

# The Art of Monetary Policy: *Lessons from Sun Tzu for Central Banks*

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2024 Karl Brunner Lecture  
Swiss National Bank  
Zurich, Switzerland  
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THE  
ART  
OF  
WAR



SUN TZU

***“..The art of war is of vital importance to the State.***

***It is a matter of life and death, a road either to safety or to ruin.***

***Hence, it is a subject of inquiry which can on no account be neglected.”***

***Sun Tzu, Chapter 1  
Principles 1 and 2***

# THE ART OF WAR

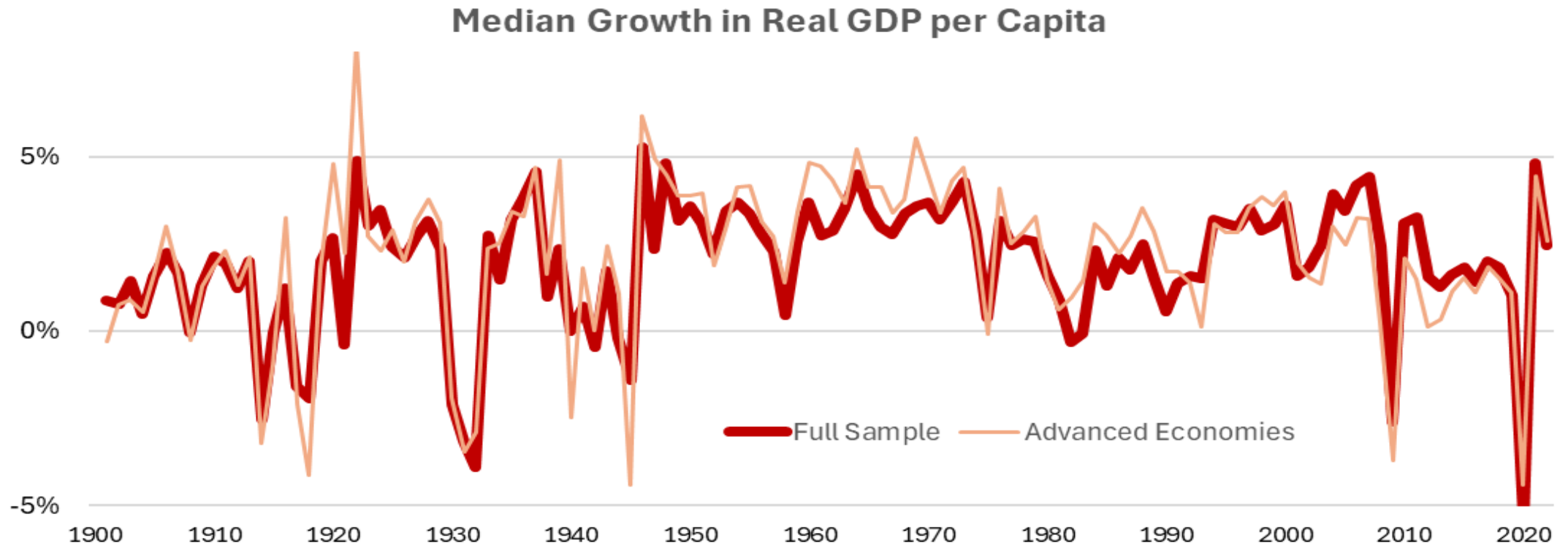


SUN TZU

1. Laying Plans: *Preparing for the Next Financial Battle*
2. Heaven: *The Inevitability of Powerful External Shocks*
3. Earth and Terrain: *Establishing a Strong Tactical Position*
4. Maneuvering: *Combining the Weapons and Methods*
5. Variation in Tactics: *Maintaining Flexibility*
6. The Resources and Costs of Battles: *Tradeoffs*

Conclusions

# Tumultuous Two Decades



**Notes:** Median growth in real GDP per capita from 1900 through 2022. Full sample is the 58 economies in the dataset that have data for 1950 and 2022. Advanced economies is a sub-sample of 24 advanced economies based on current IMF definitions.

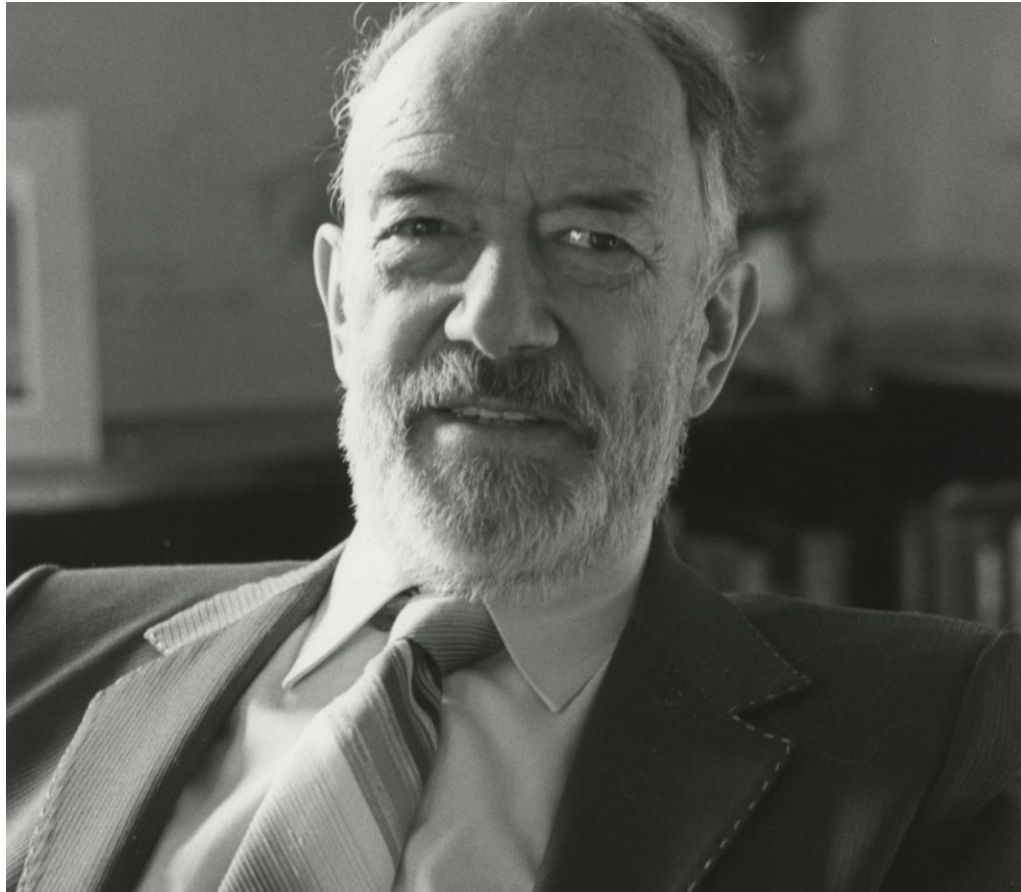
**Source:** Underlying data used to calculate growth rates from [Maddison Project Database \(2023\)](#).

# With Thanks to Important Coauthors

- **Jongrim Ha (World Bank) and Ayhan Kose (World Bank):** Rate cycles
- **Wenxin Du (HBS) and Matt Luzzetti (Deutsche Bank):** Quantitative tightening
- **Bill English (Yale) and Angel Ubide (Citadel):** Central bank responses to covid and post-pandemic inflation
- **Katharina Bergant (IMF):** Covid responses and macroprudential policy
- **Anusha Chari (UNC) and Karlye Dilts-Stedman (Kansas City Fed):** Risk exposures and macroprudential policy
- **Christian Friedrich (BoC) and Dennis Reinhardt (BoE):** Spillovers and leakages from macroprudential tools



# What Would Karl Brunner Say??



**Source:** Provided by Swiss National Bank





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# 1

*Laying Plans:  
Preparing for the  
Next Financial Battle*



# Laying Plans

***“Now the general who wins a battle makes many calculations in his temple ere the battle is fought. The general who loses a battle makes but few calculations beforehand. Thus do many calculations lead to victory, and few calculations to defeat...”***

***Sun Tzu, Chapter 1, Principle 26***



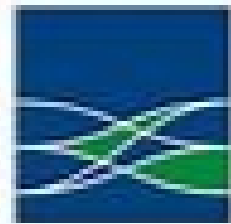


# “Speed Kills”: Runs and Doom Loops

2008



**WaMu**

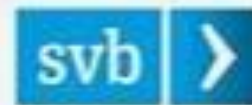


**WACHOVIA**

*Run time: 16/19 days*

*Outflow: 4%/10% of deposits*

2023



**Silicon Valley Bank**



**SIGNATURE BANK®**

*Run time: 1-2 days*

*Outflow: 87%/29% of deposits\**

**Note:** \* Outflows in 2023 include those over first day of run plus outflows scheduled for the 2<sup>nd</sup> day but that did not occur as the banks were closed.

**Source:** Data on run time and deposit outflows from Rose (2023).

# Laying Plans: Suggestions

- **Plan for emergency liquidity and market support facilities *a priori* to enable quick activation if needed (albeit hopefully never)**
  - Individuals/groups to make decisions
  - Criteria to trigger use of facility
  - Types of institutions w/access; collateral/institutional characteristics for access
  - **Penalty charge/terms of access**
  - **How access ends and facility wound down**
- **Ideas for starting points:**
  - BoE response to LDI crisis
  - Kashyap (2024) proposal in Jackson Hole
  - Resolution of Credit Suisse?
- **Other details...discussed below as part of Sun Tzu's next 5 lessons....**



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# 2

*Heaven:  
The Inevitability of  
Powerful External  
Shocks*



# Heaven: One of the Five Key Factors

*“The art of war, then, is governed by five constant factors, to be taken into account in one’s deliberations...”*

*Sun Tzu, Chapter 1, Principle 3*

*“Heaven signifies night and day, cold and heat, times and seasons.”*

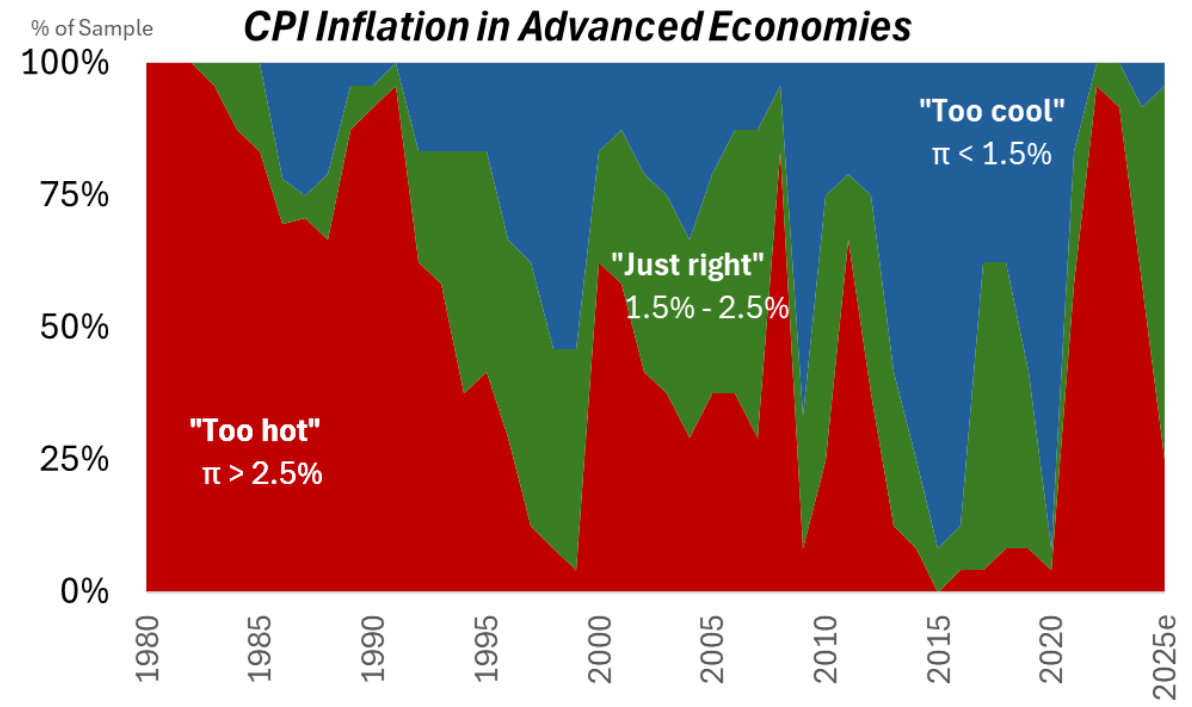
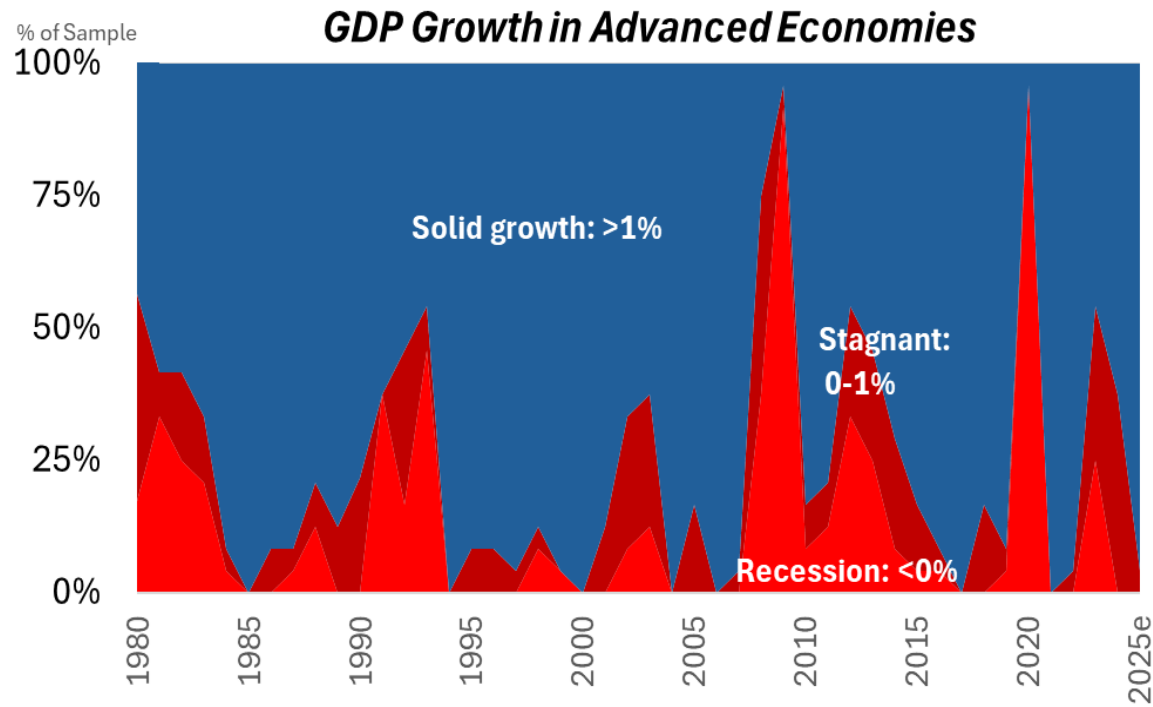
*Sun Tzu, Chapter 1, Principle 7*

*“These five heads should be familiar to every general: he who knows them will be victorious; he who knows them not will fail.”*

*Sun Tzu, Chapter 1, Principle 11*



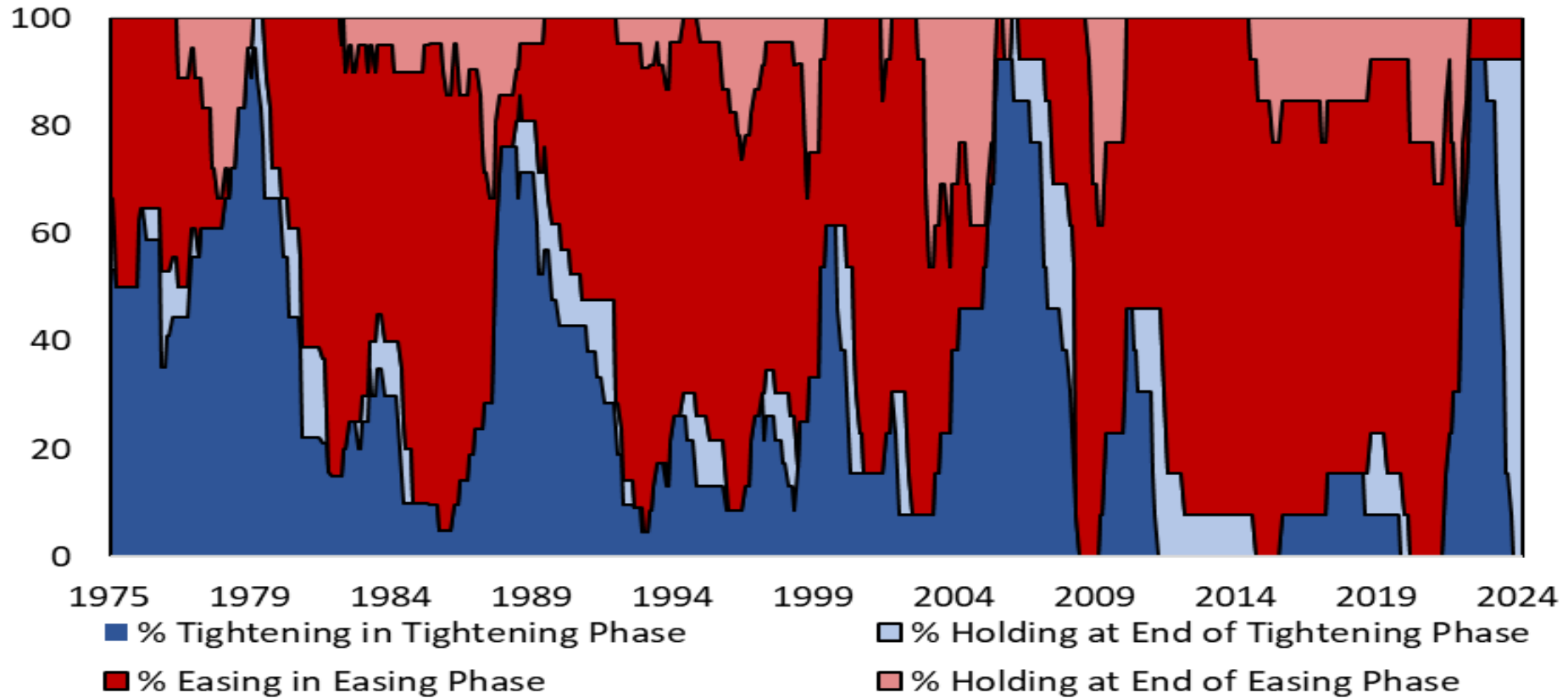
# Synchronized Swings in Growth and Inflation



**Notes:** Sample includes 24 advanced economies. GDP growth is annual real GDP growth and inflation is annual average CPI inflation.

**Source:** Calculations based on data from IMF, World Economic Outlook Database, April 2024.

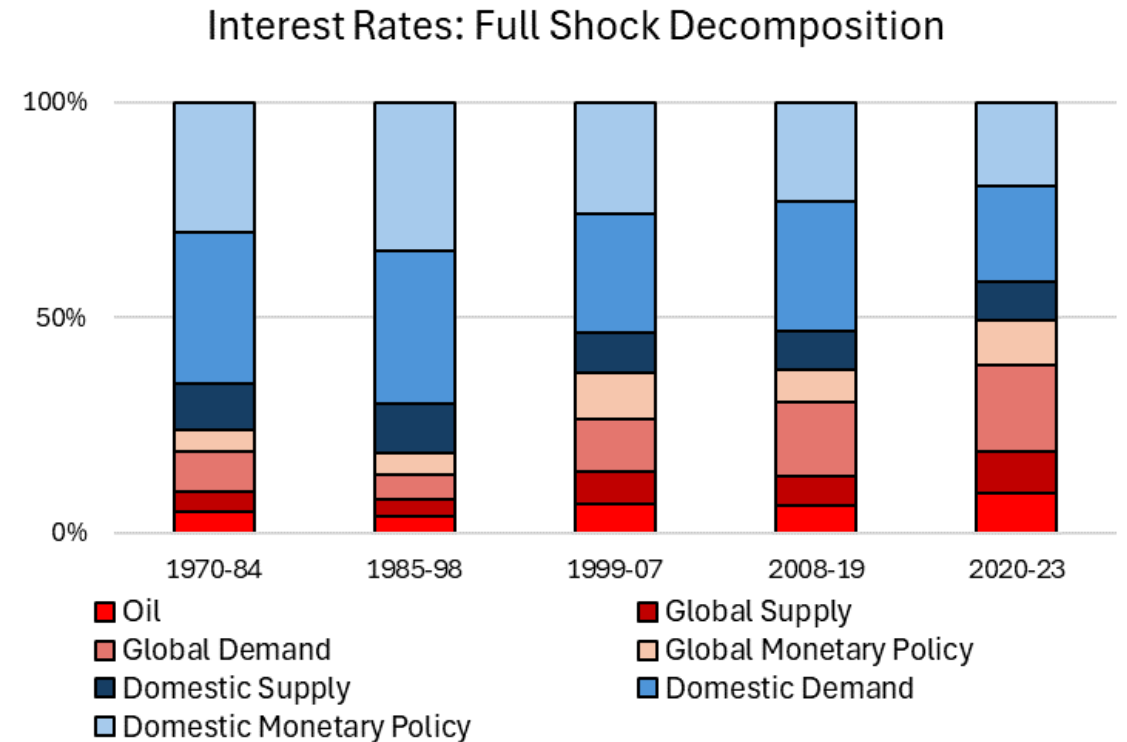
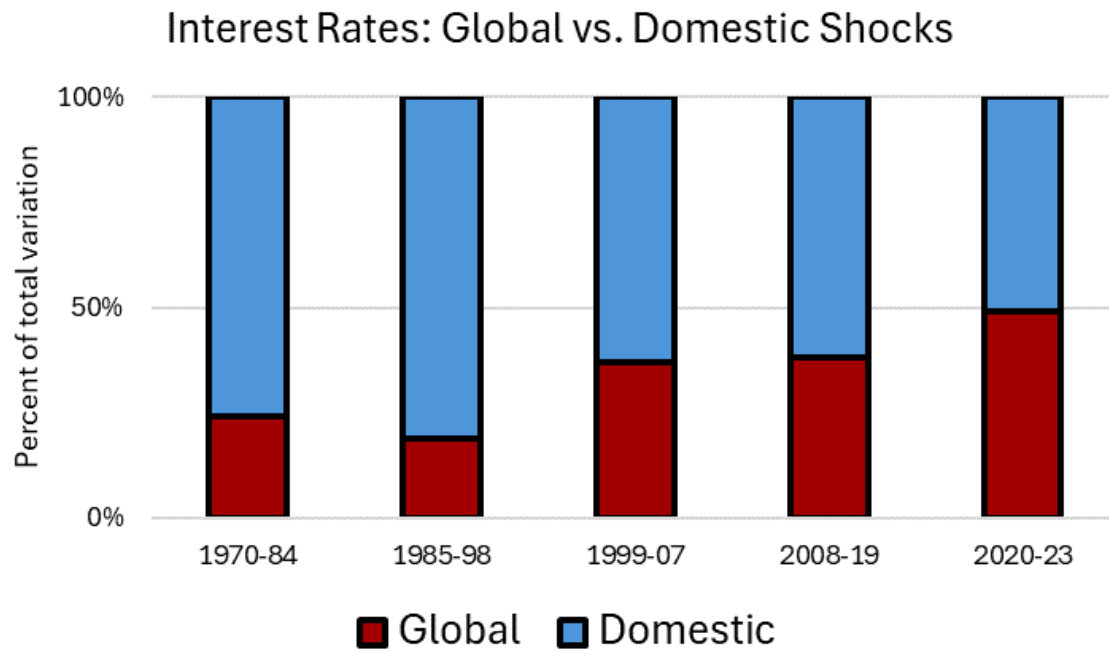
# Synchronized Adjustments in Monetary Policy



**Notes:** Share of economies tightening monetary policy by raising interest rates or easing monetary policy by reducing interest rates or QE each month, based on the phase definitions in Forbes, Ha and Kose (2024). Holding is defined as the period after any adjustments in interest rates and after the end of any QE programs before a central bank shifts to the opposite phase (i.e., either tightening or easing). Sample includes 24 advanced economies, with phases for individual euro area countries through 1998 and then for the ECB from 1999 through the end of the sample.  
**Source:** Figure from Forbes, Ha and Kose (2024), "Rate Cycles".



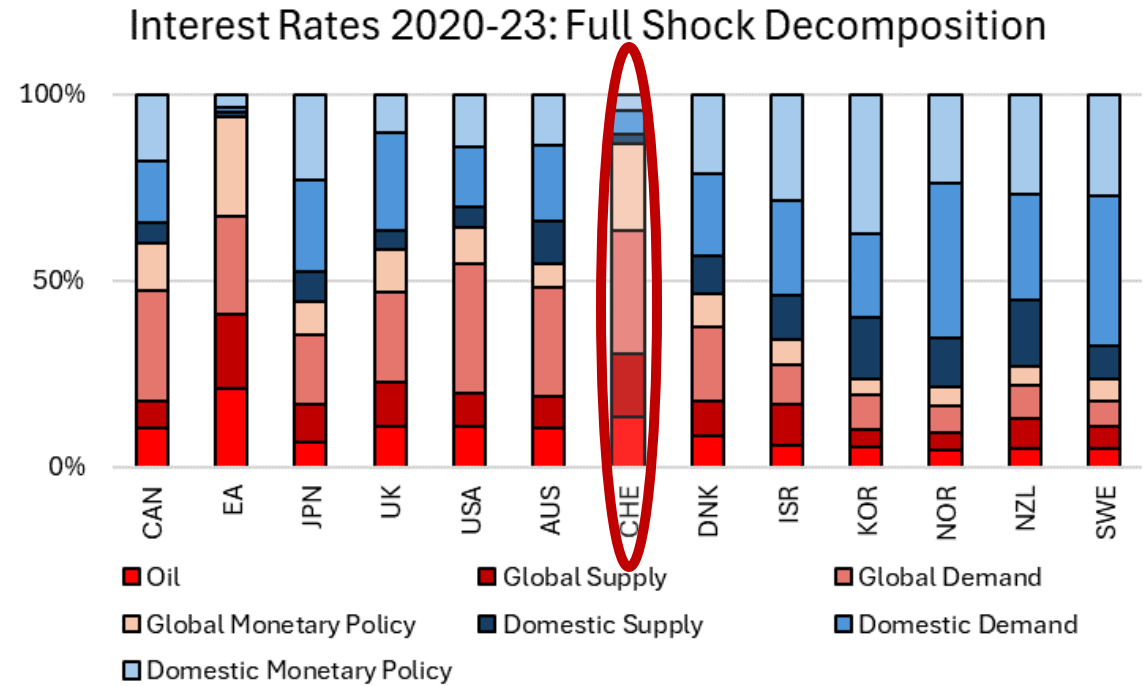
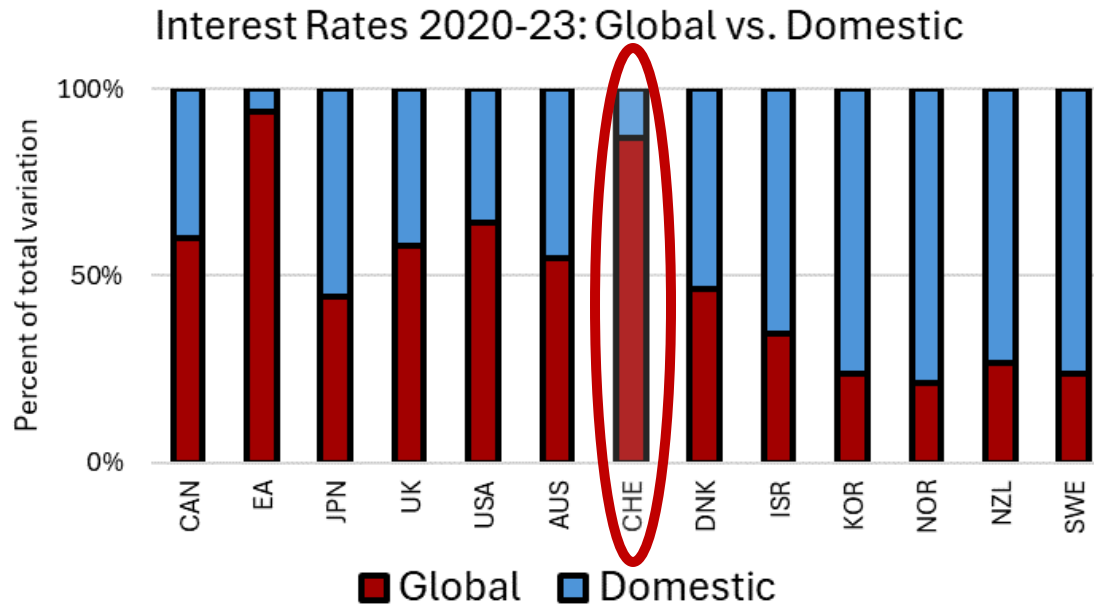
# Increased Role of Global Shocks over Time



**Notes:** Figures show percent of variation in interest rates driven by shocks listed at bottom estimated using a FAVAR model with 7 shocks. Interest rates measured using shadow interest rate, and if not available, the overnight rate or 3-month yield. Results are averages for the 13 advanced economies in the sample (listed on the next slide).

**Source:** Calculations follow those in Forbes, Ha and Kose (2024), "Rate Cycles", but extend sample from 5 to 13 advanced economies.

# Switzerland: Prominent Role of Global Shocks



**Note:** Figures show percent of variation in interest rates driven by shocks listed at bottom estimated using a FAVAR model with 7 shocks. Interest rates measured using shadow interest rate, and if not available, the overnight rate or 3-month yield.

**Source:** Calculations follow those in Forbes, Ha and Kose (2024), "Rate Cycles", but extend sample from 5 to 13 advanced economies.

# Heaven: Lessons for the Future

- **Accept the inevitability of “heaven”—and adjust targets appropriately**
  - Bands, not targets to one decimal place
  - Underlying (not headline) inflation
  - Inflation in two years (not every month)
- **Greater focus on global shocks and source of global shocks**
  - Global  $\neq$  Supply
  - Important for appropriate monetary policy response
- **Prepare companies, households and governments for corresponding volatility**
  - Greater use of scenarios



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# 3

*Earth and Terrain:  
Establishing a Strong  
Tactical Position*



# Earth, Terrain, and Tactical Positioning

***“..if you know Heaven and know Earth, you may make your victory complete.”***  
***Sun Tzu, Chapter 10, Principle 31***

***“Earth comprises distances, great and small; danger and security; open ground and narrow passes; the chances of life and death.”***

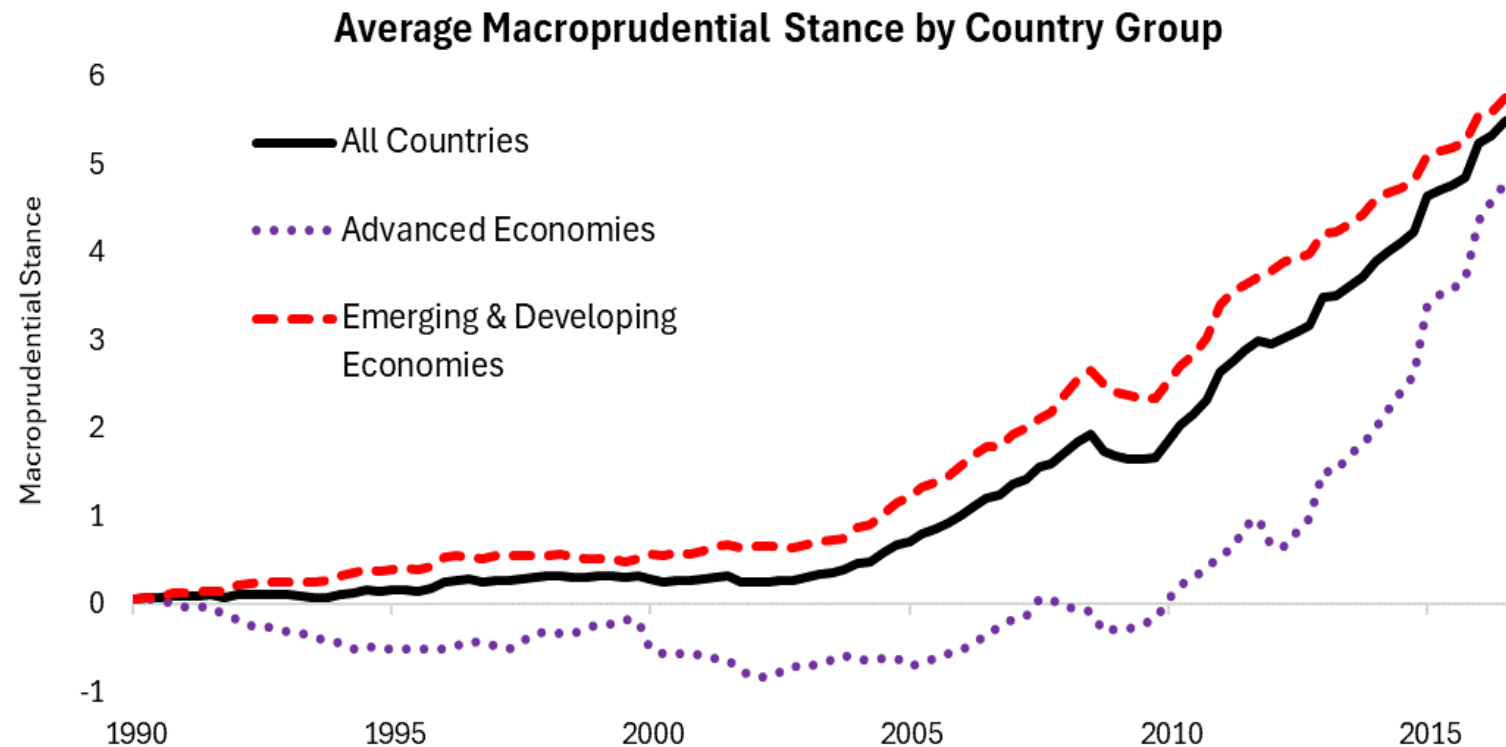
***Sun Tzu, Chapter 1, Principle 8***

***“Security against defeat implies defensive tactics.....the general who is skilled in defense hides in the most secret recesses of the earth...thus...we have ability to protect ourselves”***

***Sun Tzu, Chapter 4, Principles 4 & 7***



# Macroprudential Policy: Strengthening Positions



## The effects:

- Reduces targeted vulnerabilities
- Improves resilience of banking system
- **Generates leakages and spillovers**
- **Increases risks and vulnerabilities outside the regulatory perimeter**

**Notes:** Graph shows average, annual macroprudential stance for each country group. The stance is calculated as the net change in macroprudential policy each year (with a +1 for a tightening of any macroprudential policy and a -1 for each loosening), and then the changes are cumulated each year starting in 1990 (which is set at 0).

**Source:** Replicated from Forbes (2021), which calculates the stance using data from the IMF's Integrated Macroprudential Policy (iMaPP) database, described in Alam et al. (2019).



# Strengthening the Tactical Position: Lessons

- **Address gaps in current macroprudential framework**
  - “Shadow” financial system
  - Exposure of banks to “shadow” financial system
- **Make greater use of counter-cyclical tools in good times (and bad)**
- **More creative and public use of scenario analysis**
- **Strengthen institutions/committees responsible for macroprudential oversight**



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# 4

*Maneuvering:  
Combining the  
Weapons and  
Methods*



# Maneuvering: Combining Weapons and Methods

***“In all fighting, the direct method may be used for joining battle, but the indirect methods will be needed in order to secure victory.”***

***Sun Tzu, Chapter 5, Principle 5***

***“In battle, there are not more than two methods of attack—the direct and the indirect; yet these two in combination give rise to an endless series of maneuvers.”***

***Sun Tzu, Chapter 5, Principle 10***

***“Water shapes its course according to the nature of the ground over which it flows; the soldier works out his victory in relation to the foe whom he is facing...”***

***Sun Tzu, Chapter 6, Principle 28***



# Many Tools over Time



© Bank of England / Rex Features

Source: [click here](#).

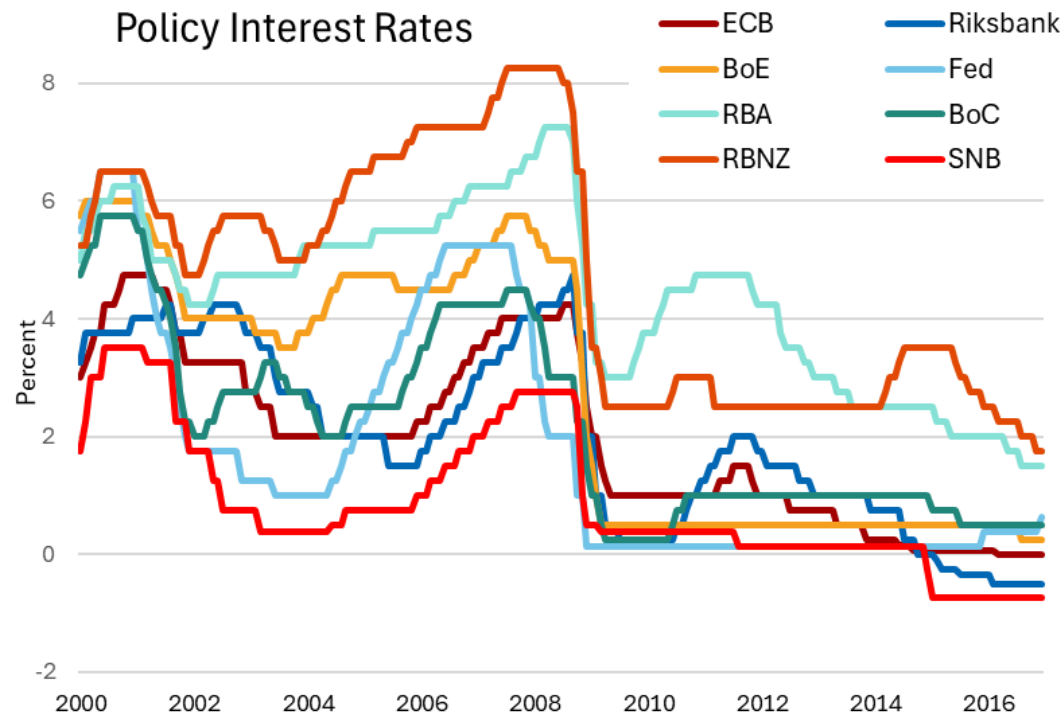
## Bank of England, Courtroom



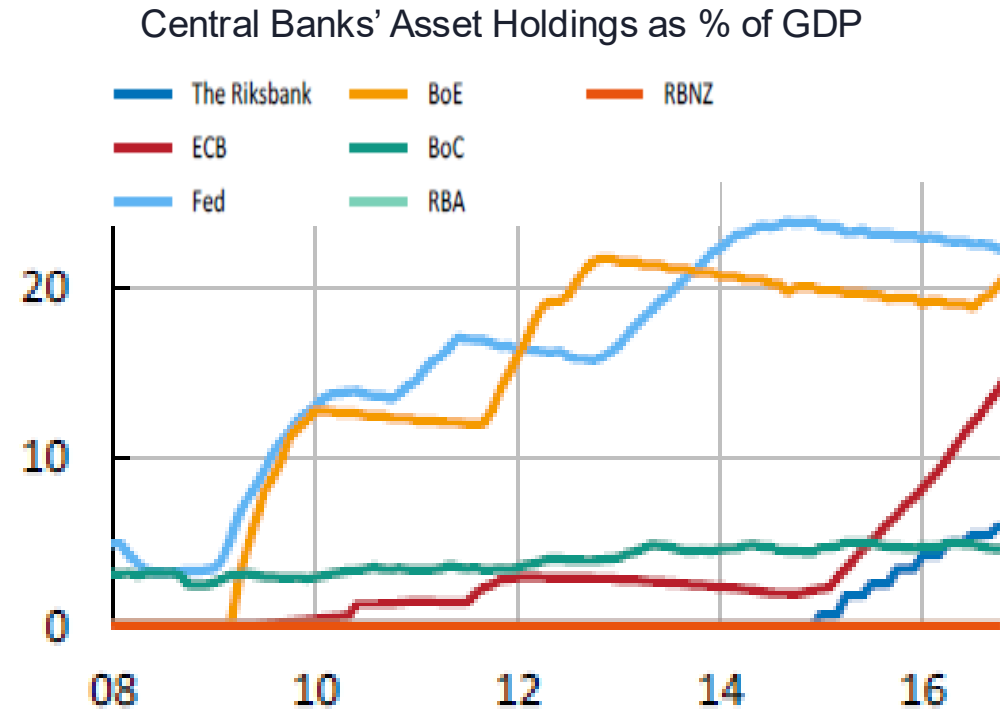
Source: personal photo



# 2008 GFC Response: Rates → QE → Market Support



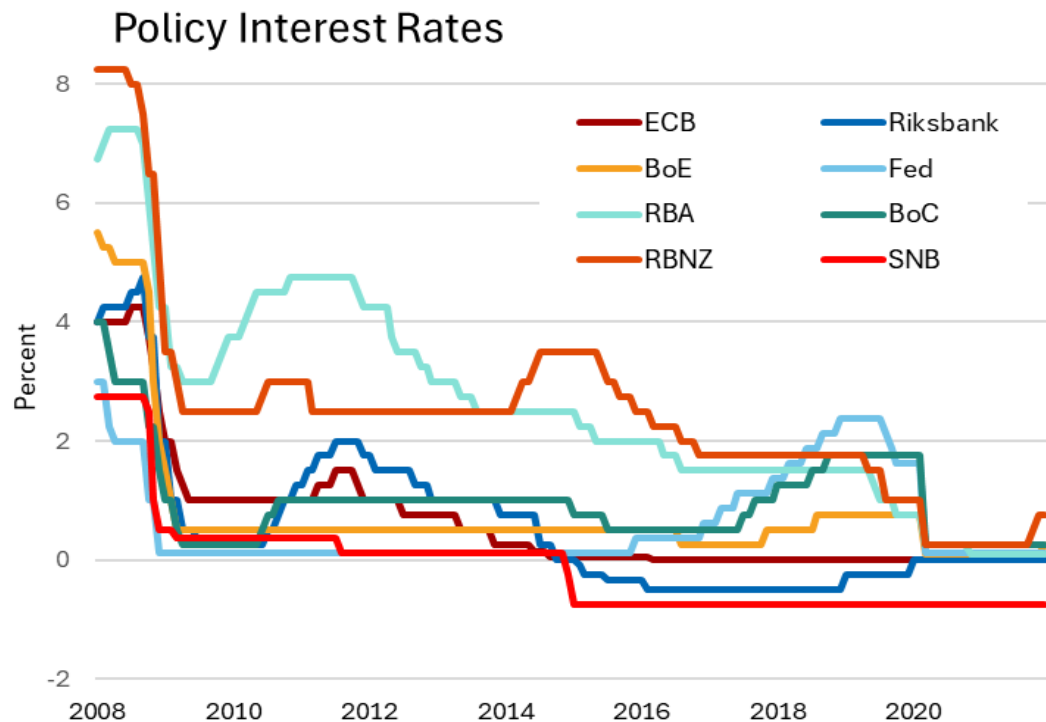
Source: Based on data from BIS.



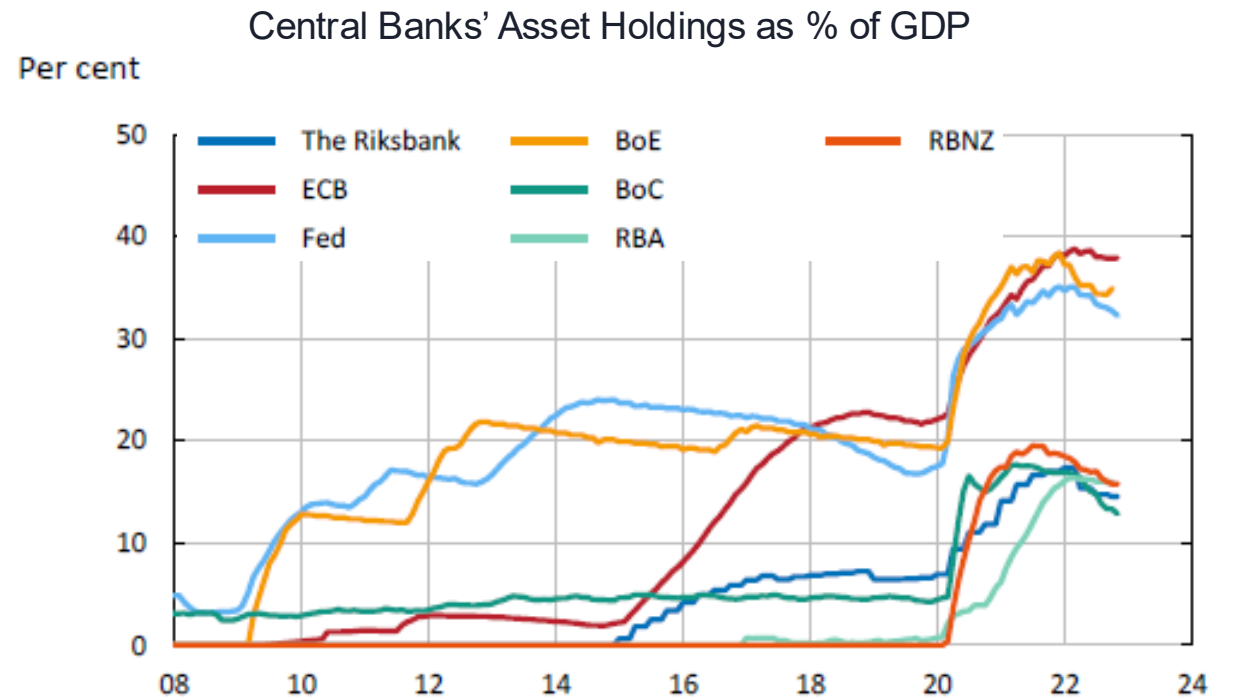
Source: Excerpt from Fig. 8 in Andersson, Osterholm and Gustafsson (2021).

**+ new programs to provide support functioning of specific markets**

# 2020 Pandemic Response: Limits to Rate Cuts



Source: Based on data from the BIS.



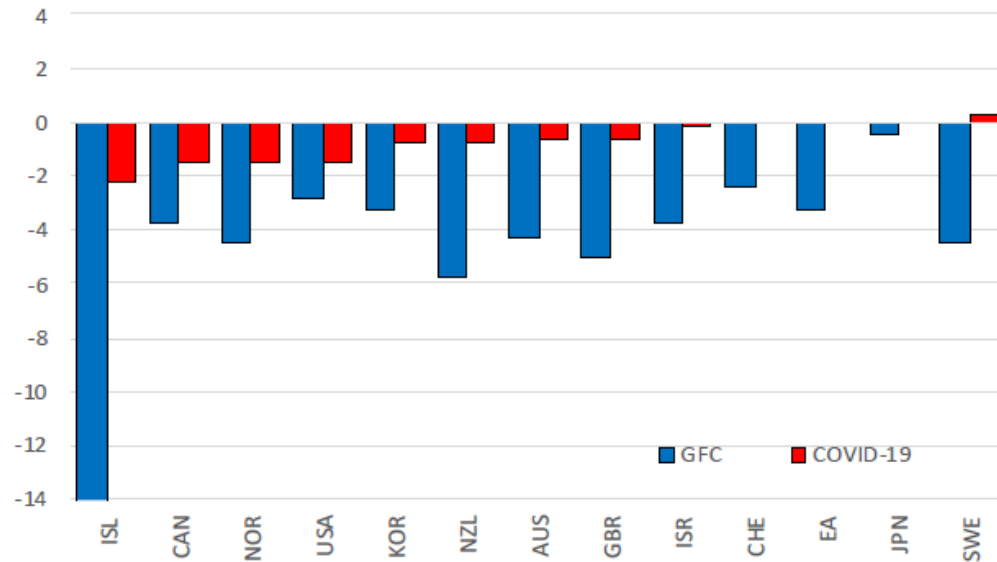
Source: Excerpt from Fig. 8 in Andersson, Osterholm and Gustafsson (2021).



# 2020 Pandemic Response: Two Tools in Context

**FIGURE 1 POLICY INTEREST RATES WERE CUT BY MUCH LESS THAN IN THE GLOBAL FINANCIAL CRISIS**

Percentage point change in policy interest rates

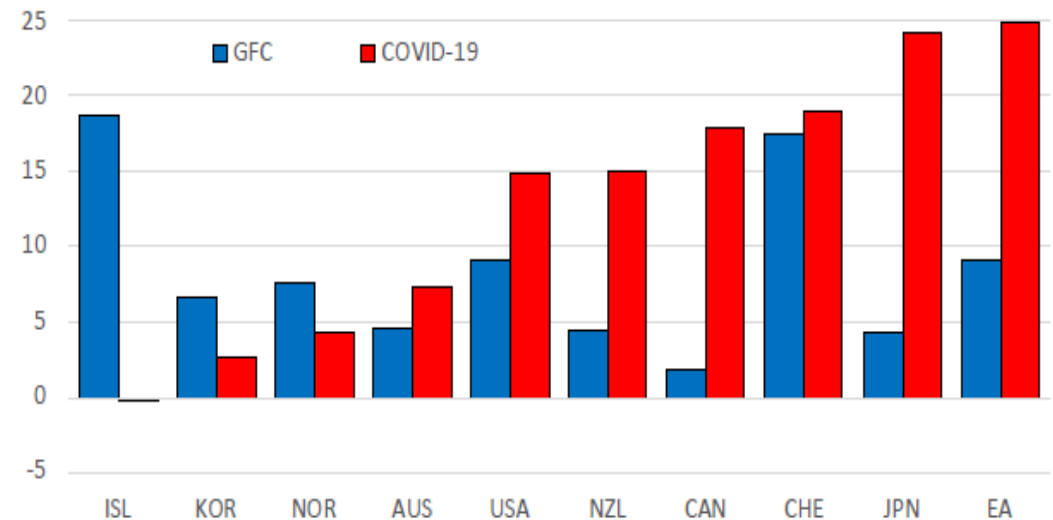


Note: GFC refers to the change in the policy interest rate during the global financial crisis (i.e. between the maximum in 2008 and the minimum in 2009-2010). COVID-19 refers to the change in the policy interest rate during the COVID-19 crisis (i.e. between end-2019 and mid-March 2020).

Source: Bank for International Settlements; and authors' calculations.

**FIGURE 3 CENTRAL BANK TOTAL ASSETS INCREASED SIGNIFICANTLY**

Change in central bank's total assets, as a per cent of pre-crisis GDP



Note: GFC refers to the change between June 2008 and the maximum between July 2008 and December 2009 as a per cent of 2008 GDP. COVID-19 refers to the change between December 2019 and the maximum in 2020-21 as a per cent of 2019 GDP.

Source: Refinitiv; OECD Economic Outlook 108 database; and authors' calculations.

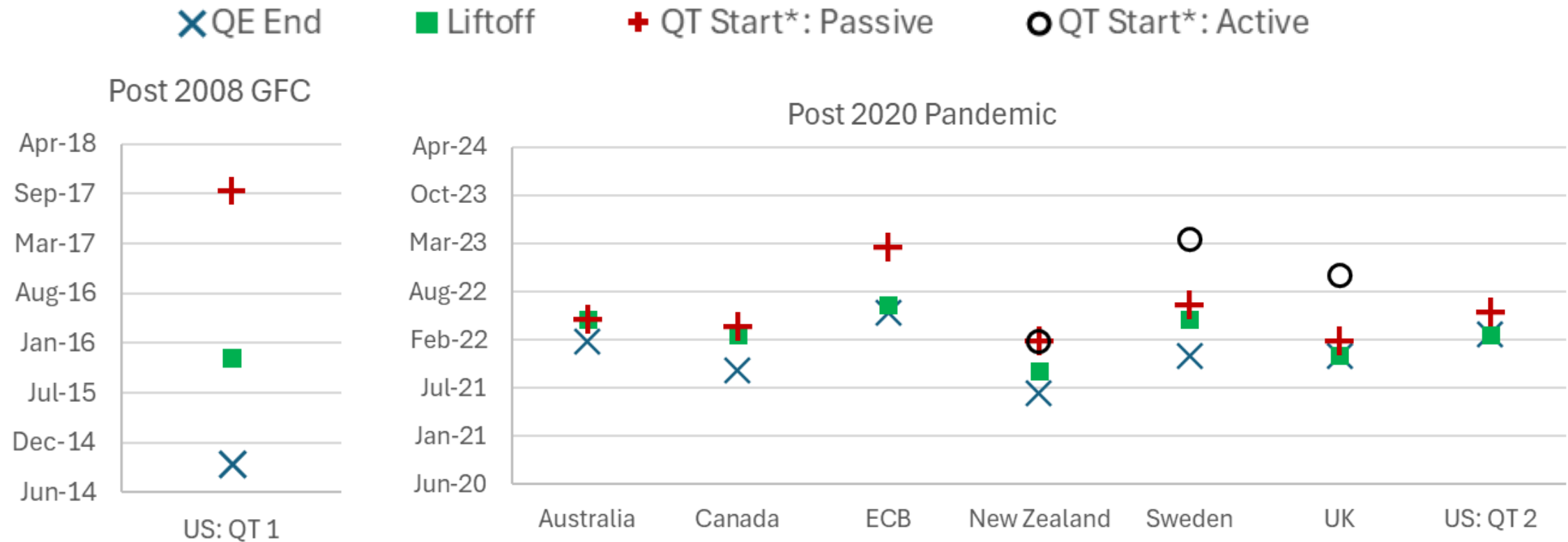
Source: Laurence Boone and Lukasz Rawdanowicz (2021), in English, Forbes and Ubide, *Monetary Policy and Central Banking in the Covid Era*, CEPR e-book, Chapter 19.

# 2020 Pandemic Response: Expansion of Tools

		Advanced Economies											Middle East and Africa						Emerging Asia							Latin America					Eastern Europe														
Tool type	Measures	US	EA	JP	GB	CA	AU	CH	DK	NO	NZ	SE	AE	DZ	IL	KW	MA	SA	TR	ZA	CN	HK	ID	IN	KR	MY	PH	SG	TH	VN	AR	BR	CL	CO	MX	PE	CZ	HU	PL	RO					
Interest	Policy rate cut	✓			✓	✓	✓			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		
Lending operations	Liquidity provision	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		
	Targeted lending	✓	✓	✓	✓		✓	✓			✓	✓	✓		✓			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		
Asset purchases <sup>1</sup>	Government bonds	✓	✓	✓	✓	✓	✓					✓			✓				✓	✓					✓		✓						✓	✓				✓	✓	✓	✓	✓			
	Commercial paper	✓	✓	✓	✓	✓						✓													✓																				
	Corporate bonds	✓	✓	✓	✓	✓						✓			✓										✓			✓															✓		
	Other private		✓	✓		✓						✓																															✓		
Foreign exchange	USD swap line		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓												✓			✓			✓															
	Swaps <sup>2</sup>														✓								✓	✓			✓			✓	✓	✓	✓	✓	✓						✓				
	Spot intervention								✓													✓	✓									✓											✓		
Reserve policy	Remuneration						✓	✓			✓										✓	✓																							
	Requirement ratio	✓											✓	✓								✓	✓	✓	✓	✓	✓			✓	✓		✓	✓	✓	✓							✓		
	Compliance																								✓	✓				✓	✓													✓	

Source: Figure from Cantú, Carlos., Paolo Cavallino, Fiorella De Fiore, and James Yetman. (2021). "A Global Database on Central Banks' Monetary Responses to Covid-19." *BIS Working Paper*, No 934, March.

# The Playbook: Compressed Timeline in 2021/22

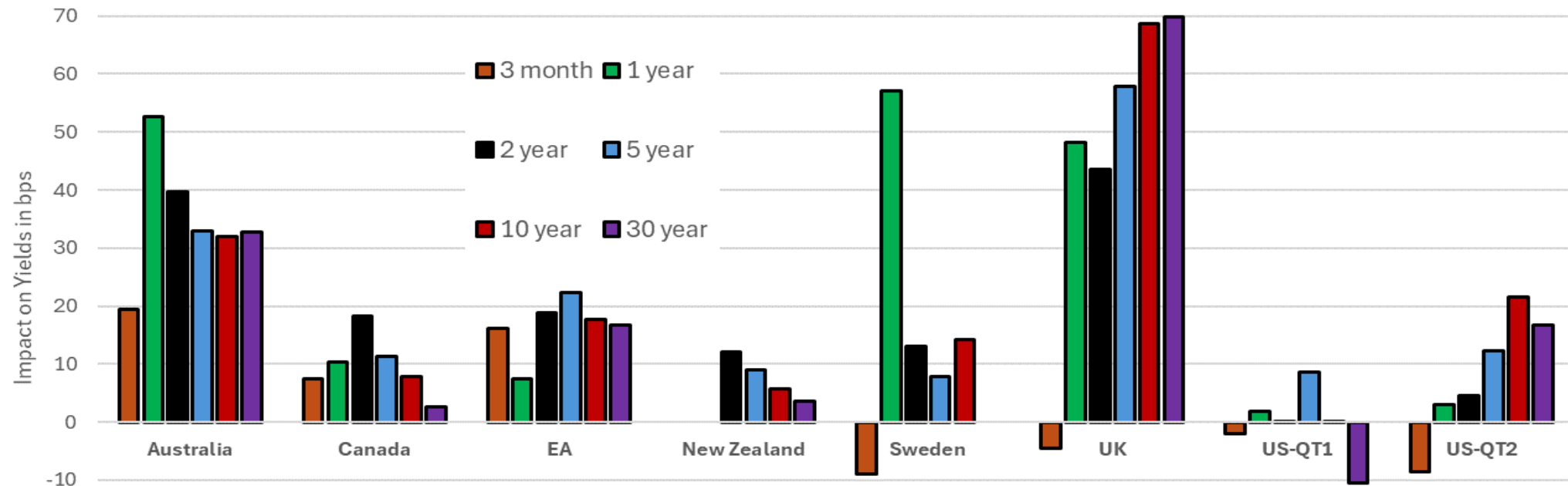


Source: From Du, Forbes and Luzzetti (2024), "Quantitative Tightening Around the World: What Have We Learned?"



# Aggregate Impact of QT on Govt Bond Yields

Cumulative Effect of all QT Announcements on Government Bond Yields

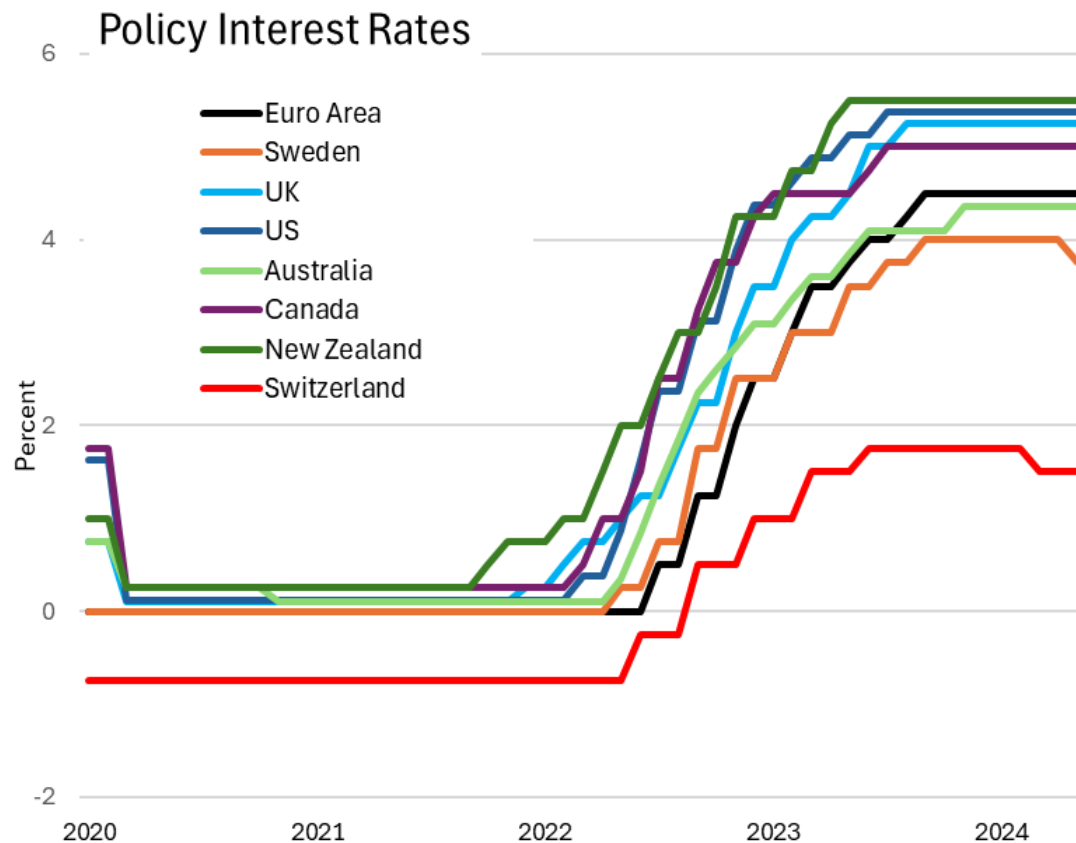


**Notes:** Calculated as the sum of the estimated effects of each individual QT announcement by country. These aggregate effects only includes QT events that are new or additional QT (i.e., not *WindDown* events) and only include post-pandemic QT announcements, except for the US announcements from 2014-2017, which are included as US-QT-1.

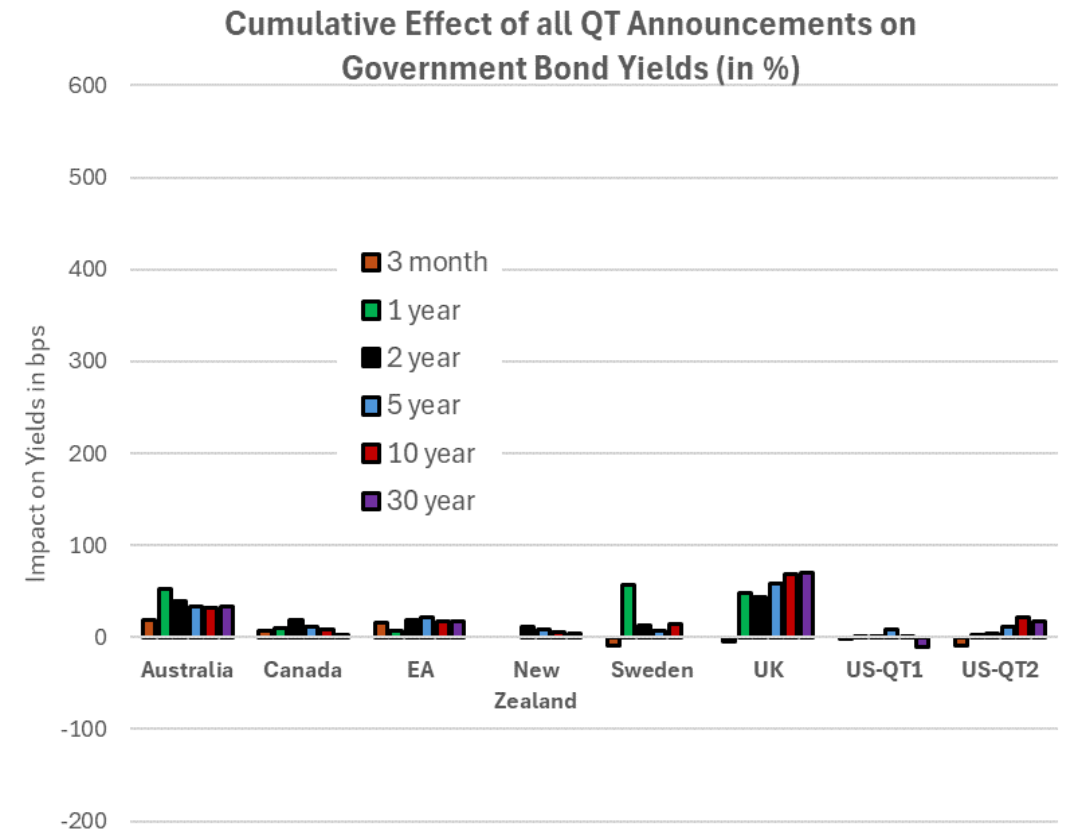
**Source:** Replicated from Du, Forbes and Luzzetti (2024).



# Comparing Magnitudes: Rate Hikes vs. QT



Source: Underlying data from BIS.



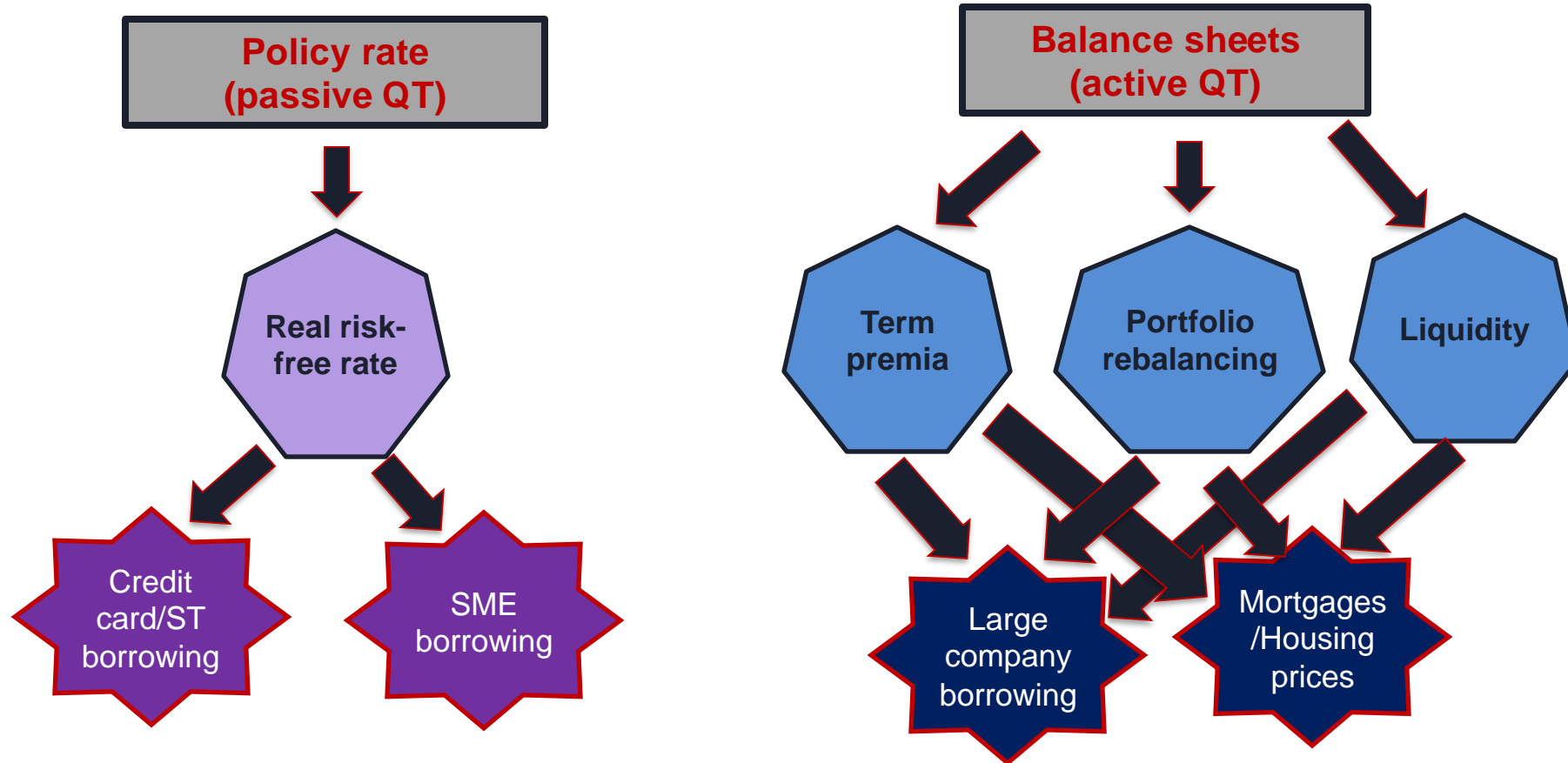
Source: Replicated based on results in Du, Forbes and Luzzetti (2024), "Quantitative Easing Around the World: What Have We Learned?"

# Maneuvering: Lessons

- **“Conventional” tools are the best maneuver for easing & tightening**
  - Possible exception: severe illiquidity/market stress
- **But QT should not be relegated to use only if 1<sup>st</sup> choice is not available (unlike QE)**
  - QT can run in background, consistent with easing policy
  - QE has larger costs and can limit room to maneuver
- **To consider: use tools to better address specific weakness in economy**
  - Adjusting rates (short end of yield curve) vs. balance sheets (long end of curve)
  - Passive QT (short end of yield curve) vs. active QT (long end of curve)



# New Maneuvers for Certain Contingencies?



**Source:** Forbes, Kristin. (2022). "Unwinding Monetary Stimulus in an Uneven Economy: Time for a New Playbook?" In *Macroeconomic Policy in an Uneven Recovery*. 2021 Jackson Hole Symposium organized by the Federal Reserve Bank of Kansas City. August.



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# 5  
*Variation in  
Tactics:  
Maintaining  
Flexibility*



# Variation in Tactics: Maintaining Flexibility

*“He who can modify his tactics in relation to his opponent and thereby succeed in winning, may be called a heaven-born captain.”*

*Sun Tzu, Chapter 6, Principle 33*

*“Do not repeat the tactics which have gained you one victory, but let your methods be regulated by the infinite variety of circumstances.”*

*Sun Tzu, Chapter 6, Principle 28*

*“So, the student of war who is unversed in the art of war of varying his plans, even though he be acquainted with the Five Advantages, will fail to make the best use of his men.”*

*Sun Tzu, Chapter 8, Principle 6*

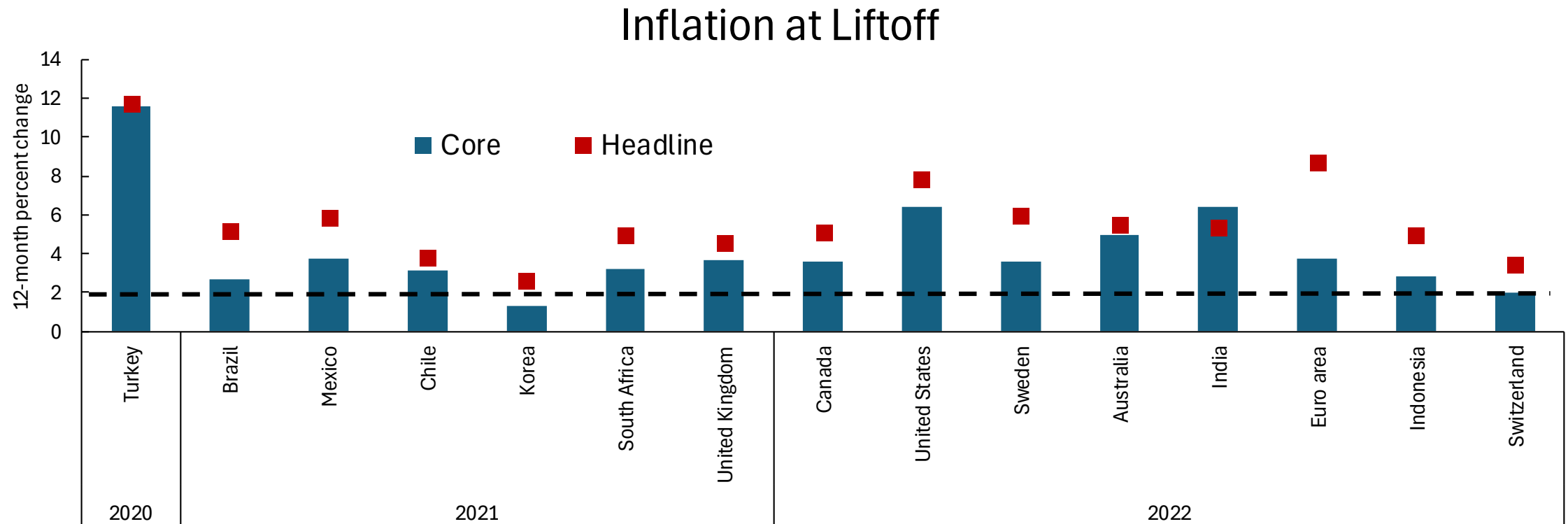


# Response to Crises: Impressive Flexibility

		Advanced Economies											Middle East and Africa						Emerging Asia							Latin America					Eastern Europe									
Tool type	Measures	US	EA	JP	GB	CA	AU	CH	DK	NO	NZ	SE	AE	DZ	IL	KW	MA	SA	TR	ZA	CN	HK	ID	IN	KR	MY	PH	SG	TH	VN	AR	BR	CL	CO	MX	PE	CZ	HU	PL	RO
Interest	Policy rate cut	✓			✓	✓	✓			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Lending operations	Liquidity provision	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓				✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Targeted lending	✓	✓	✓	✓		✓	✓			✓	✓	✓		✓			✓	✓	✓	✓			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓			✓	
Asset purchases <sup>1</sup>	Government bonds	✓	✓	✓	✓	✓	✓				✓	✓			✓				✓	✓			✓	✓	✓		✓	✓						✓	✓				✓	✓
	Commercial paper	✓	✓	✓	✓	✓						✓								✓				✓																
	Corporate bonds	✓	✓	✓	✓	✓						✓			✓									✓				✓											✓	
	Other private		✓	✓		✓						✓																					✓	✓					✓	
Foreign exchange	USD swap line		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓													✓			✓			✓				✓					
	Swaps <sup>2</sup>														✓								✓	✓			✓				✓	✓	✓	✓	✓	✓			✓	
	Spot intervention								✓											✓	✓	✓											✓				✓			
Reserve policy	Remuneration						✓	✓			✓								✓	✓	✓																			
	Requirement ratio	✓										✓	✓							✓	✓	✓	✓		✓	✓				✓	✓		✓	✓	✓				✓	
	Compliance																		✓					✓	✓					✓	✓							✓		

Source: Figure from Cantú, Carlos., Paolo Cavallino, Fiorella De Fiore, and James Yetman. (2021). "A Global Database on Central Banks' Monetary Responses to Covid-19." *BIS Working Paper*, No 934, March.

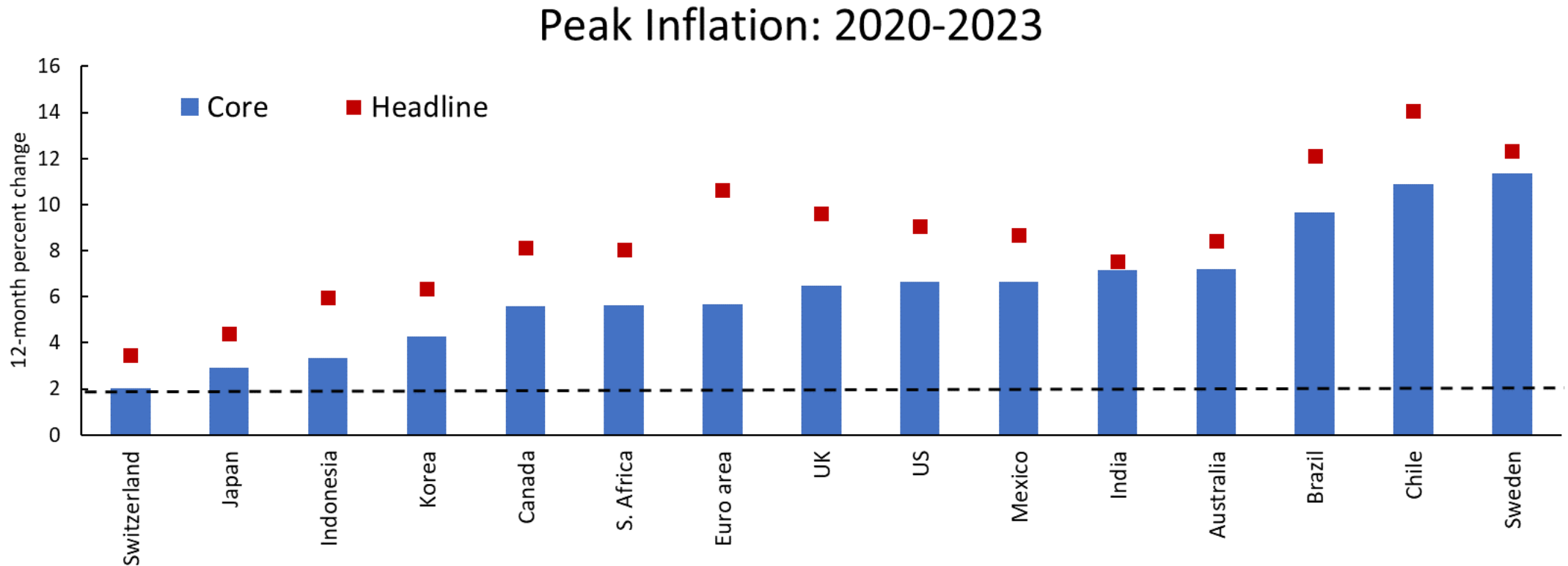
# Slow Response to Post-Pandemic Recovery



**Notes:** Graph shows headline and core CPI inflation rate in each country at the time of "liftoff"--the first rate hike after the pandemic.

**Source:** English, Forbes and Ubid (2024), based on data from BIS and central bank websites.

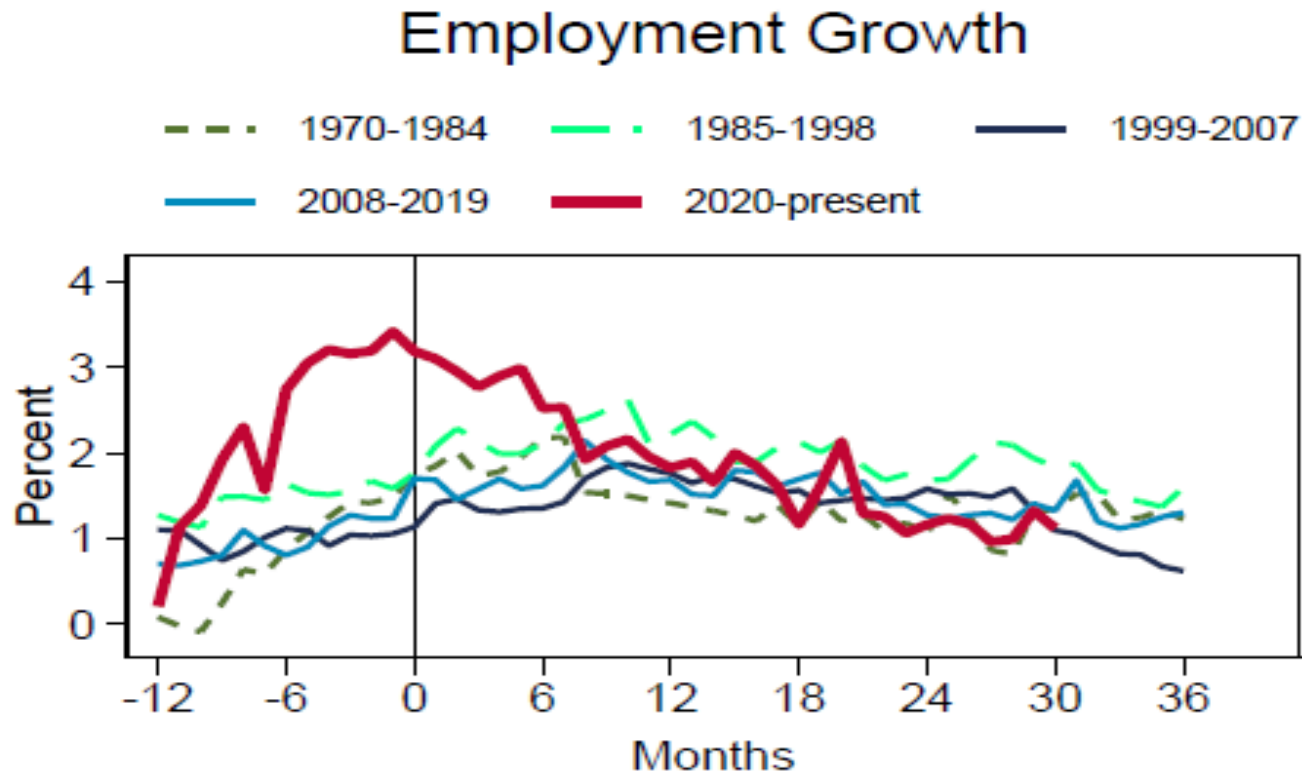
# Slow Response to Post-Pandemic Recovery



**Notes:** Original data from World Bank, Global Inflation Database, OECDStat and National Sources. Economies are ordered by their peak inflation rates. Core inflation for most economies is all items excluding food and energy. For Indonesia, core is all items excluding food. For Australia, data is the monthly CPI indicator rather than the quarterly CPI, and core excludes volatile items and holiday travel.

**Source:** From English, Forbes and Ubide (2024).

# Slow Response Compared to Historical Cycles



**Notes:** Graphs show median value for employment growth in sample of 24 advanced economies over historical hiking cycles, with  $t=0$  the first rate hike in the cycle.

**Source:** Forbes, Ha and Kose (2024)

## Why so slow?

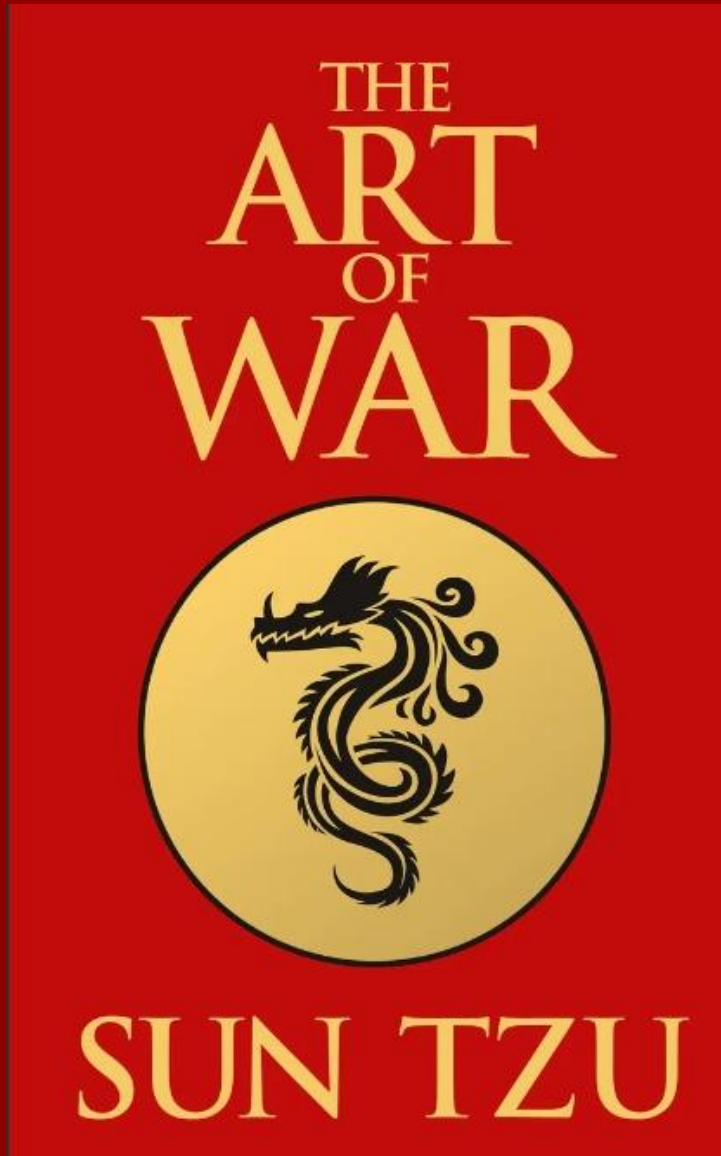
- Confidence in inflation anchoring
- Prolonged recovery after 2008 GFC
- Belief Phillips curve was flat
- **Difficulty exiting from pandemic policy responses**

# Flexibility and Tactics: Lessons

- **Incorporate flexibility in the design of “unconventional” tools**
  - Programs should have default end dates/volumes, possibly combined with state-contingent criteria
  - Note: asymmetry between QE and QT
- **Consider ease of unwinding securities when making purchases**
  - Short-term bonds easier to unwind through passive QT
  - Mortgage-related assets harder to unwind if interest rates increase
  - QE has larger costs and can limit room to maneuver
- **Keep each monetary policy meeting “live” and rely less on guidance**
- **Make greater use of scenario analysis to make alternate outcomes more tangible**







**# 6**

***The Resources  
and Costs of  
Battle:  
Tradeoffs***



# Costs of Battles: Tradeoffs

*“...if the campaign is protracted, the resources of the State will not be equal the strain.”* **Sun Tzu, Chapter 2, Principle 3**

*“... the proximity of an army causes prices to go up; and high prices cause the people’s substance to be drained away.”*

**Sun Tzu, Chapter 2, Principle 11**

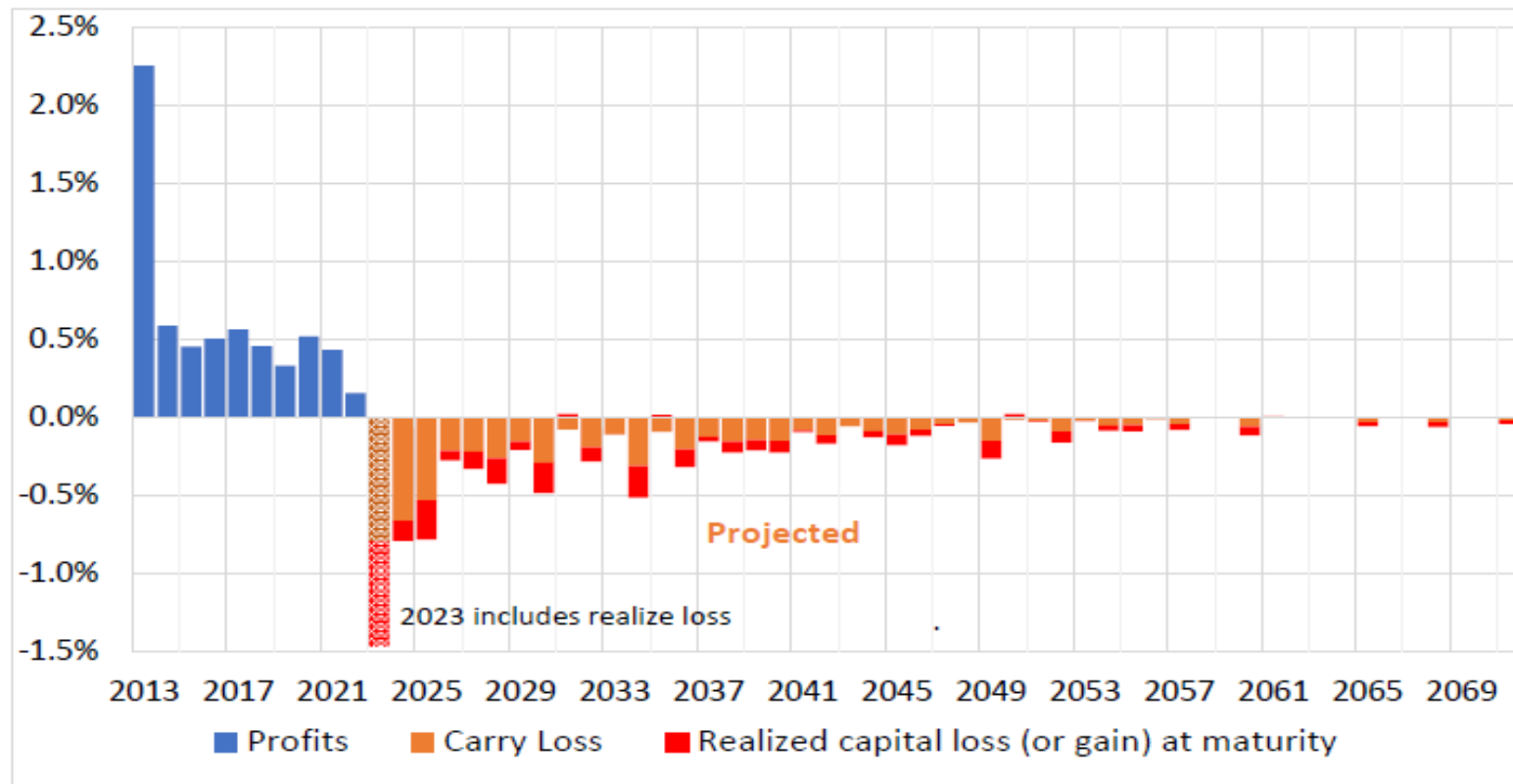
*“When their substance is drained away, the peasantry will be afflicted by heavy exactions.”*

**Sun Tzu, Chapter 2, Principle 12**



# Costs of Asset Purchases: Bank of England

Figure 2: Bank of England Asset Purchase Facility Net Profits and Losses, 2013 to 2071



Source: Stephen Cecchetti and Jens Hilscher (2024). "Fiscal Consequences of Central Bank Losses," *NBER Working Paper 32478*, May.

# Costs: Federal Reserve and Swiss National Bank

Figure 4: Federal Reserve Transfers to the US Treasury, 1994 to 2030

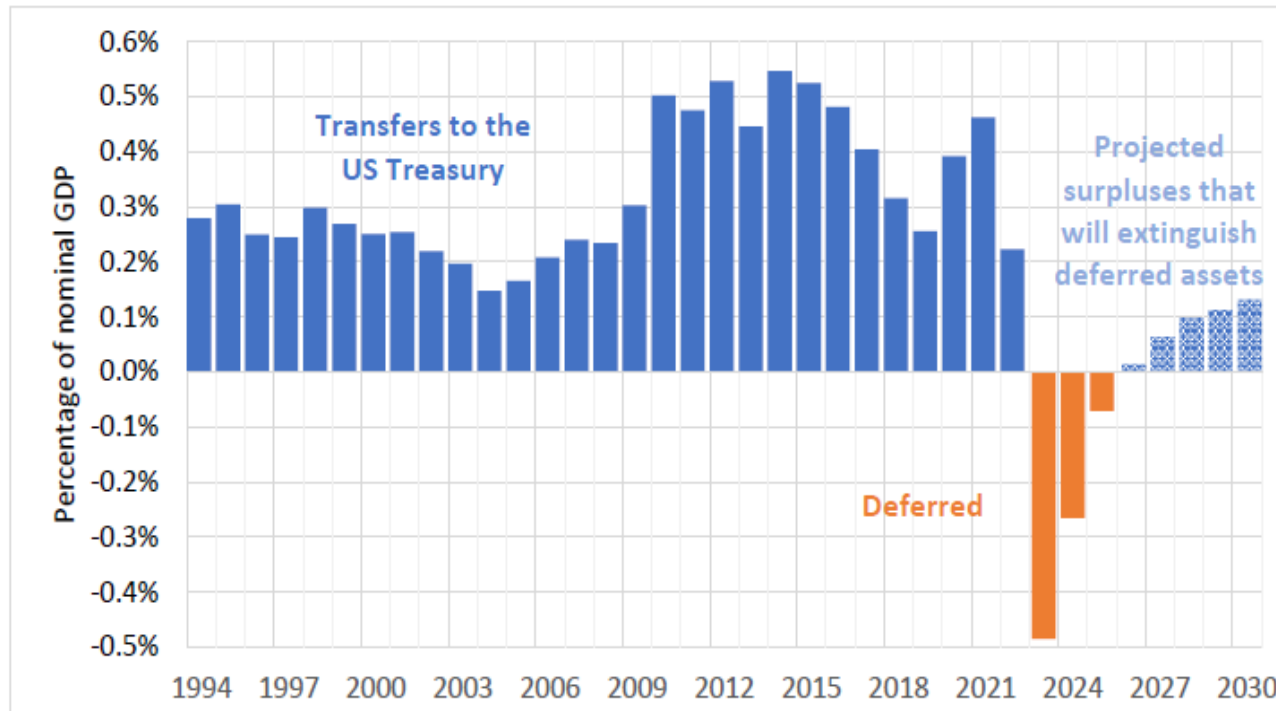
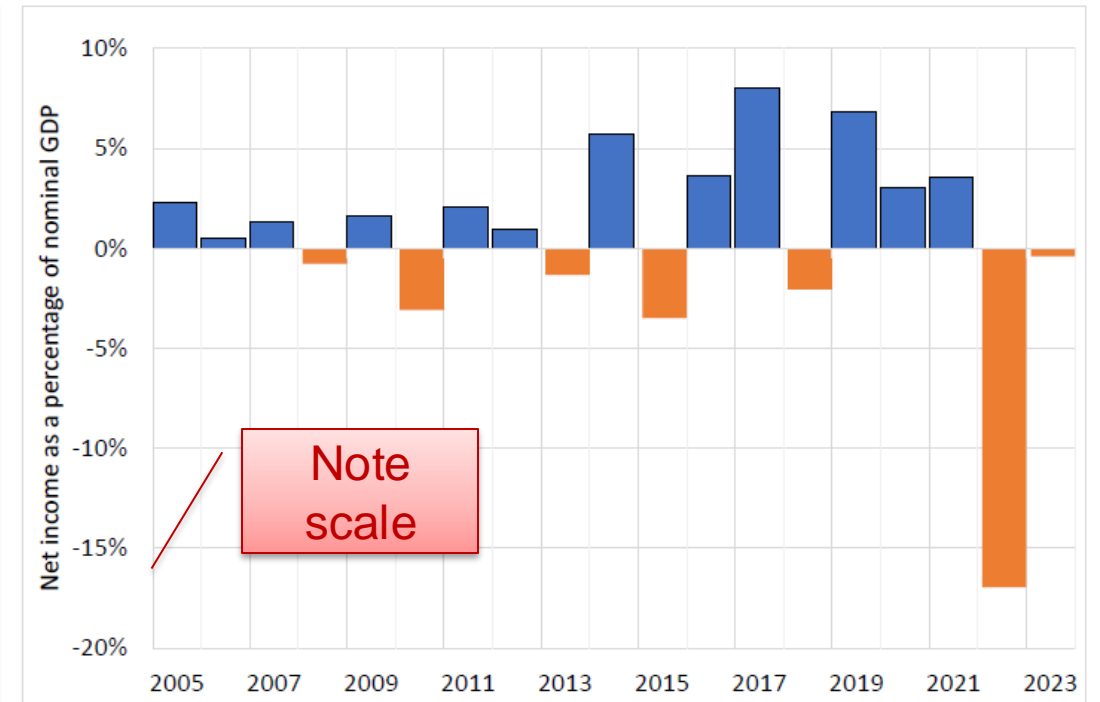


Figure 5: Swiss National Bank Net Income 2005 to 2023, percent of GDP



Source: Stephen Cecchetti and Jens Hilscher (2024). "Fiscal Consequences of Central Bank Losses," *NBER Working Paper 32478*, May.

# Costs of Battle: Lessons

- **Consider costs in program design**
  - Calibrate magnitudes—not endless
  - Weigh benefits vs. costs
  - Wind down and exit programs as soon as possible
  - **Not a free lunch!!!**
- **When designing programs, consider ability and cost to unwind the holding**
  - Example: harder to unwind mortgage-backed securities in high interest rate environment
- **Evaluate institutional framework to account for losses without constraining operations of central bank**



THE  
ART  
OF  
WAR



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# *Conclusions*



# THE ART OF WAR



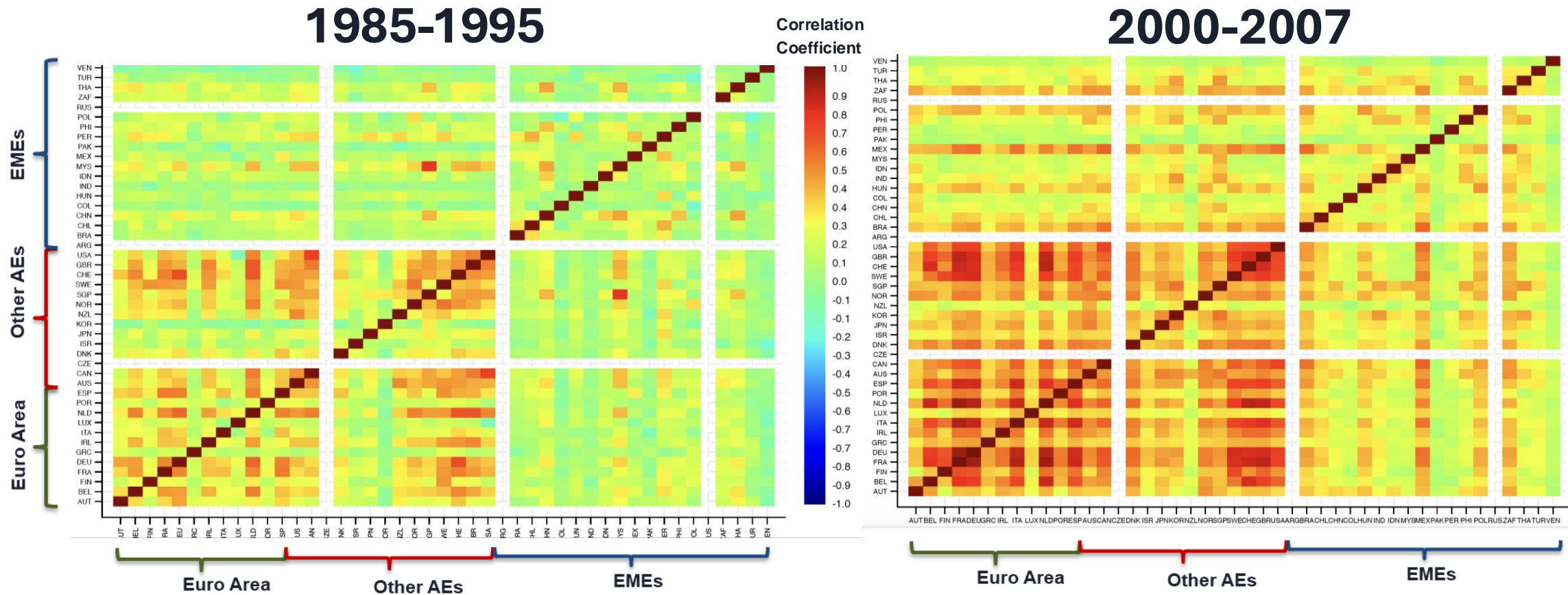
SUN TZU

1. Laying Plans: *Preparing for the Next Financial Battle*
2. Heaven: *The Inevitability of Powerful External Shocks*
3. Earth and Terrain: *Establishing a Strong Tactical Position*
4. Maneuvering: *Combining the Weapons and Methods*
5. Variation in Tactics: *Maintaining Flexibility*
6. The Resources and Costs of Battles: *Tradeoffs*

*A Tension in War and Central Banking???*

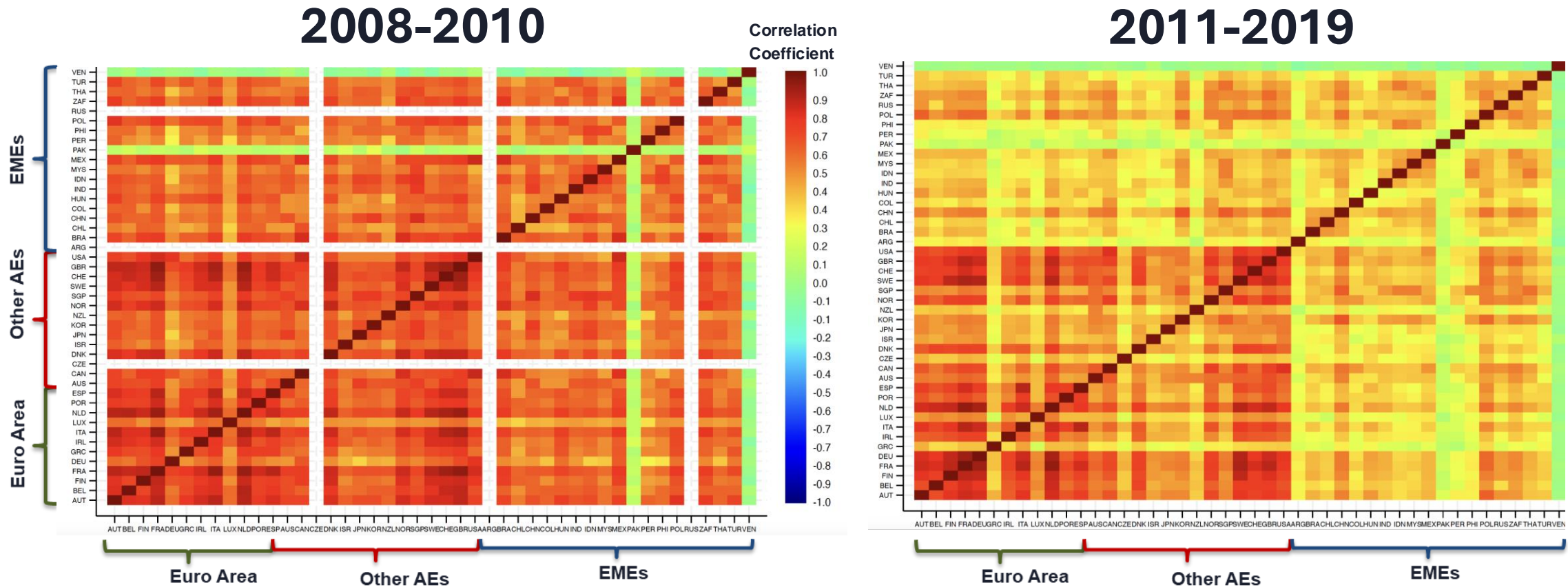


# Equity Market Correlations (1)



**Notes:** Each box is the average correlation in weekly returns based on the local currency stock market index between the countries listed on the horizontal and vertical axis over the window listed at the top. White is no data. The index for Argentina is in USD  
**Source:** Stock indices from Datastream.

# Equity Market Correlations (2)

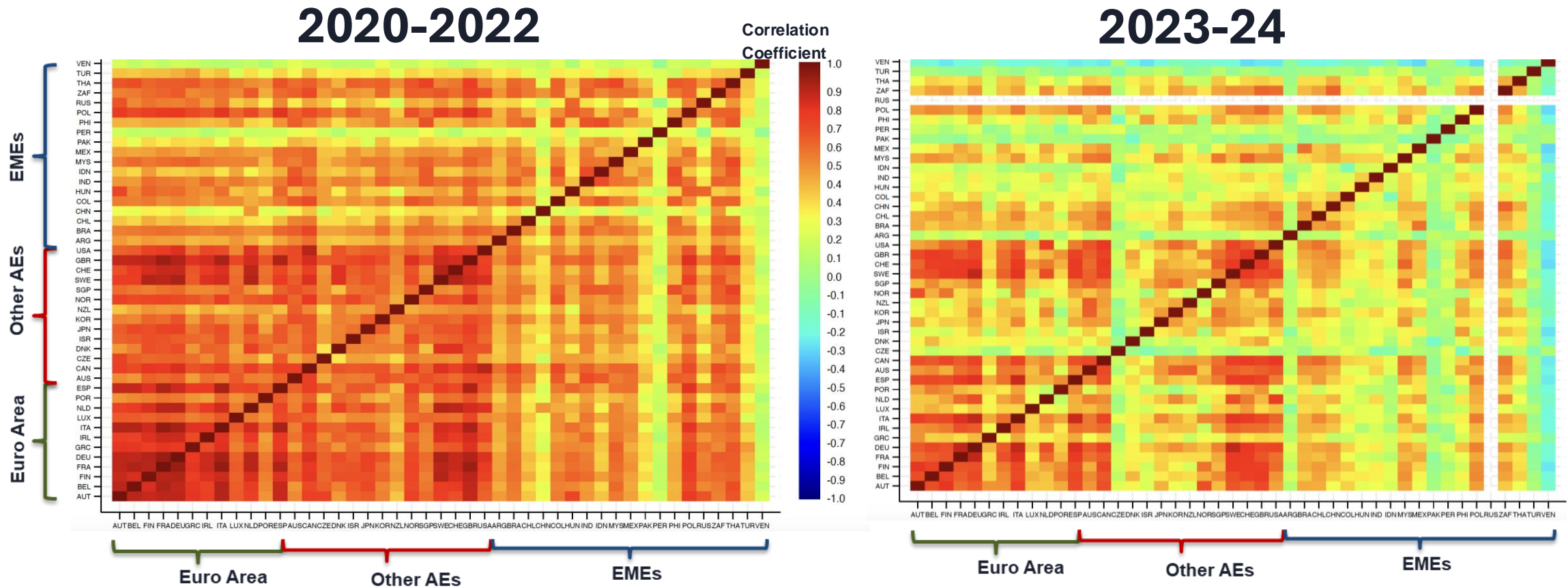


**Notes:** Each box is the average correlation in weekly returns based on the local currency stock market index between the countries listed on the horizontal and vertical axis over the window listed at the top. White is no data. The index for Argentina is in USD

**Source:** Stock indices from Datastream.



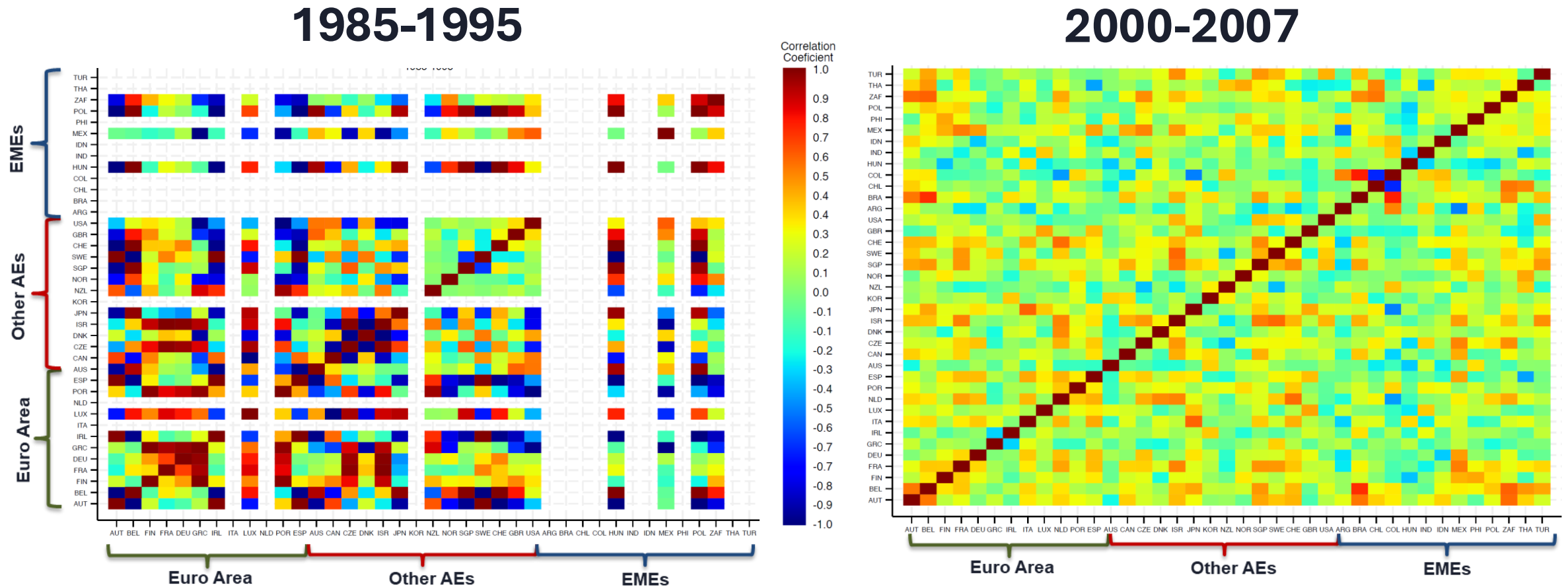
# Equity Market Correlations (3)



**Notes:** Each box is the average correlation in weekly returns based on the local currency stock market index between the countries listed on the horizontal and vertical axis over the window listed at the top. White is no data. The index for Argentina is in USD

**Source:** Stock indices from Datastream.

# GDP Growth Correlations (1)

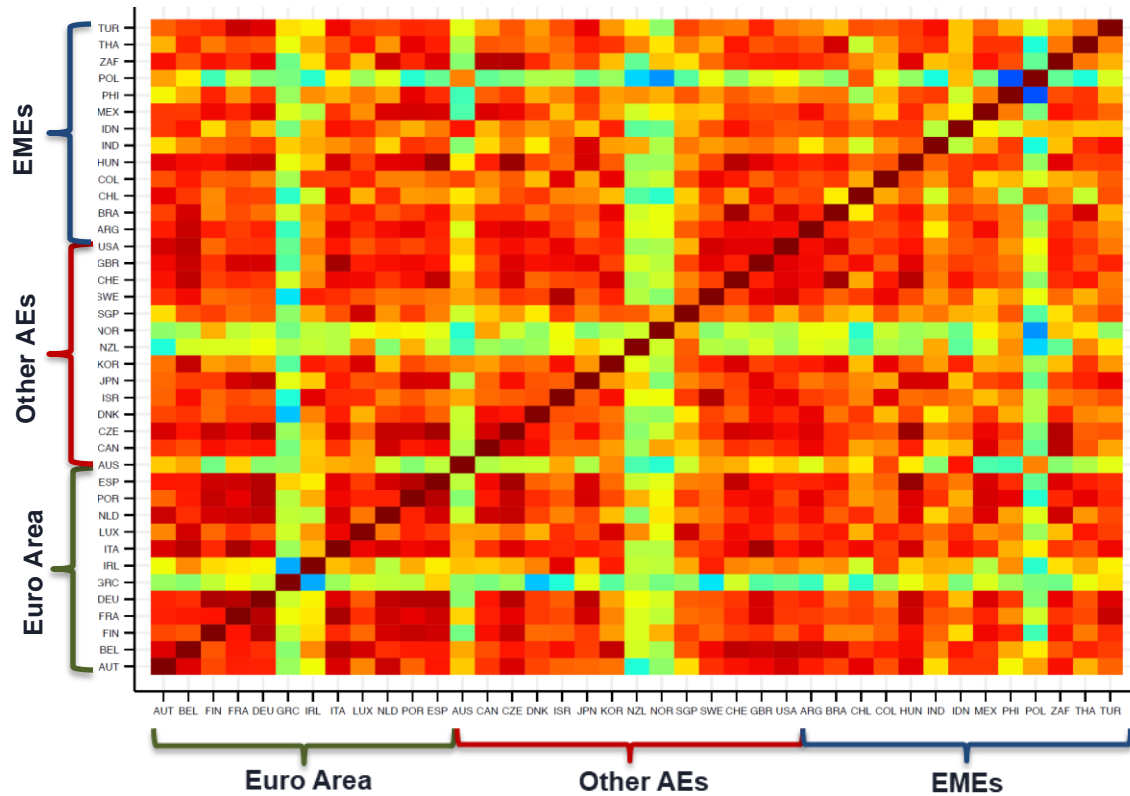


**Notes:** Each box is the average correlation in quarterly real GDP growth (seasonally adjusted) between the countries listed on the horizontal and vertical axis over the window listed at the top. White is no data.

**Source:** Based on GDP data from the IMF's *International Financial Statistics* database, accessed September 2024.

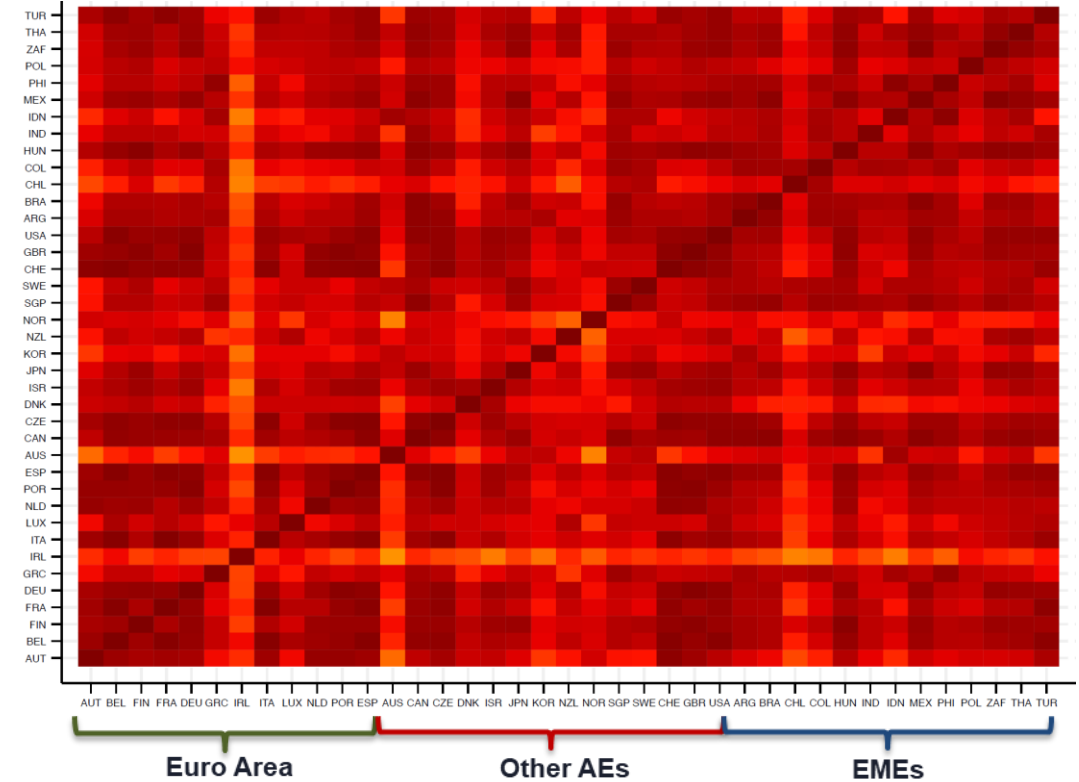
# GDP Growth Correlations: Crisis Years

## 2008-2010



## 2020-2022

Correlation Coefficient  
1.0  
0.9  
0.8  
0.7  
0.6  
0.5  
0.4  
0.3  
0.2  
0.1  
0.0  
-0.1  
-0.2  
-0.3  
-0.4  
-0.5  
-0.6  
-0.7  
-0.8  
-0.9  
-1.0

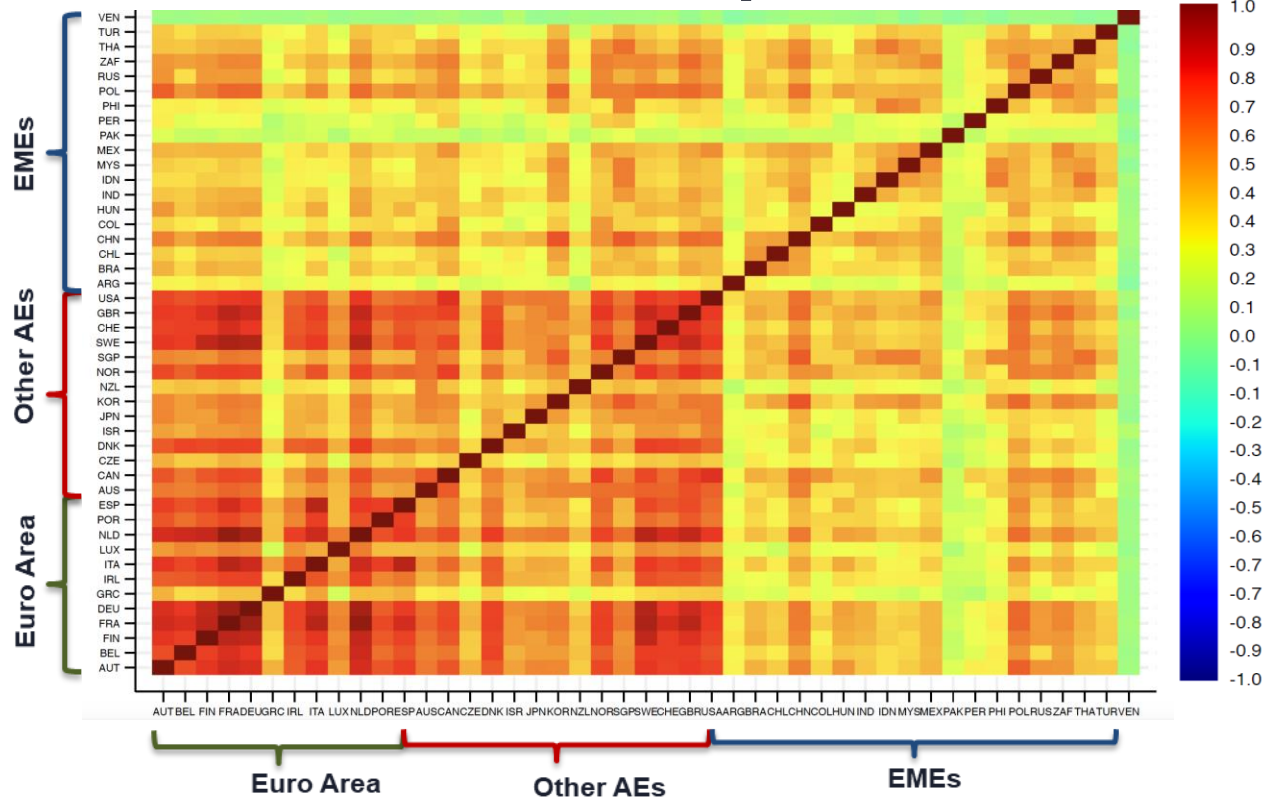


**Notes:** Each box is the average correlation in quarterly real GDP growth (seasonally adjusted) between the countries listed on the horizontal and vertical axis over the window listed at the top.

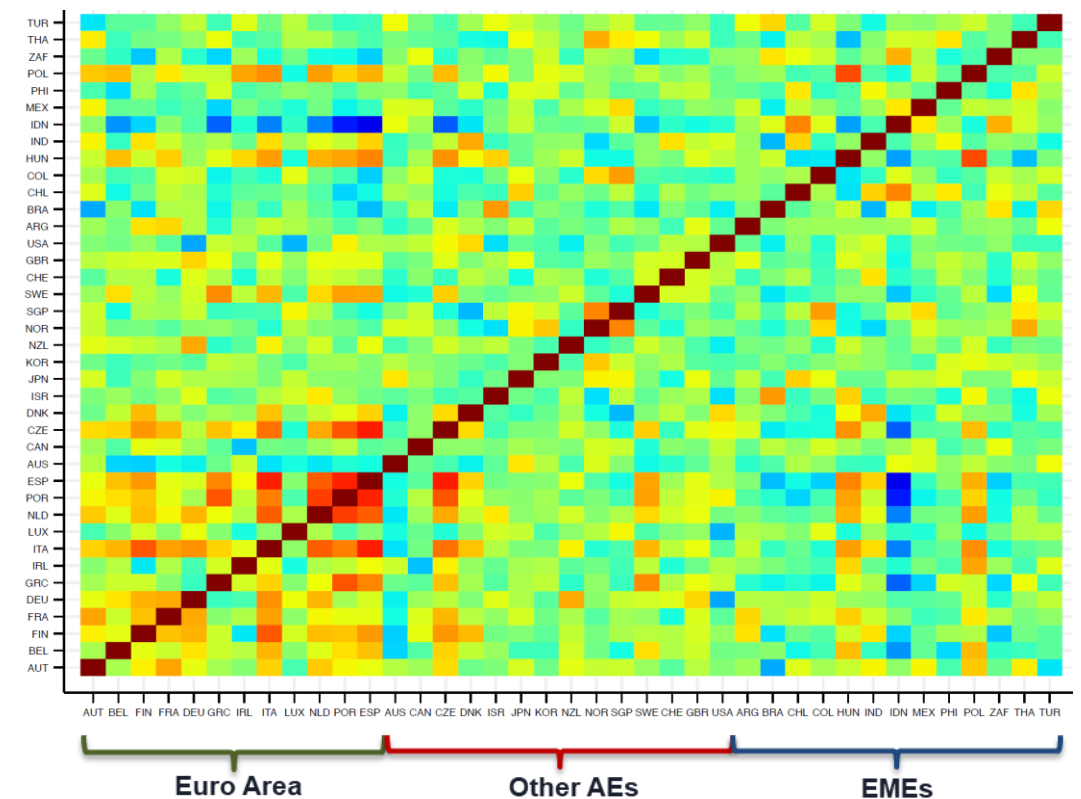
**Source:** Based on GDP data from the IMF's *International Financial Statistics* database, accessed September 2024.

# Correlations in Non-Crisis Periods: The Contrast

## 2011-2019: Equities



## 2011-2019: GDP Growth



**Notes:** Each box is the average correlation in quarterly real GDP growth (seasonally adjusted) between the countries listed on the horizontal and vertical axis over the window listed at the top.

**Source:** Based on GDP data from the IMF's *International Financial Statistics* database, accessed September 2024.



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***“The general that hearkens to my counsel and acts upon it, will conquer: let such a one be retained in command! The general that hearkens not to my counsel nor acts upon it, will suffer defeat: — let such a one be—dismissed!”***

***Sun Tzu, Chapter 1,  
Principle 15***