

Exchange Arrangements Entering the 21st Century: Which Anchor Will Hold?

Ethan Ilzetzki

LSE

Carmen M Reinhart

Kenneth Rogoff

Harvard University

Bank of Israel, December 7, 2017

Overview

- **Introduce new and updated classification of anchor currencies and exchange arrangements**
- **USD dominant anchor / benchmark currency**
- **World has *not* moved to greater ERA flexibility**
 - **Bretton Woods II: Dooley et al (2003)**
- **Anchor currency classifications shed further light on new Triffin Dilemma.**
 - **Farhi, Gourinchas & Rey (2011), Obstfeld (2013), Farhi & Maggiori (2016)**

METHODOLOGY

Sketch of ERA Algorithm

- Use monthly absolute value of change in exchange rate.
- With respect to 10 candidate anchors/benchmark.

Freely falling	Inflation > 40% for 12 months
Peg	0 variation for 4 months
Narrow band	< 2% variation over 2 year rolling window
Managed float	
Freely floating	Within 99% CI of variation among anchors

Sketch of Anchor Algorithm

- **Freely falling/floating: no anchor**
- **Peg / Narrow band: anchor unambiguous**
- **Managed float: Single candidate anchor with smallest variation $>50\%$ of observations = anchor.**
 - **If none: use non exchange rate criteria**

Benchmark Currency Selection Process: Additional Criteria

Benchmark Currency Index:

Average of four measures:

- 1. Reserve denomination (% reserves in currency X)**
- 2. Trade invoicing (% of X+M invoiced in X)**
- 3. Denomination of (external public) debt (% denominated in currency X)**
- 4. Previous anchor ($1/y$, where y is the number of years since anchored to currency X.)**

Benchmark Currency Selection Process: Additional Criteria

Country	Years	\$ index	€ index	Benchmark
Brazil	2001-	62%	4%	USD
Canada	2001-	35%	5%	USD
Chile	2008-	48%	9%	USD
Colombia	2008-	71%	0%	USD
Iceland	2001-	23%	19%	Marginal
India	2012-	63%	7%	USD
Israel	2005-	37%	12%	USD
Korea	1999-			USD
Latvia	1998-2001			EUR
Turkey	1998-	40%	25%	USD
Uruguay	2009-			USD

Existing Classifications

Exchange Arrangements:

- Reinhart and Rogoff (2004)
- Shambaugh (2004)
- Levi-Yeyati and Sturtzenegger (2005)
- IMF (annually)

Anchor Currencies:

- Frankel and Wei (1994) for E. Asia

First to integrate anchor classification formally with ERA classification.

MODERN HISTORY: ANCHOR CURRENCIES

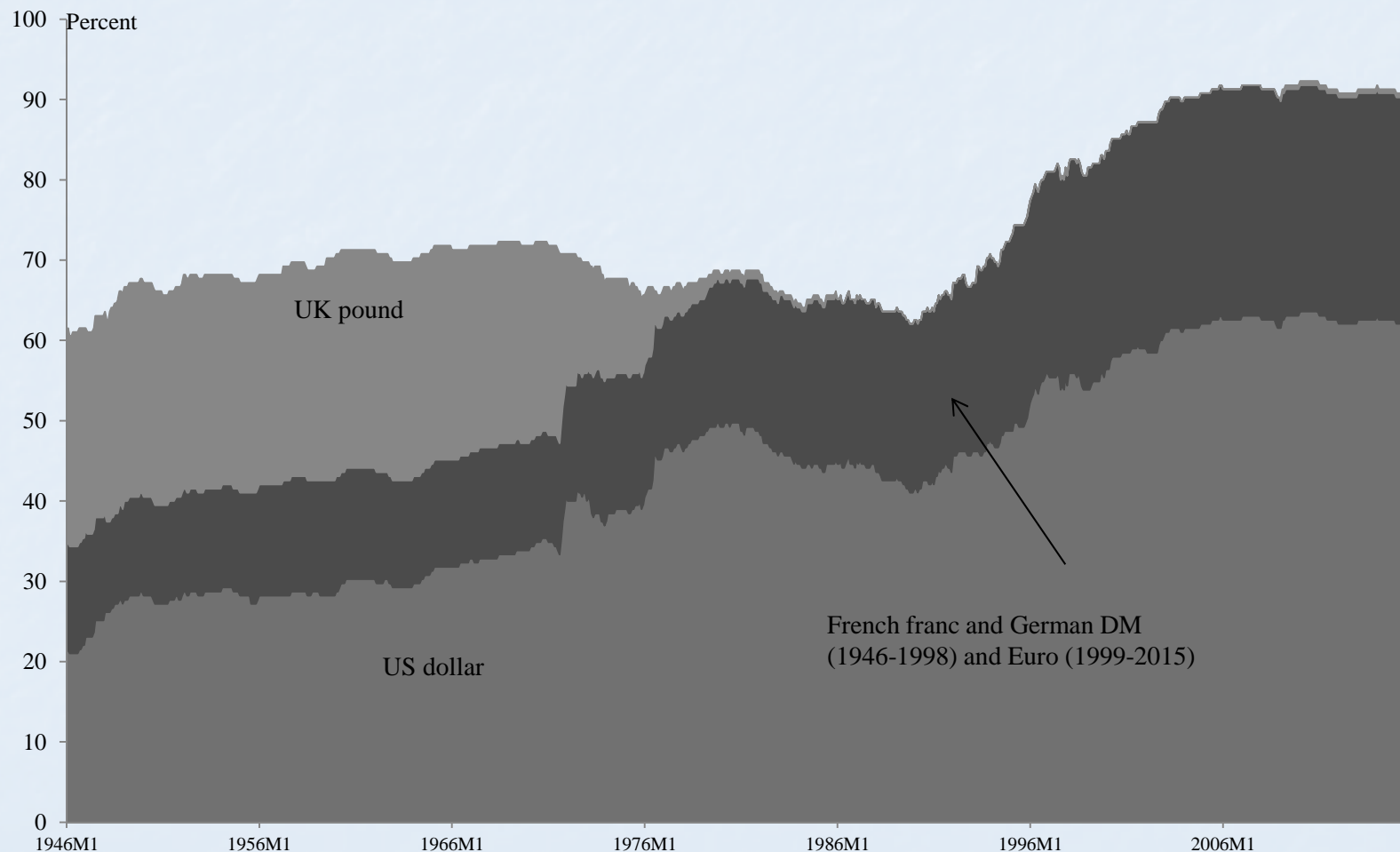
Summary of Findings

The dollar retains its dominant position as the world's reserve currency.

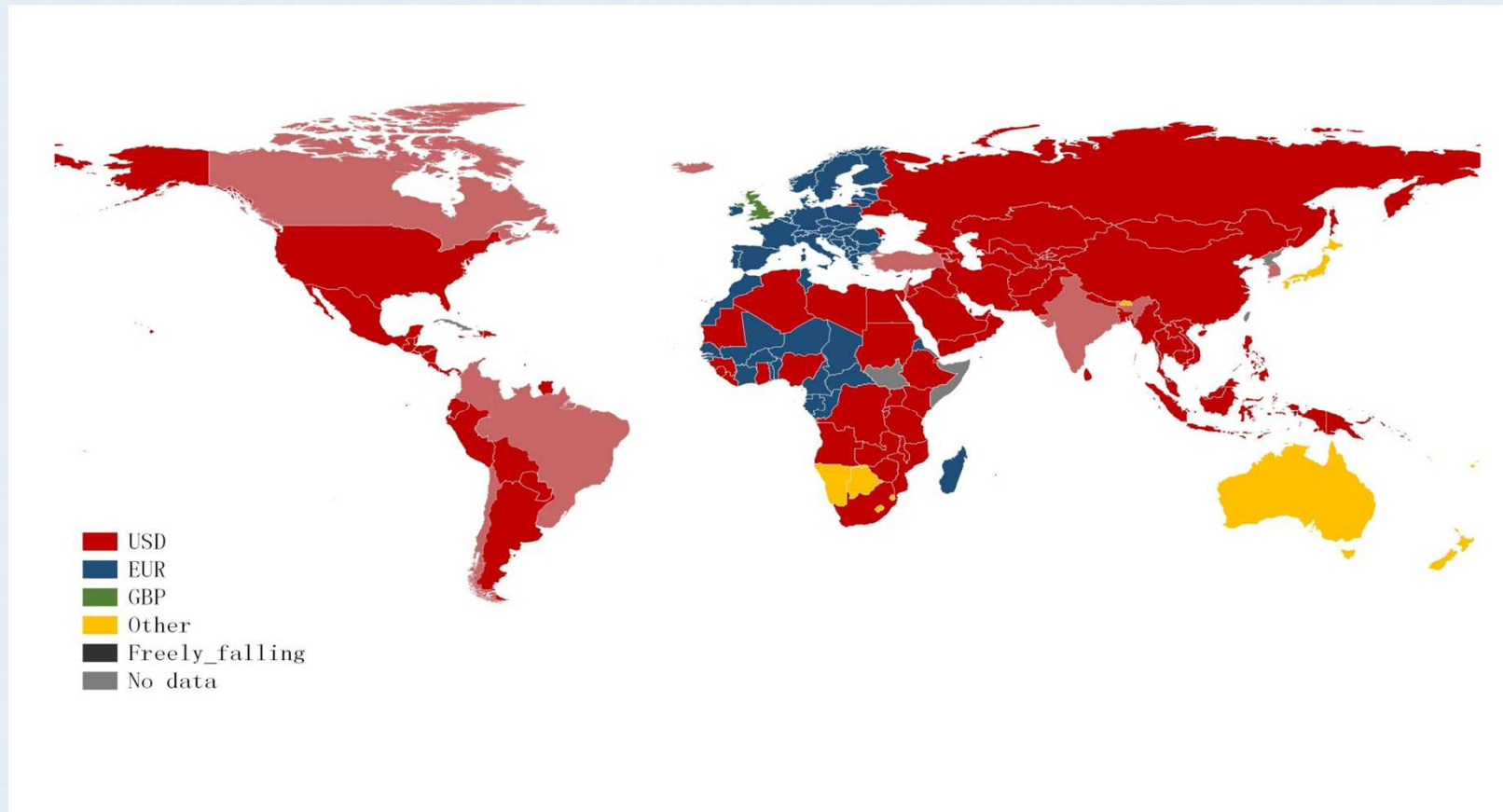
- **By some metrics it is as dominant as it was at the time of the early Bretton Woods era.**
- **By other metrics, its global role has expanded:**
 - **Collapse of the ruble zone**
 - **Re-anchoring of freely falling**
- **Classification consistent with other measures of dollar dominance and provides **summary measure** of anchor currency based on revealed preference.**

Post-World War II Major Anchor Currencies

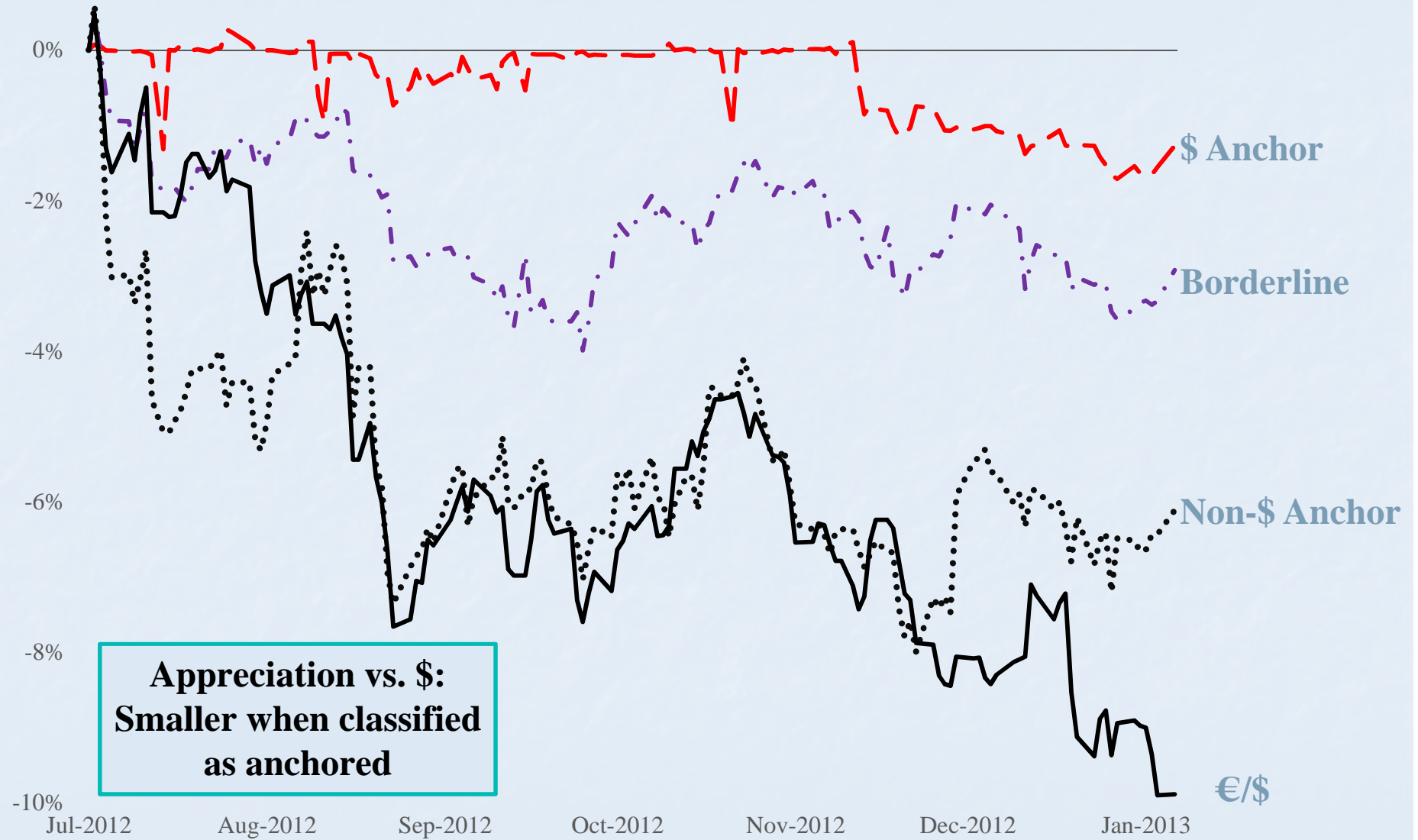
Share of countries, 1946-2015, excludes freely falling cases



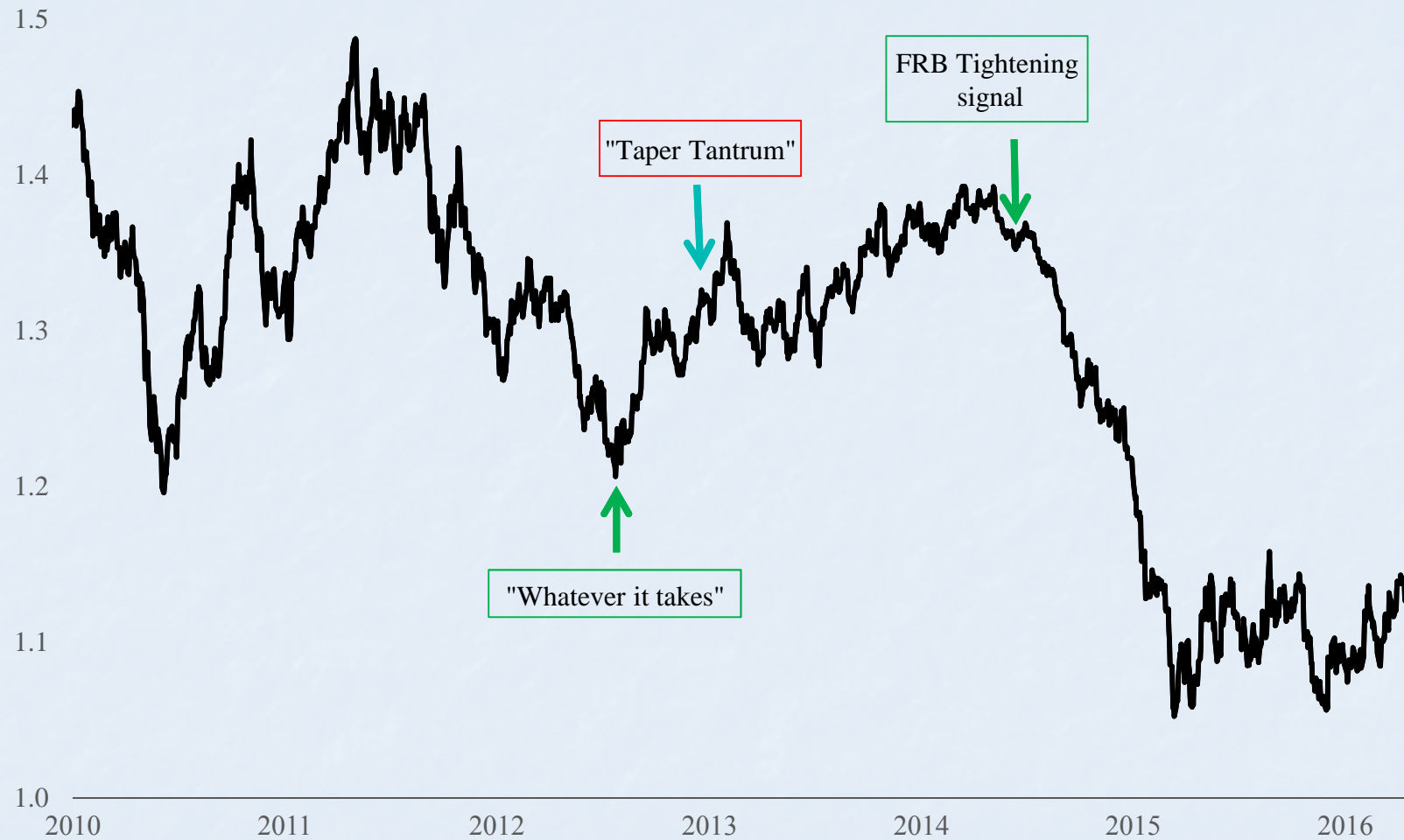
The Geography of Anchor Currencies, 2015



Stress Test: “Whatever it takes”, 2012



€/ \$ Exchange Rate



Markers of an Anchor Currency

Anchor measure or criteria: US dollar	Percent
Share of countries with a US dollar anchor in their exchange rate arrangements	62
Share of world's reserves (excluding gold) in US dollars	65
Share of developing country external debt denominated in US dollars. (This does not include debt owed to China that are denominated in US dollars)	64
Trade invoicing "index"	69
Memorandum item:	
Share of the US in world GDP	18

Anchor measure or criteria: Euro	Percent
Share of countries with a euro anchor in their exchange rate arrangements	28
Share of world's reserves (excluding gold) in euro	20
Share of developing country external debt denominated in euro	13
Trade invoicing "index"	55.5
Memorandum item:	
Share of the Eurozone in world GDP	11.8
Share of France and Germany in World GDP	5.6

Markers of an Anchor Currency

Anchor measure or criteria: UK pound	Percent
Share of countries with a pound anchor in their exchange rate arrangements	Nil
Share of world's reserves (excluding gold) in pounds	4
Share of developing country external debt is denominated in pounds	Less than 1
Trade invoicing "index"	8.5
Memorandum item:	
Share of UK in World GDP	2.7

Anchor measure or criteria: Japanese yen	Percent
Share of countries with a yen anchor in their exchange rate arrangements	nil
Share of world's reserves (excluding gold) in euro	4
Share of developing country external debt is denominated in euro	6
Trade invoicing "index"	9.6
Memorandum item:	
Share of Japan in World GDP	5

MODERN HISTORY: EXCHANGE ARRANGEMENTS

Summary of Findings

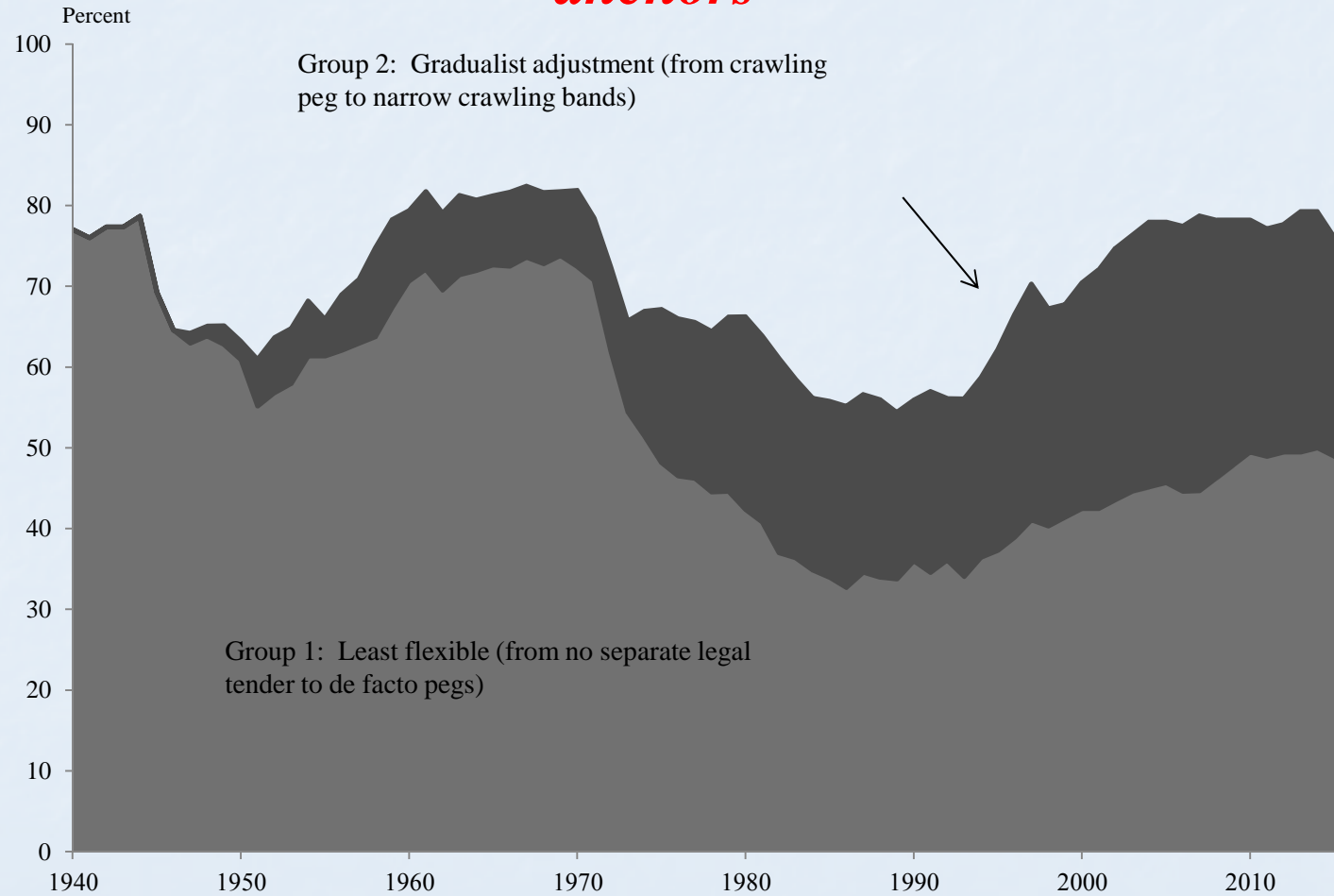
Oft cited global transition from fixed to floating exchange rates considerably overstates the reality.

- **Based on ERA classification for 194 countries over 1946-2016**
- **IMF classification of all Eurozone member countries as having floating ER since 2007 contributes to the overstatement.**
- **Lower incidence of bi-polar or corner solutions (Stanley Fischer, 2001)**

De Facto ERA 1946-2016

Share of (independent) countries in each group

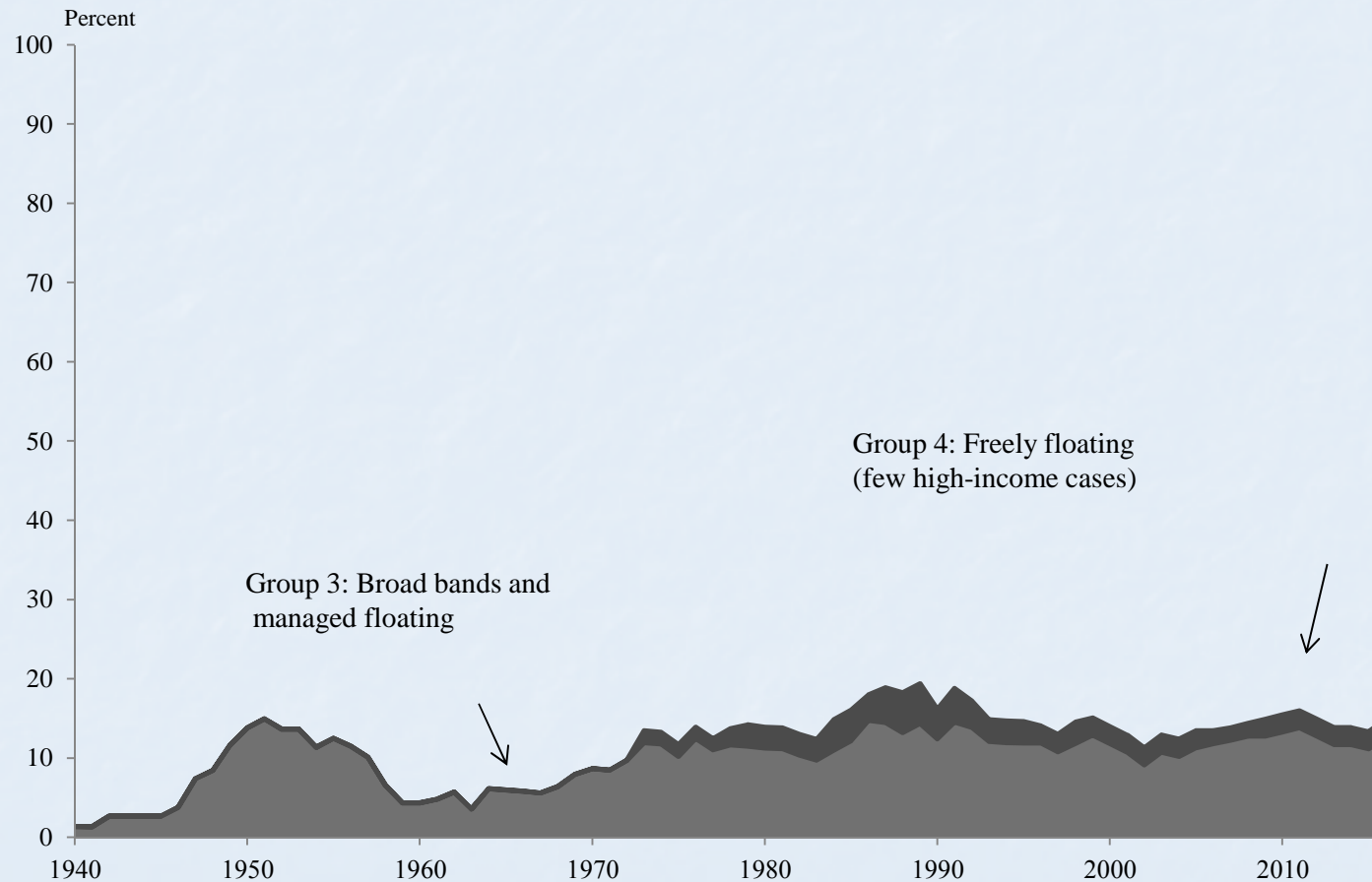
Groups 1 and 2: Less flexibility, primarily nominal exchange rate anchors



De Facto ERA 1946-2016

Share of (independent) countries in each group

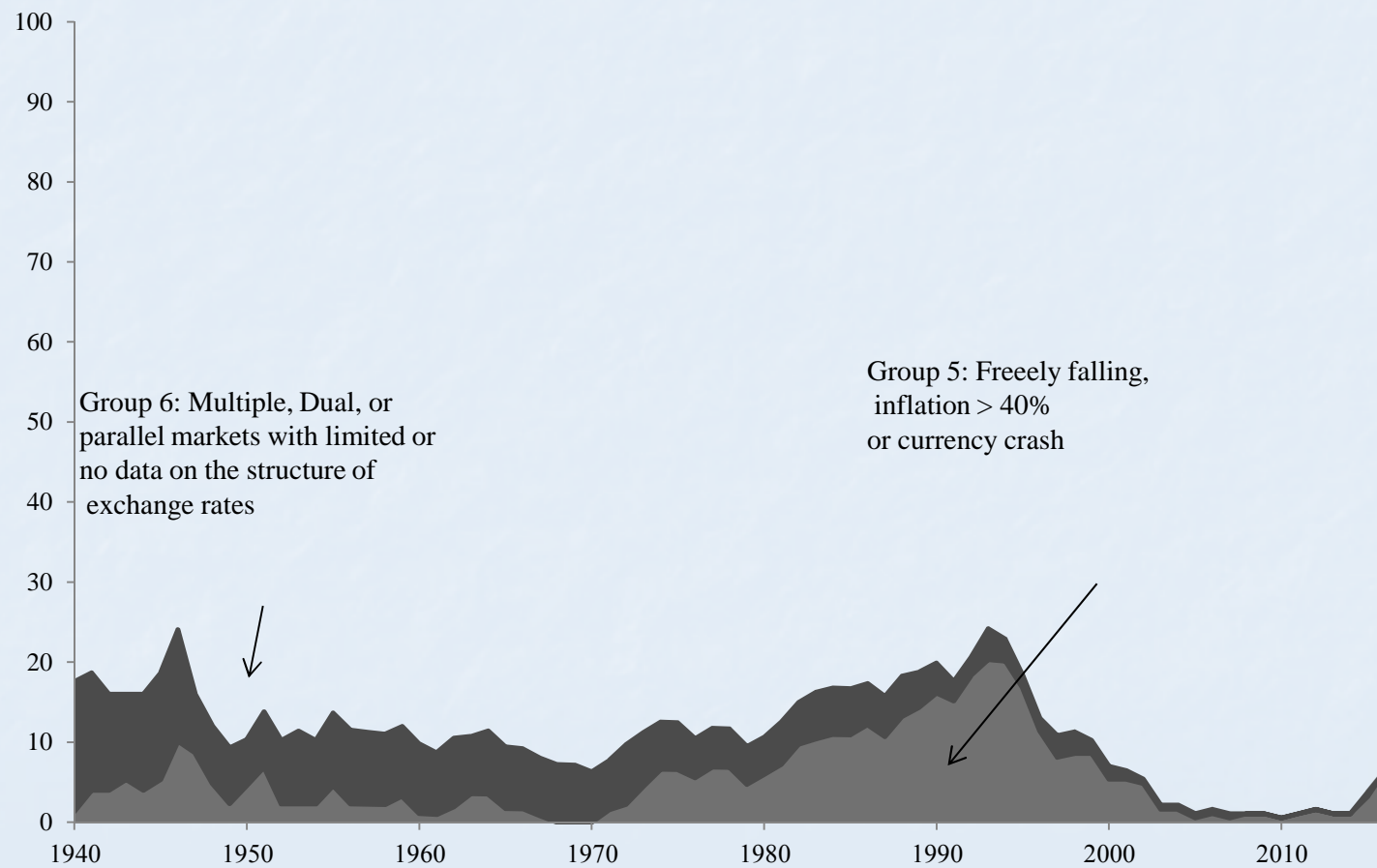
Groups 3 and 4: Flexible, incl. most inflation target arrangements



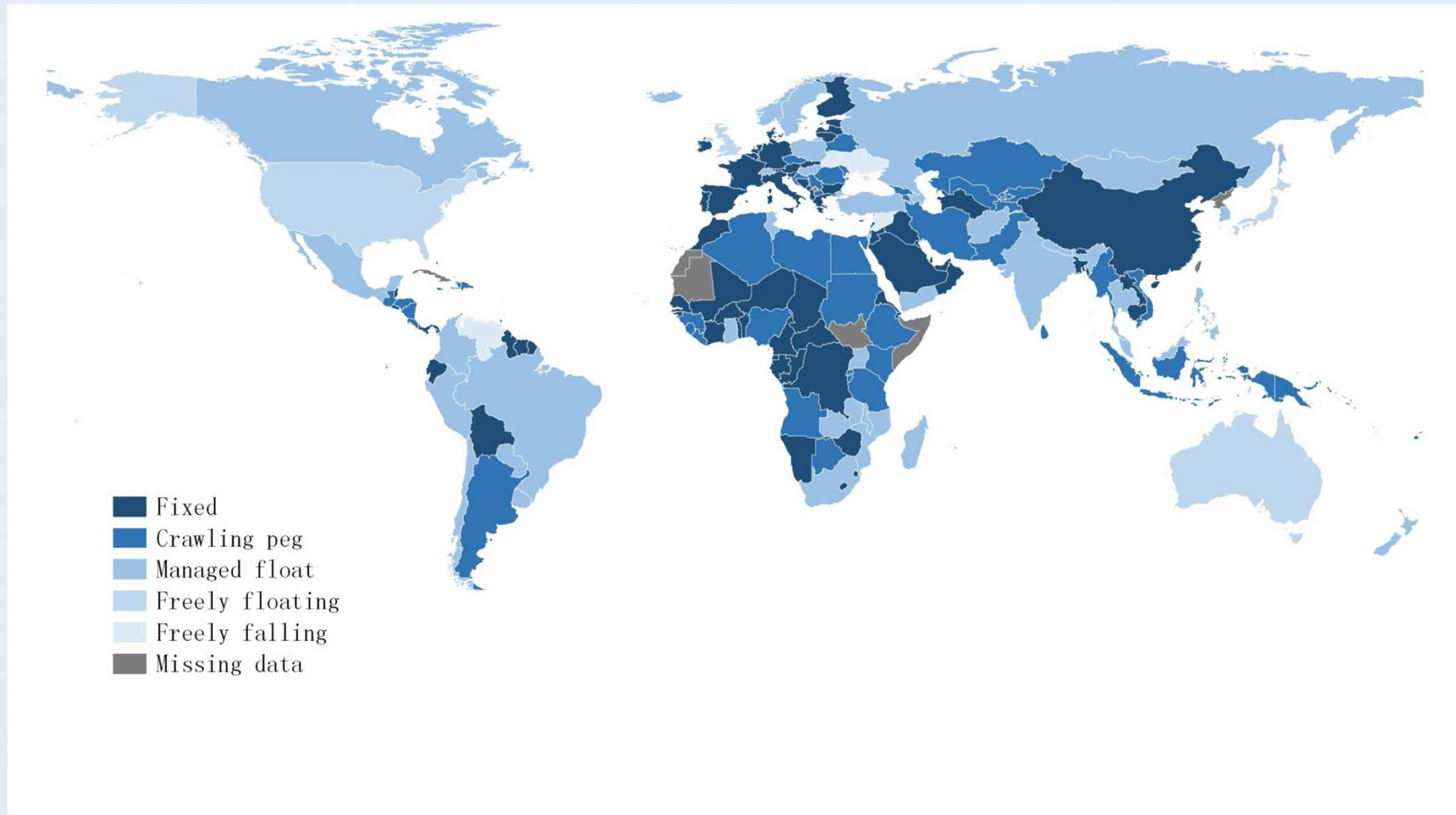
De Facto ERA 1946-2016

Share of (independent) countries in each group *Groups 5 and 6: Freely falling & multiple ER*

Percent



The Geography of Exchange Rate Arrangements, 2015



TRIFFIN DILEMMA

Summary of Findings

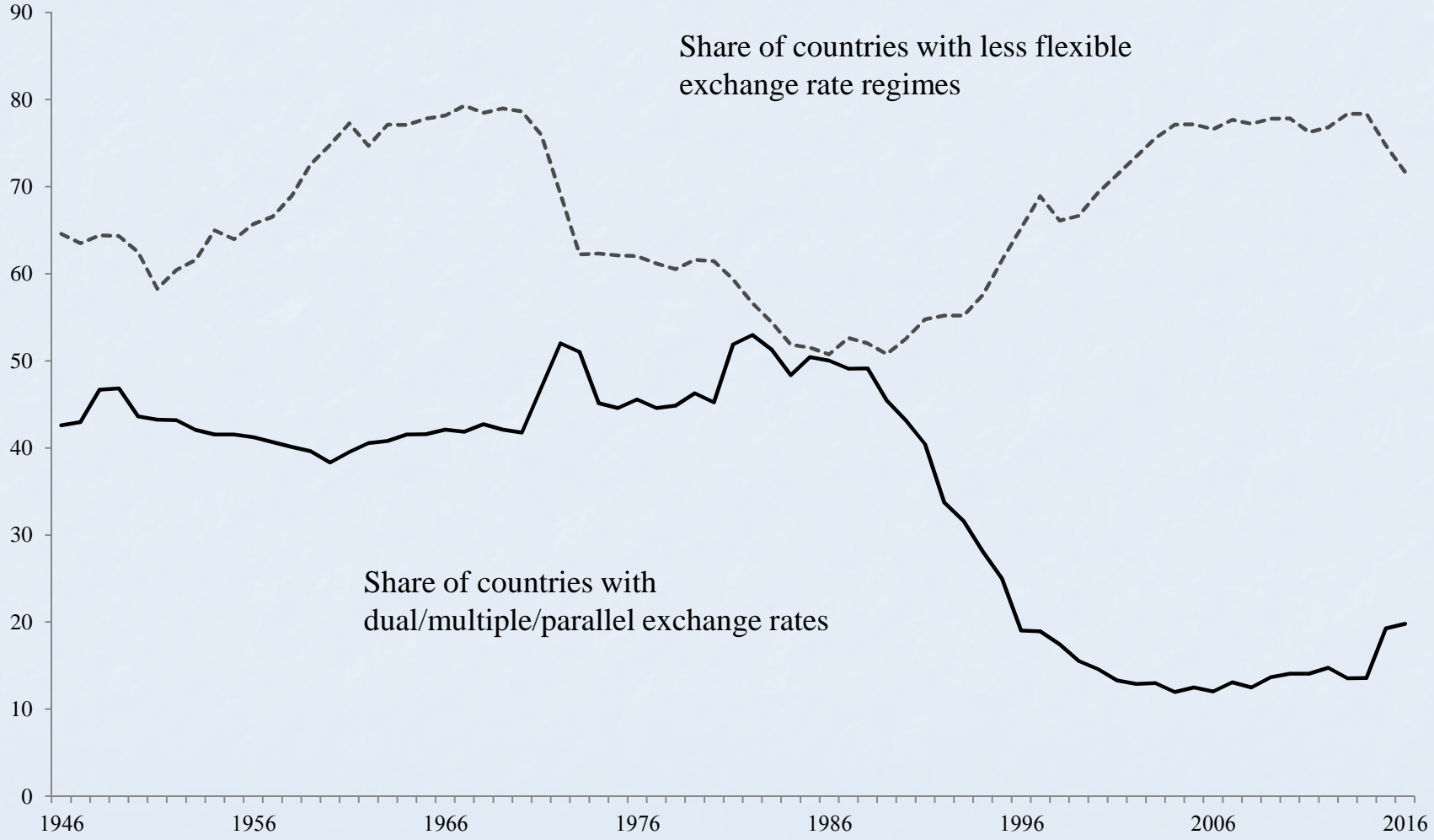
A modern Triffin Dilemma may be in the Making.

- **Increasing dominance of USD anchor**
- **Continued inflexibility of ERAs**
- **Reserve accumulation substituting capital controls**
(per theoretical analysis of Korinek, 2013)

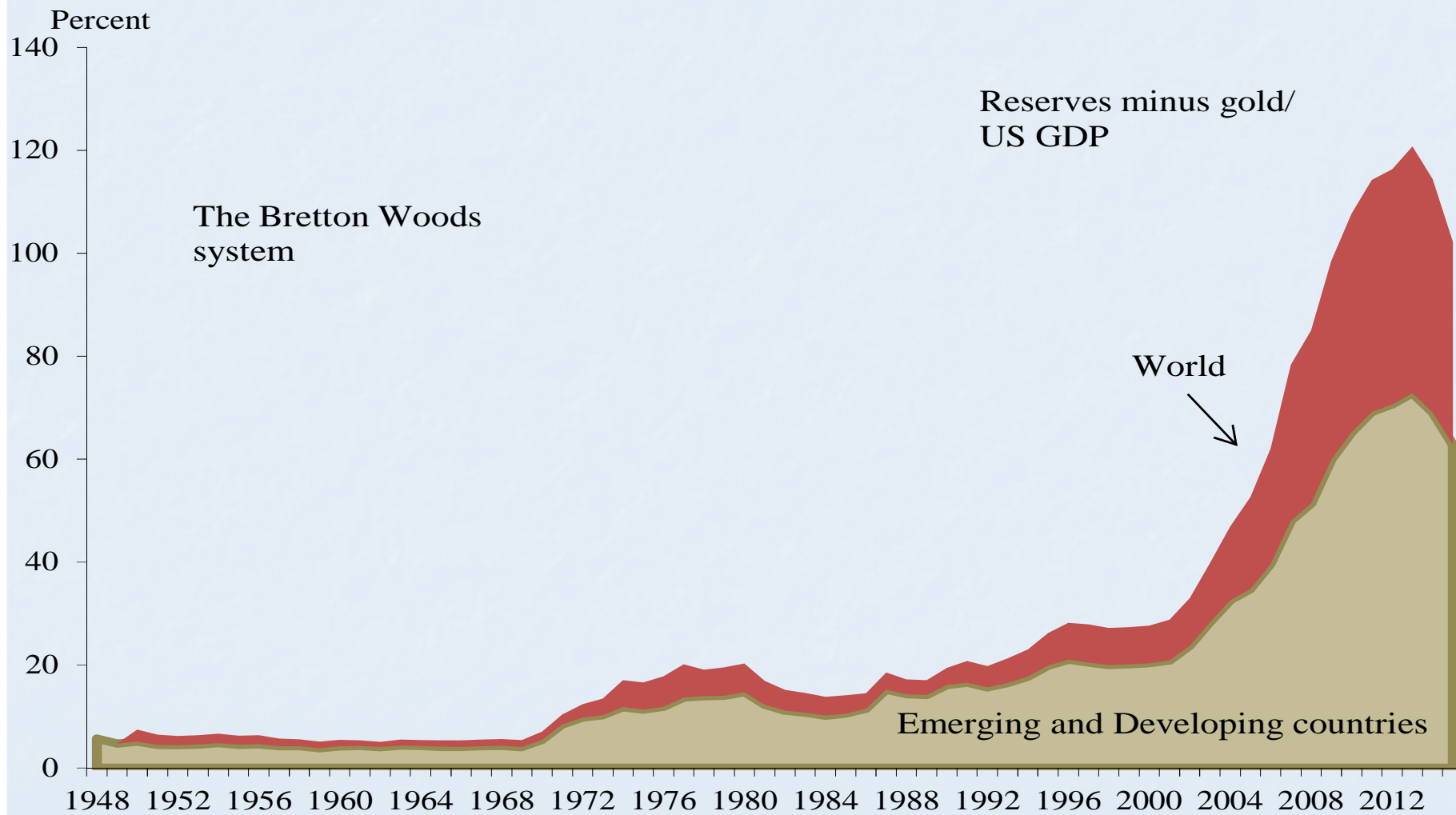
But

- **US declining share of global GDP**

Exchange Rate Arrangements and Capital Mobility, 1946-2016

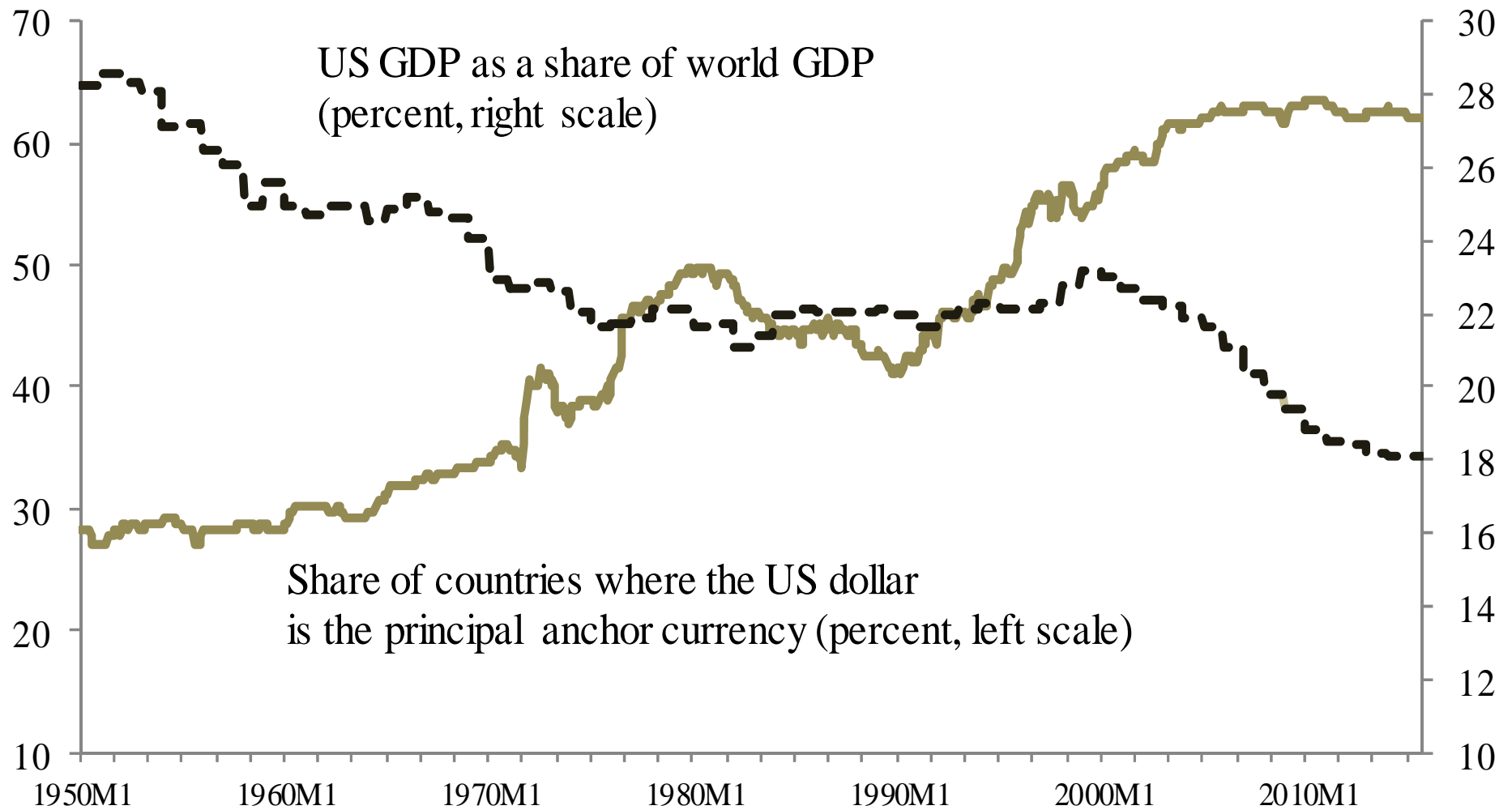


World Reserves minus Gold (US dollars) % of US GDP 1948-2015



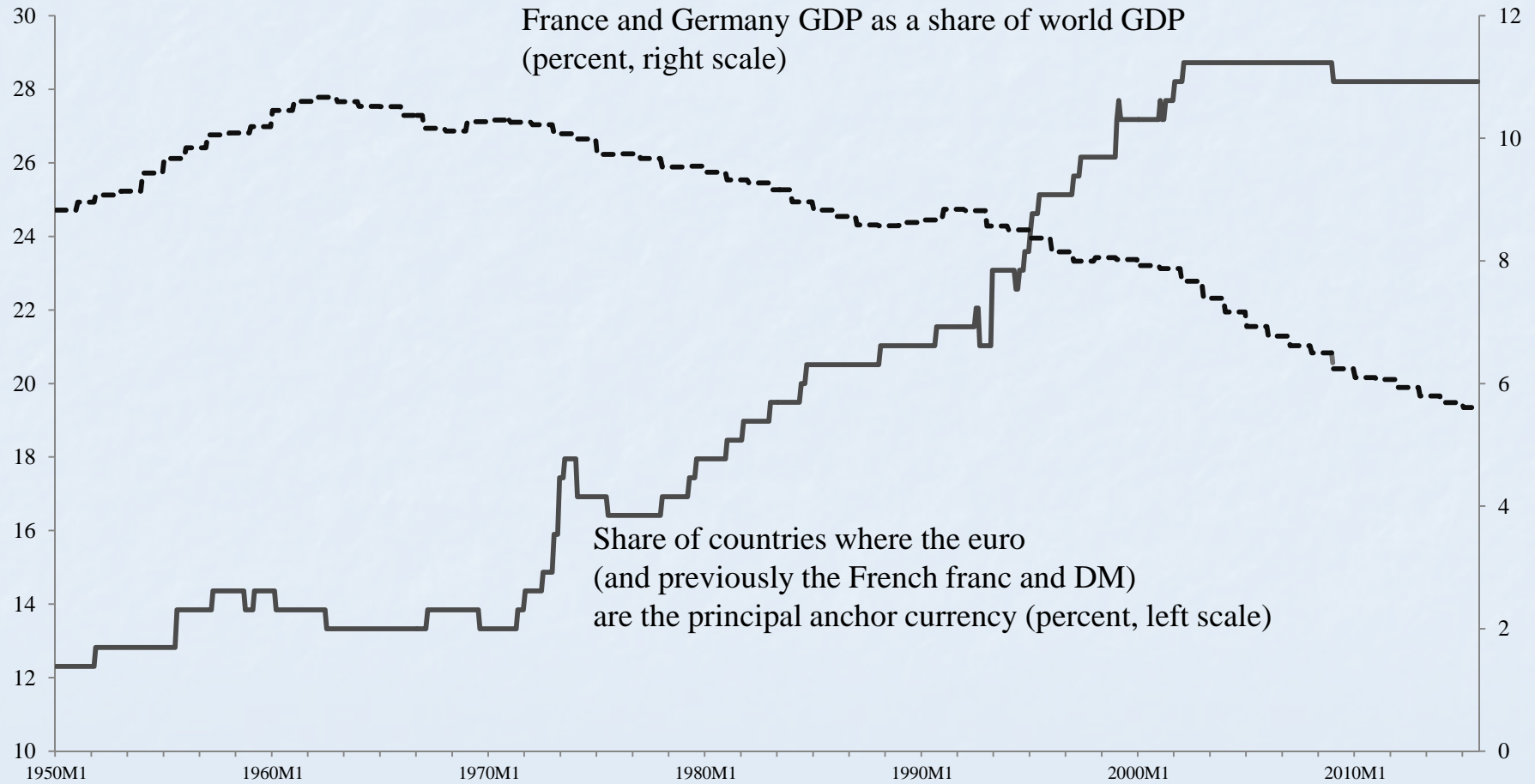
Role of the Dollar and US Economy 1950-2015

Share of countries

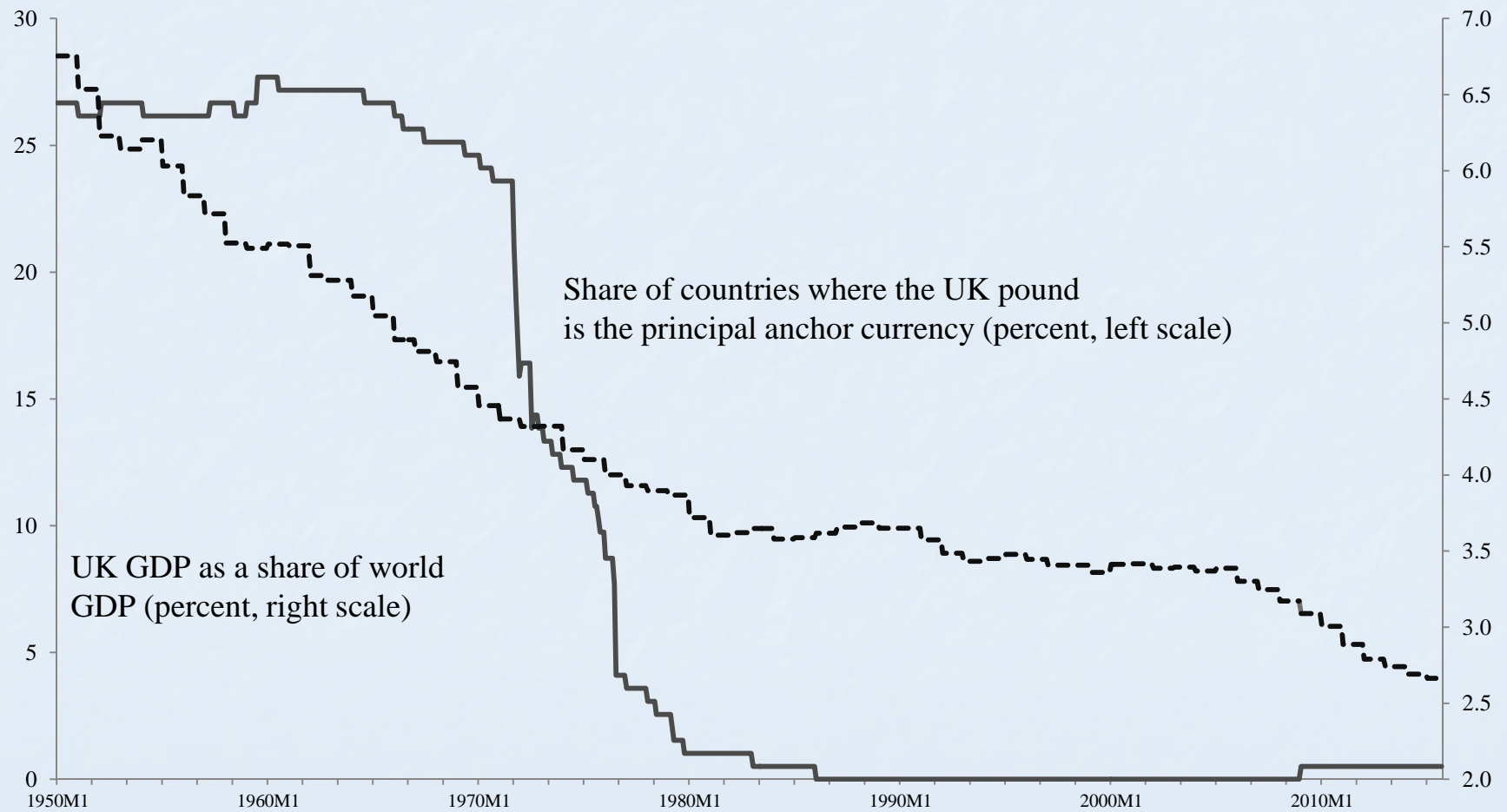


Reinhart

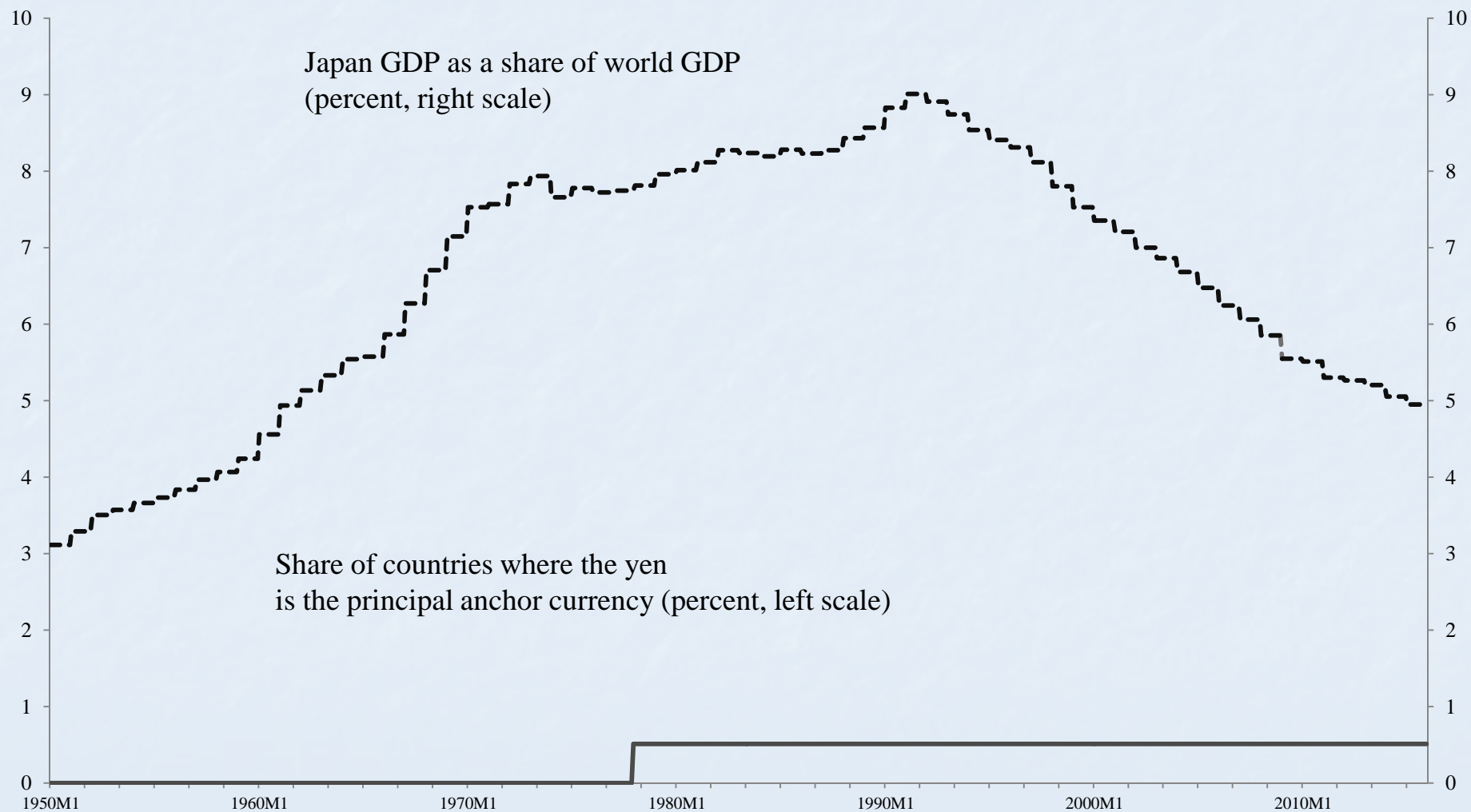
Role of the Franc & DM 1950-1998, and Euro 1999-2015



Role of the Pound and the UK Economy 1950-2015



Role of the Yen and Japanese Economy 1950-2015



Chinese Economy 1950-2015



Conclusions

- USD as dominant as anchor today as ever.
 - RMB is the wildcard.
- No substantial move to ER flexibility.
 - Increase in intermediate de-facto regimes.
- New Triffin Dilemma may be on the horizon.

**APPENDIX 1:
HOW TO CLASSIFY EZ
COUNTRIES?**

Classifying the Eurozone

- Eurozone >10% of World GDP
- Poses classification challenge
 - € floating externally
 - EZ countries no legal tender internally
- IMF classify all EZ countries freely floating
- We classify all as no legal tender

Classifying the Eurozone

- Unit of observation is sovereign country
- No EZ member has more than 4% voting share
- Trade: >60% of trade is internal
- Consistency in time series
 - EZ has moved to *less* monetary autonomy

Classifying the Eurozone: Evidence

- Modern macro textbook “floater” would likely follow Taylor’s (1993) rule:

$$i_t = \bar{r} + \pi_t + a(\pi_t - \bar{\pi}) + by_t$$

- i_t : nominal policy interest rate
- π_t : nominal policy interest rate
- y_t : output gap
- \bar{r} : natural rate of interest
- $\bar{\pi}$: inflation target
- **$a > 0$ required to satisfy the Taylor principle**

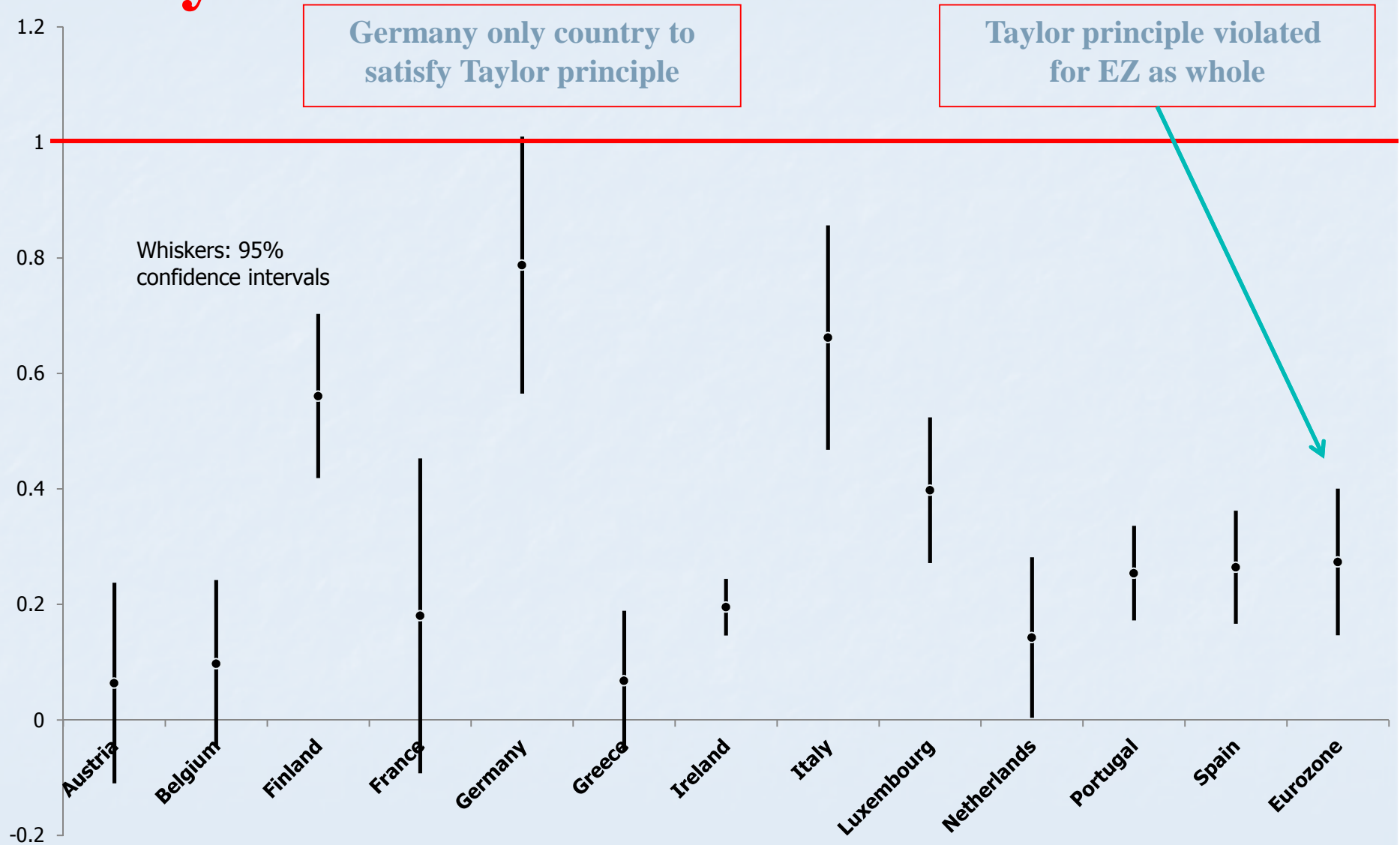
Estimating Taylor Rules

- For each EZ country n , estimate for 1999 –July 2014, using monthly data:

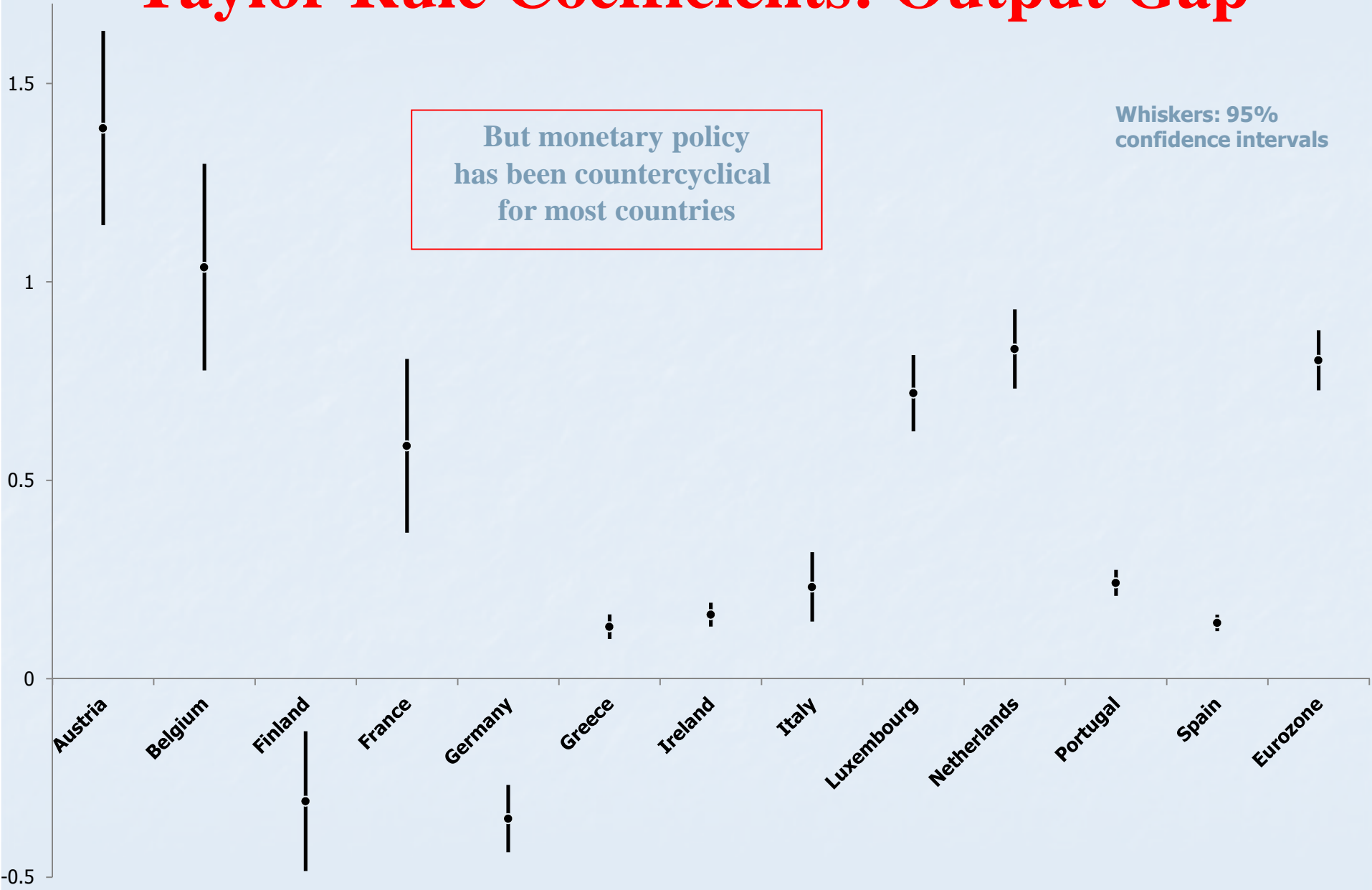
$$i_{t,n} = \alpha + \beta_1 \pi_{t,n} + \beta_2 y_{t,n} + \varepsilon_{t,n}$$

- $\pi_{t,n}$ year on year inflation
- $y_{t,n}$ output gap, estimated as deviation of unemployment from country's average unemployment rate 1992-2007
- **$\beta_1 = a + 1 > 1$ to satisfy Taylor principle**

Taylor Rule Coefficients: Inflation



Taylor Rule Coefficients: Output Gap



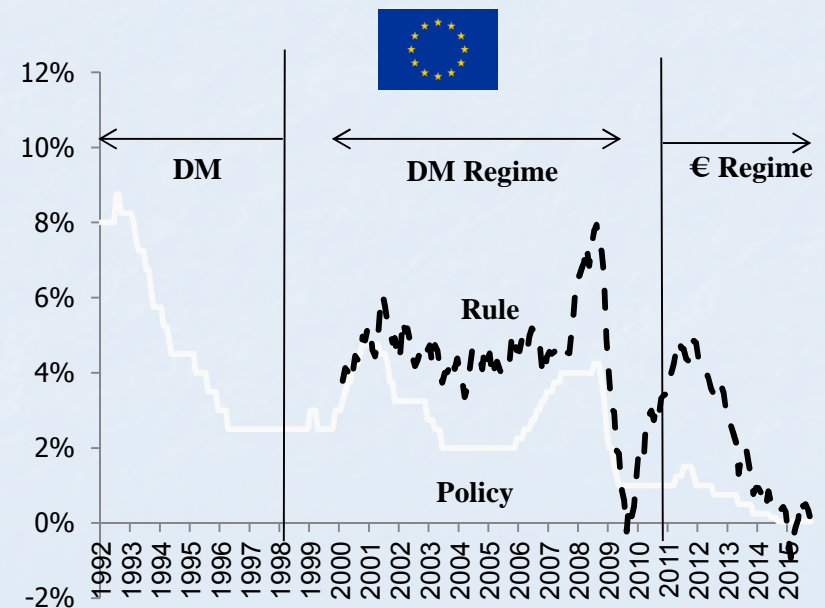
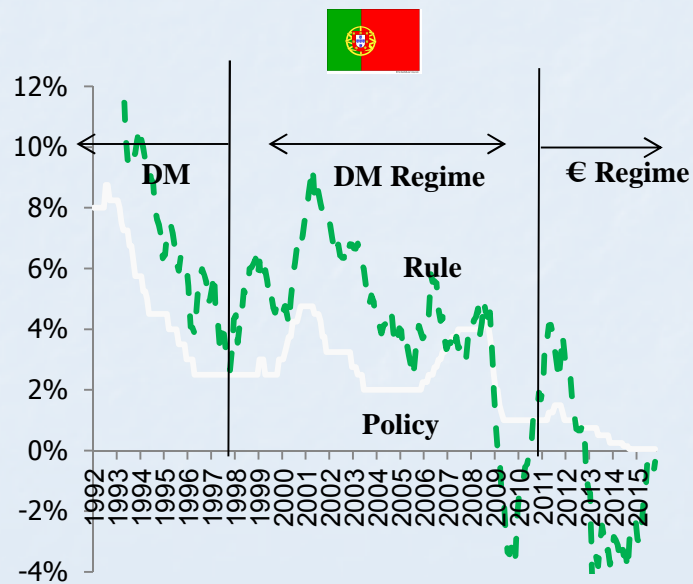
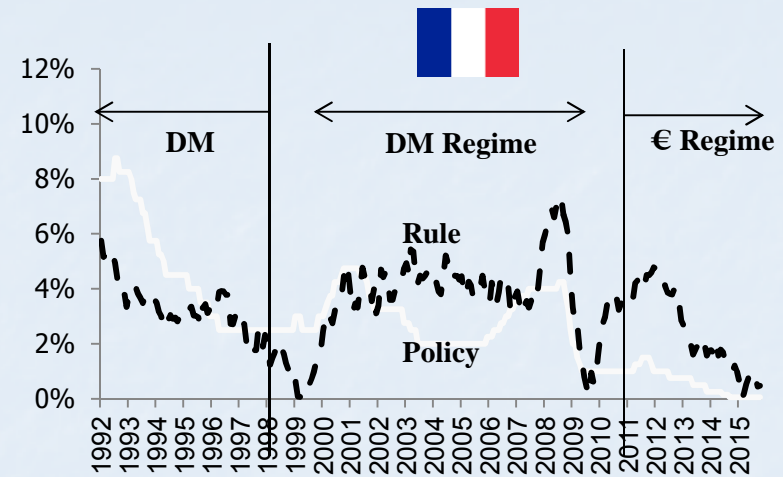
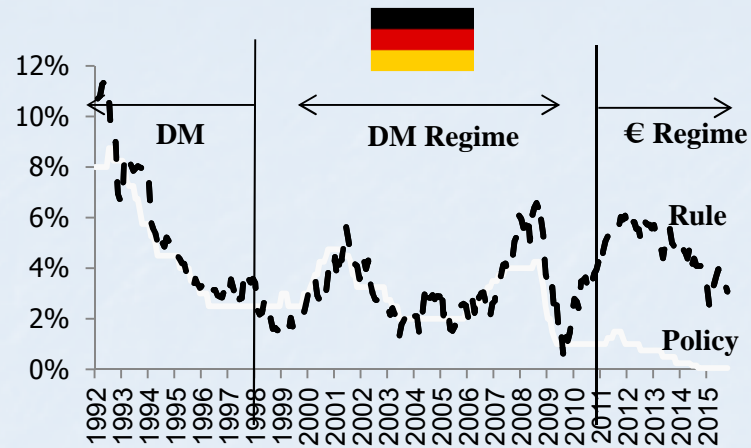
Calculating Taylor Rules

- - For each country, calculate Taylor (1993) rule recommendation:

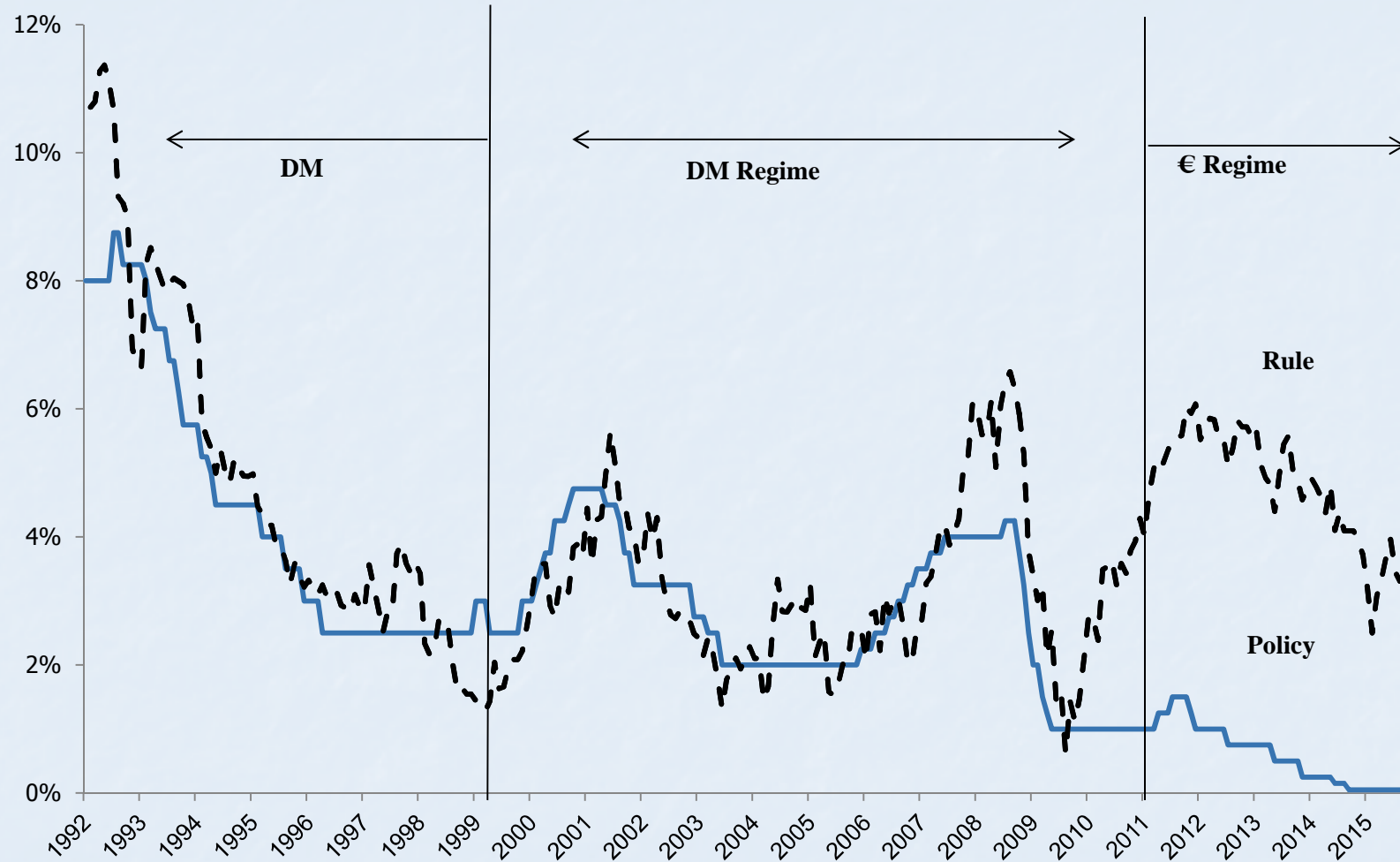
$$i_t = \pi_t + .5y_t + .5(\pi_t - 2) + 2$$

- With $a = b = 1/2$ as in Taylor's original rule
- Compare with actual policy rate

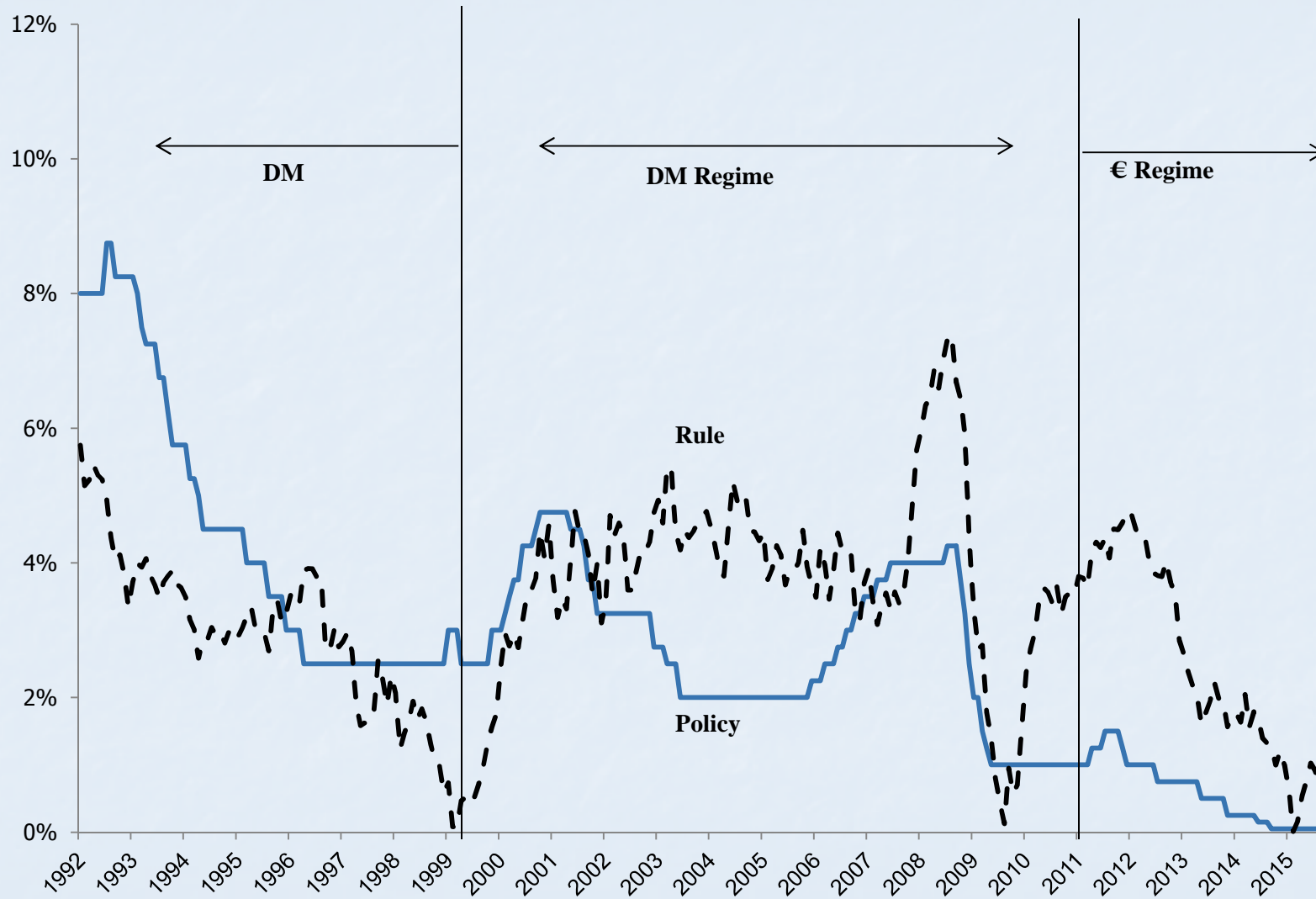
Taylor Rule vs. Policy Rate



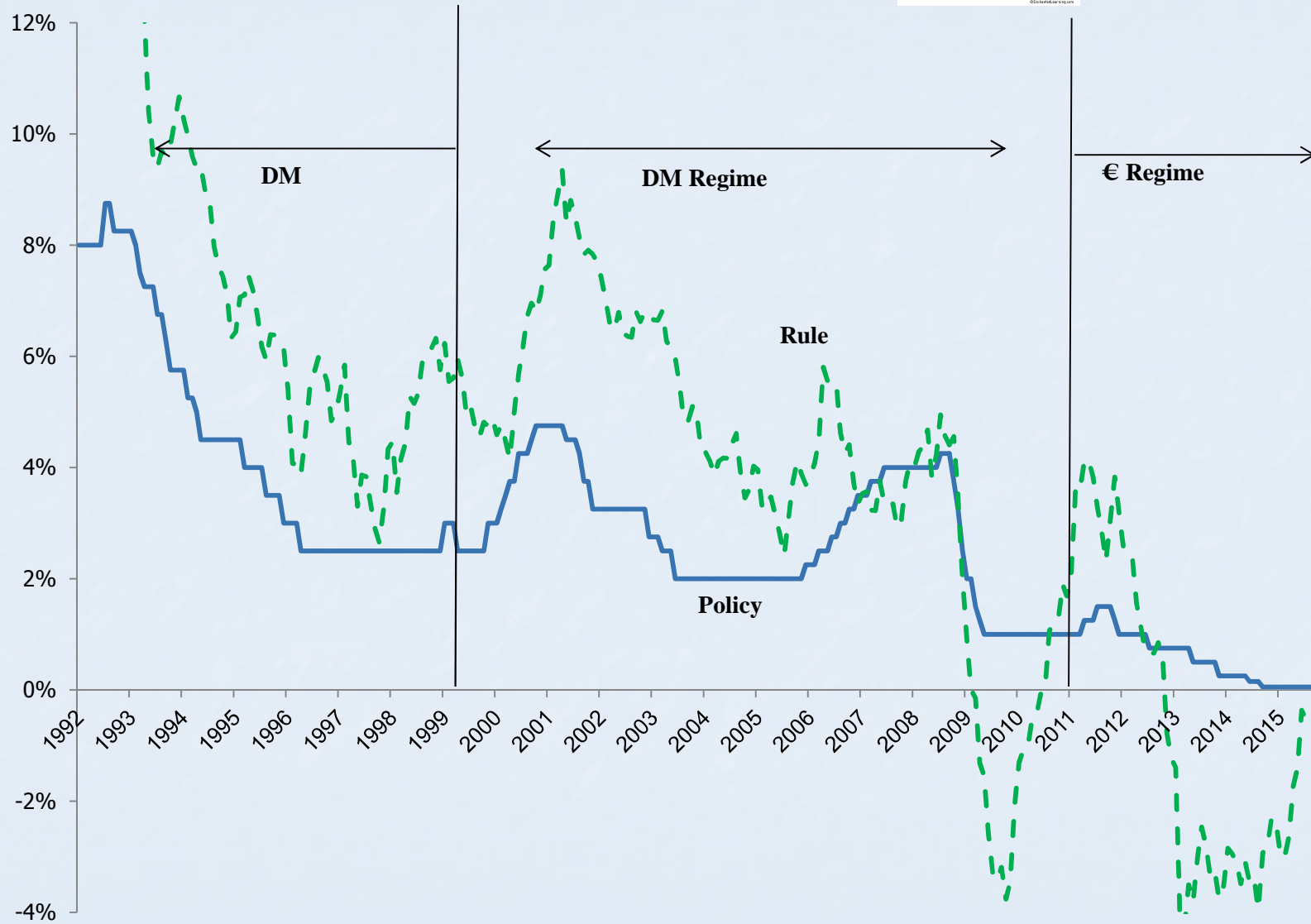
Germany



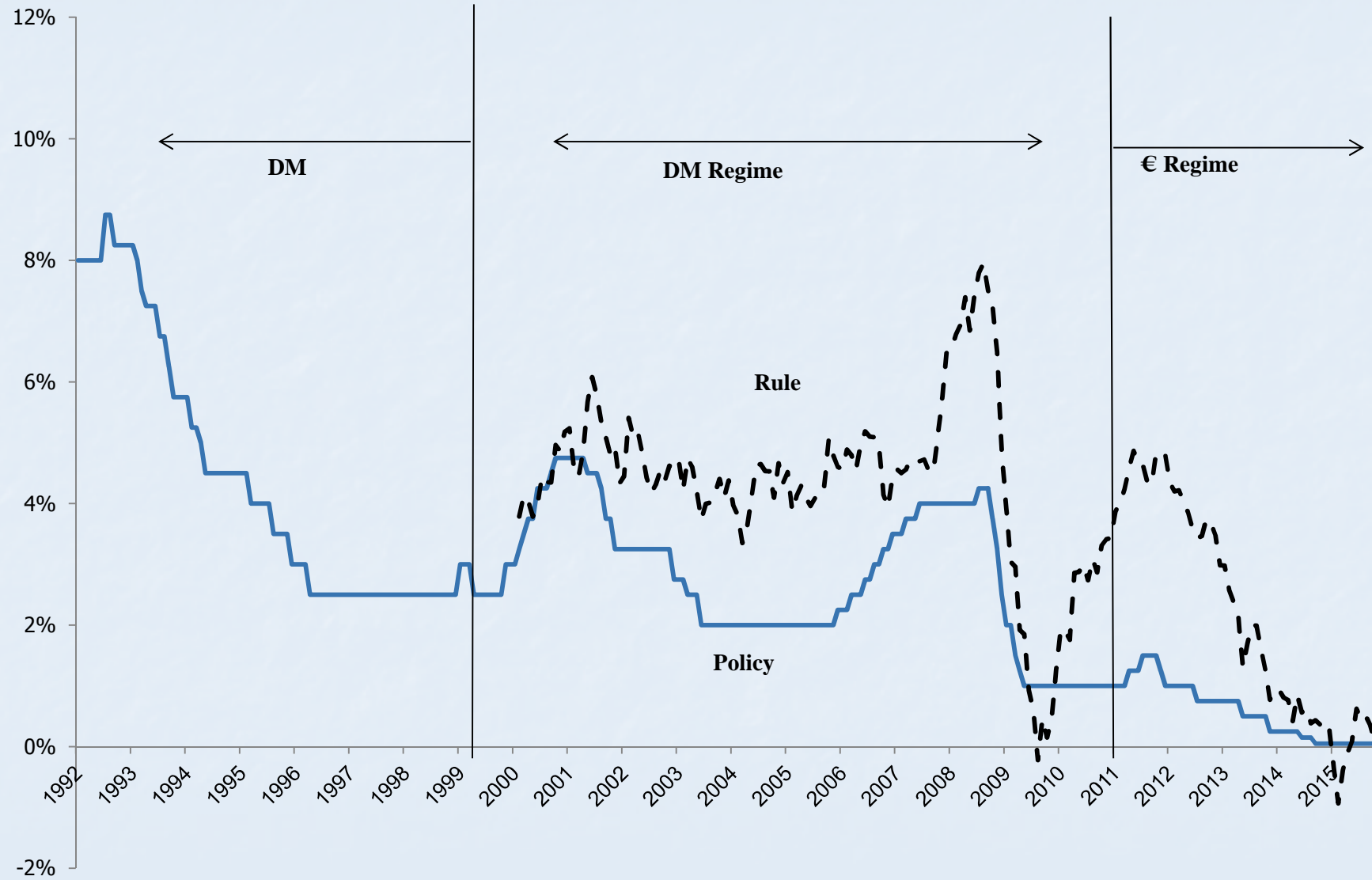
France



Portugal



Eurozone



Summary

- No clear break in policy in 1999
- ECB follows DM Taylor rule closely until 2008
- Post crisis ECB playing stabilizing role for EZ, but little to suggest that doing so for for any individual member

**APPENDIX 2:
ARE INFLATION TARGETERS
DIFFERENT?**

Inflation Targeting

- One of the biggest developments in de-jure monetary arrangements
- As we will show: IT not particularly informative
- Masks heterogeneity in exchange arrangements in practice.

Inflation Targeters



Monetary Practices of IT Central Banks

- Estimating Augmented Taylor rule for inflation targeters:

$$i_t = \bar{r} + \pi_t + a(\pi_t - \bar{\pi}) + by_t + cs_t$$

- Panel regression with country fixed effects
 - Exploiting within country variation
 - Average Taylor rule estimates across countries

$$i_{t,n} = \beta_1\pi_{t,n} + \beta_2y_{t,n} + \beta_3FIX_{t,n}\pi_{t,n} + \beta_4FIX_{t,n}y_{t,n} + \alpha_n + \varepsilon_{t,n}$$

Augmented Taylor Rule Estimates

Unbalanced Panel 1990-2015

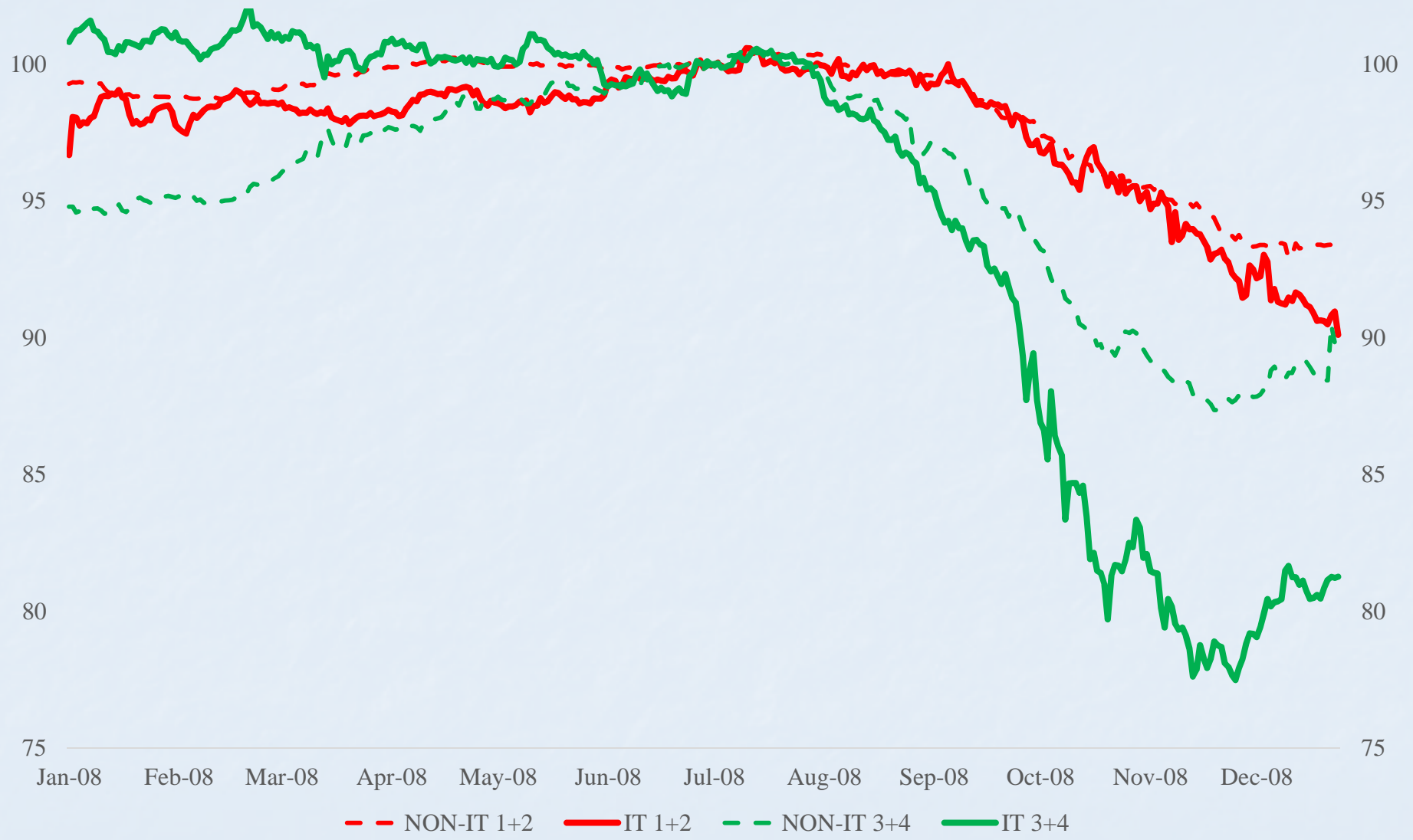
Regression Results w. Country Fixed Effects					
Dependent Variable = Nominal Interest Rate					
	1	2	3	4	5
Inflation	.68*** (.014)	.67*** (.015)	.74*** (.017)	.74*** (.017)	.73*** (.017)
Log(Exchange Rate)		2.24*** (.144)	2.03*** (.147)	1.99*** (.150)	1.60*** (.150)
Unemployment				.10*** (.017)	.07*** (.017)
Commodity Price Inflation					1.00 (.628)
Inflation*"Fixed"		Fixed IT: Less aggressive on inflation		-.19*** (.026)	-.19*** (.026)
Log(Exchange Rate)*"Fixed"		Fixed IT: More aggressive on exchange rate		.34*** (.053)	.36*** (.053)
Commodity Price Inflation*"Fixed"					.22 (.168)
R ²	0.32	0.35	0.36	0.36	0.36
n	4717	4666	4665	4574	4529

Stress Testing ER Classification of IT Central Banks

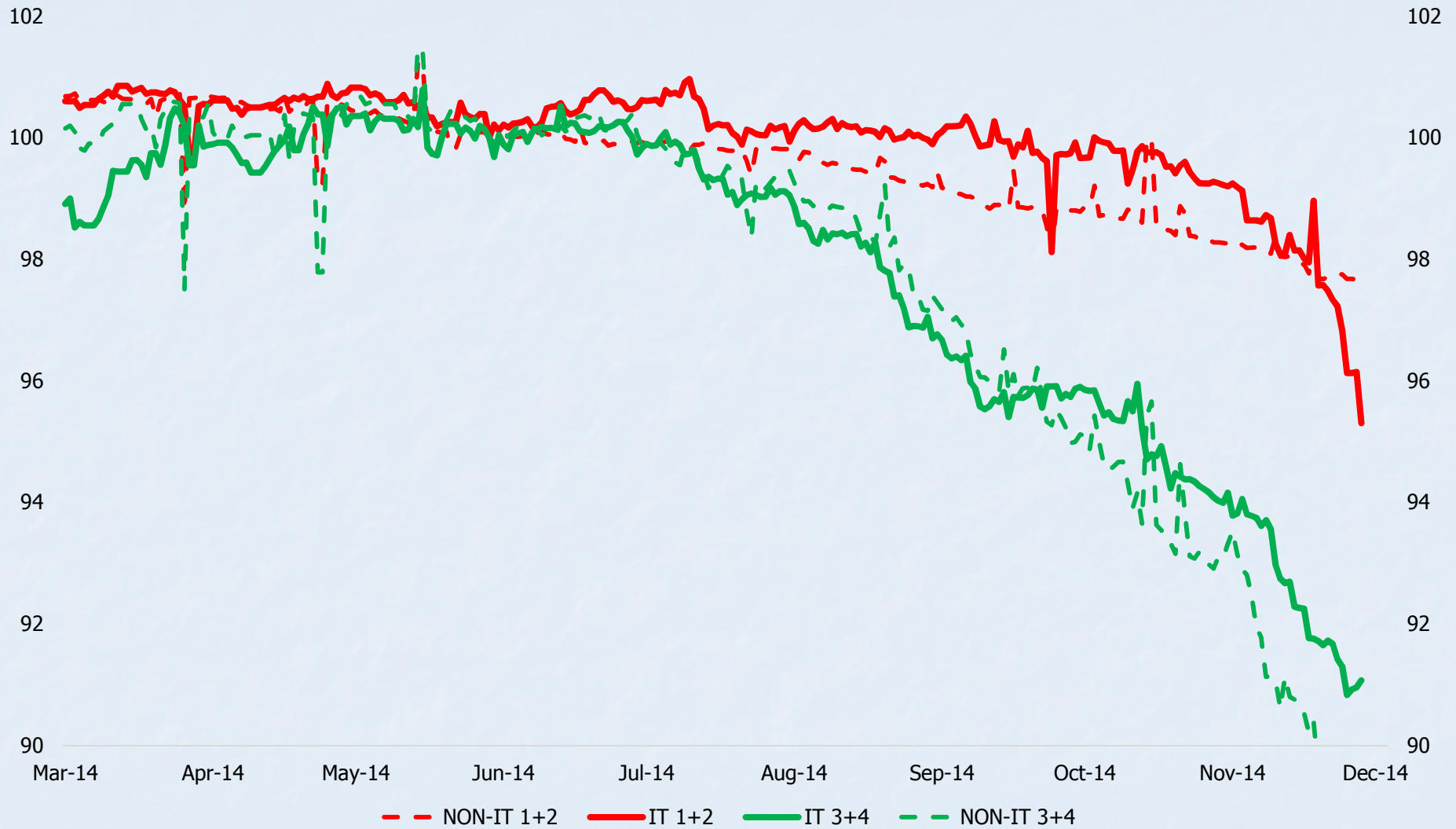
Consider two major shocks:

1. Lehman, September 2008
2. FRB signalling tightening cycle in June 2014

Lehman 2008

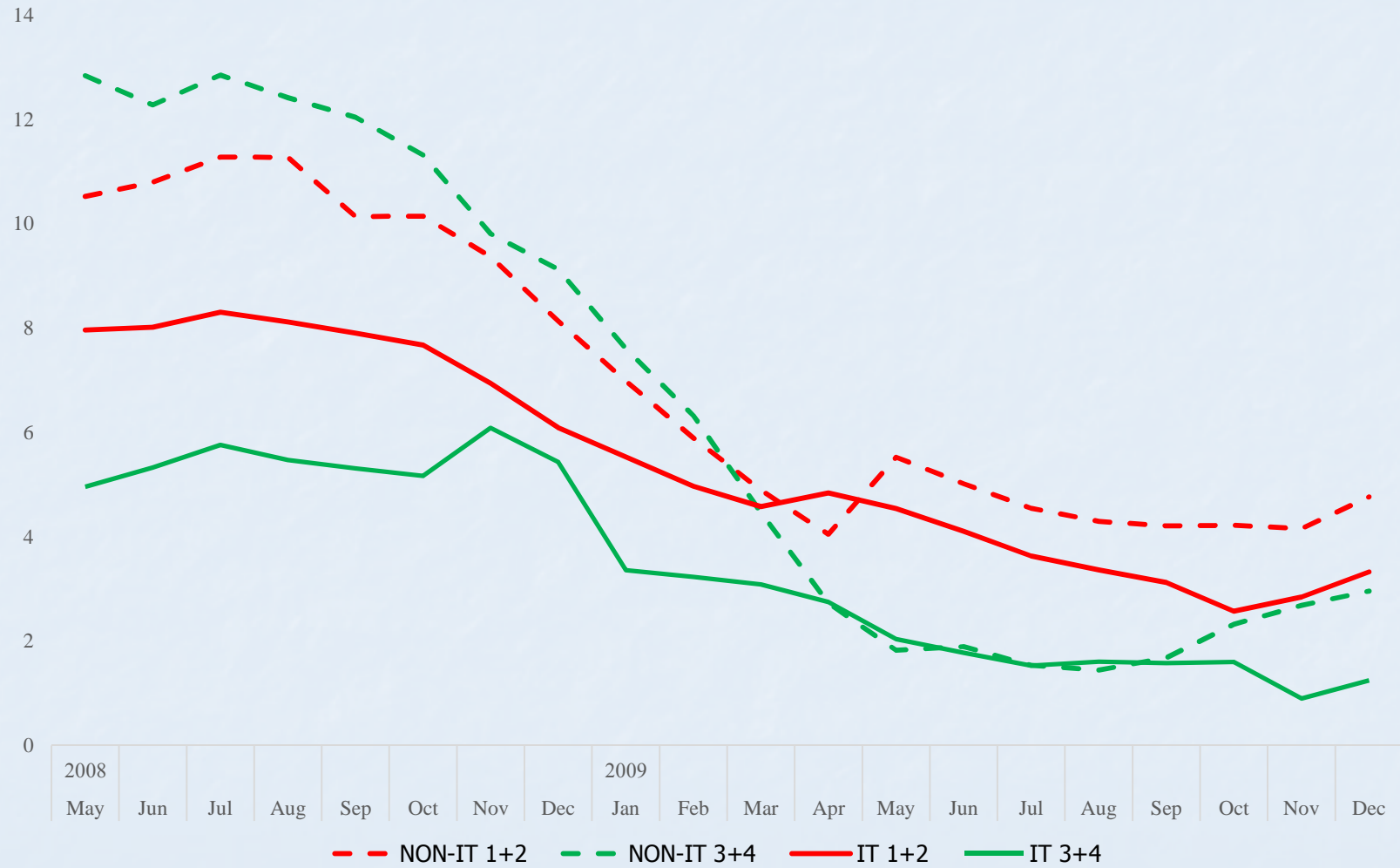


Fed Tightening Announcement 2014



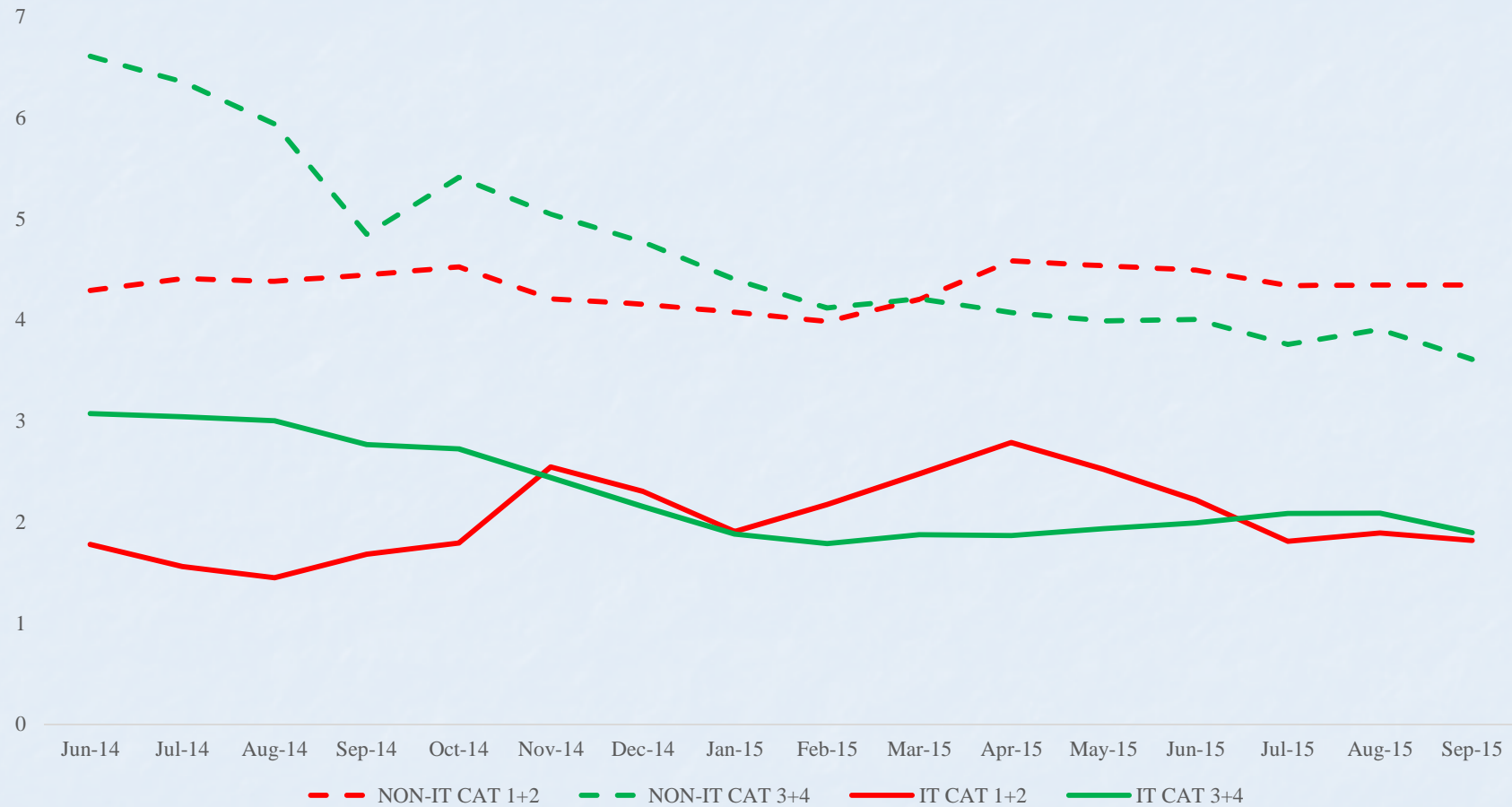
Lehman 2008

Inflation



Fed Tightening Announcement 2014

Inflation



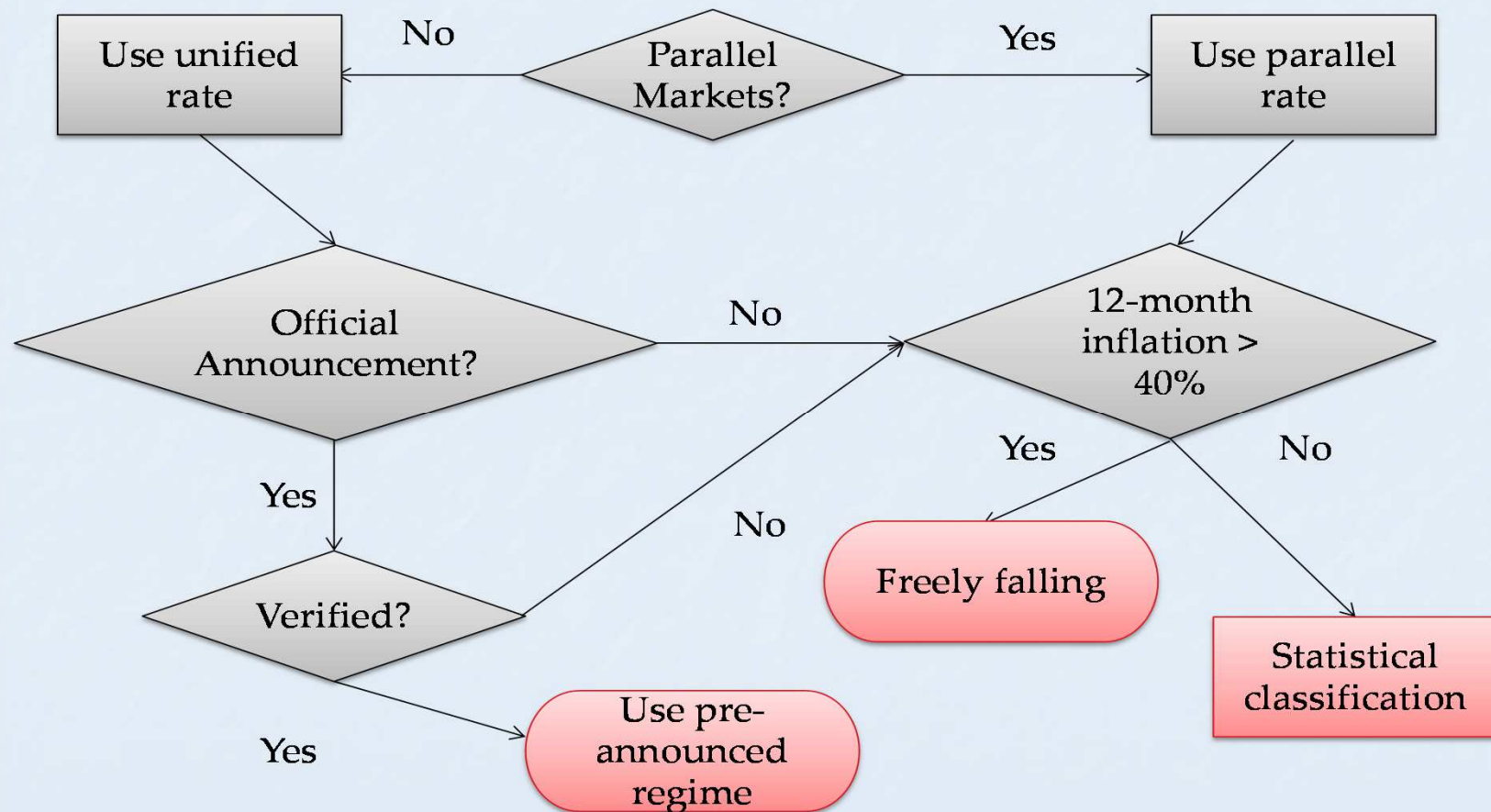
Summary

- IT masks heterogeneity in exchange rate practices
- Our ERA classification gives information that goes beyond the IT headline
- “Pegged” IT central banks less aggressive on inflation & more on exchange rate
- Similar exchange rate behavior to non-IT “pegged” currencies in face of major shocks.
- But inflation is lower in IT countries, even those with a “dual mandate”

**APPENDIX 3:
ANCHOR AND ERA
ALGORITHMS**

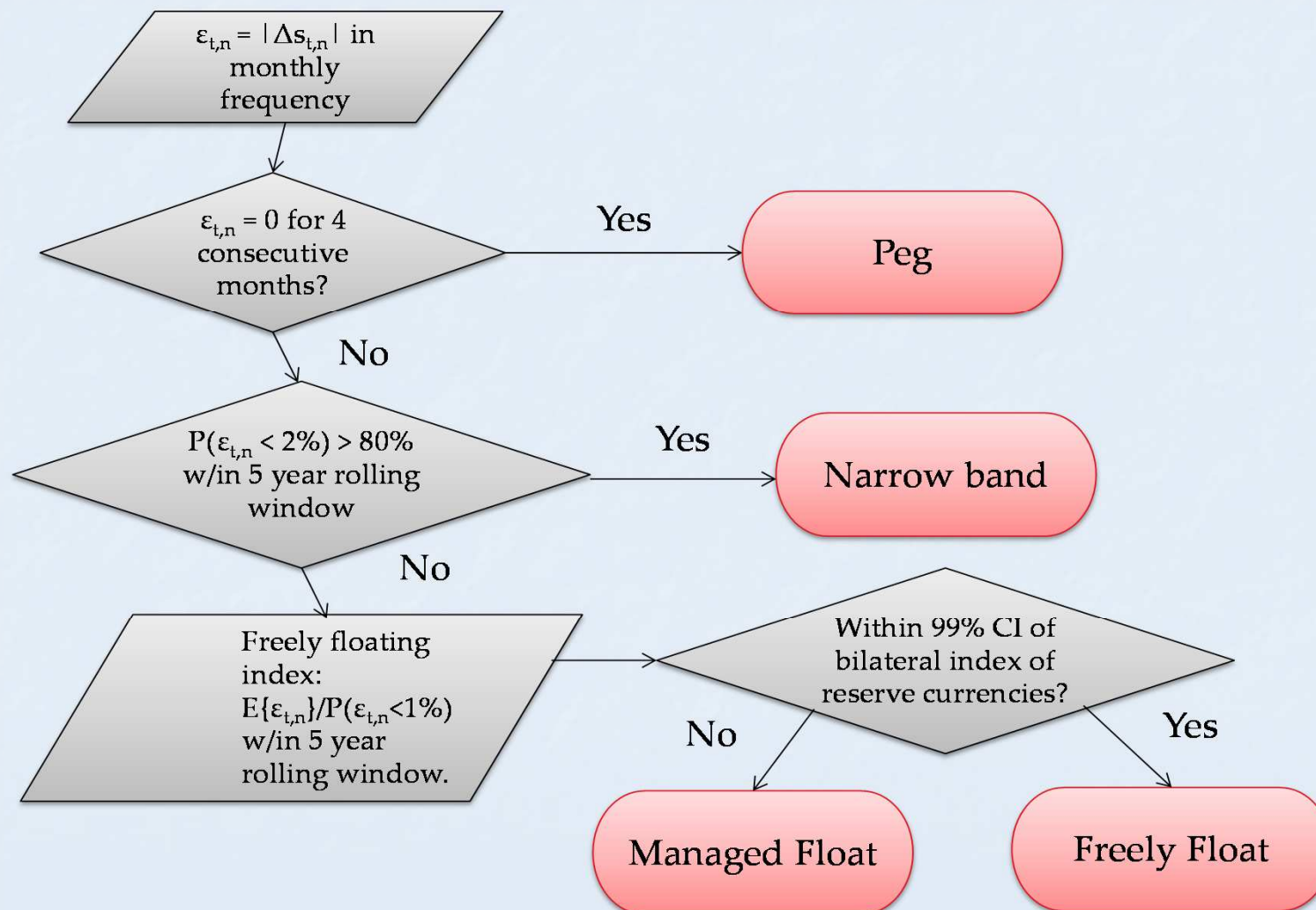
ER Arrangement Classification Algorithm

Sequence and general scheme

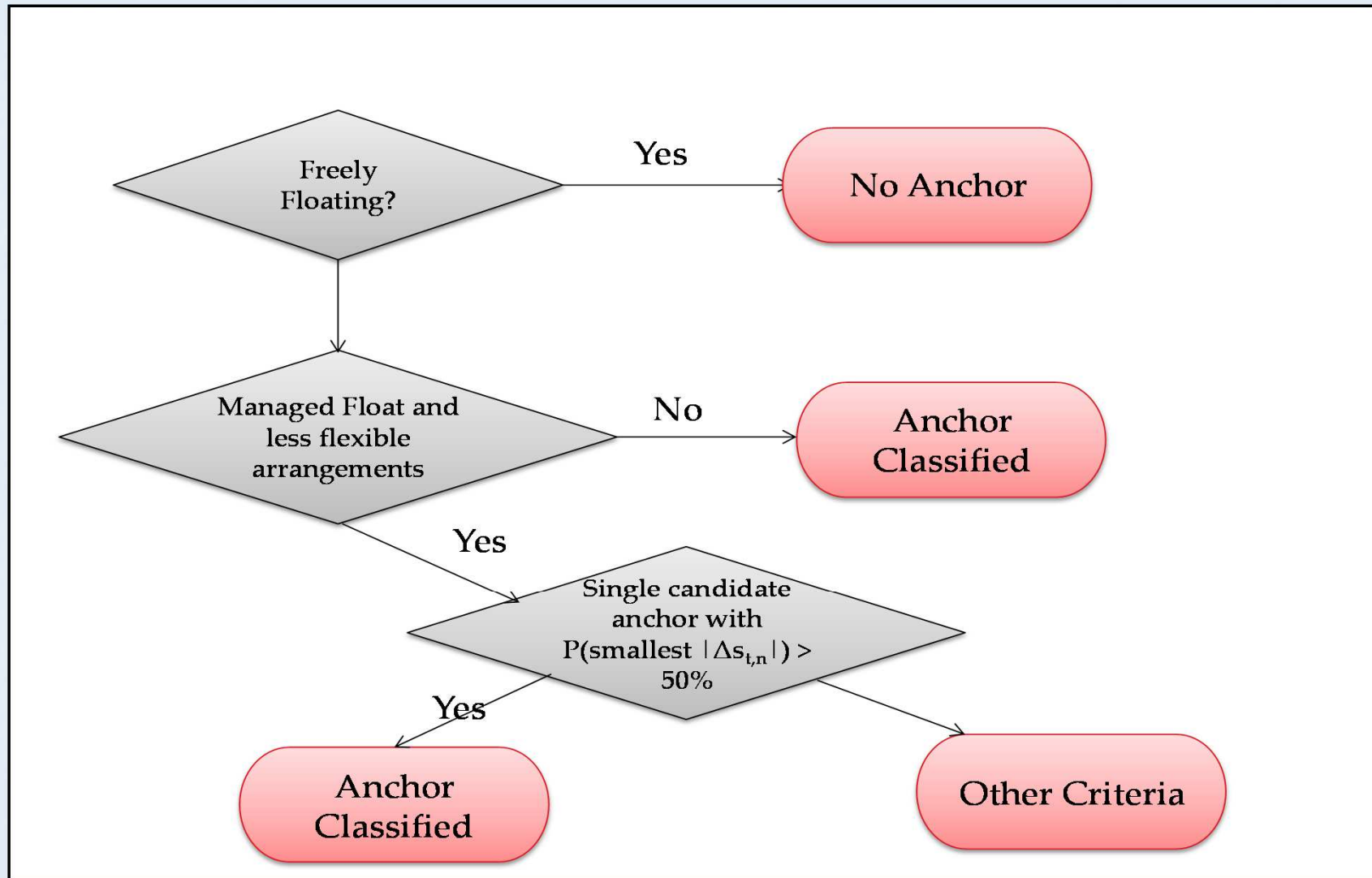


ER Arrangement Classification Algorithm

Statistical tests



Anchor Currency Selection Process



APPENDIX 4: CAPITAL CONTROLS

Summary of Findings

Introduce an index of exchange restrictions

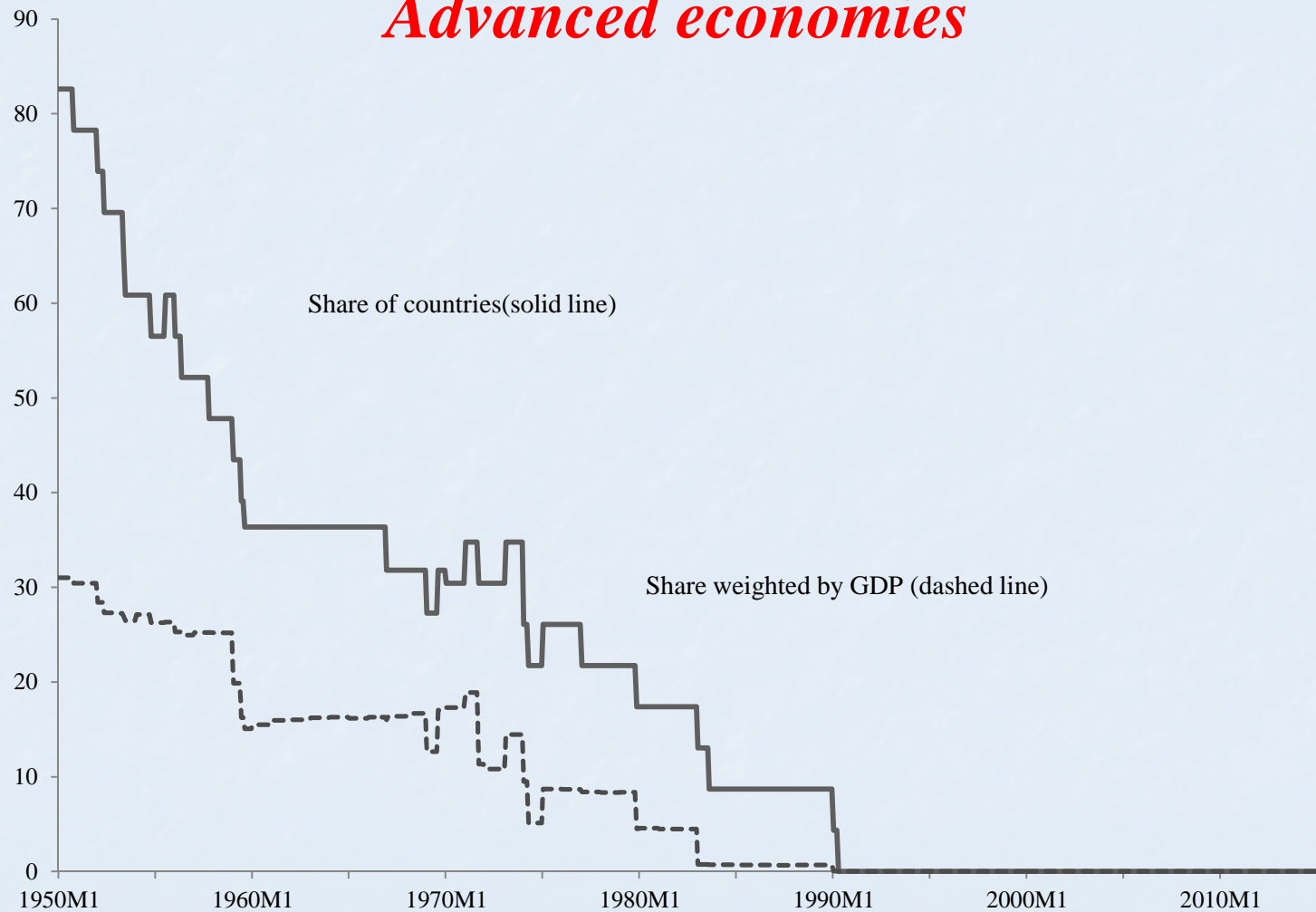
- **As a minimal measure of capital controls.**
- **Global trend towards increased capital mobility.**
- **A fairly modern phenomenon for emerging and developing countries.**

Index of Exchange Restrictions

This index takes on the value 1 if any one or more of the following conditions hold and 0 otherwise.

- **There is a de-jure dual market / multiple exchange rates OR**
- **There is a de-facto parallel market and the parallel premium >10% over 12-month moving average.**
- **Sources: IMF AEAER, Franz Pick.**
- **Index = 1 is sufficient but not necessary for capital controls.**

Share of Independent Countries with Dual, Multiple, or Parallel Exchange Rates, January 1950-September 2016: *Advanced economies*



Share of Independent Countries with Dual, Multiple, or Parallel Exchange Rates, January 1950-September 2016: *All independent countries*

