Mundell-Fleming Trilemma in the 21st century & China – Are we heading towards a multipolar global architecture? Joshua Aizenman USC and the NBER

Reviewing the global debate and related research with M. Chinn and H. Ito



DEUTSCHE BUNDESBANK EUROSYSTEM





The World Economy under High Uncertainty –

What kind of Economic Development Can Be Expected

in China, Europe, and the USA?

18th Monetary Policy Workshop at the Berlin School of Economics and Law

12-13 October 2017

Organised by Berlin School of Economics and Law, Southwestern University of Finance and Economics and Deutsche Bundesbank Berlin



- 1. Framing the Trilemma as a binary choice of "corner options" fitted well the Bretton Woods era (BW, 1945-1970) of limited financial openness and controlled financial stability.
- The US dollar was the anchor that other currencies were pegged to, and private financial flows were mostly prohibited.
- 2. The original Trilemma does not fit well the post BW world due to developments suggesting growing multi-polarity:
 - a. /Emerging markets prefer "in-between" regimes,
 - b. Most of the EU countries joined a currency union, Eurozone (EZ).
 - c. Chinese GDP [PPP adjusted] has converged to US & EU levels.
 - d. Following crises [1990s sudden stops crises, the GFC, EZ crisis], financial stability has been added to the original Trilemma policies
 → the Trilemma morphed into Quadrilemma.

Key points, cont. Jan Tinbergen policy assignment rule: The number of goals a policymaker can pursue successfully is no greater than the number of instruments the policymaker can control



3. In line with Tinbergen's result, the added policy tools needed to control financial instability include swap lines [mostly for OECD countries], buffers like IR/GDP and SWF [mostly for Emerging Market Economics, EMs], and Macro prudential regulation.

 Notwithstanding Rey's "Dilemma, not Trilemma" argument, the extended Trilemma remains valid into the 21th century. 5. While China has already asserted itself as a global player in manufacturing, and in export of infrastructure services [fast train systems, ports, power generation, etc.], Chinese global financial footprint falls short of the needed to compete with the liquidity and depth of the dollar bond market and dollar funding options.

Conclusions: The financial globalization of the RMB is a work in progress. Prioritizing financial stability by China and other blocks implies that it will take time for the RMB to become an international currency at par with the \$ or the euro.

In the meantime, the Asian region will continue to belong to the dollar bloc, with growing exposure RMB funding options linked to regional trade and finance, and the interests of China.



Tri-polar dynamics?

BW time, 1950, PPP adjusted, US the clear hegemon

Source: Infogram

2008, PPP adjusted: US, Eurozone and China approaching parity. Transitioning from the BW system into a multi-polar world? Path dependency & hysteresis, similar real GDP of the Euro Zone, US, and China, yet differential financial openness, and differential global financial footprint

Countries of the world resized according to their total estimated GDP output in the year 2010 measured in purchasing power parity (PPP) Map created by Benjamin Hennig (c) Sasi Research Group, University of Sheffield www.viewsoftheworld.net

GDP PPP 2010

Data sources: IMF (2010), Maddison (2003), UNDP (2004)

The economic Trilemma (aka the *impossible economic trinity*), vintage 1960s

Among Mundell's seminal contributions in the 1960s was the derivation of the Trilemma in the context of an open economy extension of the IS-LM Neo-Keynesian model, AKA the Mundell-Fleming model.

The Trilemma states that market forces impose scarcity of policy instruments. A country may simultaneously choose any two, but not all of the following three policy goals –

- **1. monetary independence, MI**
- **2. exchange rate stability, ERS**
- **3. and financial integration, FI**



The Global Finance and Monetary Regime after WWII followed the Bretton Woods 1944 agreement:

Financial regime:

Stringent capital controls prevent capital flows **Exchange rate regime:**

Fixed exchange rate, the US\$ the global anchor. Under these circumstances, countries enjoyed monetary independence, as their bonds were not traded across borders.



The Economic trilemma, as follows from the Mundell–Fleming model



The trilemma was framed as a binary choice between 3 stark policy options: a country simultaneously may choose any two, but not all, of the following three:

- Fixed exchange rate, providing exchange rate stability.
- Monetary autonomy, allowing setting domestic interest rates.
- Unrestricted financial integration with the global financial market.

Framing the Trilemma as a binary choice of 'corner options' fitted well the BW regime, and provided sharp predictions.

- Yet, following the collapse of the BW system in early 1970s, the OECD countries transitioned toward greater exchange rate flexibility, rapid financial integration, dismantling capital controls.
- The outcome: large increase in gross financial flows and exchange rate volatility, financial deepening and the proliferation of financial instruments aiming at hedging the exposure to greater exchange rate volatility.

Financial integration from 1970s
→ heightened exposure to financial volatility



Meanwhile, Emerging Markets (EMs)

- experimented in the early 1990s with greater financial openness, while maintaining exchange rate stability as a policy goal.
- An unintended consequence of the deeper financial integration was a string of sudden stops of inflows of capital, capital flights, and deleveraging crises.
- Depleted international reserves forced exchange rate depreciations, inducing countries towards the middle ground of the trilemma:
- 1. Managed exchange rate flexibility.
- 2. Controlled financial integration.
- 3. Limited monetary autonomy.

Emerging Markets' experience -- Financial liberalization in the 1990s, followed by deep crises. Mexico (1994-95), Thailand and East Asia in 1997, Russia (1998), Brazil (1999), Argentina and Turkey (2000-01), etc.

13



The Mexican crisis, 1994-5



Following the collapse of the BW system, growing share of EMs and developing countries experimented with in-between regimes, raising questions regarding the validity and the relevance of Mundell's binary choice Trilemma.

Testing properly the Trilemma paradigm remains a challenge.

- 1. While by now some view the Trilemma as truism, most countries are not at the vertices of the Trilemma.
- 2. The Trilemma framework does not impose an exact functional restrictions on the association between the three Trilemma policy variables with respect to configurations outside the three Trilemma vertices.
- 3. Measuring the degree of financial integration, exchange rate flexibility & monetary independence remains a challenge.
- Capital mobility has often been difficult to operationalize and to measure in practice.

Obstfeld et al. (2004, 05, 08) sidesteps some of these difficulties by taking a historical perspective by

Evaluating the transmission of interest rate shocks in various regimes, and over time contrasting different regimes that were close to the three Trilemma vertices. Overall, the results are in line with the Trilemma prediction.

1. During fixed-exchange rate episodes (the gold standard period), a pronounced & rapid transmission of interest-rate shocks is found, in line with the prediction that fixed exchange rate with capital mobility, nullifies monetary independence.

2. In contrast, during the Bretton Woods era, fixed exchange rates did not provide much of a constraint on domestic interest rates, a by-product of widespread capital controls.

3. In the post-BW era, the reversion to the more globalized pattern is manifested through an increased interest-rate transmission among fixedrate countries. Non-peg countries, have enjoyed considerably higher monetary independence than countries with pegs. Against this background, in a string of papers Aizenman, Chinn and Ito (ACI) aimed at testing a generalized version of the Trilemma hypothesis

I. We constructed continuous measures of the trilemma, normalized between 0 and 1, the bi-polar ends of the original Trilemma.

II. We tested the continuous version of a linear trilemma, where the sum of the three trilemma variables adds up to a constant-- a rise in one trilemma variables is traded off by the drop in the sum of the other two.

III. We extended the Trilemma hypothesis adding concerns related to the growing exposure to financial and regime instability -financial stability may be added as a 4th policy dimension – the trilemma morphed into a quadrilemma.

See http://web.pdx.edu/~ito/trilemma_indexes.htm

for these papers and the data

EMs Trilemma configurations 1970- 2010 Convergence to the middle ground



Trilemma trends 1970-2006



Exchr. Stab., non-EMG LDC

Mon. Indep., non-EMG LDC

KAOPEN, non-EMG LDC

Source: "The emerging global financial architecture: Tracing and evaluating new patterns of the trilemma configuration," Aizenman, Chinn and Ito, JIMF 2010

1990

Year

1980

Mon. Indep., IDC

KAOPEN, IDC

2000

Exchr. Stab., IDC

Latest trends, http://web.pdx.edu/~ito/trilemma_indexes.htm





MI, ERS, and KAOPEN, non-EMG LDC



In practice, Aizenman, Chinn, Ito (2010, 1) found that countries do not choose 2 policy options out of the 3,

Instead, they choose all three with different weights on the 3 policy goals: managed E.R. flexibility, controlled financial integration, and limited financial autonomy.



Policy makers face a tradeoff, wherein increasing one variable induces a drop in the weighted average of the other two variables. Example: greater financial integration lowers exchange rate stability or lowers monetary autonomy, or weighted average of both.

Precautionary IR holding, a lesson from the Asian crisis?

(a) As a ratio to GDP

(b) As a ratio to the world total



Note: For the country groups, the group's aggregate IR is divided by the group's aggregated GDP Note: For the country groups, the group's aggregate IR is divided the world's total IR

Testing the modern trilemma

Hypothesis: the weighted sum of the 3 trilemma policy variables adds up to a constant, with positive weights:

 $1 = a_j M I_{i,t} + b_j E R S_{i,t} + c_j K A O P E N_{i,t} + \varepsilon_t; \quad a, b, c > 0,$

where j can be either Industrial Countries, Emerging markets [EMs], or developing countries.

- We tested this specification, and validated it -- in line with the conjecture that countries face the trade-off, where higher policy goal is traded off with a drop in the weighted average of the other two policy goals.
- We tested the linear specification by verifying that adding quadratic terms is redundant (R^2 of the linear regression for the full sample is ~ 90%).

Findings for EMs

1. Greater MI and exchange rate flexibility can dampen output volatility while greater ERS implies greater output volatility, which can be mitigated by managing a buffer stock of reserves.

2. Greater monetary autonomy is associated with higher inflation while greater exchange rate stability and greater financial openness could lower the inflation level.

3. A policy pursuit of stable exchange rate while financial development is at the medium level can increase output volatility.

4. Greater financial openness with a high level of financial development can reduce output volatility, though greater financial openness with a low level of financial development can be volatility-increasing.

5. The middle ground of the trilemma and active management of IR allows EMs to lessen output volatility through reduced REER (real exchange rate)volatility.

Rey (2015) - alternative take on the trilemma

- The economic centre's [i.e., the US] monetary policy influences other countries' national monetary policy.
- That happens mostly through capital flows, credit growth, and bank leverages, making the types of exchange rate regime of the non-centres irrelevant.
- The countries in the periphery are all sensitive to a 'global financial cycle' irrespective of their exchange rate regimes. Thereby, the 'trilemma' reduces to an 'irreconcilable duo' of monetary independence and capital mobility "Dilemma not Trilemma." Consequently, restricting capital mobility maybe the only way for non-centre countries to retain monetary autonomy.
- Rey's concluded that whenever capital is freely mobile, the global financial cycle constrains national monetary policies regardless of the exchange rate regime.



- The follow up literature propagated by Rey's "Dilemma not Trilemma" hypothesis painted mixed & nuanced views of Rey's conjecture.
 - Taking the 'irreconcilable duo' hypothesis literally, the ECB & UK's monetary policy stance are irrelevant, as the EZ and the UK have been financially integrated with the global economy...
 - Mundell's Trilemma does not argue that countries can insulate themselves from global shocks propagated by large countries: the Trilemma is about trade-offs and mitigations.
 - Size matters: among *n* currencies, at most only *n* 1 are independent. USA's size matters especially as the financial size of the US well exceeds its global GDP share.
 - A possible avenue to test the viability of the trilemma is to verify the degree to which exchange rate regimes impact significantly the transmissions of shocks from financial center economies.

The counter factual of fixed exchange rate is not flexible ER, but collapsing exchange rate, and skyrocketing interest rates.

For EMs, the transitions from fixed to flexible exchange rate have been the outcome of sudden stop crises -depleted IR forced twin or triplet crises – collapsing exchange rate, banking, and sovereign debt. During this transition, the CB policy rate skyrockets.



Trilemma empirical literature is bounded by the historical data – no easy ways to control for the counter factual

Closeness to ZLB accounts for the growing sensitivity to the Center.

- Had Brazil been under a fixed exchange rate regime in 2010s, it would have gone by now a balance of payment and banking crises, aka collapsing exchange rate (Reinhart and Rogoff (2004), Ghosh, Ostry, and Qureshi (2015)).
 - Without controlling for this counterfactual, inference about the relevance of the exchange rate regime is limited, and should be taken with a grain of salt.
 - These views are in line with Bernanke (2017)'s Mundell-Fleming 2015 lecture at the International Monetary Fund, putting Rey's conjecture in the context of the evolving debate on the global financial structure.

Alternative take, supported by ACI (2016, 7) research, "Balance Sheet Effects on Monetary and Financial Spillovers."

Conjectures: The extended Trilemma is about trade-offs and mitigations.

Balance sheet exposure matters: Greater exposure to hard currency debt issued in currency i (i = US, EZ, Japan, UK) implies greater transmission of exchange rate and interest shocks from center i.

> We study how the financial conditions in the Center Economies (CE --U.S., EZ, Japan, UK and China) impact other non center countries (PHs), over 1986 – 2015.



- **1.** For each of the five linkages, we first regress a financial variable of the PHs on financial variables of the CEs while controlling for global factors.
- 2. Next, we examine the determinants of sensitivity to the CEs as a function of country-specific macroeconomic conditions and policies, including
- exchange rate regime, currency weights in the implicit currency basket, international reserves.
- balance sheet exposure, currency composition of external debt.
- monetary, trade and financial linkages with the CEs,
- the levels of institutional development.

For policy interest rates and the real exchange rate (REER), the link with the CEs have been pervasive for developing and EMs in the last two decades.

Movements of policy interest rates are found to be more sensitive to global financial shocks around the time of the EMs' crises in the 1990s and early 2000s, and since 2008.

- Having a higher weight on the dollar (or the euro) makes the response of financial variable like the REER and exchange market pressure in the PHs more sensitive to a change in key variables in the U.S. (or the euro area, respectively), such as policy interest rates, the REER, etc.
- Economies more reliant on dollar-denominated debt issuance tend to be more vulnerable to shocks emanating from the U.S.
- China does not exert (yet) substantial influence in financial markets

The greater exchange rate stability or less of financial openness a country pursues, the more **financial development** makes its economy's **EMP** (exchange market pressure) more sensitive to changes in the center economies' **REER**

- If a non-center economy runs a current account deficit, its EMP sensitivity to the REER of the CEs rises especially when it pursues greater exchange rate stability.
- Having greater trade linkages with the CE contributes to more positive EMP-EMP linkages if a country pursues greater financial openness.
- Greater import demand for a developing country increases policy interest rate or stock market price correlations at higher levels of exchange rate stability.
- Greater exchange rate stability also amplifies the impact of gross debt on the REER link.
- Holding higher levels of foreign reserves tend to help non-CEs to shield the impact of changes in the CEs' policy interest rates, i.e., to retain greater monetary autonomy.
- The above results validate EMs benefits from being in the Trilemma middle ground, buffered by international reserves and policies aiming at reducing balance sheet exposures.

Related studies with similar findings include:

Klein and Shambaugh (2015) Partial capital controls do not generally allow for greater monetary control than with open capital accounts, unless capital controls are quite extensive.

A moderate amount of exchange rate flexibility does allow for some degree of monetary autonomy, especially in emerging and developing economies. In any given year, there is a wide range of scope with which capital controls are employed, generating an extensive middle ground between open and closed capital markets.

Obstfeld, Ostry and Qureshi (2017) Countries with fixed exchange rate regimes are more likely to experience financial vulnerabilities—faster domestic credit and house price growth, and increases in bank leverage—than those with relatively flexible regimes. The transmission of global financial shocks is magnified under fixed exchange rate regimes relative to more flexible regimes. They attribute this to both reduced monetary policy autonomy and a greater sensitivity of capital flows to changes in global conditions under fixed rate regimes.

Bekaert and Mehl (2017) propose a measure

of de facto financial market integration based on a factor model of monthly equity returns.

They find evidence consistent with the trilemma and inconsistent with the dilemma hypothesis, both throughout history and for the recent decades; non-US central banks still exert more control over domestic interest rates when exchange rates are flexible in economies open to global finance.

Cerutti, Claessens and Rose (2017) use capital flow data dis-aggregated by direction and type between 1990 and 2015, for 85 countries.

The evidence is mostly inconsistent with framing the Global Financial Cycle as US cycle.

Most variation in capital flows does not seem to be the result of common shocks nor stem from observables in a central country like the United States.

ACI, "Financial Spillovers and Macro-prudential Policies" (2017, in progress)

A more intense implementation of macro-prudential regulations is associated with stronger monetary independence from the Center Economies (CEs).

This strengthening effect is greater in countries running current account deficit; holding lower levels of international reserves; when their financial markets are relatively close; when they receive more bank lending from the CEs; and when they have more developed financial markets.

Vulnerable to "Global Financial Cycles"?

- Countries around the globe have been nervous about the state of the major economies (the U.S., Euro Area, Japan, China)
- In the highly globalized world, the fate of economies, especially open and small ones, can be subject to policy changes in the economic centers (CEs)
 - "Fragile five" / "Taper tantrum"
 - Lifting of NIRP/ZIRP by the Euro area and Japan
 - China's slow down
 - Continuing U.S. contractionary monetary policy

Unwinding of U.S. Unconventional Policy

Federal-Funds Interest-Rate Target

37

For release at 2:00 p.m., EDT, September 20, 2017



38 Evaluation of global currencies: The US overplayed it's privileged position in the 1960s, ending the BW system. With lags (network externalities), the global IR system adjusts endogenously to the global patterns of trade, finance & economic might. The first adjustment was the formation of



China's external trade and direct investment settled in RMB (bn)



the Eurozone. The RMB Next ???



N.B.: 2017 data till March





Sources: World Bank staff calculations, using data from IMF Direction of Trade Statistics, IMF Currency Composition of Official Foreign Exchange Reserves, Bank for International Settlements, and World Bank World Development Indicators.

WB, Global Development Horizon, 2011

- Ideal global currency should have the following virtues
- I. Liquid and safe.
- II. Supplied in sufficient quantity.
- III. Delivering an 'appropriate return.' Jeanne (2012).
- The depth and liquidity of the global bond market in the specific currency is a necessary condition for a vibrant global currency.
- Supplying the global currency entails also the provision of a global public good, granting the suppliers the benefit of the 'exorbitant privilege.'
- At times of global peril, the public good is manifested by willingness to provide global insurance at a 'reasonable cost.'

Once the crisis took place, the US provided important global insurance services: bailing out Fannie Mae & Freddie Mac, and AIG in ways that shielded China and the EURO block, Swap lines to 4 EMs and OECD countries, etc... Gourinchas and Rey (2005) "From World Banker to World Venture Capitalist"

Are we in a messy transition to a Tri-polar world?

- US \$ ~ the US sphere of influence [the Americas],
- €~ The EU sphere of influence,
- the Eastern Pacific Rim [China, Japan, Korea, etc...], transiting from a US\$ towards a CYU anchored system ?
- The transition would be faster if
 - the US mishandles its fiscal and monetary overhangs
 - China avoids hard landing and financial crisis, moving smoothly to full convertibility, etc.
 - The CNY & € are yet to pass the test of a viable robust global currency CNY remains non convertible, lacks a vibrant global bond market.
 - The growing exposure of China to financial and growth instability [a common experience of maturing EMs] remains a valid concern.

China's Economy



Asia and EMs remain vulnerable, yet resilient (so far)

VIX and Net Capital Flows to EMEs



Why vulnerable?

- Spillover of monetary shock
 - A country with fixed exchange rate must follow the MP of the key economy (e.g., HK)
 - If the economy of concern does not have a fixed exchange rate arrangement, a rise in the interest rate of the key economy (e.g., U.S.) causes capital flight, currency depreciation of the domestic currency.
 - That can enlarge the debt burden if it is denominated in the key economy's currency
 - Also, it can cause disturbances in the domestic economy's financial markets (i.e., vicious cycle), see "Tapper Tantrum."

The Transmission of FEDs Tapering News to Emerging Financial Markets

45

Grouping EMEs into "robust" fundamentals (current account surpluses, high IR and low external debt) and "fragile", one finds that the tapering news was associated with much larger ER depreciation and increases in sovereign CDS spreads of the robust group than the fragile.

The tapering news had less impact on countries that received fewer inflows of funds in the first instance during the quantitative years and had less to lose in terms of repatriation of capital [Aizenman, Binici, Hutchison, IJCB 2016].

- Countries with larger and more liquid markets and larger inflows of capital in prior years experienced more pressure on their exchange rate, foreign reserves, and equity prices.
- Interpretation: investors being able to rebalance their portfolios more easily when the target country has a large and liquid financial market ["Tapering Talk" Eichengreen & Gupta, EMR 2015]

The resilience of Asian and other EMs economies

- Learned from the experience of the Asian financial crisis of 1997-98, moved to the middle ground of the Trilemma
- Since then, most of the Asian emerging market economies have been accumulating int'l reserves as a buffer to external shocks.
- In the aftermath of the GFC, countries exposed to larger hot money inflows, ended up being exposure to more outflows when the 'risk on' switched to 'risk off.'
- Outcome: growing use of macro prudential aiming at reducing the exposure to destabilizing hot money inflows in good times [risk on], mitigating thereby the need to hoard costly reserves.
- This is one of the lessons of the GFC, and the experience of S. Korea – IR accumulation is costly, and may not be enough to buffer at times of financial panic.

Most Asia's financial markets are not that open – mixed trends. Asian EMs are in the middle ground of the Trilemma, buffered with plenty IRs and SWFs



The degree of reliance on the dollar does matter, and remains high



(a) Dollar Share in Export Invoicing







Less and less reliant on the U.S. as an export destination, BUT

(a) Share of the U.S. as an Export Destination

(b) Share of China as an Export Destination



EA economies have maintained stable ties with the *de-facto* dollar zone.



The ongoing relationship with the dollar means 51

The dollar continues to be influential for the economies in the region, so does its issuer, the U.S. \rightarrow Asian EMEs are susceptible to shocks arising in the U.S. financial markets even though their levels of financial openness are still intermediate.

The continuing importance of the dollar is partly driven by the fact that China remains a dollar-oriented economy

Source:



52 What if China succeeded in "internationalizing" the RMB and forming its own currency zone?

- The extent of reliance on the dollar would change, which would change the volumes and directions of K-flows in the Asian region
- The rising Chinese income level and the country's role as a major global trading country will help the RMB to become more widely used as an international currency
- Questions: are the gains from the internalization of the RMB worth moving faster the convertibility agenda?



Sources: World Bank staff calculations, based on data from Bloomberg, the Board of Governors of the Federal Reserve System, and the European Central Bank.

China's bilateral currency swap agreements with other central banks – internalization the Chinese way?

Trade settlement in RMB has surged thanks to currency swaps that China entered with its trade partners: more than 30 bilateral currency, the total value of effective currency swap agreements was RMB 2.9 trillion in 5-2015 (~ US\$ 500 billion).

In 2014, US\$ 180 billion of swaps were conducted under these swap agreements. These growing currency swap agreements demonstrate the wider use of RMB and China's growing international responsibilities for its trade and strategic partners.

Source: http://www.frbsf.org/banking/asia-program/pacific-exchange-blog/banking-on-china-renminbi-currency-swap-agreements/



Key determinants for China to choose its RMB swap partners: trade intensity, economic size, strategic partnership, free trade agreements, corruption and stability.

Lin, Zhan, Cheung (China & World Economy, 2016)

Looking forward - uncertainties

- 1. How smoothly will China proceed with financial liberalization and deregulation?
 - Financial development and liberalization are the keys to internationalizing the use of a currency (Ito and Chinn, 2015; Ito and Kawai, 2016)
 - Chinese authorities have been an active interventionist since 2014
- 2. China is surrounded by countries that belong to the dollar bloc
 - The difference b/w the yen and the DM is whether countries surrounding the currency issuers belonged to the currency blocs (Ito and Kawai, 2016)
- 3. Is China ready to move to RMB convertibility? Not so far.

Looking forward

It would still take time for the RMB to become a fully convertible international currency. How fast? The answer is blowin' in the wind...

Conclusions: The financial globalization of the RMB is a work in progress. Prioritizing financial stability by China and other countries implies that it will take time for the RMB to become an international currency at par with the \$ or the euro.

In the meantime, the Asian region will continue to belong *de-facto* to the dollar bloc, with growing exposure to RMB funding options linked to trade and finance with China, at a speed dictated by China, and by global events.

Thank you for your attention!