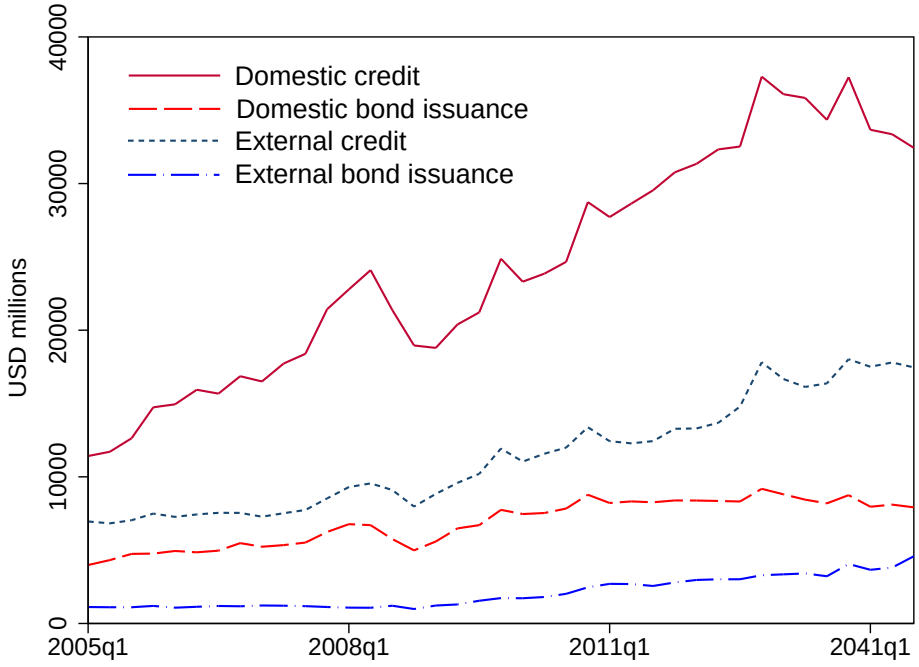
Source: Bank of Mexico, own calculations and Carabarín, de la Garza, and Moreno (2015).

The Mexican sector that has been increasing more its foreign lending is services and commerce, i.e. hedged industries (**this is specific for Mexico**)

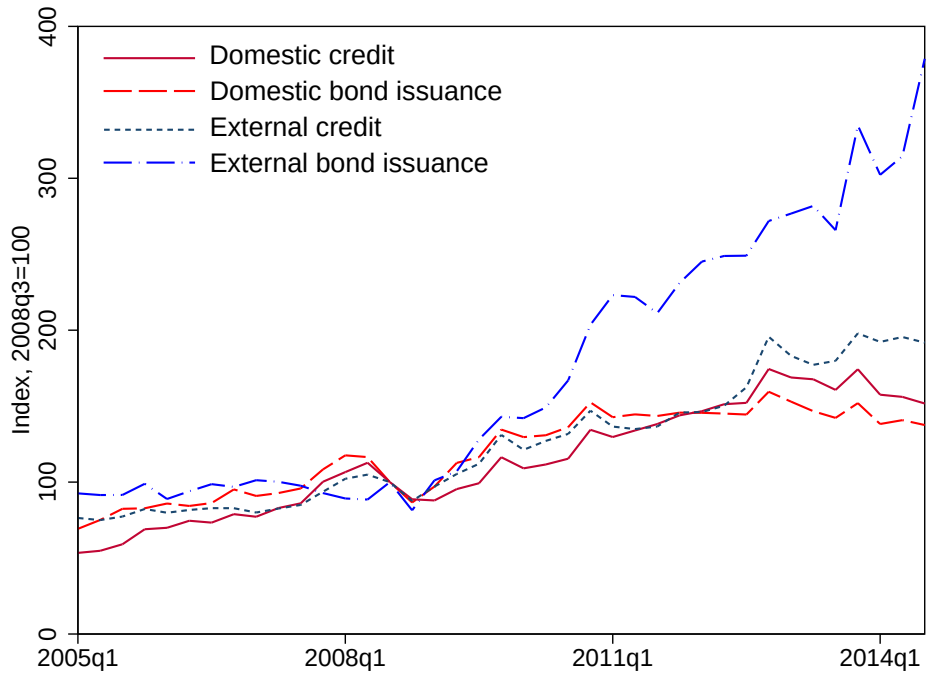
- In **EMEs**, ↑ **leverage** in more cyclical sectors, and high leverage is associated with ↑ **foreign currency exposure** (IMF, 2015)
- LA Firm-level data shows that the average firm is a **non-exporter** (Gonzalez-Miranda, 2012)

Empirical Evidence Chilean Case

Total financing in USD



Total Financing, 2008q3=100



Source: Central Bank of Chile and own calculations.

- Chilean firms also show an increase in external financing (lack of information regarding the type of firm)

$\Rightarrow$ **We build a model to study the consequences of an increase in the foreign interest rate when exporting and non-exporting firms borrow from abroad**

The Model

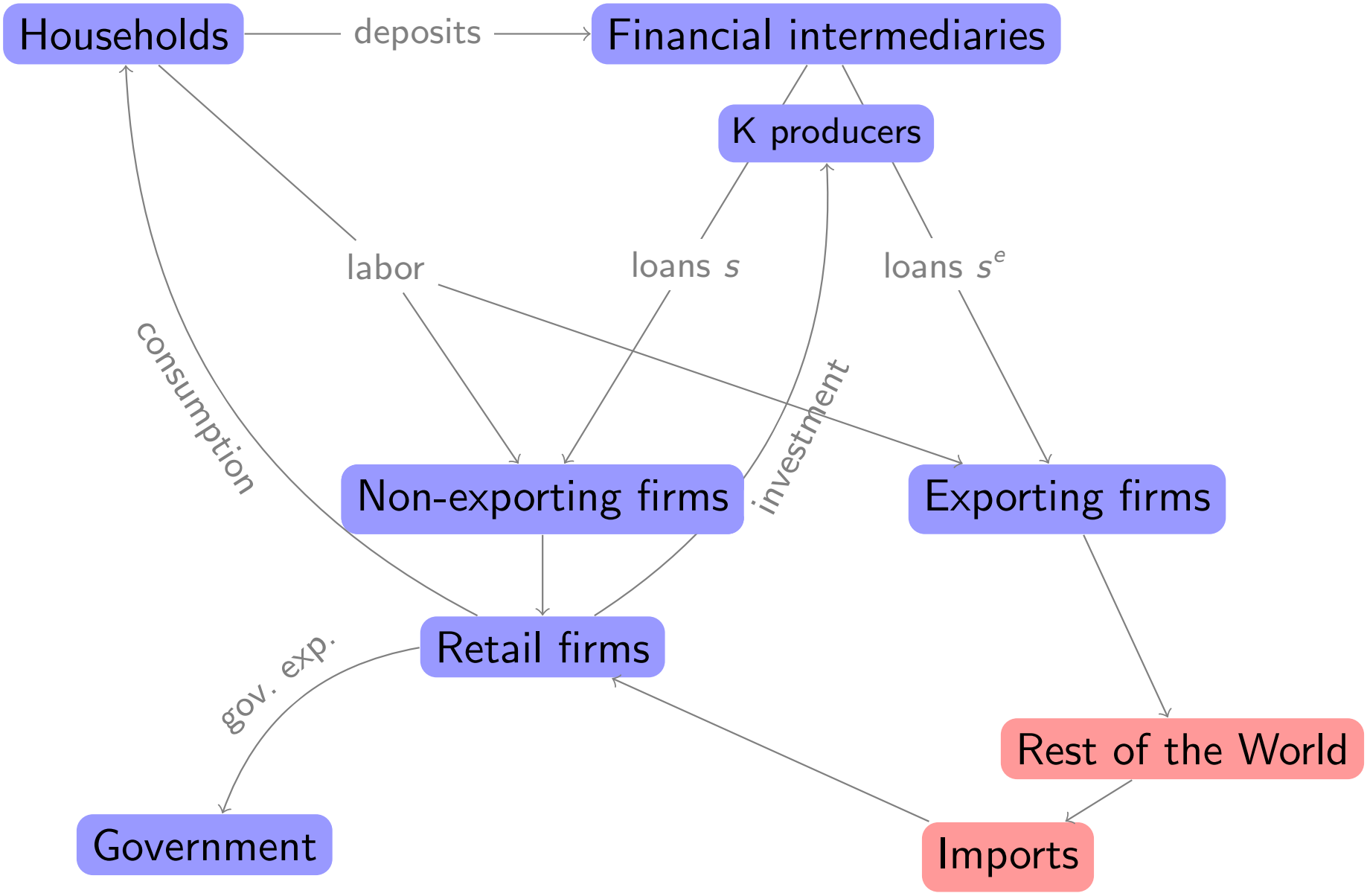
No Policy Response

The Model

Small-open-DSGE model

1. **Households** are standard, they own the firms in the economy
2. **Non-Financial Firms**
   - **Intermediate firms** Domestic (non-exporting) and Exporting
   - **Capital good producers** Specialize in capital for domestic and exporting firms, symmetric
   - **Retail firms** Buy intermediate goods (domestic and foreign), repackage, and sell them as a retail output that is used for final good
3. **Financial Intermediaries** with financial frictions *à la* Gertler and Kiyotaki (2010)

The Model Setup



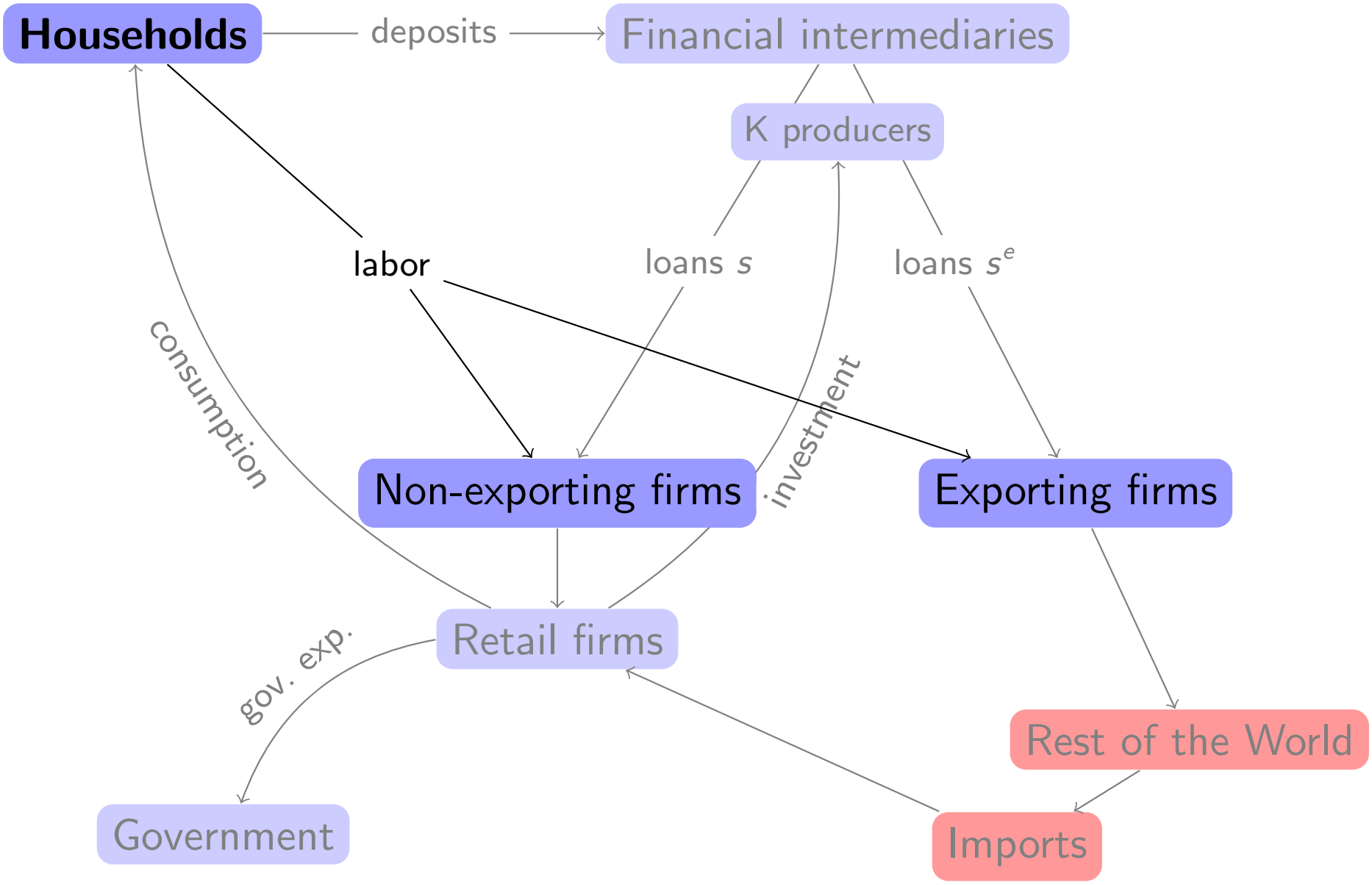
The Model Households

Each household consists of a continuum of members

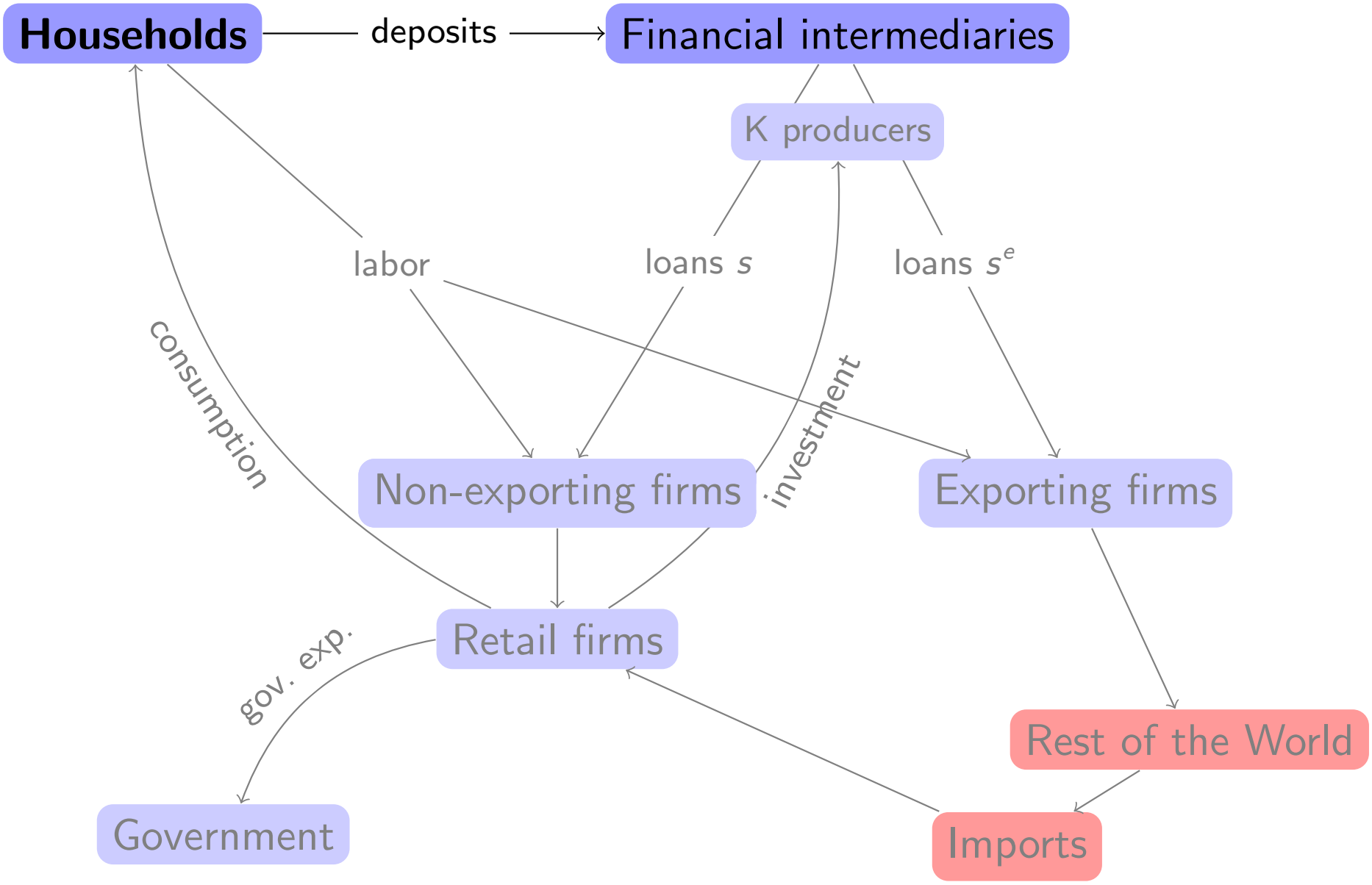
1. Worker
   - supplies labor to non-financial firms (domestic and exporters)
2. Banker
   - with prob. σ continues being a banker
   - with prob. $1 - \sigma$ exits the banking business

Perfect consumption insurance within the household.

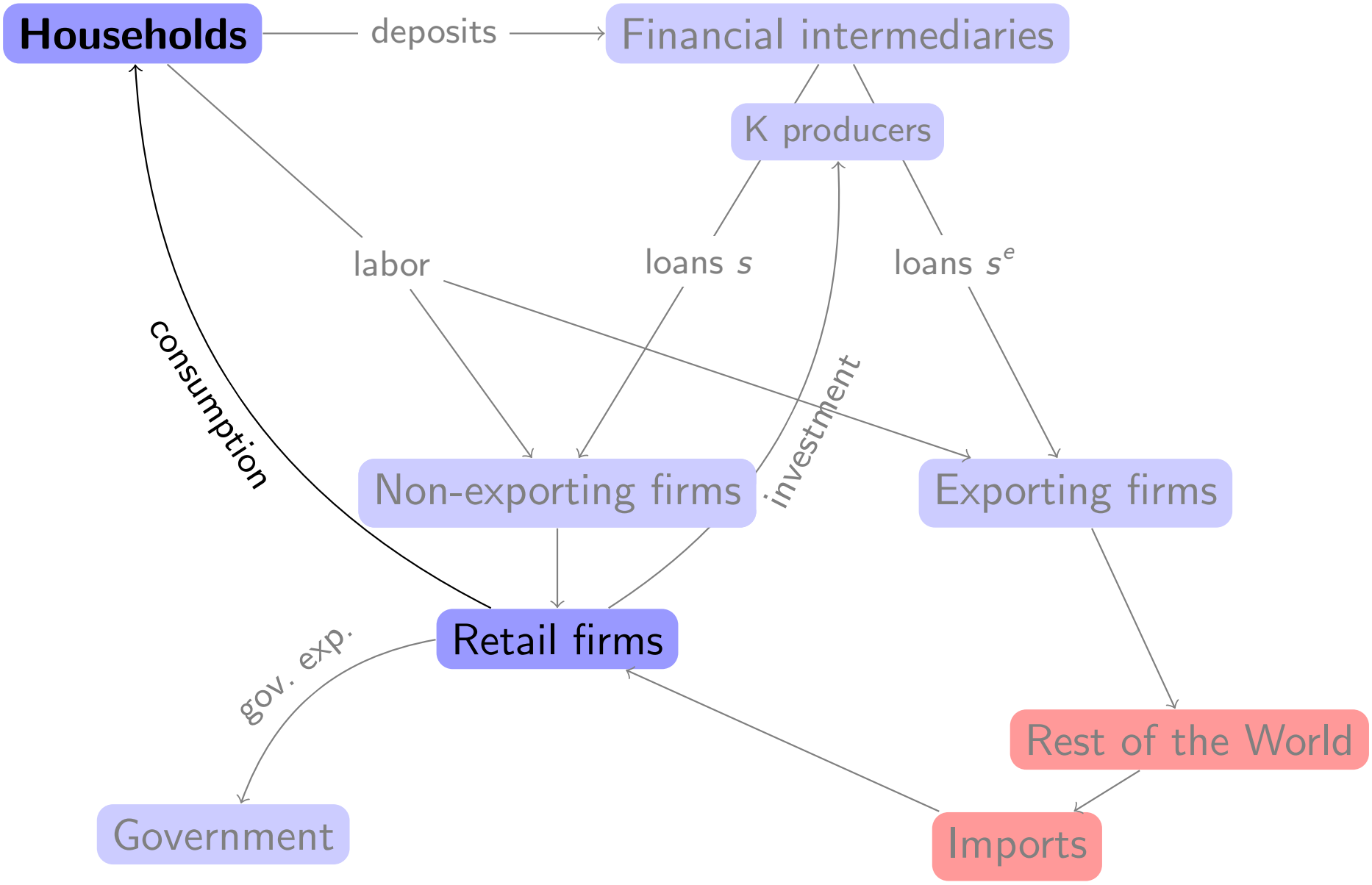
The Model Households



The Model Households



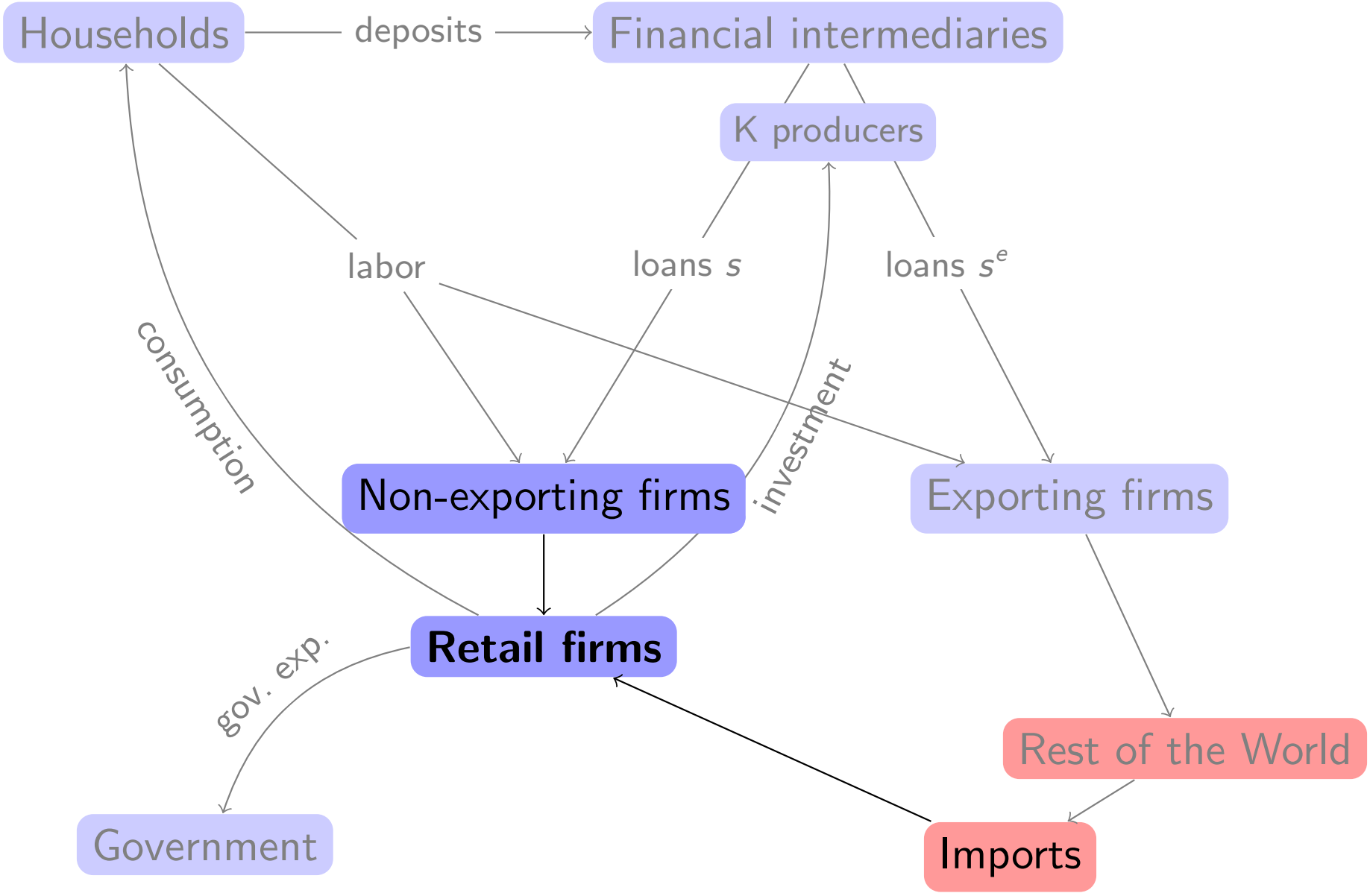
The Model Households



The Model Retail Firms

- They buy intermediate goods (domestic and foreign), repackage, and sell them as a retail output that is used for consumption, investment, and government expenditure
  - CES aggregator of the 2 goods

The Model Retail Firms



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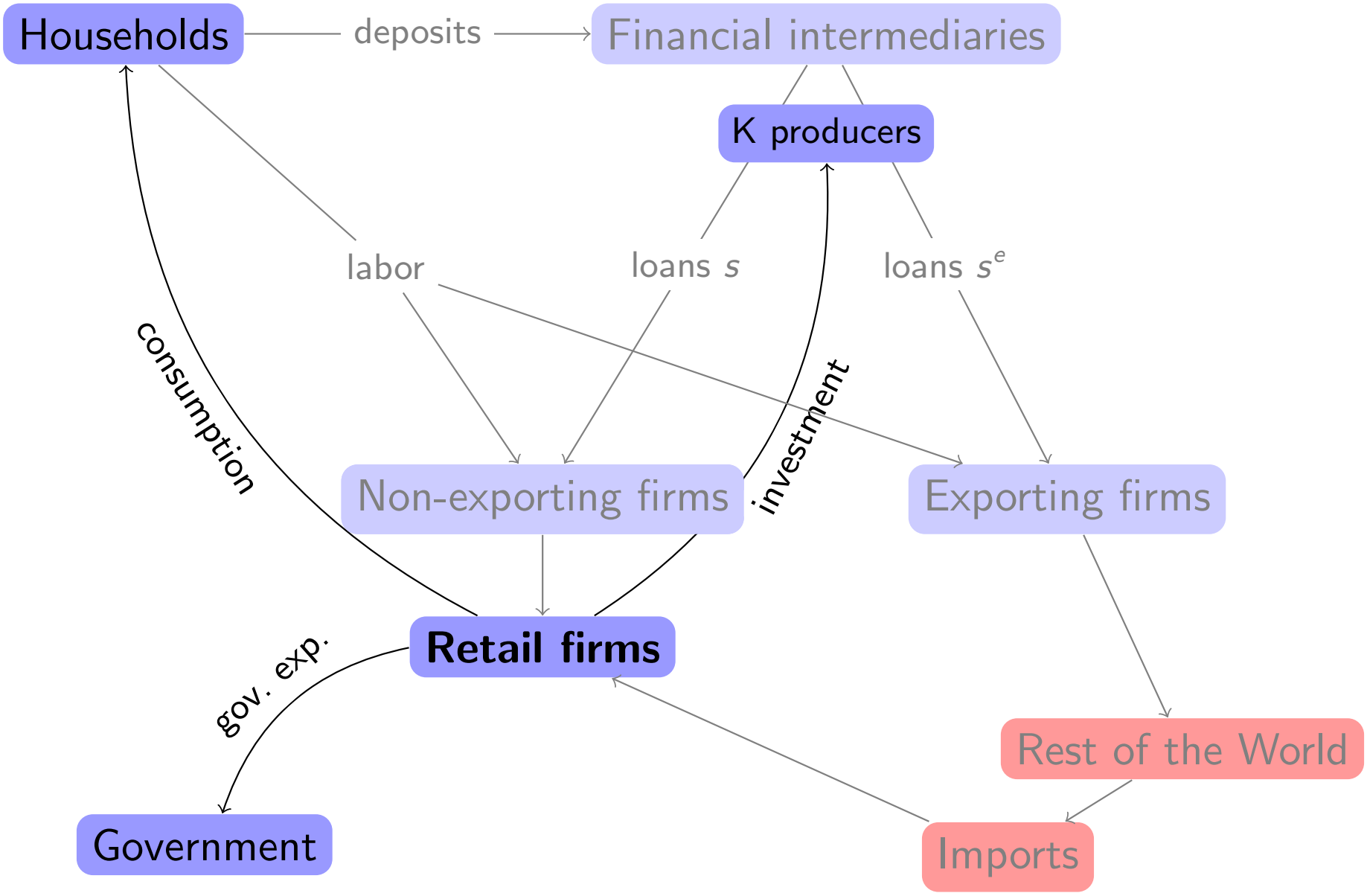
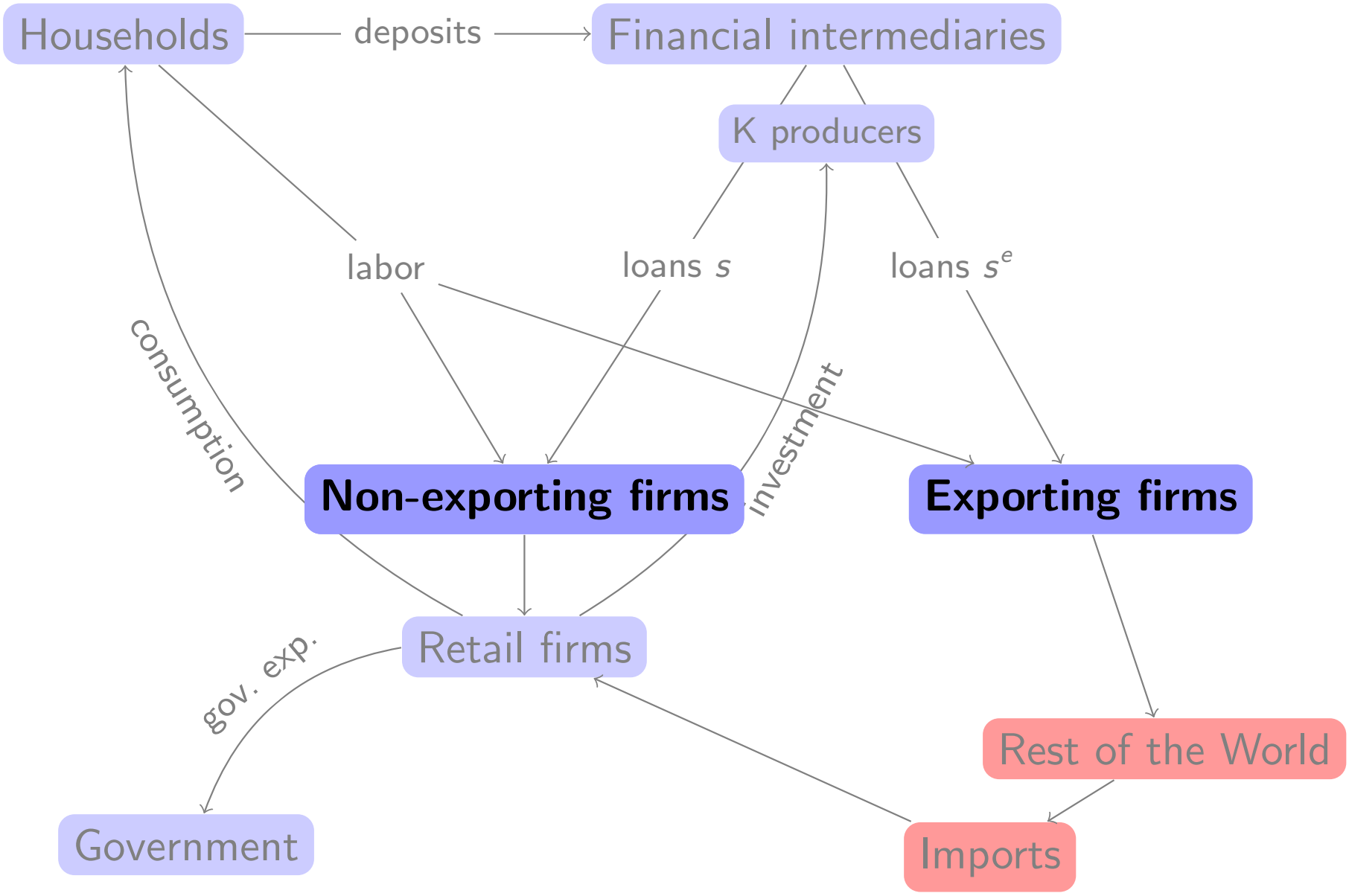


The Model Non-Financial Intermediate Firms

Domestic and Exporting

- They produce an intermediate good that is sold to retail firms (domestic or foreign) with a Cobb-Douglas production function
- They issue new securities, S_t (S_t^e), at price Q_t (Q_t^e) to obtain funds to buy new capital, they do not face any friction with banks
- Either we allow domestic or exporting firms to borrow from abroad
- Depending on who borrows from abroad
  1. Non-exporting firms: return on capital on domestic firms equalizes to return on foreign borrowing
  2. Exporting firms: return on capital on exporting firms equalizes to return on foreign borrowing

The Model Non-Financial Intermediate Firms



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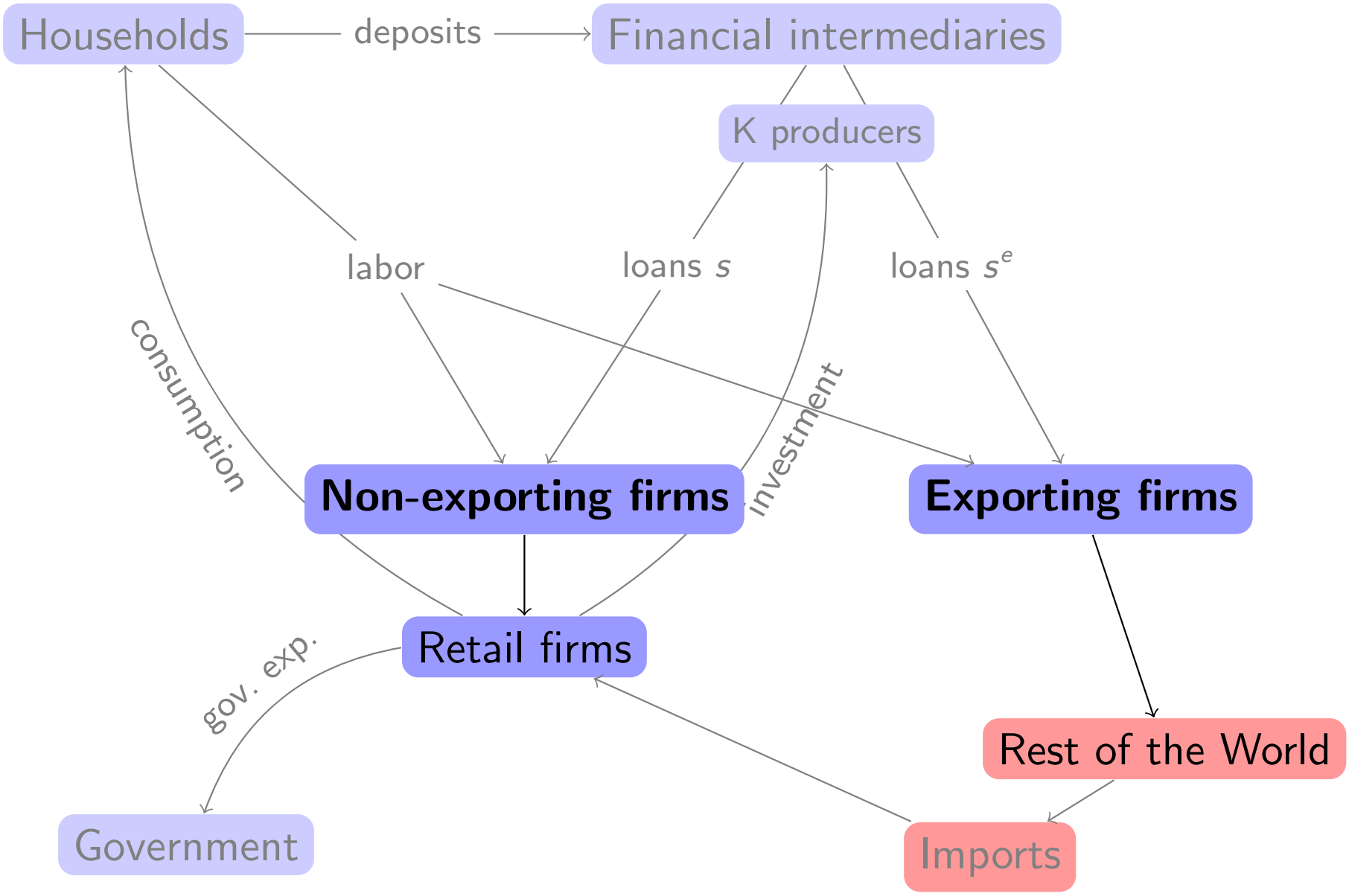
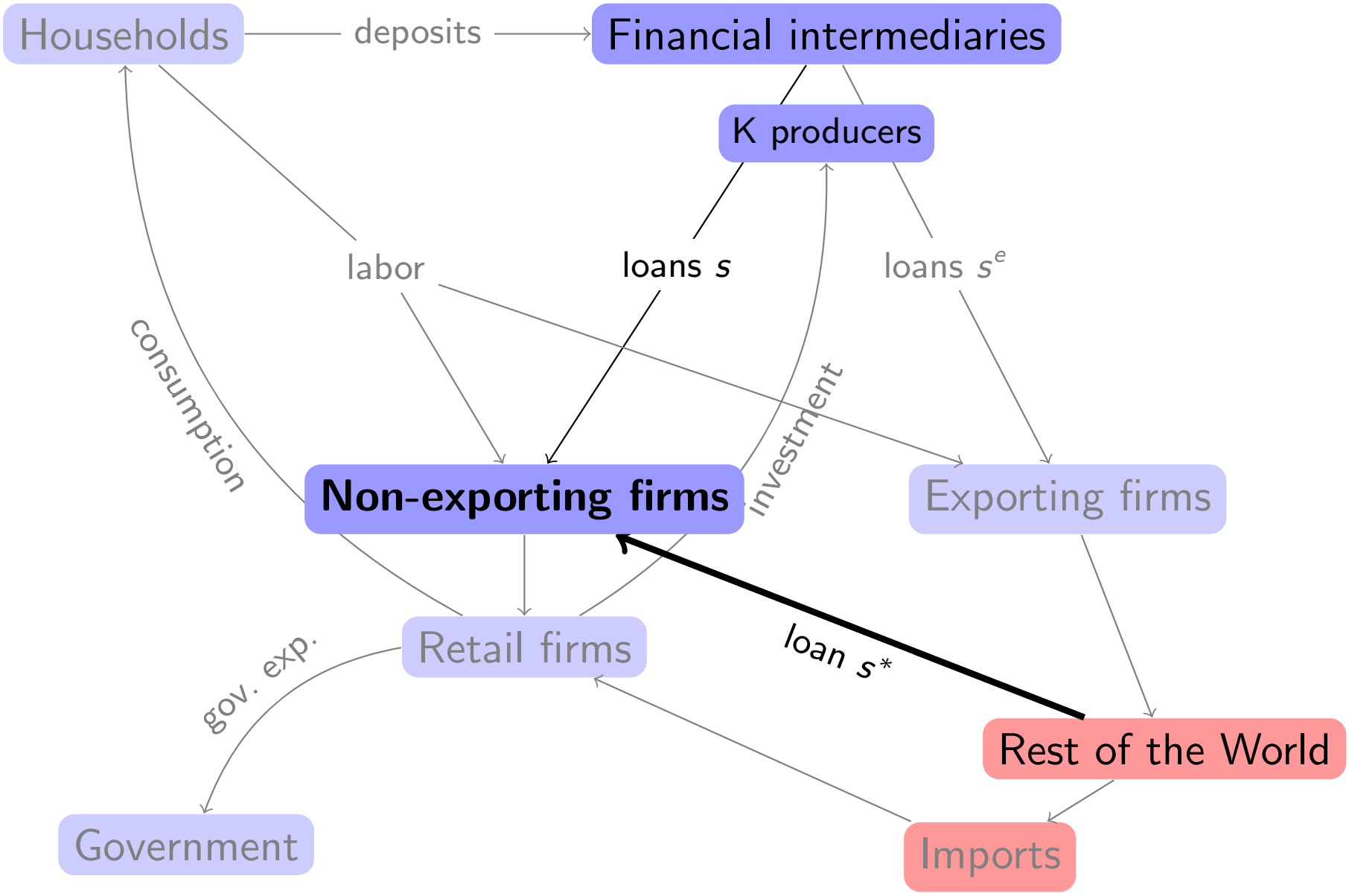
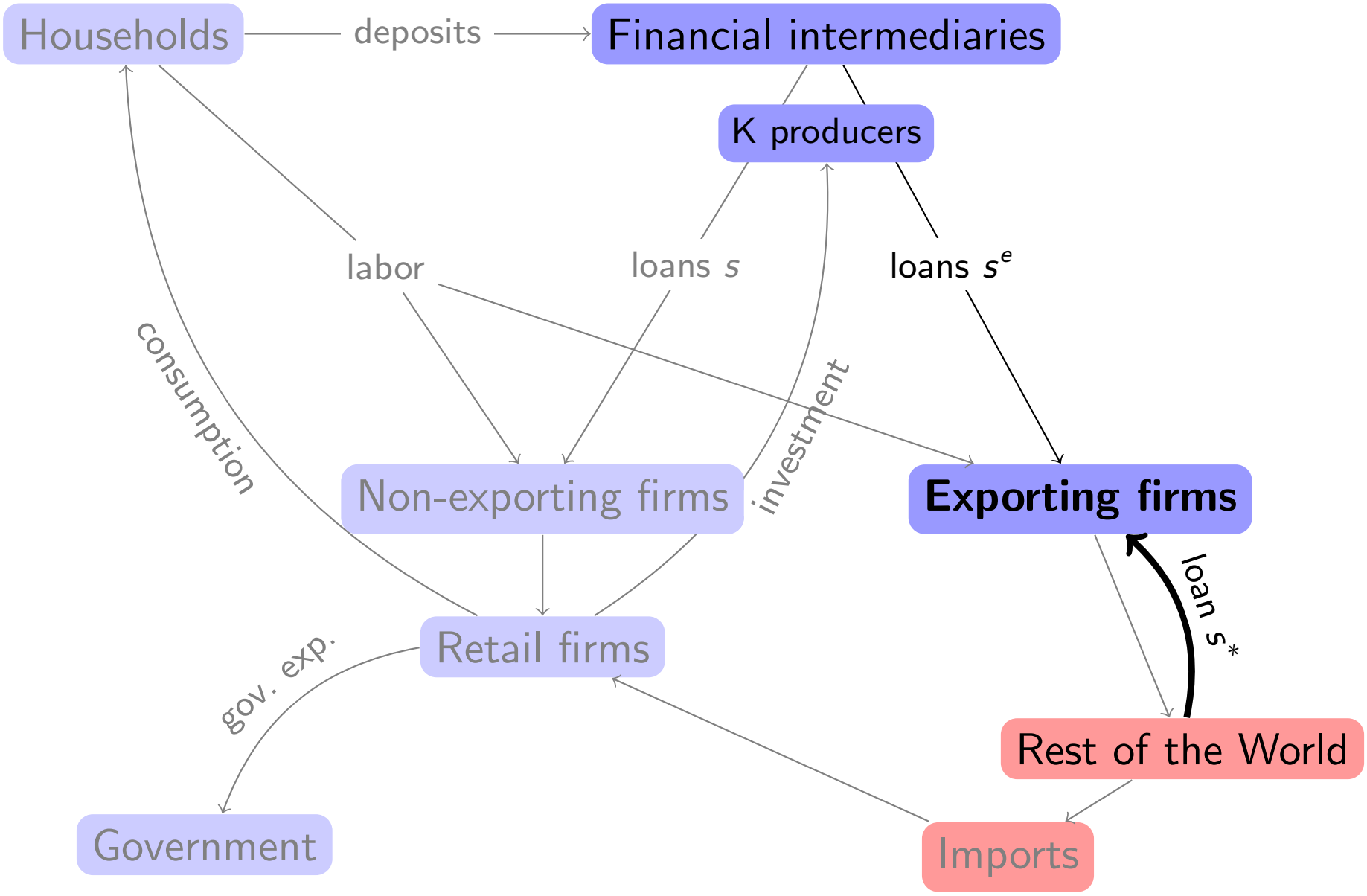


The Model Non-exporting firms borrow from abroad



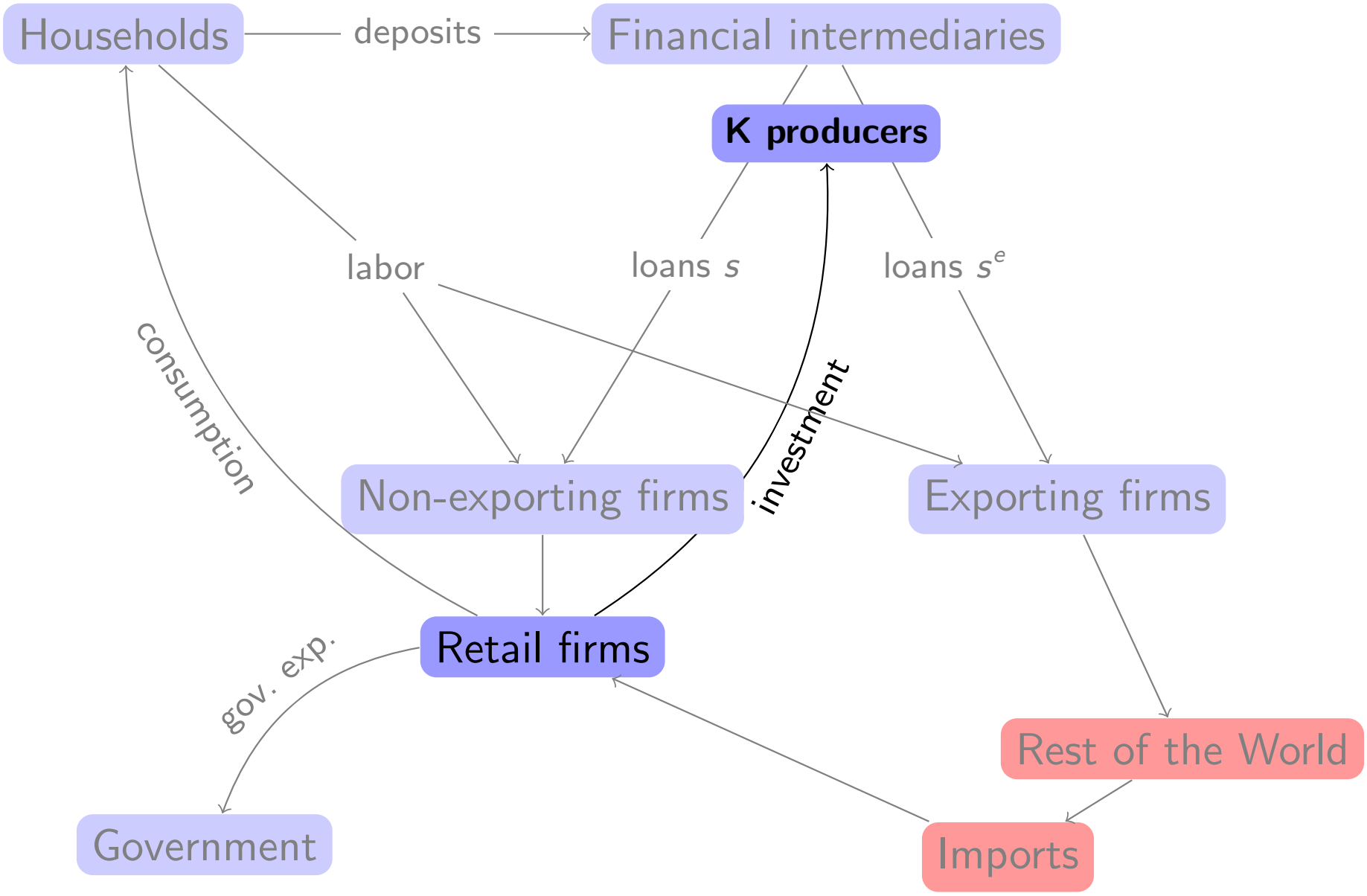
The Model Exporting firms borrow from abroad



The Model Capital Producer Firms

- They specialize in capital for domestic and exporting firms, they are symmetric
- They choose investment to maximize profits
- The first order condition yields an endogenous price of capital

The Model Capital Producer Firms



The Model Financial Intermediaries

Financial Frictions *à la* Gertler and Kiyotaki (2010)

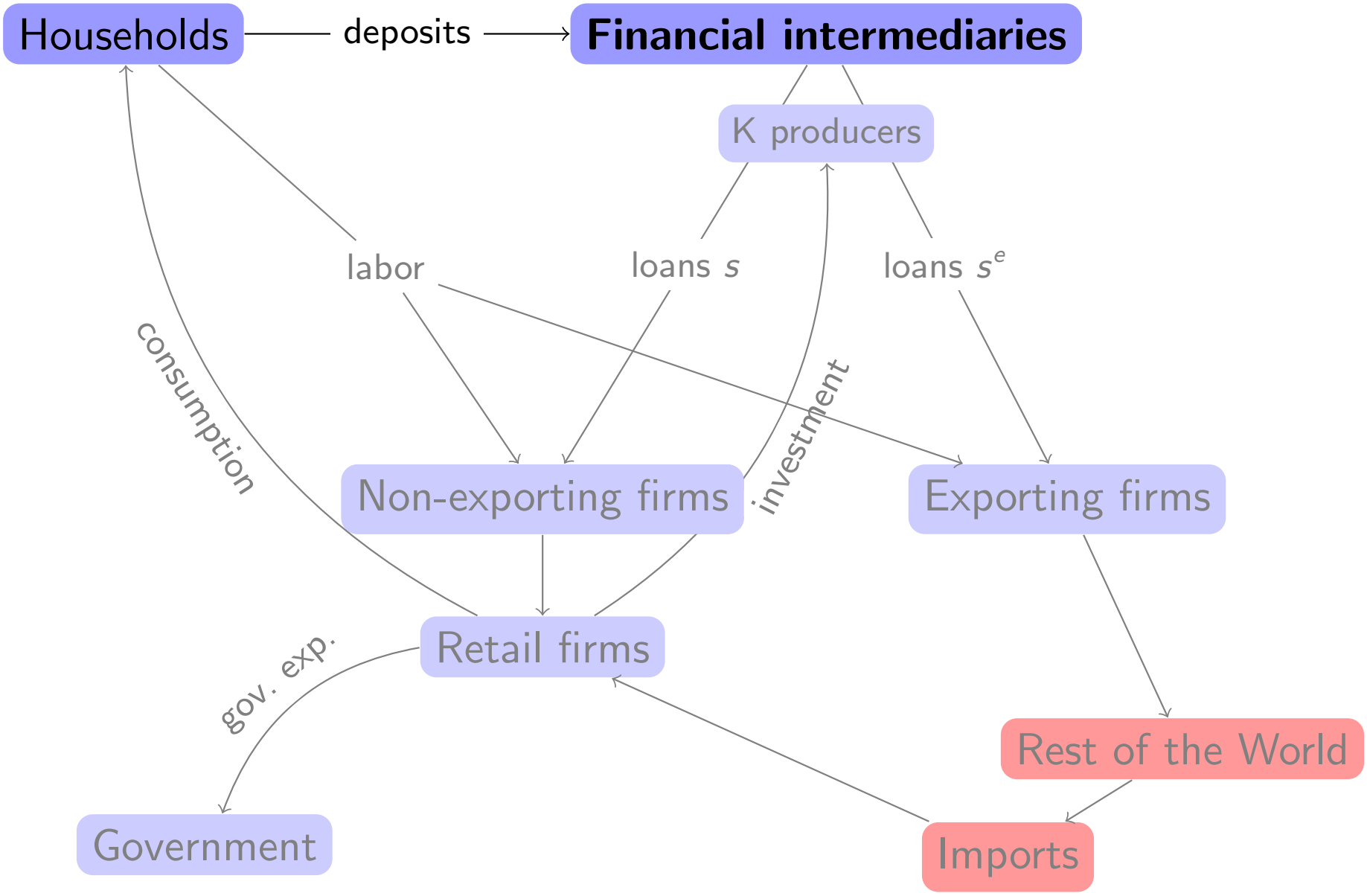
- Raise deposits from domestic households, d_t
- Lend
  - to domestic firms, s_t
  - to exporting firms s_t^e

Assets	Liabilities
$Q_t s_t$	d_t
$Q_t^e s_t^e$	n_t

Moral hazard problem

- After obtaining deposits, the banker might run away with a fraction of total assets; if she runs away, she defaults on her creditors and shuts down; creditors can reclaim the remaining fraction of assets
- Households know this, so they limit the funds deposited at banks
- $\Rightarrow$ Incentive compatibility constraint: the value of the bank has to be at least as large as the benefits from diverting funds

The Model Financial Intermediaries



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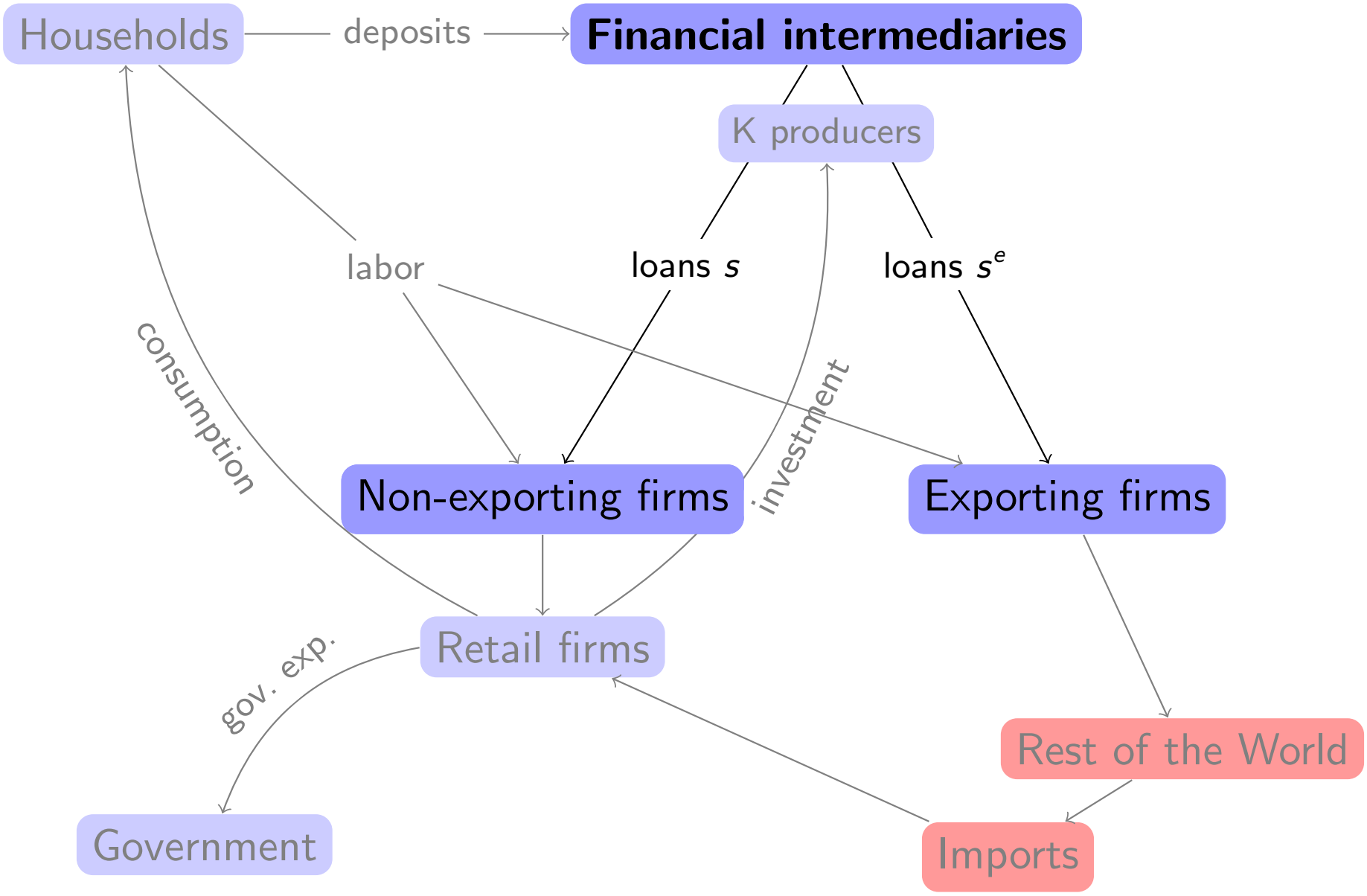


No Policy Response
IRF to a 1% Increase in Foreign Interest Rate

IRF to a 1% Increase in Foreign Interest Rate

No Policy Response

1. In both models
   - transmission through financial and real exchange rate channels
   - foreign borrowing is more expensive
   - firms decrease how much foreign debt they hold
   - and substitute for domestic borrowing, crowding out the other sector

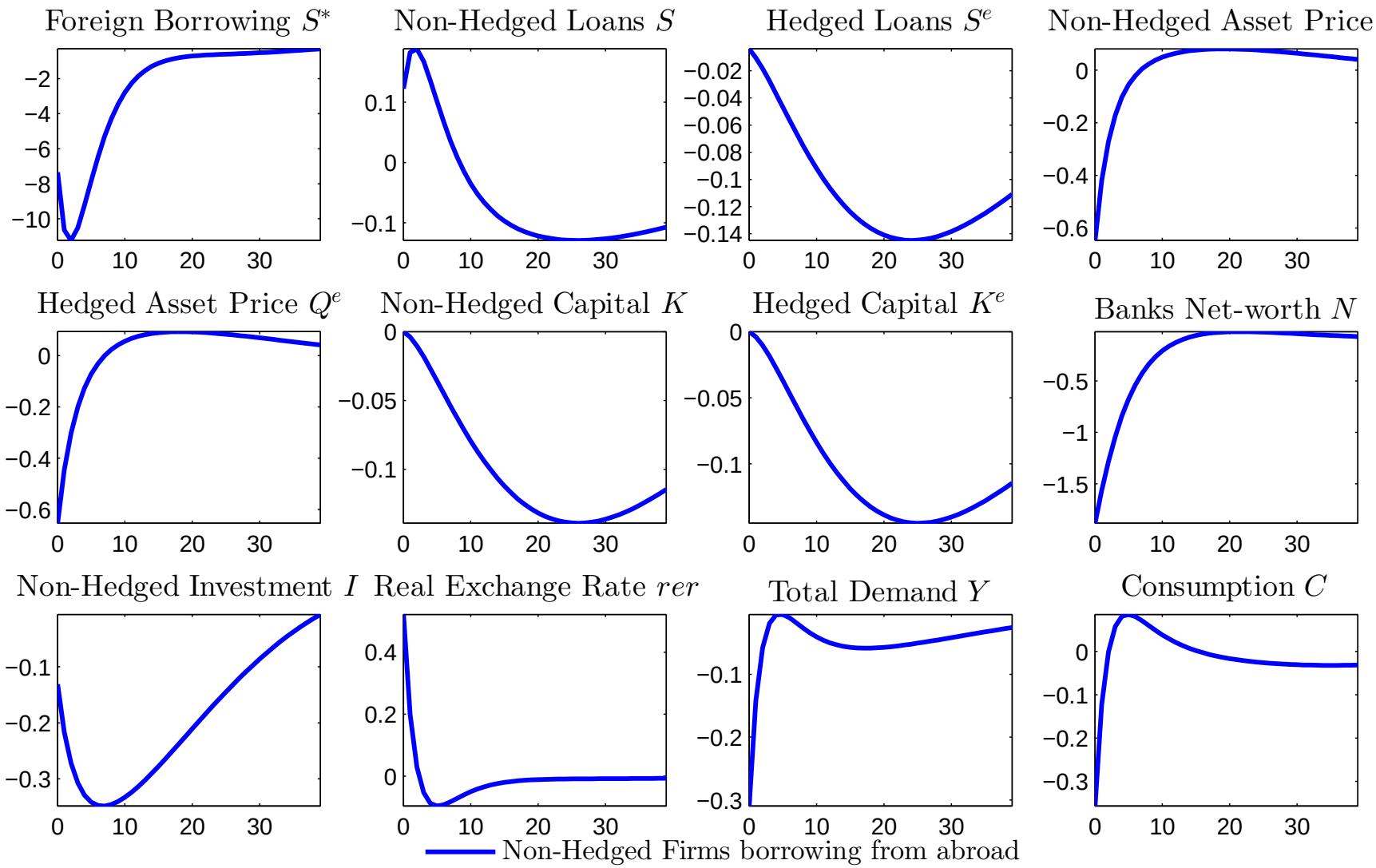
2. Hedged (exporting) vs. non-hedged (non-exporting) firms
   - the model in which hedged firms borrow from abroad brings about less volatility in macro variables than the model in which non-hedged firms do

Calibration

- real sector: average of BR, CL, CO, PE, MX weighted by per-capita GDP
- banking sector: previous literature

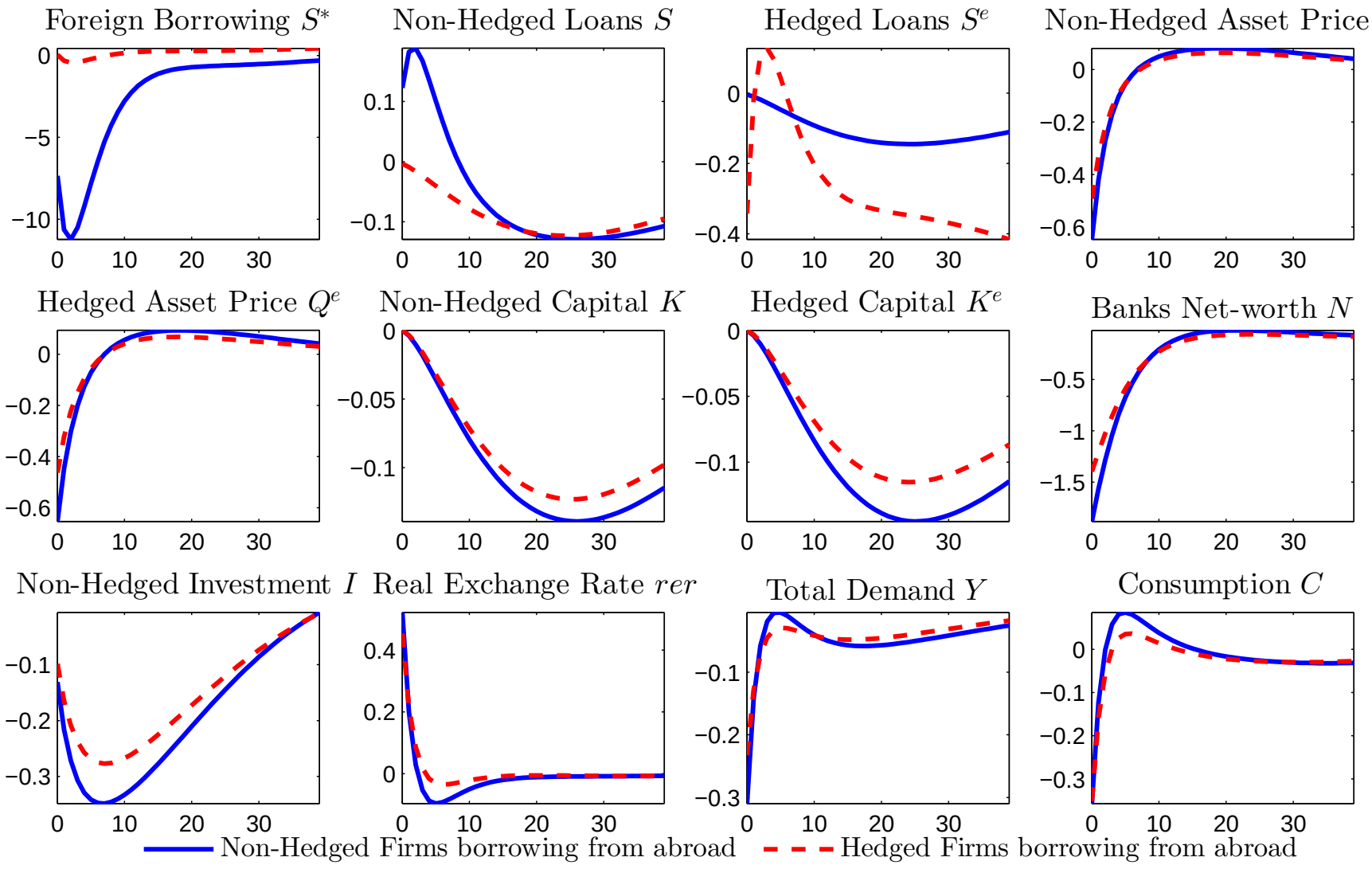
▸ Calibration

IRF to a 1% Increase in Foreign Interest Rate



Note: y axis: percentage deviation from steady state; x axis: quarters

IRF to a 1% Increase in Foreign Interest Rate



Note: y axis: percentage deviation from steady state; x axis: quarters

▸ More Variables

Non-conventional Policy

The Model

With Policy Response

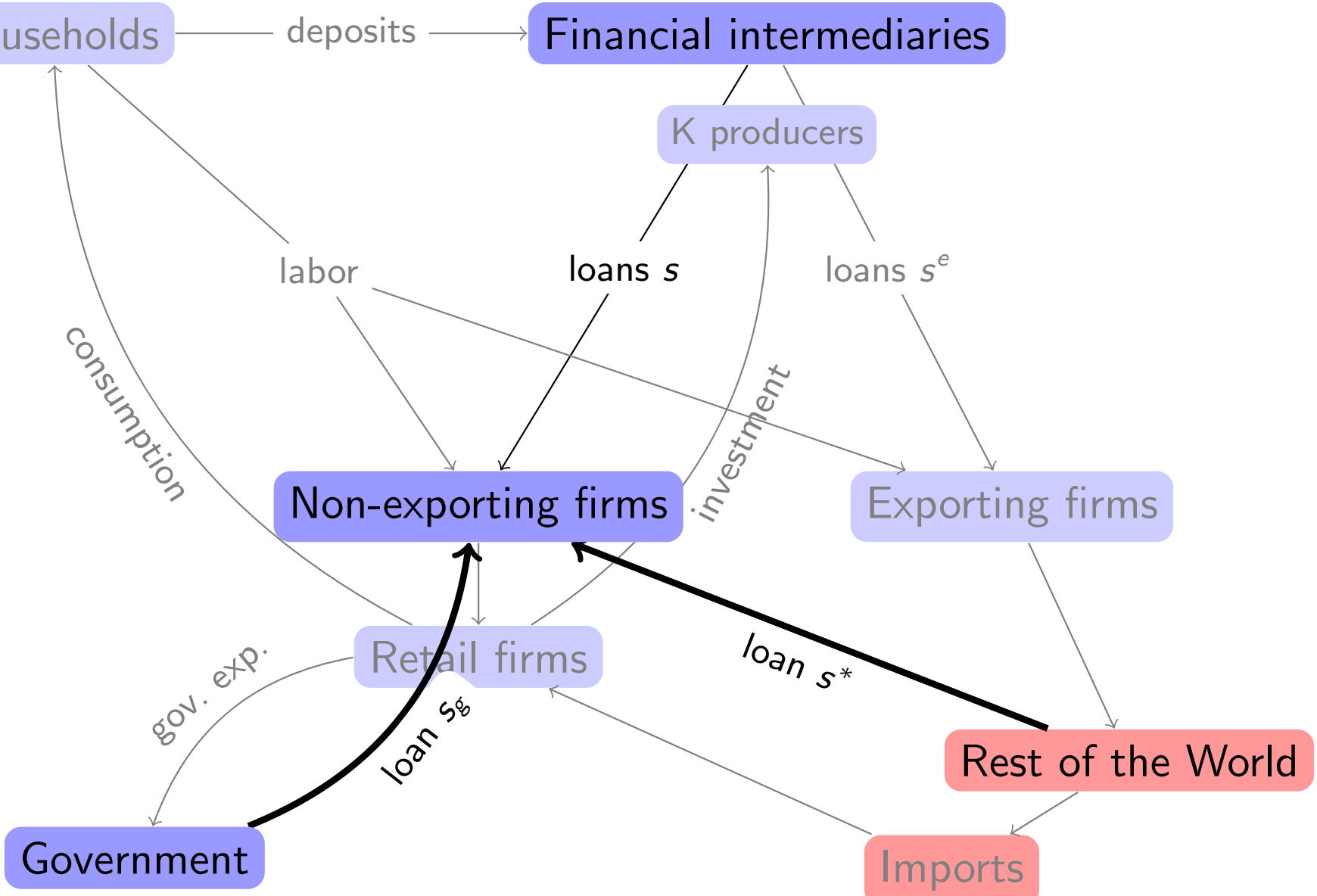
Non-conventional Policy in the EME

For non-hedged firms that borrow from abroad

- The financial authority lends directly to firms that borrow from abroad
- How much the authority injects, S_t^g, is endogenously determined as it is related to the dynamics of the domestic spread

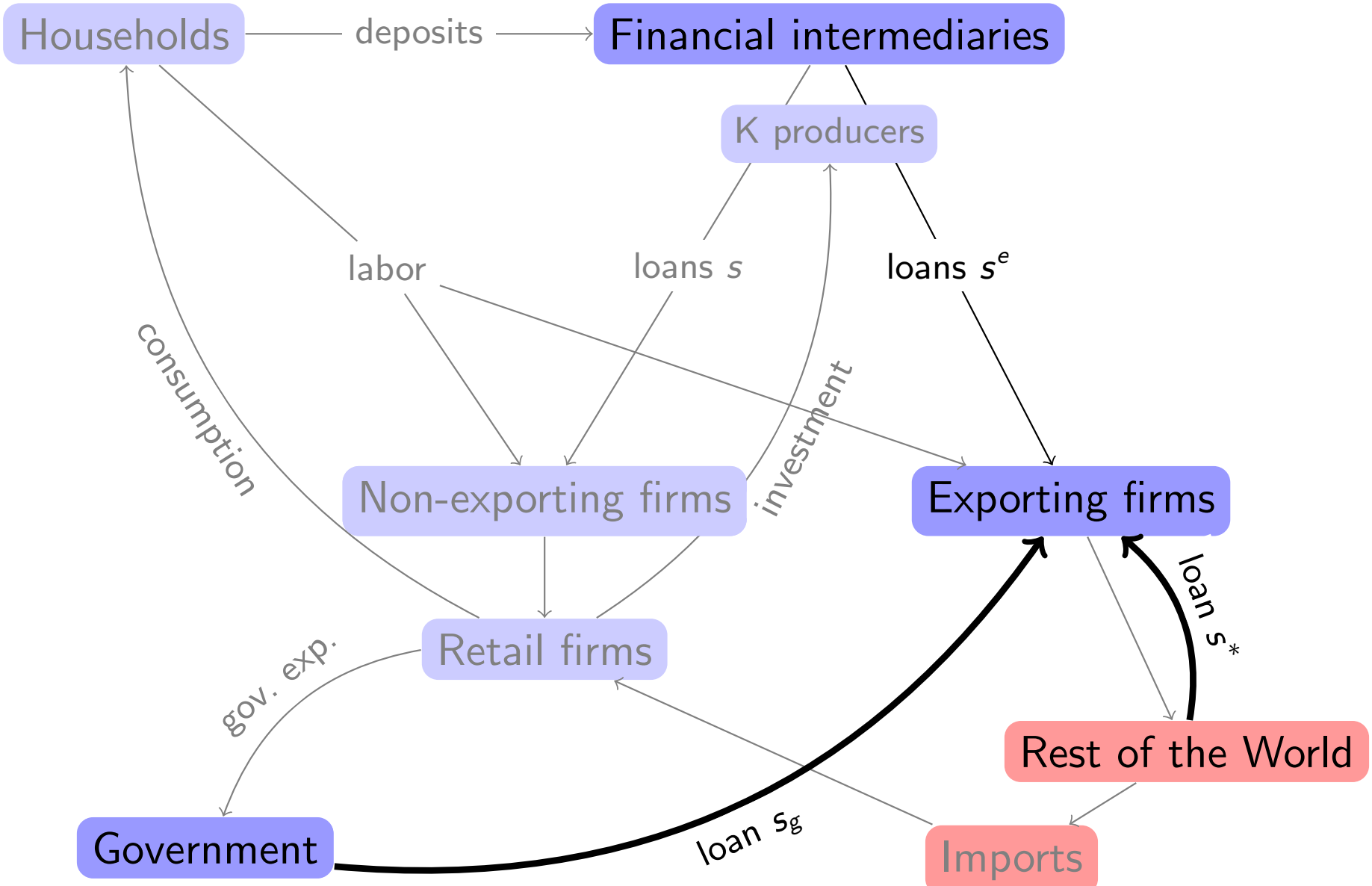
The Model Non-exporting firms borrow from abroad

Policy Response

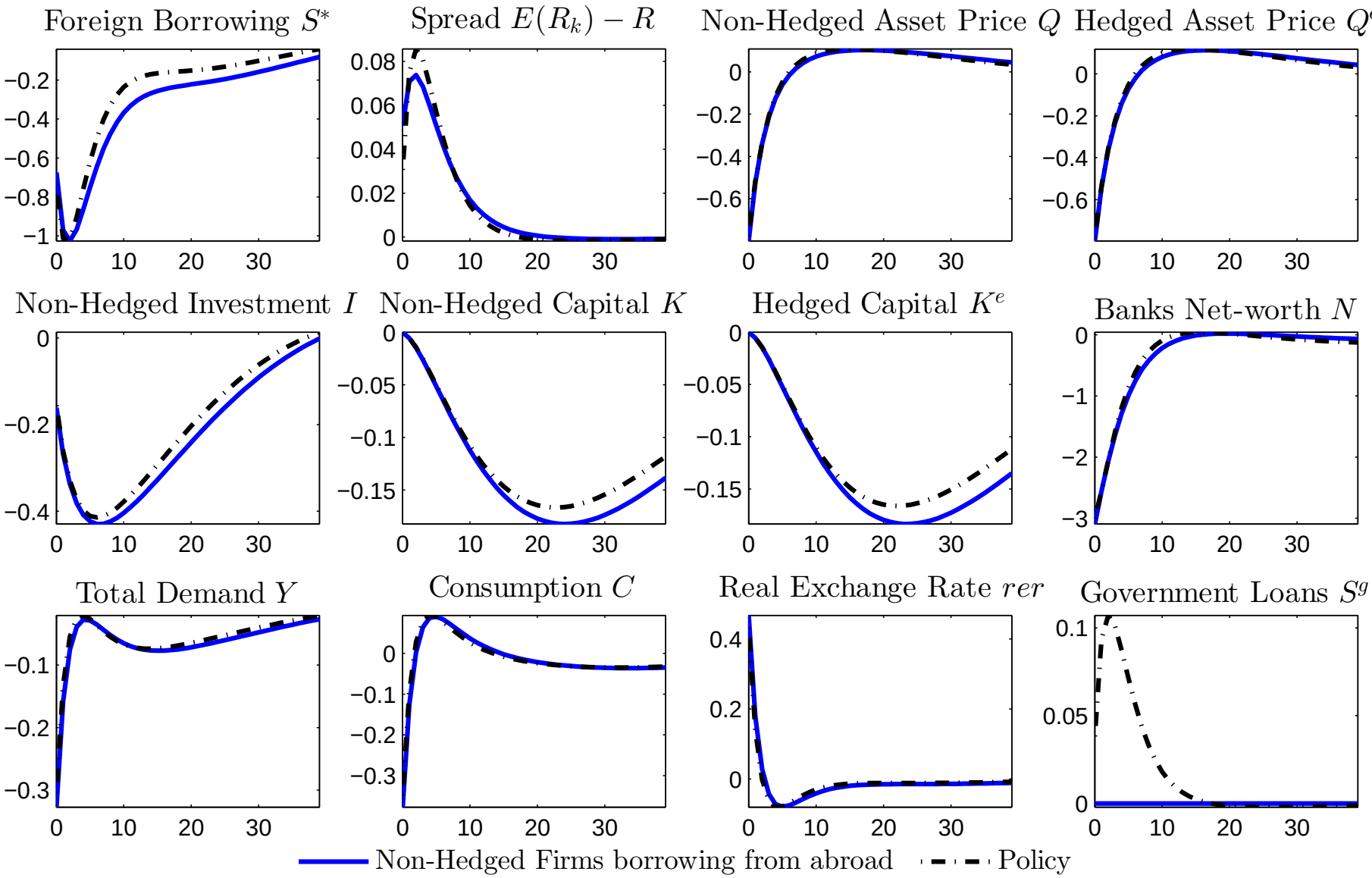


The Model Exporting firms borrow from abroad

Policy Response



IRF to a 1% Increase in Foreign Interest Rate - Policy



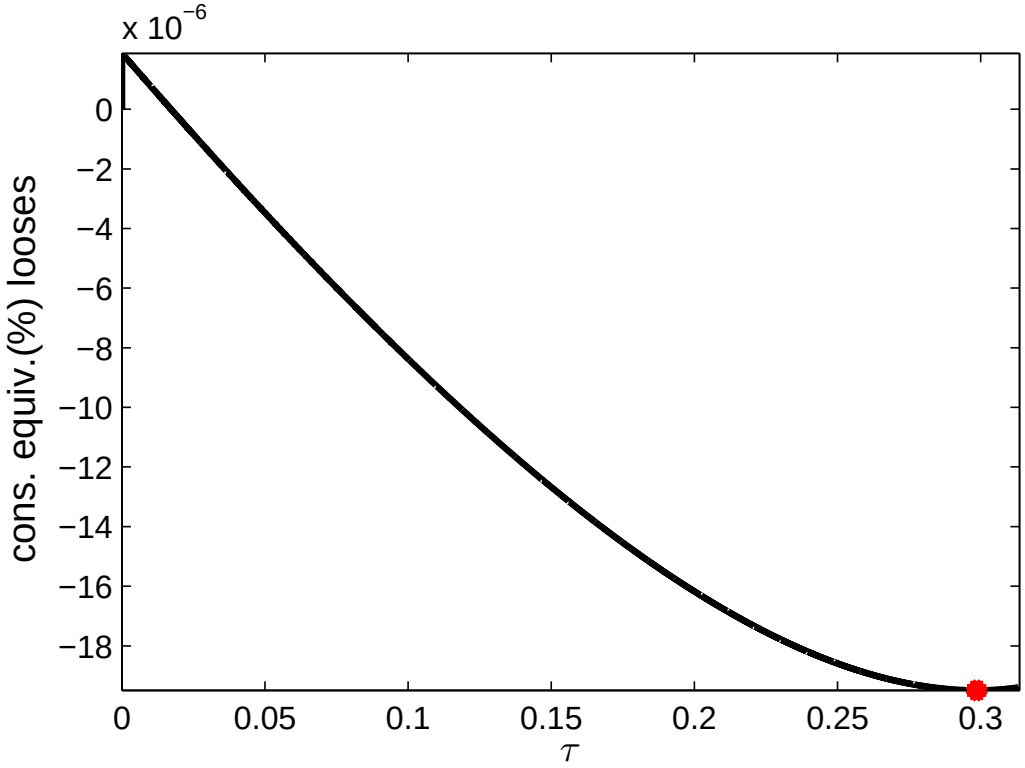
Note: y axis: percentage deviation from steady state; x axis: quarters

Welfare analysis

Welfare analysis CE Non-Hedged Firms

- We define welfare as in Schmitt-Grohé and Uribe (2007)
- **Consumption Equivalent**: fraction of households' consumption that would be needed to equate the welfare under no policy to the welfare under policy

Figure: Consumption equivalent losses of no policy for different levels of τ



Note: The red points represent the lowest welfare loss of having no policy. The calculations are done with a foreign interest rate increase of 0.00001.

Conclusions

What are the possible effects on the financial stability of EMEs when the Federal Reserve starts the normalization of its interest rate?

- Foreign borrowing becomes more expensive and brings a $\downarrow$ in credit and output
- Specially when non-natural hedged firms borrow from abroad

What can EMEs do to mitigate the effects of the foreign shock when non-hedged firms borrow from abroad?

- Non-conventional policy: the government lends directly to non-hedged firms when the foreign borrowing is reduced
- Macro variables show a smoother reaction with the intervention
- Consumers are better off with the policy

Thank you!

Appendix Related Literature

Theoretical Analysis

- Relevance of external factors in EMEs

  Aoki, Benigno, and Kiyotaki (2015), Devereux, Young, and Yu (2015), and Rey (2013)

- Modeling of the financial sector

  Aoki, Benigno, and Kiyotaki (2015), Kamber and Thoenissen (2013), Kollman (2013), Nuguer (2015), and Chang, Velasco, and Gulan (2015)

Empirical Evidence

- Relevance of external factors in EMEs companies' funding strategies

  Ayala, Nedeljkovic, and Saborowski (2015), Feyen, Ghosh, Kibuuka, and Farazi (2015), IMF (2015), and Rodrigues-Bastos, Kamil, and Sutton (2015)

- Corporate sector's risks

  Burns et al. (2014) and Gonzalez-Miranda (2012)

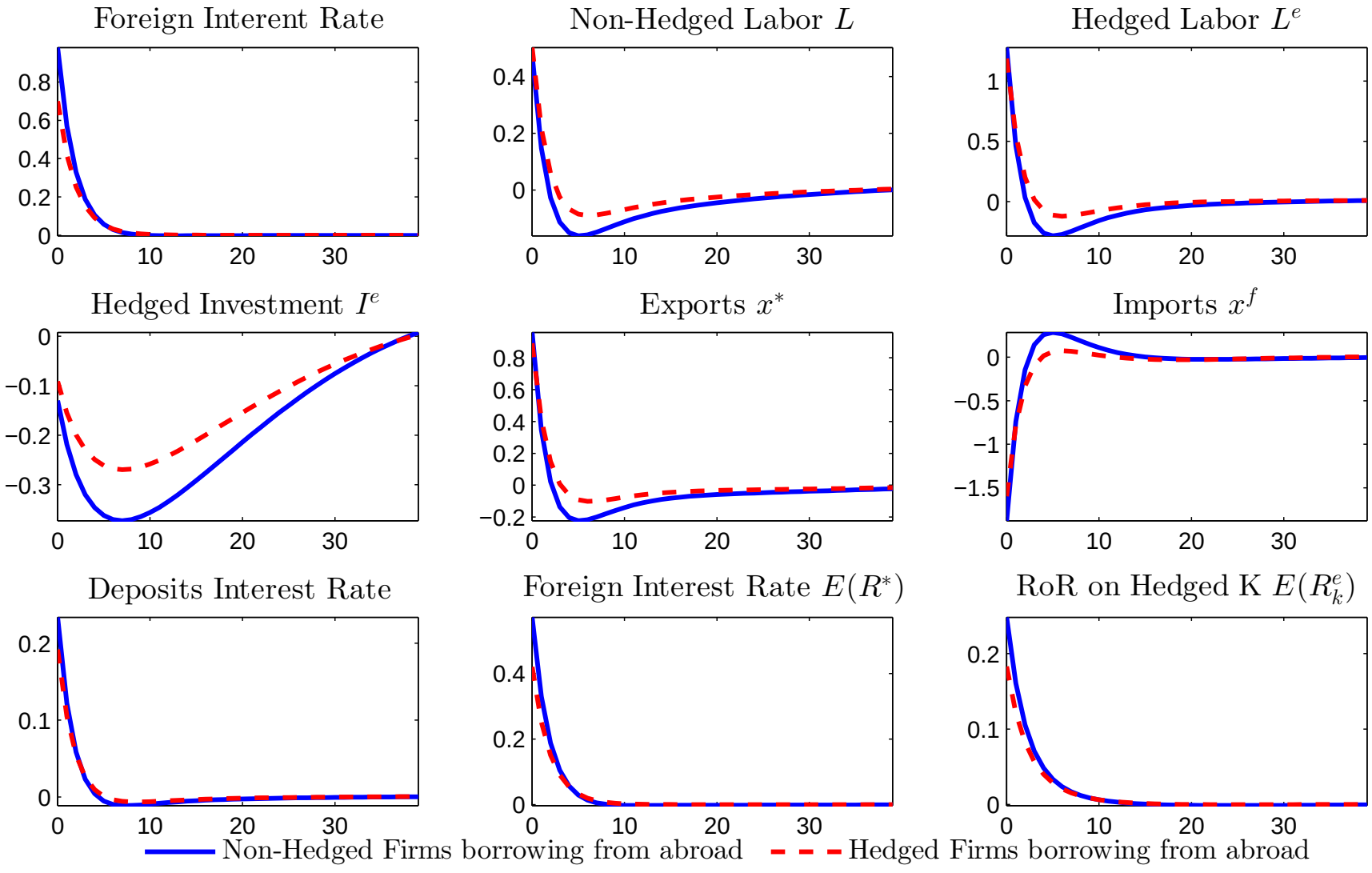
This Paper's Contribution

- Theoretical model with an exporting sector that borrows from abroad
- Analyze the difference in a foreign shock having hedged or non-hedged firms borrowing from abroad and propose non-conventional policy

Appendix Calibration

Households		
Discount factor	β	0.9900
Inverse elasticity of consumption	σ_c	1.0000
Inverse elasticity of labor supply	υ	0.1000
Relative utility weight of labor	ψ	2.5328
Labor elasticity of substitution	ξ_l	0.3000
Final Goods Firms		
Home bias	ν	0.6500
Foreign bias	ν^*	0.7000
Substitution between domestic and foreign goods	ρ	0.6666
Retailers		
Capital share	α	0.3000
Exporters		
Capital share	α^e	0.2500
Capital Producing Firms		
Capital adjustment cost	κ	3.0000
Depreciation of capital	δ	0.0350
Financial Firms		
Survival rate	σ	0.9600
Transfer to the entering bankers	ξ	0.0022
Fraction of divertable assets	λ	0.4868
Riskiness	ω	0.2000

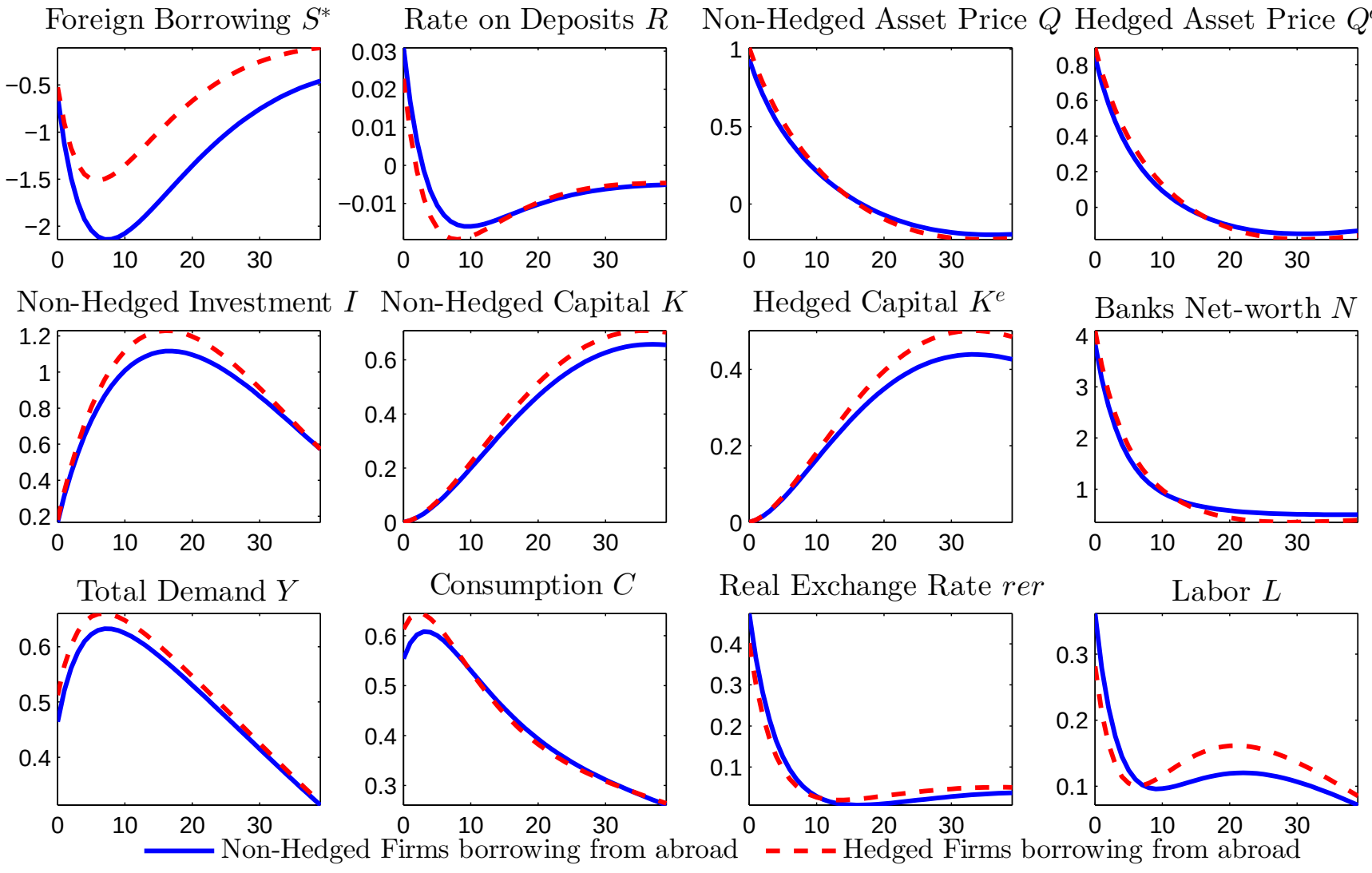
Appendix IRF 1% ↑ in Foreign Interest Rate More Variables



Note: y axis: percentage deviation from steady state; x axis: quarters

▸ Back to IRFs

Appendix IRF 1% ↑ in Non-Hedged Technology Shock



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▸ Back to IRFs