International Macroeconomics: From the Global Financial Crisis to COVID-19, and Beyond

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Mundell-Fleming Lecture

International Macroeconomics: Beyond the Mundell-Fleming Model

MAURICE OBSTFELD*

This paper presents a broad overview of postwar analytical thinking on international macroeconomics, culminating in a more detailed discussion of very recent progress. Along the way, it reviews important empirical evidence that has inspired alternative modeling approaches, as well as theoretical and policy considerations behind developments in the field. The most recent advances in model building center on the "new open-economy macroeconomics," which synthesizes Keynesian nominal rigidities, intertemporal approaches to open-economy dynamics, and the effects of market structure on international trade. [JEL F41, F33]

On the History of the Mundell-Fleming Model

Keynote Speech

ROBERT MUNDELL

It is a great pleasure for me to speak at this opening of the first IMF Annual Conference on International Macroeconomics and a special honor to be here at the inauguration of the annual Mundell-Fleming Lecture. Quite apart from the flattering distinction it confers on Marcus Fleming and me, it serves to commemorate a very special period in the Research Department at the Fund when, under the able leadership of Jacques Polak, it made an enduring contribution to the development of the standard international macroeconomic model.

Inaugural Mundell-Fleming lecture published 20 years ago in a 2001 special issue of the *IMF Staff Papers*

From the Great Financial Crisis to COVID-19, and Beyond

My (modest) objective: to start where Maury stopped, and cover a few of the major intellectual developments in international macroeconomics of the last twenty+ years.

Along the way, I will try to highlight some remaining and some new challenges.

This intellectual journey has been marked by two major crisis: the global financial crisis of 2008 and the (ongoing) COVID-19 pandemic.

- Global Financial Crisis: powerfully reminded the (advanced part of the) world of the importance of financial frictions and linkages.
- COVID-19 Pandemic: still early, but already a powerful illustration of the role of sectoral production frictions and linkages, especially across borders.

Both crises provide 'the inspiration for new explorations' (Obstfeld, 2001)

Outline

I will proceed in two steps.

1. Start from the New Open-Economy Macroeconomic (NOEM) synthesis and discuss four dimensions of progress

2. Highlight three policy areas where further progress can be made:
   - Implementation of optimal policy in EMs with shallow FX markets: 'basis control'
   - The worsening of the US external position: is it the end of the 'exorbitant privilege'?
   - Suggestions for strengthening the IMFS : the IMF as an elastic provider of global liquidity

Beyond the Mundell-Fleming / NOEM Models

The Starting Point: The New Open-Economy Macroeconomics Synthesis

Following Obstfeld and Rogoff (1995), NOEM quickly established itself as the dominant analytical framework to study open economy macro questions, and as a favorite tool in the policymakers' toolkit.

Key feature: strong exchange rate passthrough of exchange rate and expenditure switching.

A central policy message:

Flexible exchange rates + credible 'inflation targeting' rule is close to optimal, under a variety of configurations. [Corsetti, Dedola, Leduc]

Four Dimensions of Progress

In the last two decades, much progress has been made along four main dimensions.

1. Pricing and invoicing
2. Sectoral and trade frictions and linkages
3. Cross-border allocation of capital, role of global financial intermediaries
4. Externalities and the use of prudential instruments

1. Pricing and Invoicing

- NOEM assumes sticky prices in the producer's currency (PCP) + law of one price (LOP)
  Assumption was always tenuous given strong evidence against LOP

- Evidence on prices at the dock shows goods are invoiced (and sticky) in a few dominant currencies. Dominant Currency Paradigm. [Tille, Goldberg, Gopinath et al.]

- Implications:
  - Expenditure switching less potent
  - Worse 'output-inflation' trade-off.
  - Dollar cycle moves global trade.

- However, main prescription unchanged: floating exchange rates + domestic inflation target remains optimal for non-dominant currencies. [Gopinath et al., Egorov & Mukhin]

2. Trade and Productions Frictions and Linkages

Sectoral and trade frictions put in sharp relief by COVID-19 pandemic.

- Recent foundational work on the importance of the input-output structure for the aggregate production function. [Baqaee & Farhi]

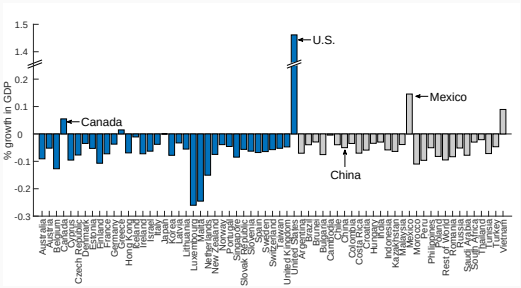
- Shocks propagate upstream and downstream in complex ways, e.g. during COVID-19:
  - Negative supply shock morphs into negative demand shock. [Airline travel & car rental]
  - Positive demand shock morphs into negative supply shock. [Shipping bottlenecks].

- Makes policy formulation particularly challenging (monetary or fiscal).

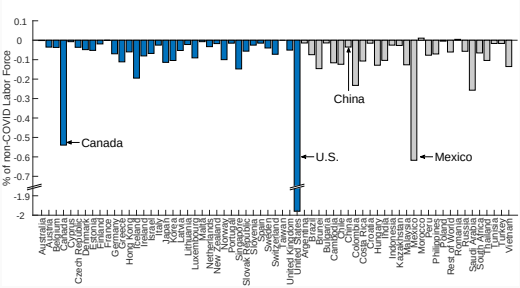
Open research questions: (a) dynamic models (macro and networks); (b) interactions between global supply chains, invoicing and funding currencies, for the transmission of shocks.

Fiscal Policy Spillovers during COVID-19 in a Dynamic Network Model

Impact of US fiscal policy during 2020, on the US and the rest of the world.



(a) % Output Spillovers



(b) Unemployment Spillovers

- Output spillovers small (and mostly negative). General Equilibrium effects.
- Employment spillovers small (and mostly positive)

[Gourinchas, Kalemli-Ozcan, Penciakova & Sander (2021)]

3. Cross-border Capital Allocation

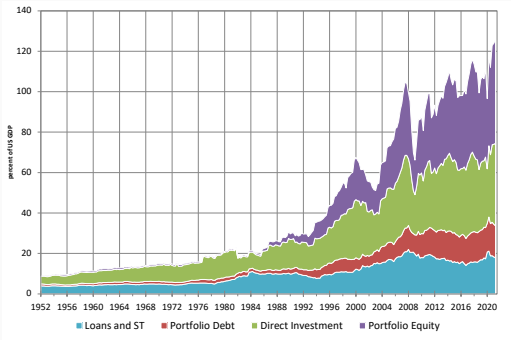
Three major stylized facts:

- Major fact (1): Massive increase in cross-border gross capital flows and positions.
  [Lane & Milesi-Ferretti]

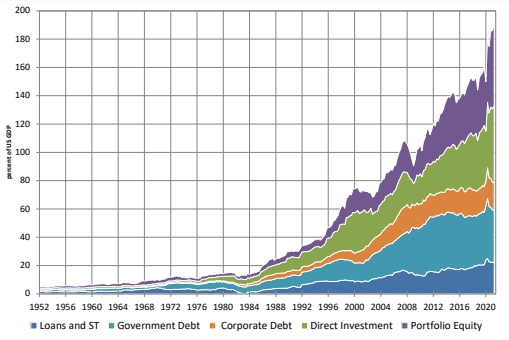
- Major fact (2): Asymmetry in the international financial system, with the US at the center. Dollar and Treasuries are global safe assets.
  [Despres, Kindleberger & Salant, Gourinchas & Rey]

- Major fact (3): Global financial cycle. Strong co-movement in international asset prices and quantities. [Rey]

United States External Balance Sheet, 1952-2021:2



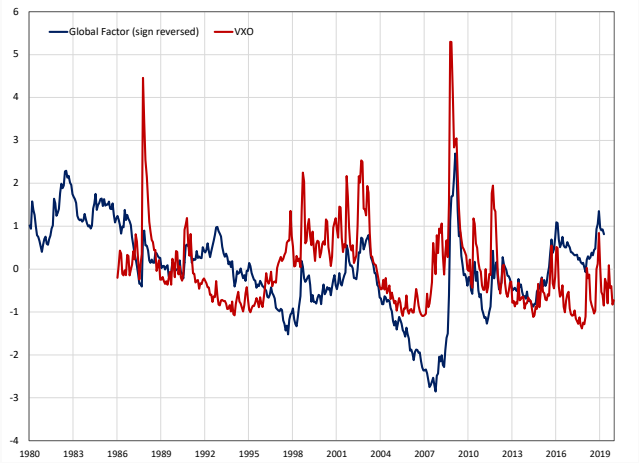
U.S. Gross External Assets



U.S. Gross External Liabilities

Note: The figure reports U.S. gross external assets and liabilities, as a percent of U.S. GDP. [Source: U.S. IMA.]

The Global Financial Cycle



Note: Global Factor from Miranda-Agrippino & Rey (2021). VIX from CBOE.

3. Cross-border Capital Allocation: Global Intermediaries

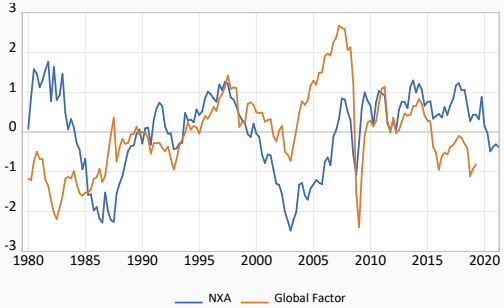
- Early NOEM models ill-equipped to account for these facts.
  - Assets priced by a representative household with excessively smooth discount factor.
  - Excessive levels of risk sharing. [Backus and Smith puzzle]
- Importance of global financial intermediaries with various mandates and limited capital. [Kouri, Gabaix & Maggiori, BIS]
  - Intermediaries earn excess return 'rents' (UIP, CIP). [Ivashina, Sharfstein & Stein, Du et al]
  - Fluctuations in the aggregate risk-bearing capacity of global financial intermediaries connects markets (risk on/off).
  - Quantities matter. FX interventions, QE or shocks to asset demand/supply ripple through markets. [Gourinchas, Ray & Vayanos, Greenwood et al, Koijen & Yogo]
  - Challenges the Mundell/Friedman idea that floating exchange rates provide sufficient insulation (dilemma/trilemma). [Rey]

Insights gradually ported over into quantitative macro models.

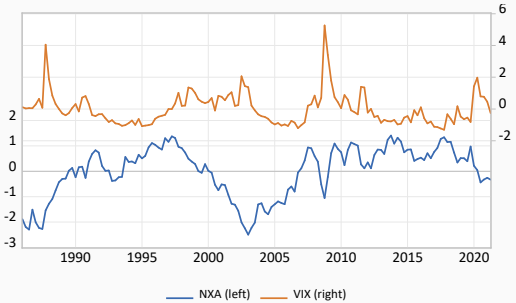
3. Cross-border Capital Allocation: External Adjustment and Exorbitant Privilege

- Large cross-border positions, and associated valuation effects, significantly alter the dynamics of external adjustment and long run sustainability[Gourinchas & Rey]
- Asymmetry and associated excess return ('exorbitant privilege') reflects the role of the US as a net provider of (safe) stores of value. [Caballero et al, Mendoza et al]
- Emphasizes the importance of (regulated) financial development and of a proper fiscal backstop/fiscal space.
- That privilege could erode over time (Triffin dilemma) or be competed away by other safe asset issuers. [Triffin, Farhi et al, Farhi & Maggiori, He et al]

The U.S. External Balance Sheet Provides Insurance to the Rest of the World



nxa and Global Factor



nxa and VIX

Note: *nxa*: cyclical component of the US external balance, updated from Gourinchas & Rey (2007). Global Factor from Miranda-Agrippino and Rey.

4. Externalities and Prudential Policy

- Externalities:
  - Fire-sale externality [Mendoza, Bianchi, Korinek]
  - Aggregate demand externality [Lorenzoni, Farhi & Werning, Schmitt-Grohe & Uribe]

- Optimal Pigouvian policy leans against the wind.
  rationale for macroprudential, capital flow management (CFM), or FX interventions.

- Generically, floating exchange rates remain desirable, although fire-sale externalities can justify some 'fear of floating'

The Fund is at the vanguard of converting these conceptual innovations into policy.
[Integrated Policy Framework. Basu et al]

Looking Ahead

Looking Ahead

For the rest of my talk, I will zoom in on three specific issues:

- Optimal policy for EMs in environments with shallow FX markets: 'basis control'
- Are we getting close to a 'Triffin moment'?
- Strengthening the Global Financial Safety System:
  The IMF as an elastic provider of international liquidity.

‘Basis Control’: A Rationale

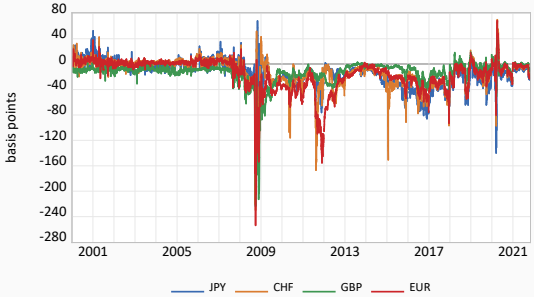
Define the cross-currency basis (‘the basis’) as:

$$bs_t = i_t^{\$} - (i_t - (f_s - s_t))$$

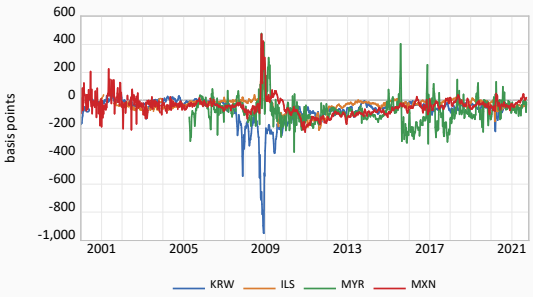
Negative basis ($bs_t < 0$): synthetic dollar more expensive than cash dollar.

- CIP deviations small for AEs before the GFC, but possibly much larger for EMs.
  [harder to measure due to credit risk, Du & Schreger]
- Shadow cost of dollar balance-sheet expansion for global financial intermediaries
  [Du, Verdelhan, Hebert]
- Implies different local currency rates: $i \neq i^{\$} + (f - s)$, potentially creating challenges for the transmission of domestic monetary policy. [Obstfeld et al]
- Can express optimal policy in terms of a target for the basis: basis control.
- Suggests supplementing an inflation targeting rule with a ‘basis targeting rule’.

Cross-Currency Basis: Advanced vs Emerging



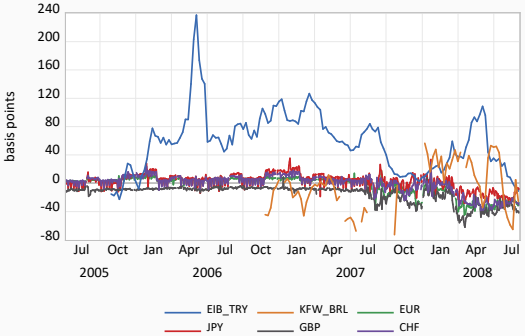
Advanced Economies



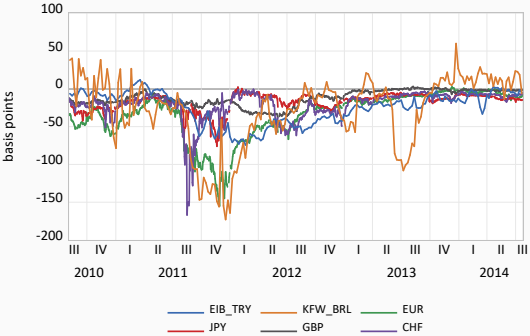
Sample of EMs

Note: The figure reports the 3-m LIBOR cross-currency basis for a set of Advanced and Emerging market economies. [Source: Bloomberg.]

Cross-Currency Basis: 3m-Advanced vs 5y-Supranational Emerging



Pre-GFC



Post-GFC

SSA-basis (5y) much larger than AEs basis (3m) pre-GFC, but comparable post-GFC.

EIB_TRY and KFW_BRL: Basis on 5-year ZC bonds issued by supranationals in TRY and BRL. [Du & Schreger 2016]

A Simple Model of Basis Control

A small open economy: endowment of T-goods y^T, producing N-goods $y^N = F^N(L)$.

[Separable preferences, unit elasticity, $\lim \beta = 1$; Bianchi & Lorenzoni, Schmitt-Grohe & Uribe]

- Supply of dollars (FE):

$$d^*_{t+1} = \omega_t x_t \tag{1}$$

  - ω_t: risk bearing capacity of (foreign) financial intermediaries
  - $x_t \geq 0$: excess return on dollar lending required by the intermediaries.
    In equilibrium, equal to CIP deviation: $x_t = -bs_t = i_t - (f_t - s_t) - i^*_t$ [Bahaj & Reis]

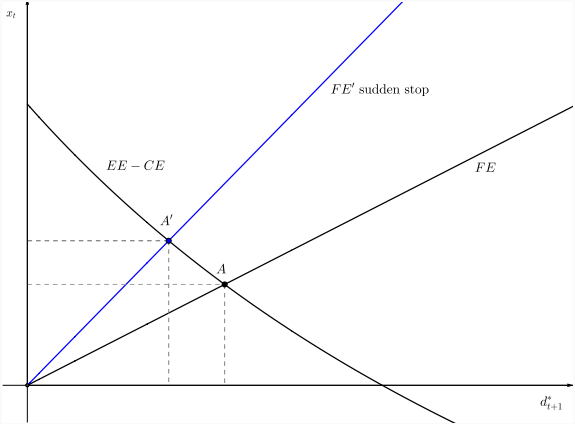
- Demand for dollar-debt for T-consumption smoothing (EE):

$$d^*_{t+1} = \frac{y^T}{R^*_t + x_t} - (y^T - b^*_t) \tag{2}$$

  b^*_t: face value of debt to be repaid in t and $R^*_t = 1 + i^*_t$.

- Determines $x_t(\omega_t, R^*_t, b^*_t)$, $d^*_{t+1}(\omega_t, R^*_t, b^*_t)$ and $c^T_t(\omega_t, R^*_t, b^*_t)$

Basis Control: Competitive Equilibrium



Competitive Equilibrium

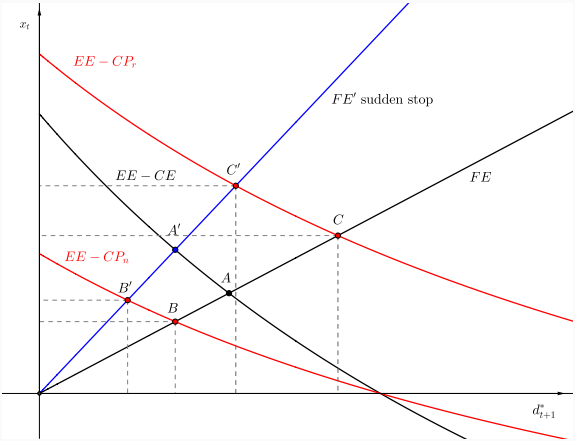
- Sudden shock ($\omega_t \downarrow$):
  - $x_t \uparrow$ and d^*_{t+1} (borrowing) $\downarrow$
  - Consumption of T-good $c_t^T \downarrow$.
- Externality: With nominal rigidities and an insufficiently flexible exchange rate, N-sector experiences a recession:

$$F^N(L) = c_t^N = c_t^T \frac{S_t}{\underline{w}} \frac{1-\phi}{\phi} < F^N(\bar{L})$$

- Dichotomy: Monetary policy (S_t) has no effect on the basis (not general).

Ex-ante (prudential) and ex-post (crisis management) policies may improve outcomes.

Basis Control: Constrained-Efficient Crisis Management



Ex-Post Constrained-Pareto

- Two externalities:
  - Terms of Trade: less borrowing reduces the basis
  - Aggregate demand: more borrowing increases output in recessions
- $EE - CP_n$: no recession. first effect. Always borrow less, smaller basis.

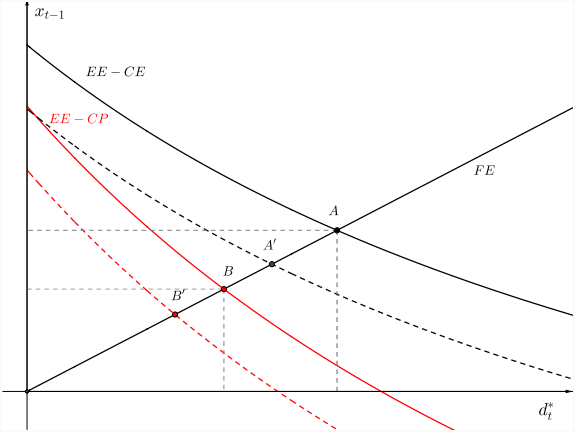
$$d^*_{t+1} = \frac{y^T}{R^*_t + 2x_t} - (y^T - b^*_t)$$

- $EE - CP_r$: in recession: both effects. Borrow more, larger basis ($\phi < 0.5$).

$$d^*_{t+1} = \frac{y^T}{\phi(R^*_t + 2x_t)} - (y^T - b^*_t)$$

Optimal crisis management: expand basis during SS-recessions, otherwise keep it tight.

Basis Targeting: Constrained-Efficient Prudential Policy



Ex-Ante Constrained Pareto

- Ex-ante, policy leans against borrowing:
  - lowers the basis today
  - reduces future borrowing needs (hence likelihood of recession)
- Small basis means small rent extraction + 'dry powder'
- Higher likelihood of SS: less borrowing today

Optimal prudential policy: discourage borrowing and keep basis tight.

Basis Control: Implementation with Capital Controls

Basis x_t acts as a 'sufficient statistic,' with optimal level x_t^n.

Can implement optimal policy with a basis targeting rule:

$$\tau_t = \tau(x_t, E_t x_{t+1}, L_t, E_t L_{t+1}, ...)$$

For instance, in our simple model, ex-post capital controls take the following simple form:

- Outside a recession:

$$\tau_t = \frac{x_t}{R_t^* + 2x_t} > 0$$

- In a recession:

$$\tau_t = -\frac{(1-2\phi)x_t + (1-\phi)R_t^*}{\phi(R_t^* + 2x_t)} < 0 \quad \text{when } \phi < 0.5$$

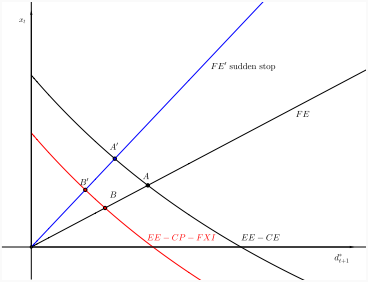
Basis Control: Implementation with FX Intervention

Can also think of implementing with a rule on FX interventions:

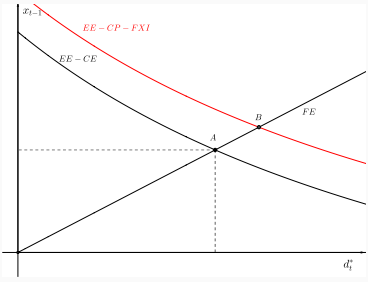
$$A_t^* = A^*(x_t, E_t x_{t+1}, L_t, E_t L_{t+1}, ...)$$

FX interventions generically not optimal. Intervention today reduces basis ex-post but can increase the basis ex-ante (quasi fiscal cost).

Can still improve welfare (locally) but potential negative externalities [Fornaro & Romei]



Ex-Post FX Intervention



Ex-Ante FX Intervention

Are We Getting Closer to a ‘Triffin Moment’?

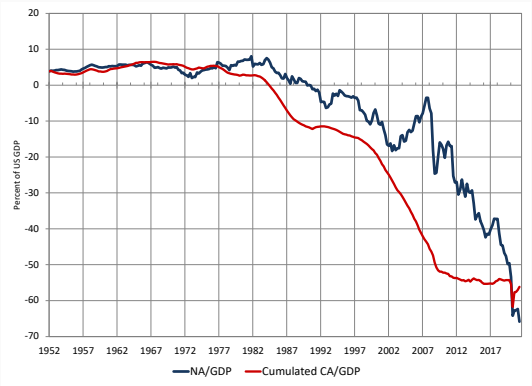
Are We Getting Closer to a 'Triffin Moment'?

- Much has been written about the increased centrality of the USD for the IMFS, as the currency of choice for trade invoicing, international security issuance, cross-border banking, international reserve issuance or anchoring. [Gourinchas et al, Eichengreen].

- A cornerstone of the system is the stability of the USD and of US Treasuries as global safe assets. This generates a convenience yield (prices) and relaxes the US external constraint (quantities), as measured in the US's external return on its balance sheet.

- While evidence suggests that the U.S. external balance sheet still provides insurance, both quantities and prices are showing signs of stress.

Are We Getting Closer to a 'Triffin Moment'?

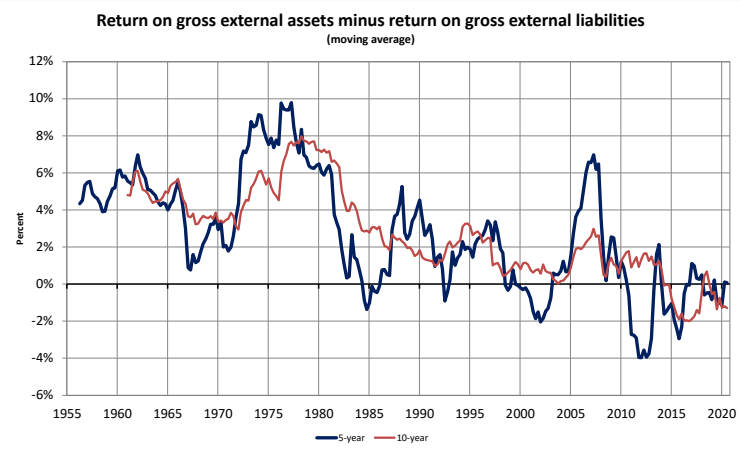


US NFA and Cumulated CA

- $VA/GDP = -10\%$. First time since 1977.
- Down from 40% of GDP in 2007.
- Recent decline due to the strong performance of US equity/DI liabilities.
- Possible interpretation: Unexpected increase in the profitability of US firms since 2013. One-off event? [Atkeson, Perri & Heathcote]
- But a longer perspective suggests low frequency decline in excess return.

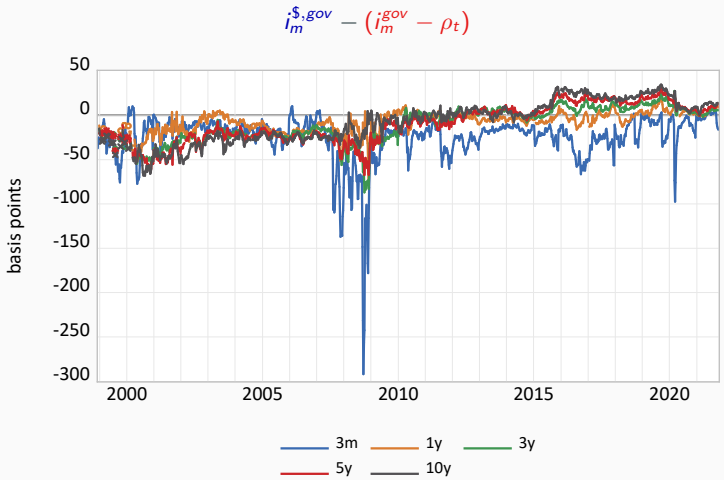
The difference between NFA and cumulated CA represents the cumulated valuation effects on the U.S. NFA.
[Source: US Integrated Macroeconomic Accounts.]

The Slow Decline in Excess Returns



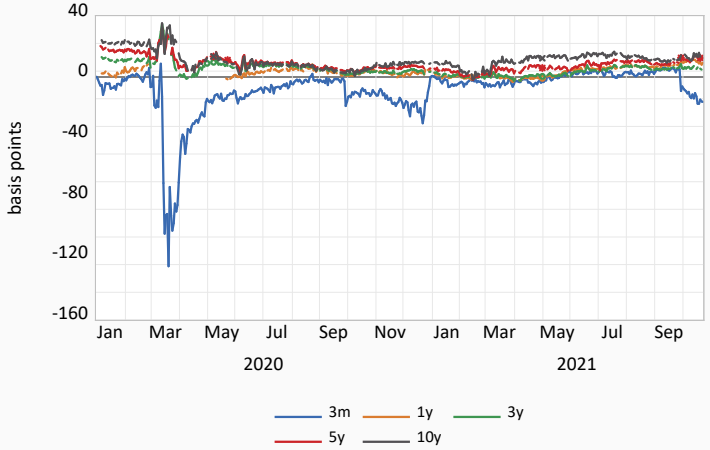
The figure reports the difference between the implicit return on gross external assets r^a and gross external liabilities r^l. 5-year and 10-year moving averages, centered on end-point. [Source: US Integrated Macroeconomic Accounts.]

The Disappearance of the US Treasury Premium



The figure reports the average US Treasury Premium for Germany, Japan, Switzerland and the U.K. Weekly average. [Bloomberg]

The March 2020 Dash for Cash: Inconvenience yield? [He, Nagel, Song]



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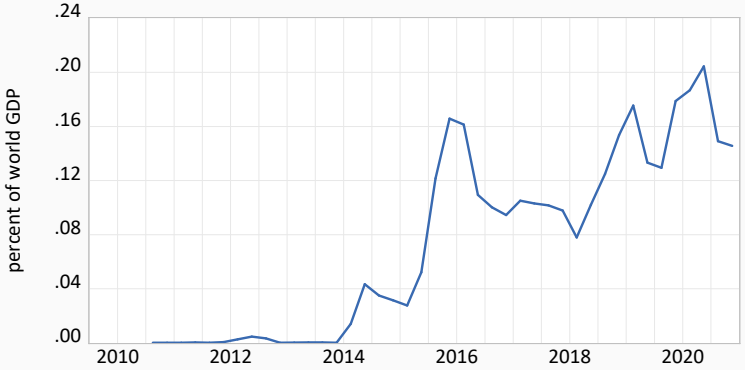
The Value of Negative-Yielding Bonds



The figure reports the market value of negative-yielding bonds, from Bloomberg-Barclays, expressed as percent of World GDP [Source: Bloomberg, Haver Analytics.]

Are We Getting Closer to a 'Triffin Moment'?

- Safe asset scarcity is still here, as evidenced by the market cap of negative-yielding bonds, representing 14% of world GDP.
- The closing of the excess returns suggests that U.S. Treasuries and the US external balance sheet may be losing some of their 'relative' shine.
- Fed reserves remain in very high demand (reverse repo). Dollar vs. U.S. Treasury convenience yield: Can one exist without the other?
- As other assets becomes more 'substitutable' with Treasuries, increased potential for large scale asset rebalancing and repricing. [Farhi et al, He, et al, Farhi & Maggiori]
- We may be much closer to a 'Triffin moment' than we thought.

Thoughts on Strengthening the IMFS

A New Architecture: The Fund as an Elastic Provider of International Liquidity

- The latest tremors could still be false alarms.
- But the transition to a multipolar system will happen. The question is when, not if!
- This transition, when it happens, could be fast and disruptive, especially in an environment where new technologies can weaken further the financial and payment system.
- The IMF can play a central role in the transition towards the new system. But we need a more radical rethink of its mission and resources, beyond its current charter.

$\Longrightarrow$ The Fund as an elastic provider of international liquidity

A New Architecture: The Fund as an Elastic Provider of International Liquidity

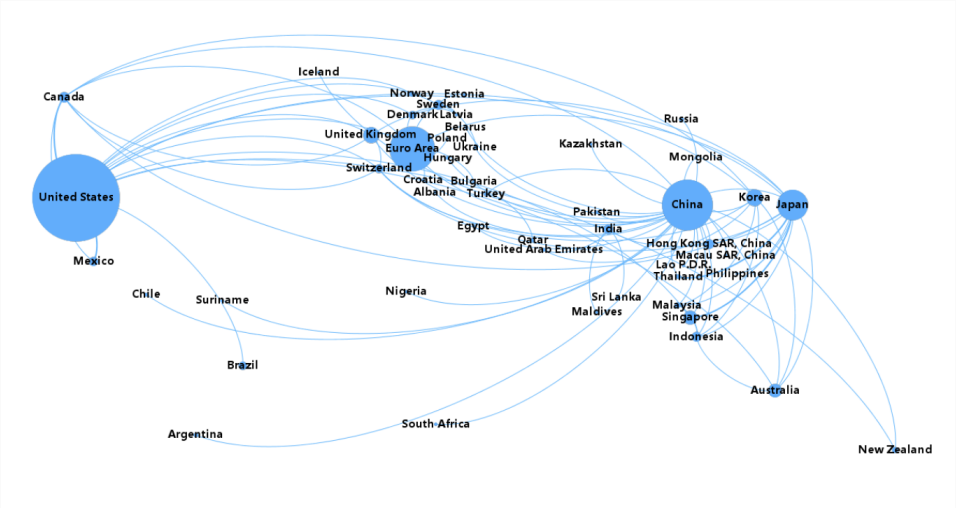
Current GFSN: $16tr in reserves, $1tr IMF, $3tr in additional resources (RFA, swaps...)

Key concept: Elastic and liquid provision of an international safe asset without the quasi-cost of international reserves for the periphery, and the Triffin dilemma for the issuer.

Benefits:

1. Reduction in safe asset demand, releasing funds for productive investments.
2. Lower likelihood of ZLB & associated problems for monetary policy ('safe asset trap')
3. Stabilizes the IMFS at scale.
4. Shared benefits/costs of supplying global liquidity with fewer coordination problems than a multipolar system.

The Network of Bilateral Swap Lines



The figure reports the network of bilateral central bank swap lines as of the end of 2020. [IMF, Perks et al. (2021)]

A Blueprint for an IMF's Safe Reserve Deposit (SRD)

In practice: the IMF could offer a Safe Reserve Deposit (SRD)

1. IMF collects reserves from member countries in a basket, redeemable at will.
2. IMF pools these deposits (up to a liquidity buffer) passively in global investable assets according to market caps. Returns are paid out to depositors and equity holders.
3. Sufficient liquidity buffer for idiosyncratic shocks. For global crises, IMF relies on standing swap lines with major currencies, collateralized by the IMF's investable assets. [for a fee; Bagehot]
4. More demand for safe assets translates into increased supply of IMF SRD elastically, backstopped by pool of IMF assets and swap lines.
5. Surveillance, conditionality and technical expertise still needed when countries need to go beyond their deposits + equity quota.
6. Fund governance adjusted to reflect economic size + liquidity supplier status.
7. Eventually, SRD can be traded, used as a medium of exchange, unit of account (invoicing, financing). [Carney]

Conclusion

- Twenty-one years after Maury Obstfeld's inaugural Mundell-Fleming lecture, much progress has been accomplished
- The theory is increasingly able to incorporate economic and financial granularity: networks, frictions, heterogeneity...
- Cross border data collection efforts are essential (BIS, IMF, Central Banks...)
- The toolkit for Emerging (and Advanced) economies is being re-designed in important ways.
- A major transition of the IMFS may already be under way, with profound implications for the stability of the global financial system. The Fund has an important role to play.

Thank You!