

How does international capital flow?

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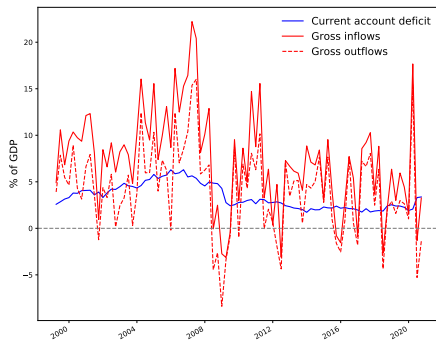
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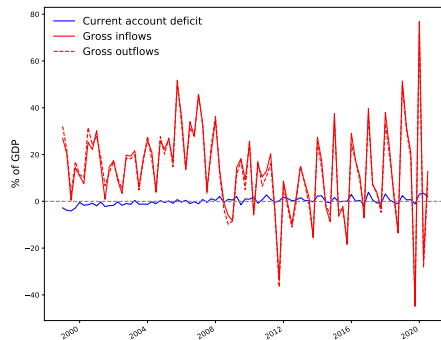
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Net vs gross capital flows

United States



France

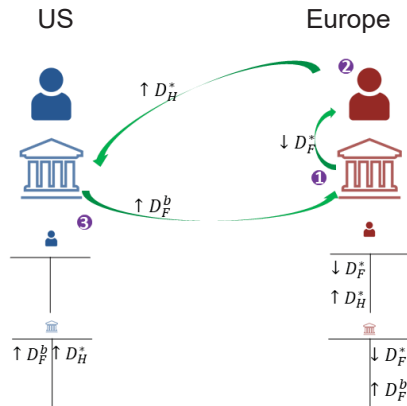


- Gross flows are extremely large relative to net flows (even in the US with its very large CA deficit)
- Gross flows are much more volatile than net flows
- Gross inflows and outflows are extremely highly correlated

Paper in a nutshell

- Renewed interest in gross capital flows and stocks
- Empirical work can rely on much better data (BIS, IMF) and made a lot of progress
- Analytical frameworks (and thus policy discussions) lagging behind:
 - ▶ Still mostly rely on net capital flows models:
 - **Payment flows (goods against assets)** = tiny fraction of gross flows
- This paper:
 - ▶ Gross + net capital flows model (DSGE):
 - **Payment flows**
 - **Financial flows (assets against assets)** = vast majority of gross flows
 - ▶ Revisit several open-economy macro policy debates

Example of a financial flow



1. Euro household deposits € check at US bank.
2. US bank does FX conversion.
3. US bank credits \$ to Euro household's account.
4. US bank collects check funds from Euro bank.
5. US bank credits its € nostro account with the Euro bank.
6. This reallocates existing purchasing power ("funds") among different currencies. It does not finance anything.
7. Gross inflow comes in a pair with gross outflow.
8. CA and "foreign saving" are unaffected.
9. No necessary connection of foreign inflow and foreign financing.

Classic open-macro debates

- Global saving glut
 - ▶ Abundant EME (real) savings financed the US CA deficit (Bernanke, 2005)
- Current account deficits (or net flows) indicate financial vulnerability
 - ▶ Vulnerability to “sudden stops” (Calvo ,1998)
 - ▶ Synonymous with global imbalances (G20, 2011)
 - ▶ Unwinding CA deficit is a cure to crises (IMF, 2014)
- Triffin’s dilemma
 - ▶ US must run persistent CA deficit to provide ROW with enough \$
 - ▶ CA surpluses “fund” FX reserve accumulation
- “Puzzling” correlation between gross inflows and outflows
 - ▶ “When foreigners invest in a country, domestic agents invest abroad, and vice versa.” (Broner et al., 2013)

Gross flows perspective on open-macro debates

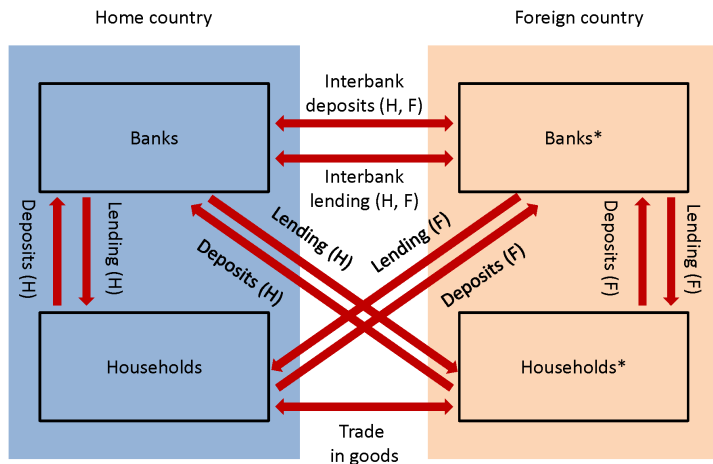
- Global saving glut
 - ▶ CA deficits are not financed by foreign HHs' physical saving, but by domestic HHs' purchasing power, likely created for them by domestic banks rather than foreign ones
- Current account deficits and financial vulnerability
 - ▶ Creditors do not stop financing CAs, they stop financing debt
- Triffin's dilemma
 - ▶ *US\$* is created by bank credit extension, independently of US CA deficits
- Correlation between gross outflows and inflows
 - ▶ True by construction at the aggregate level, from double-entry bookkeeping

The Model

Key features

- 2-country New Keynesian DSGE model
- With bank *financing*
 - ▶ Banks issue loans, thus creating deposits
 - ▶ Deposit creation limited by regulatory and monitoring costs
 - ▶ Deposits are demanded because they lower transaction costs
- And cross-border gross positions
 - ▶ Banks create own-currency loans and deposits
 - ▶ HHs demand deposits in both currencies (imperfect substitutes)
 - ▶ Settlement through nostro/vostro interbank accounts

Physical and financial flows



Banking system

- Wholesale banks

- ▶ Choose balance sheet size and asset composition to maximise net worth
 - Loans to HH, HH*, and Banks* + FX deposits at Banks*
 - Liabilities are demand-determined
- ▶ Subject to
 - 1 Minimum capital adequacy regulation (MCAR)
 - 2 FX mismatch rule (FXMR)
 - 3 Cost of maintaining exposures to foreign HH (MONFX)

- Retail banks

- ▶ Set terms of retail deposit and loan contracts
 - Deposits: mark-down on risk-free rate
 - Loans: pricing reflects default risk (land as collateral; BGG mechanism)

FXMR constraint

- Foreign exchange mismatch rule (FXMR) limits net FX exposure

$$\underbrace{E_t \left(D_{F,t}^b - L_{F,t}^b \right)}_{\text{Exposure to foreign banks}} = \phi_{fxmr} \underbrace{\left(D_{H,t}^f - L_{H,t}^f \right)}_{\text{Exp. to foreign HHs}}$$

- $\phi_{fxmr} = 1$
 - Banks accommodate private flows by acting as the counterparty
 - Banks take on FX mismatch risk
 - Implies $NFA = 0$ if symmetric
 - Accurate description of instantaneous balance sheet adjustments to a x-border transaction
- $\phi_{fxmr} = 0$
 - Banks exactly match interbank positions and hedge FX risks
 - Prices and quantities adjust instead
- Intermediate, asymmetric cases etc.

Monetary UIP condition

- Monetary UIP spread u_t arises from imperfect substitutability between Home and Foreign currencies:

$$\mathbb{E}_t \left(\ln r_{t+1} - \ln r_{t+1}^* - \ln \varepsilon_{t+1}^{real} \right) = \mathbb{E}_t u_t$$

$$\mathbb{E}_t u_t = \mathbb{E}_t \Xi_{t+1} \left(\left(\frac{1 - S_t^{mm}}{S_t^{mm}} \frac{d_{H,t}^h}{e_t d_{F,t}^h} \right)^{\frac{1}{\theta_d}} - 1 \right)$$

- Higher supply of H currency d_H lowers its relative convenience yield
- This means H currency must pay a financial premium \rightarrow expected appreciation, i.e. depreciation on impact
- Similarly, higher demand for H currency (a 'home bias' shock) raises its relative convenience yield and leads to an impact appreciation, followed by depreciation
- u_t and exchange rate more volatile for lower substitutability θ_d

Rest of the model

- Manufacturers
 - ▶ Combine labour and land to produce differentiated goods \therefore sticky prices
 - ▶ 2 NK Phillips curves (PCP baseline)
- Unions
 - ▶ Buy services from households and sell differentiated labour to manufacturers \therefore sticky wages
 - ▶ Wage Phillips curve
- Monetary policy
 - ▶ Standard Taylor rule
 - ▶ r -star also depends on banks' market power, steady-state deposit velocity and how elastic transaction costs are w.r.t velocity

Calibration

- Standard macro parameters
- Financial sector - based on data and empirical evidence
 - ▶ CAR 10.5%; SS ratio 15.5%; breach frequency 2.5%; borrower bankruptcy rate 1.5%
 - ▶ Zero risk weight for interbank claims → 25 bps spread (16bps in data)
 - ▶ Wholesale & retail lending rate spreads 66 and 167 bps (AAA CP and avg. non-bank firms)
 - ▶ Interbank and retail deposit spreads -10 and -150 bps (LIBID & avg. bank spread)

Bank balance sheet

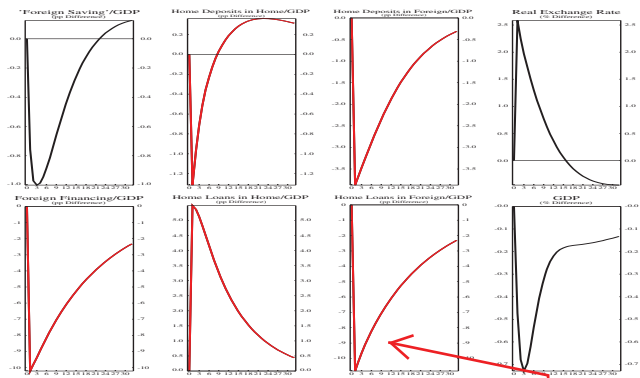
L_H^h	100	D_H^h	80
L_H^f	20	D_H^f	20
L_H^b	10	D_H^b	10
D_F^b	10	L_F^b	10
		NW	20

Simulations

Current accounts and financial vulnerability

- Literature: CA deficit sufficient statistic for financial vulnerability
- Shock to *Foreign* banks' willingness to lend to home households
- Insight:
 - ▶ In a financial crisis creditors do not stop financing (net) CAs, they stop financing (gross) debt
 - ▶ CAs can only make a minimal contribution to the required balance sheet adjustments

Current accounts and financial vulnerability



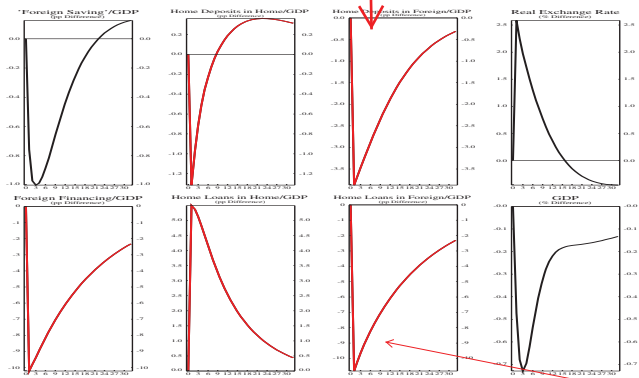
black = real variables

red = financial variables

1. Shock: Large drop in Foreign lending to Home households

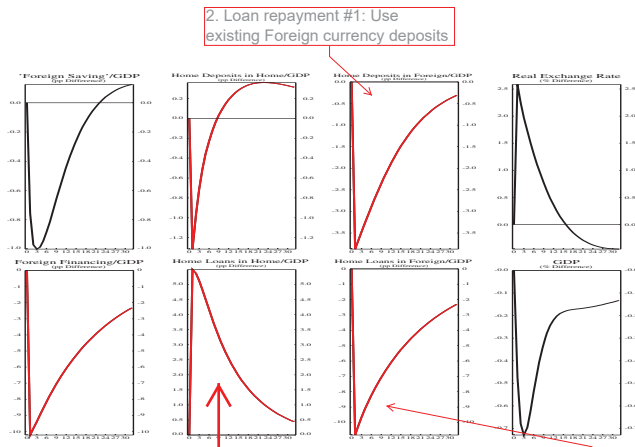
Current accounts and financial vulnerability

2. Loan repayment #1: Use existing Foreign currency deposits

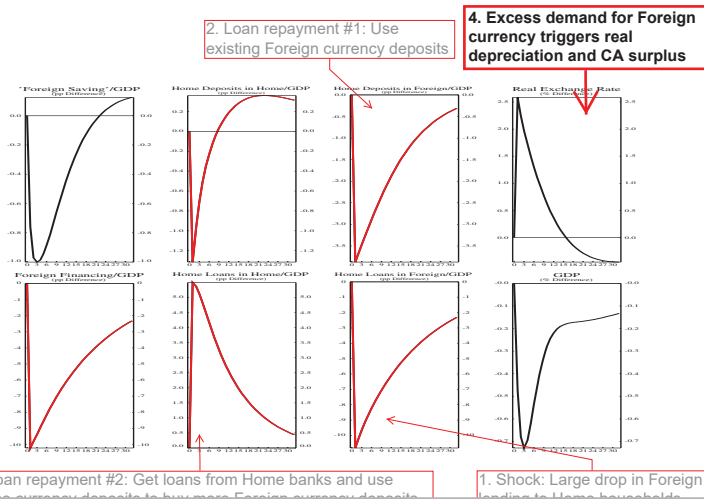


1. Shock: Large drop in Foreign lending to Home households

Current accounts and financial vulnerability



Current accounts and financial vulnerability

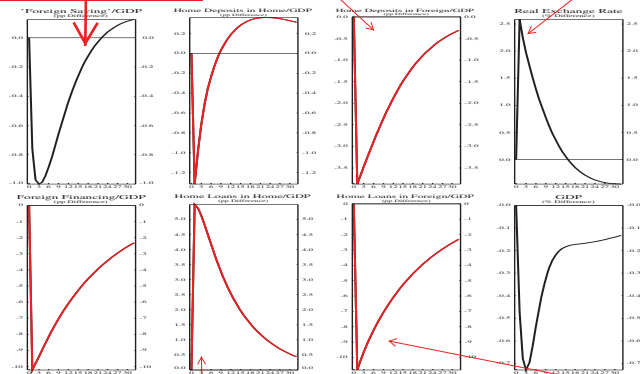


Current accounts and financial vulnerability

5. But CA surplus (a flow) makes NO contribution to the loan repayment (an instantaneous stock change)

2. Loan repayment #1: Use existing Foreign currency deposits

4. Excess demand for Foreign currency triggers real depreciation and CA surplus



3. Loan repayment #2: Get loans from Home banks and use Home currency deposits to buy more Foreign currency deposits

1. Shock: Large drop in Foreign lending to Home households

Summary

- We show how to incorporate gross flows into an open-economy DSGE model, tracking key gross positions
- The model illustrates the importance of financial shocks for macroeconomic and financial stability through their impact on gross flows
- New perspectives on classic open-macro debates
 - ▶ CA deficit can arise as a byproduct of financial shocks rather than a saving shock; US credit glut rather than global saving glut
 - ▶ Gross positions and their composition, rather than CA deficits, determine financial vulnerability
 - ▶ No Triffin's CA dilemma; It is banks that produce reserve currency
 - ▶ Gross outflow-inflow correlation is automatic