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CENTRO DE ESTUDIOS MONETARIOS LATINOAMERICANOS

The Changing Nature and Geography of Global Finance

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Banco Central de Reserva del Perú and the Reinventing Bretton Woods Committee
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Session VI: Implications for the Conduct and Design of Monetary Policies

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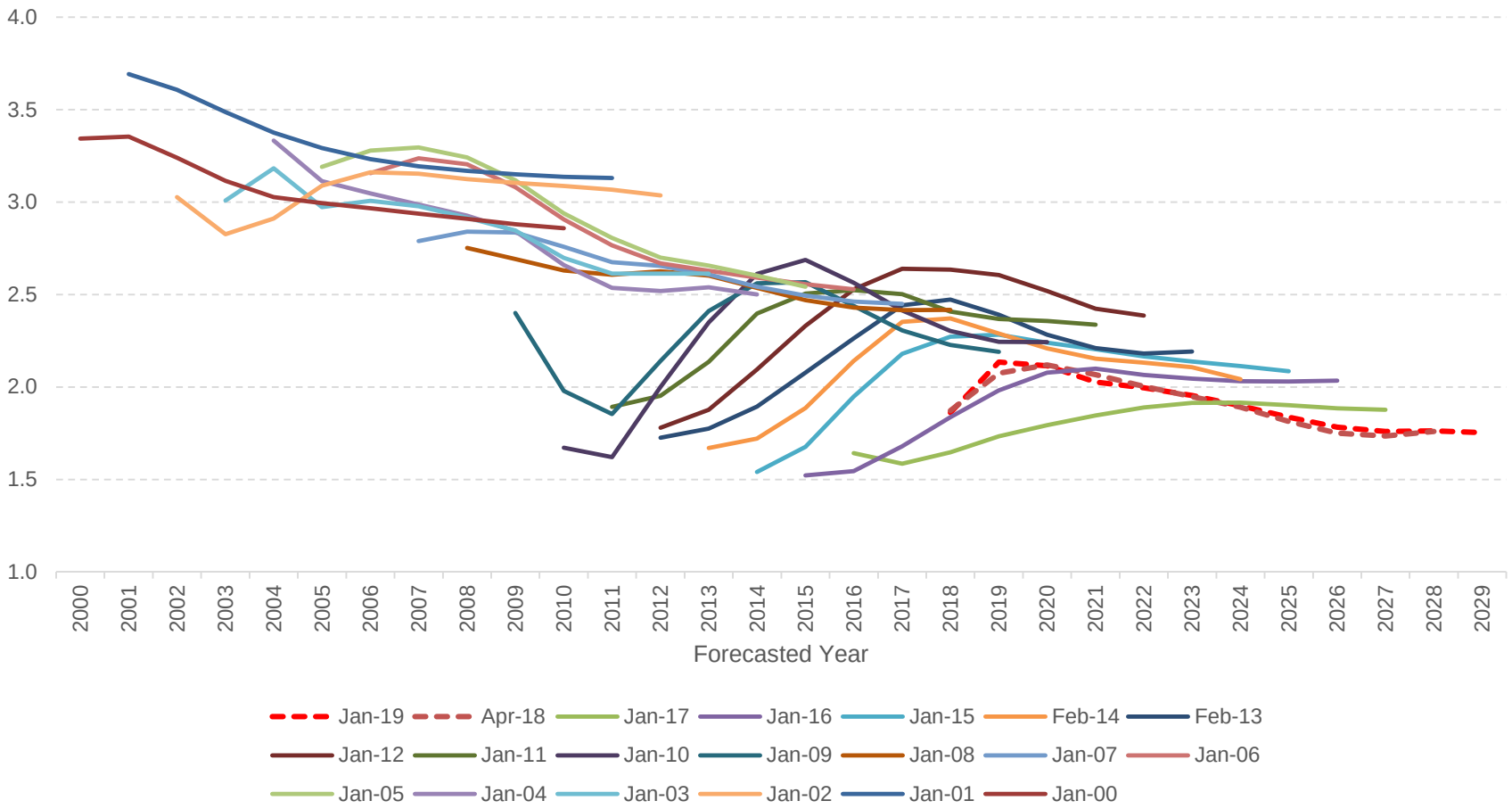
Global Monetary Game. Main elements

The global environment has been characterized by low interest rates, weak economic growth and, seemingly, little inflation pressure in AEs.

1. Secular stagnation(?)
   - ✓ **Potential growth.**
     - ❖ Demographic dynamics; educational plateau; income inequality; high public debt.
   - ✓ **A persistent deviation from potential output.**
     - ❖ Insufficient growth in demand with respect to potential output: rise in the global propensity to save, fall in the global propensity to invest.
   - ✓ **Hysteresis.**

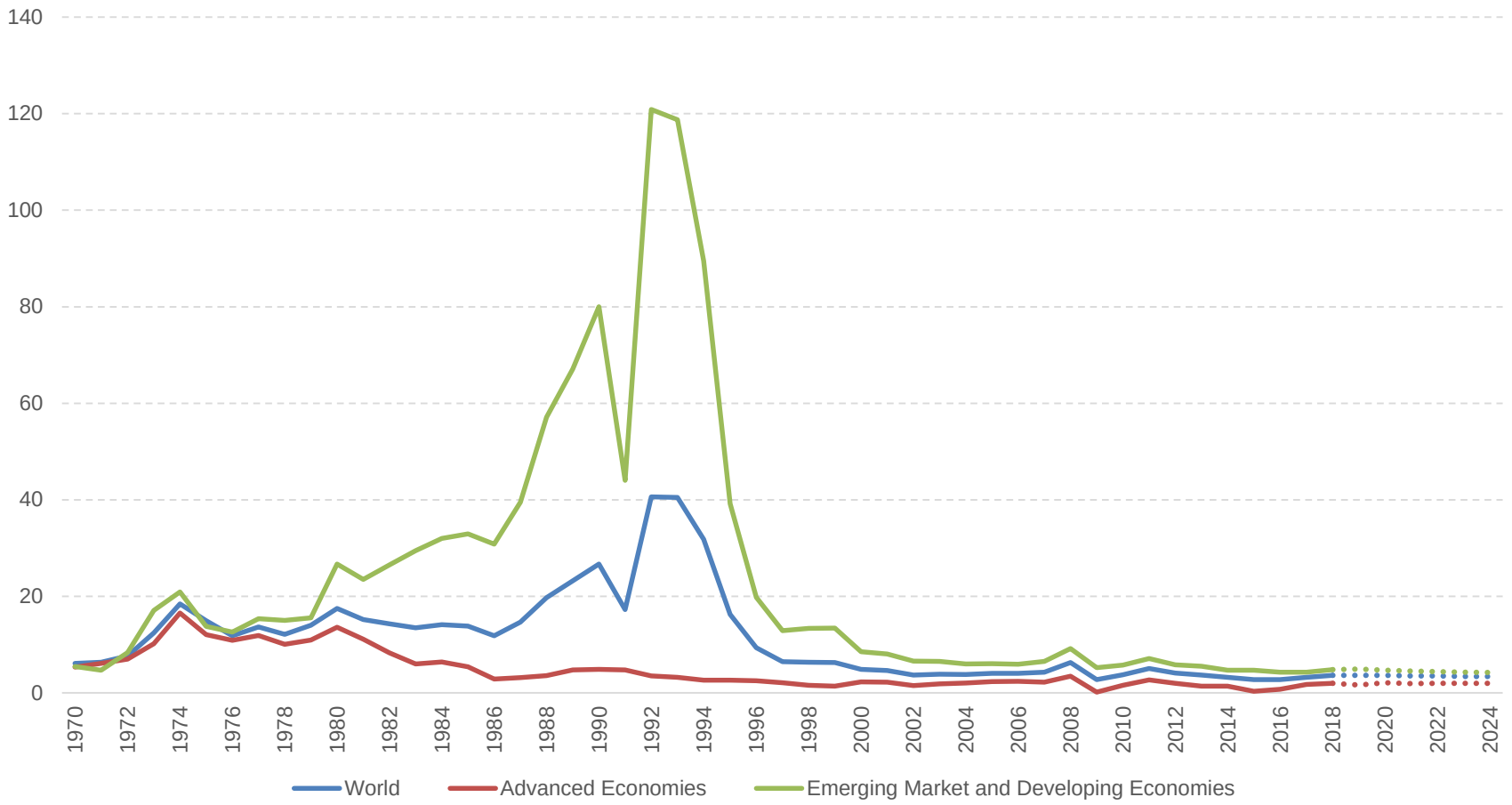
→ These conditions are being reflected in low natural interest rates.

US Potential Growth Expectations



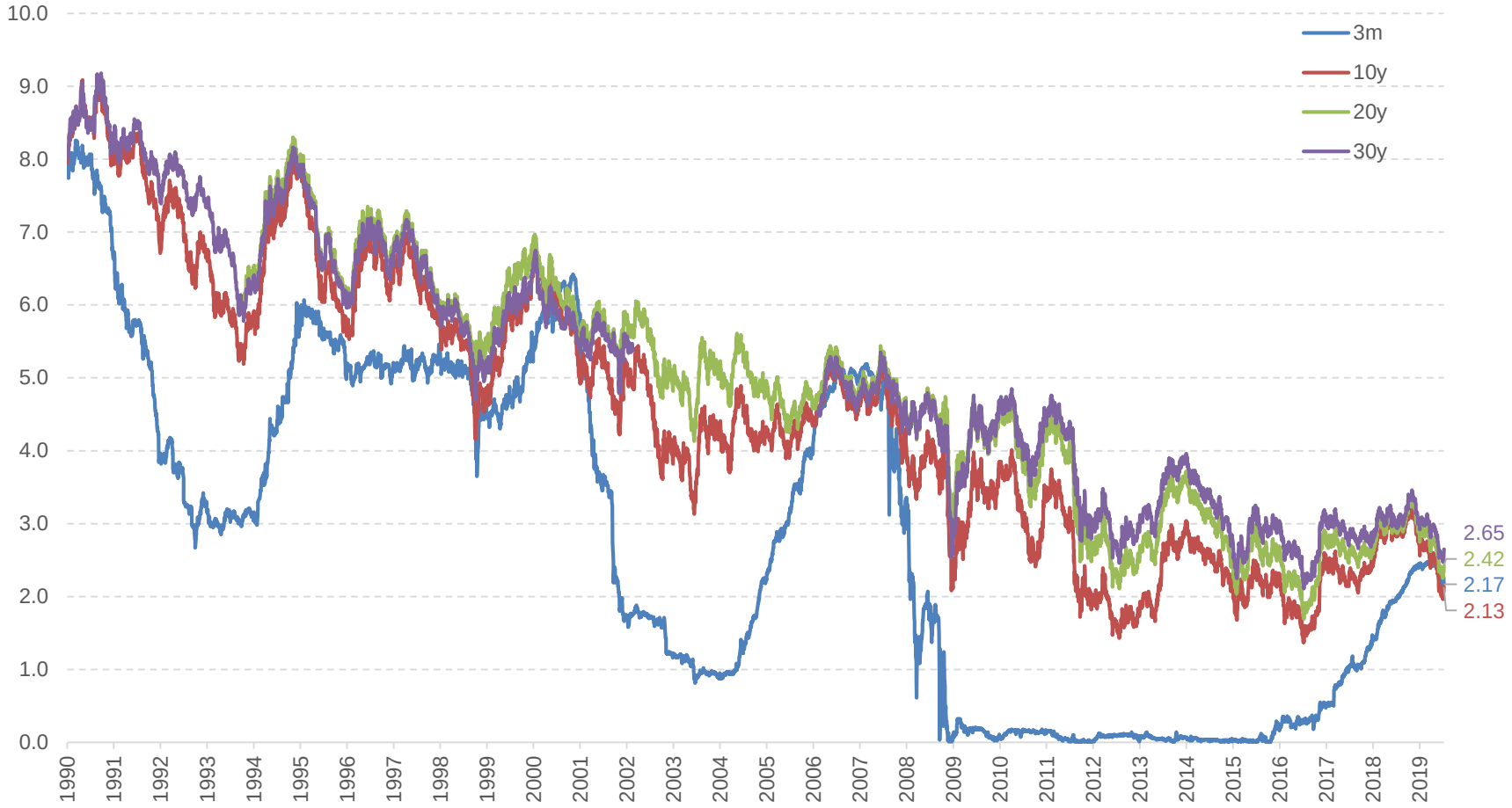
Notes: Annual growth rates. The initial point of each line is the point in time at which the forecasts have been made. For example, the red-dotted line depicts forecasts from 2019 to 2019 made in January 2019.
Source: Congressional Budget Office.

Inflation – World, AEs and EMDEs



Notes: Annual frequency. Dotted-lines indicate expected inflation levels. **Sources:** From 1970 to 1979 data from Ha, Kose, and Ohnsorge (2019) “Inflation in Emerging and Developing Economies Evolution, Drivers, and Policies," World Bank. Data for advanced economies and emerging markets and developing economies have been extrapolated based on world inflation. From 1980 – 2024 data from WEO, April 2019.

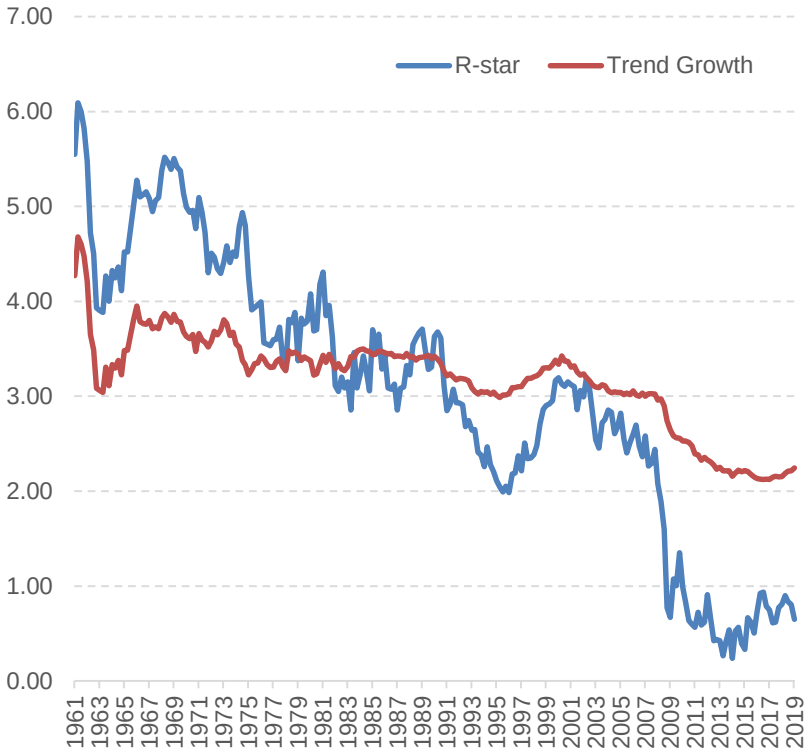
US Nominal Interest Rates



Note: m refers to month, y to year, both indicate the maturity**.** Last datum corresponds to July 11, 2019.
Source: US Treasury

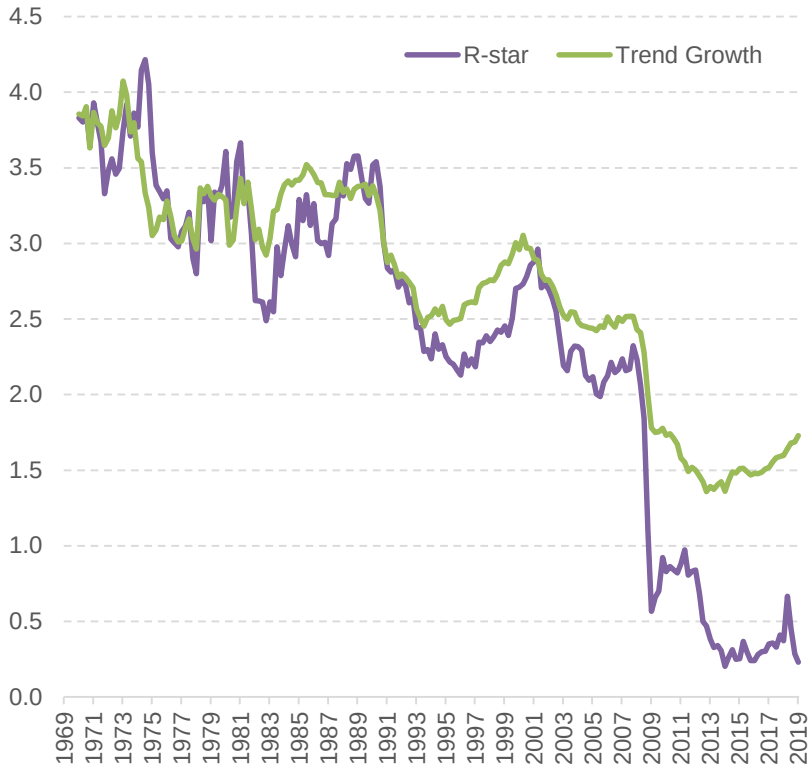
Natural Interest Rates

Natural Rate R*, US, Laubach-Williams (2003)



Notes: The **Laubach-Williams (2003) model** uses data on real GDP, inflation, and the federal funds rate to extract trends in U.S. economic growth and other factors influencing the natural rate of interest. Last datum corresponds to 20191Q.
Source: Federal Reserve Bank of New York.

Natural Rates R*, Advanced Economies Holston-Laubach-Williams (2017)



Notes: The **Holston-Laubach-Williams (2017) model** extends this analysis to other advanced economies, estimating r-star and related variables for the United States, Canada, the Euro Area, and the United Kingdom. For the Advanced Economies R*, the authors use a weighted average using each economy estimate and their PPP GDP as weights. Last datum corresponds to 20191Q. **Source:** Federal Reserve Bank of New York.

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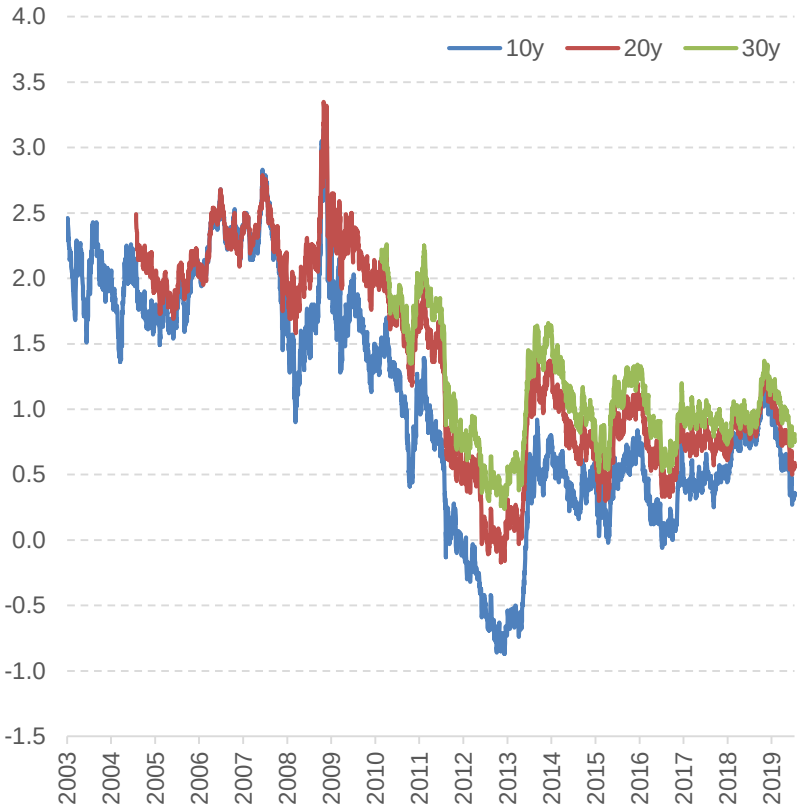
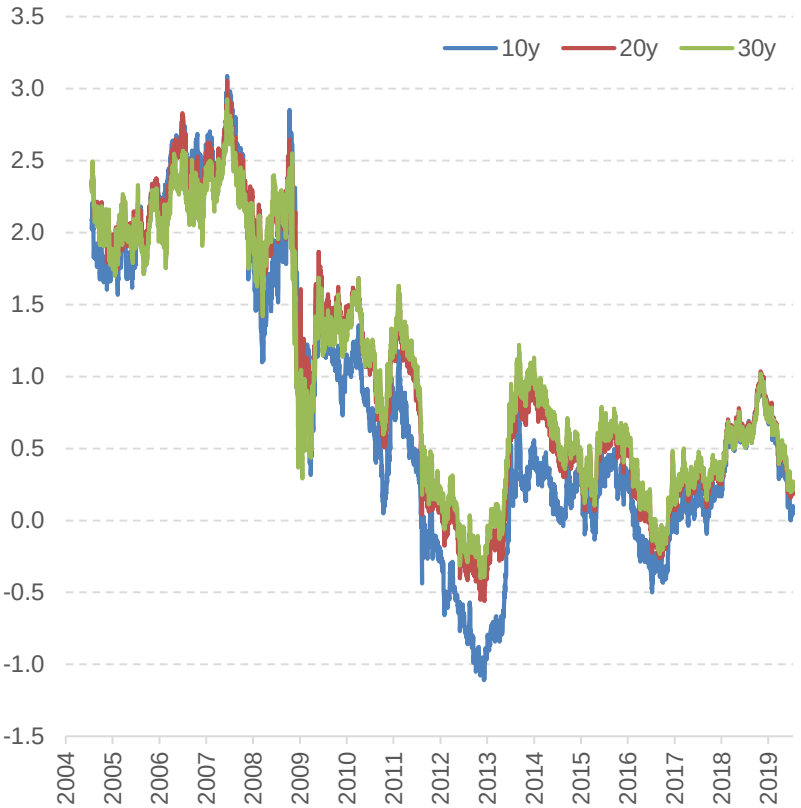
US Long-term Real Interest Rates

Treasury Inflation-Protected Securities (TIPS)



Note: Last datum corresponds to July 11, 2019.
Source: US Treasury

Implicit in Nominal Interest Rate Swaps and Inflation Swaps



Note: Difference between nominal interest rate and inflation swaps**.** Last datum corresponds to July 11, 2019**.Source:** Bloomberg

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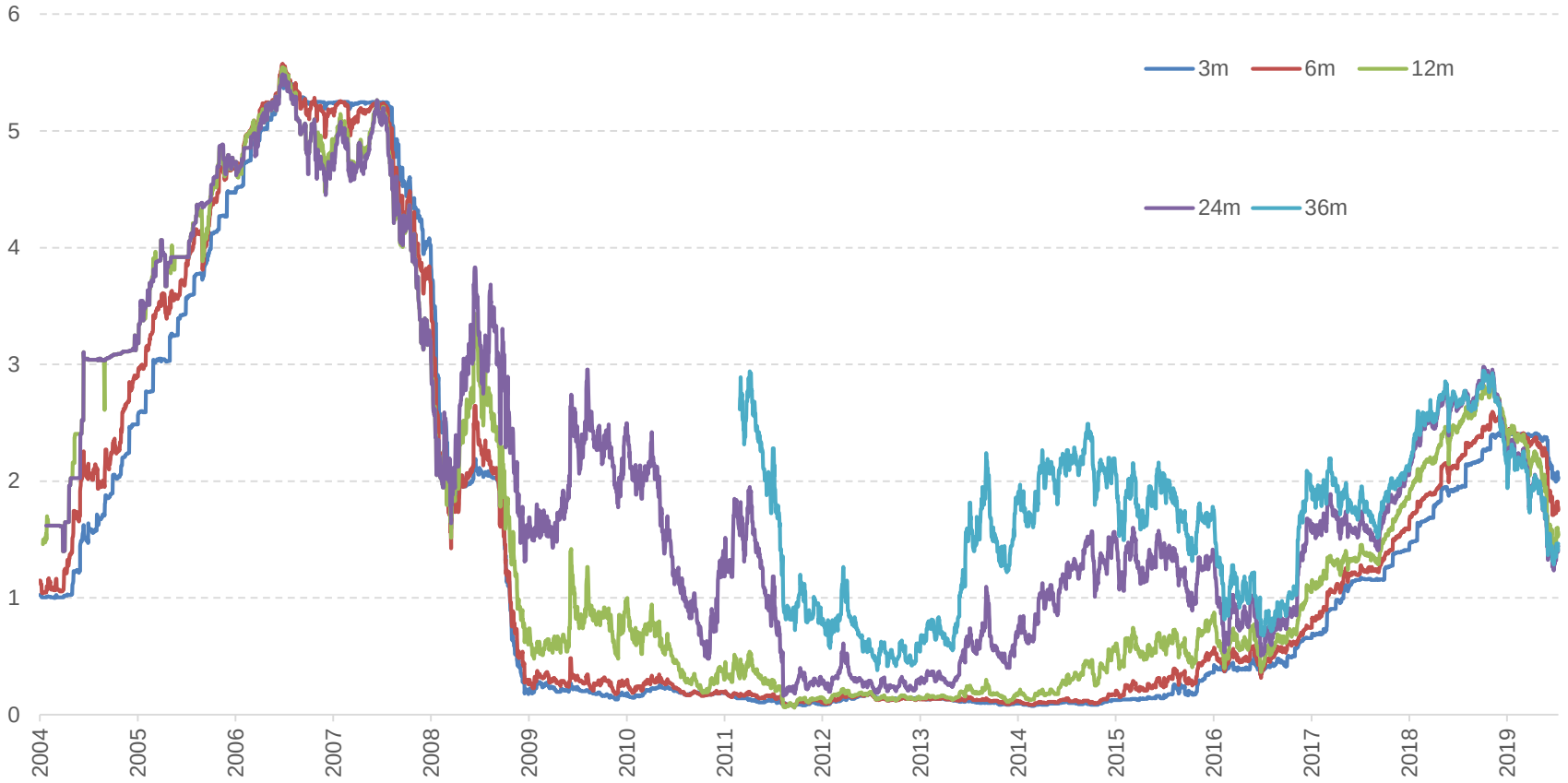
Federal Funds Rate Futures



Note: m refers to month, the swap maturity**.**
Source: Bloomberg.

Global Monetary Game. Main Elements

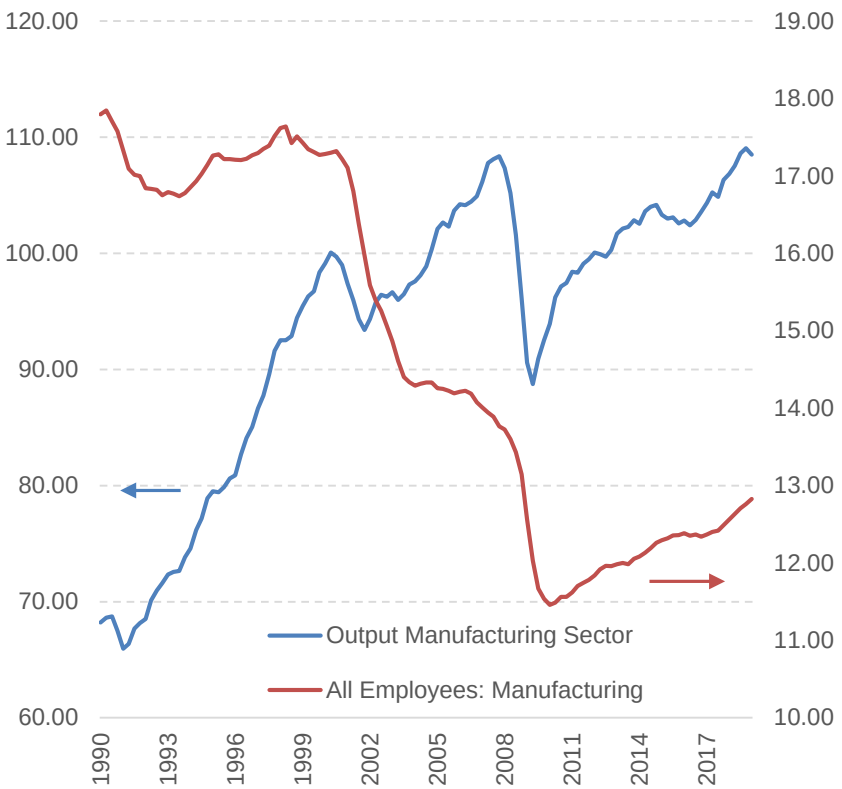
2. Less understanding of business cycles, Phillips curve.

- ✓ Wage and price formation in the US
  - ❖ **Labor market: Automatization**. **Monopsony power**.
  - ❖ **Online stores and technological platforms** (Uber, Airbnb): Lower search costs, i.e., improved matching; More and better information, less asymmetric information; Lower transaction costs.
    - ➢ Clearly, **less frictions** in the economy. Thus, some **traditional** channels of monetary transmission (e.g., aggregate demand) might have lost strength.
    - ➢ The relative importance of **other channels has increased, for ex., the risk-taking channel.**

→ Increased uncertainty concerning the direction (cyclical), and the effectiveness (traction) and best use of instruments of monetary policy in many AEs.

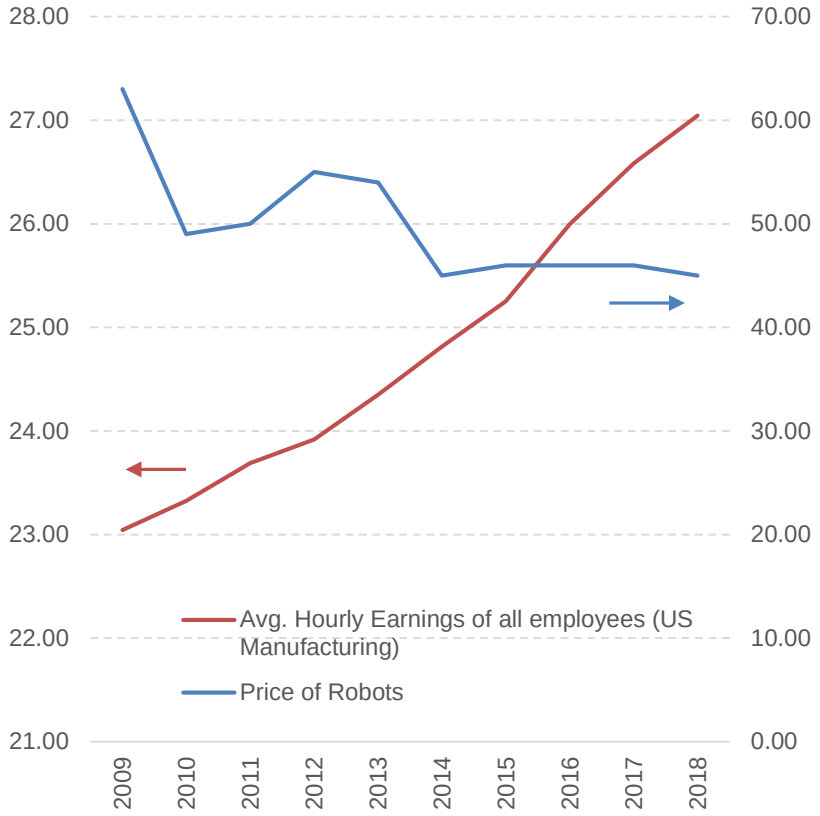
Manufacturing and Automation

Manufacturing Output and Employees



Notes: Manufacturing Sector (left-hand scale): Manufacturing Sector: Real Output, Index 2012=100, Quarterly, Seasonally Adjusted. **Manufacturing Employees (right-hand scale):** All manufacturing employees, Millions of Persons, seasonally adjusted. **Source**: Federal Reserve Bank of Saint Louis.

Labor Costs and Robot Prices



Notes: Average selling price of industrial robots from 2009 to 2018 (in 1,000 U.S. dollars) on the left-hand scale. Average hourly earnings of all employees (US Manufacturing) on the right-hand scale. **Source:** www.statista.com

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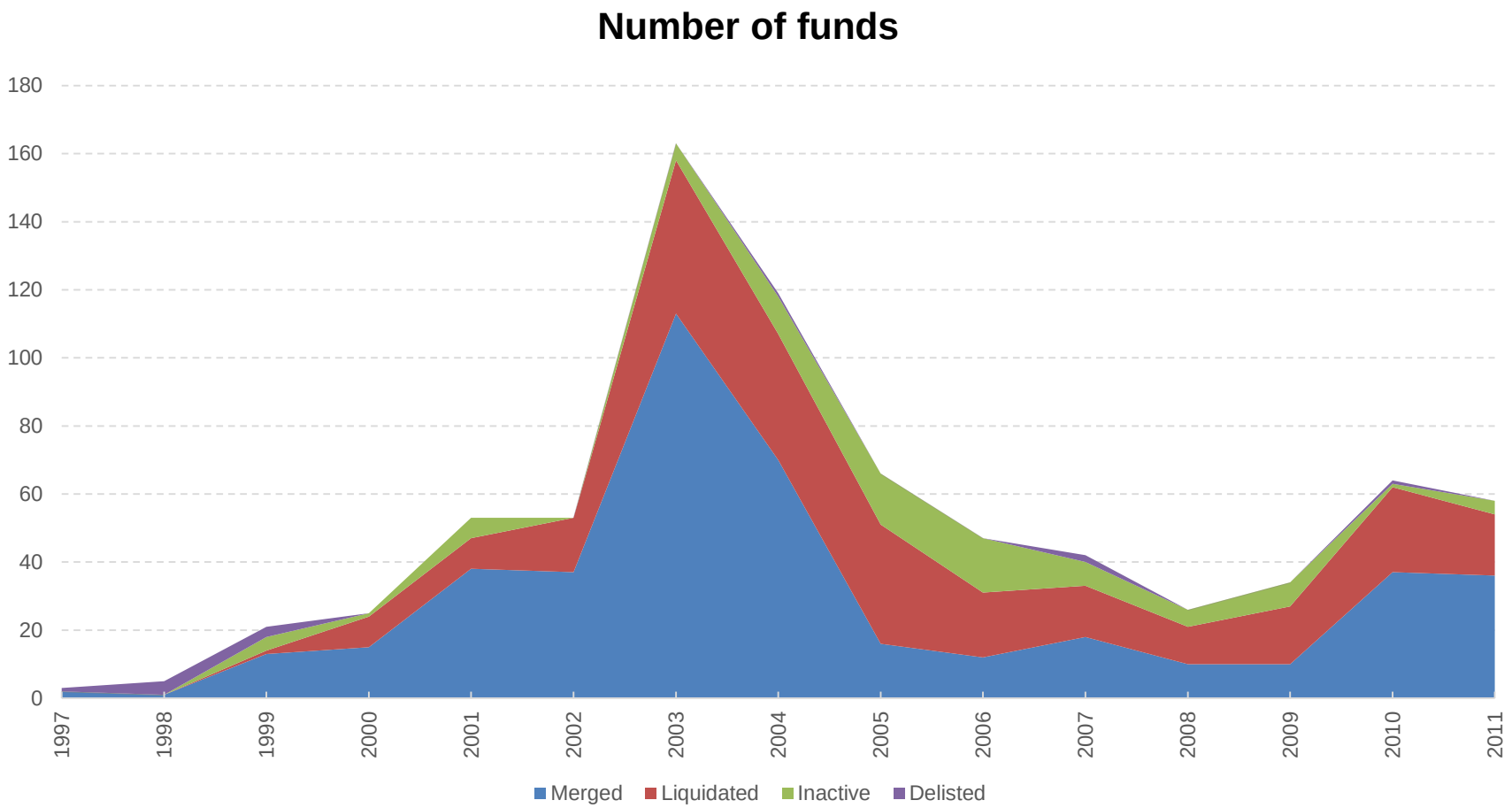
Global Monetary Game. Main Elements

3. Changes in the way various financial markets operate. Herd behavior.
   - ✓ Historically, different phenomena, externalities, and problems.
     - ❖ Incomplete information.
     - ❖ Asymmetric information.
     - ❖ Information cascades.
     - ❖ Rational bubbles.
   - ✓ Players. Fund Managers (GAMs).
     - ❖ Agency problems. Ranking-last aversion.
     - ❖ Market structure for GAMs.
     - ❖ Intense search for yield.
   - ✓ HFT, AT.
   - ✓ Depth, microstructure.

Fund Survival



Notes: This Figure reports the number of delisted funds per year, by the following types: merging, liquidation, inactivity and other delisting. Data are reported for 1,624 open-ended accumulation mutual funds with major or full allocation in equities, extracted for the period starting on Friday December 30, 1994 and ending on Friday January, 2010. At the end of the period totals were 418, 257, 82 and 12, respectively, for a grand total of 769. Thomson Reuters Datastream. The date and the reason of the delisting are retrieved manually, mainly from Bloomberg. **Source:** Cogneau and Hubner (2015). The prediction of fund failure through performance diagnostics. *Journal of Banking and Finance*. Vol. 50.

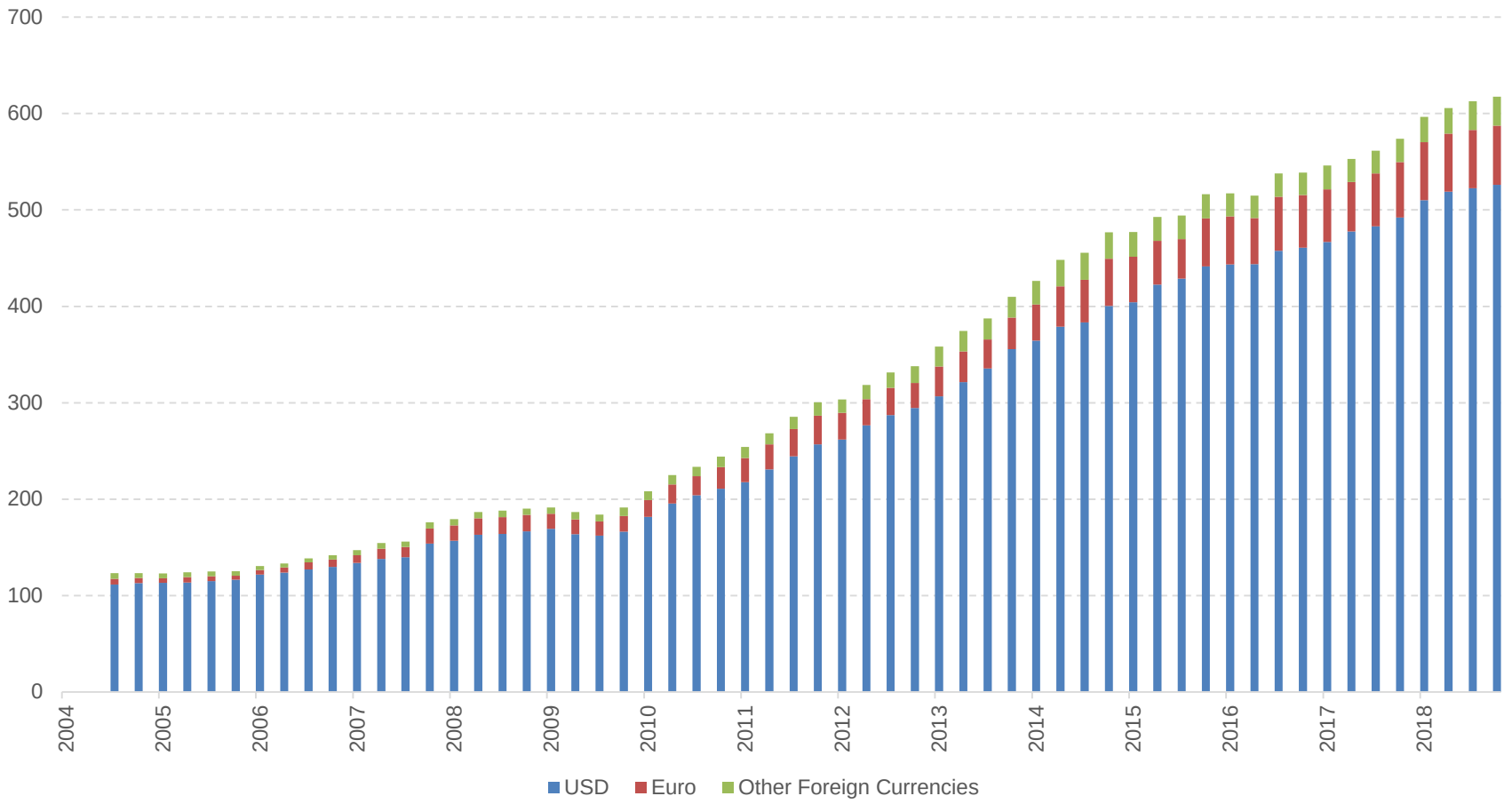
Global Monetary Game and High, Volatile Capital Flows

1. **Low natural interest rates in AEs. [Push]**
2. **Persistently higher inflation, term premia and growth expectations in EMEs. [Pull]**
3. **Changes in risk-aversion? Intensive search for yield.**
4. **New players (GAMs) (Liquidity ↑?). New ways to operate (HFT, AT) (Liquidity ↓). Anonymous electronic platforms. [Pipes]**
   - **Concentration of players, investment vehicles (ETFs) and exposures (Liquidity ↓).**
   - **Crowded Trades (Liquidity ↓).**
   - **Unrealistic redemption policies from GAMs (Liquidity ↓).**

The interaction of these elements has resulted in the presence of herd behavior, contributing to *highly volatile capital flows*. This, in turn, has led to:

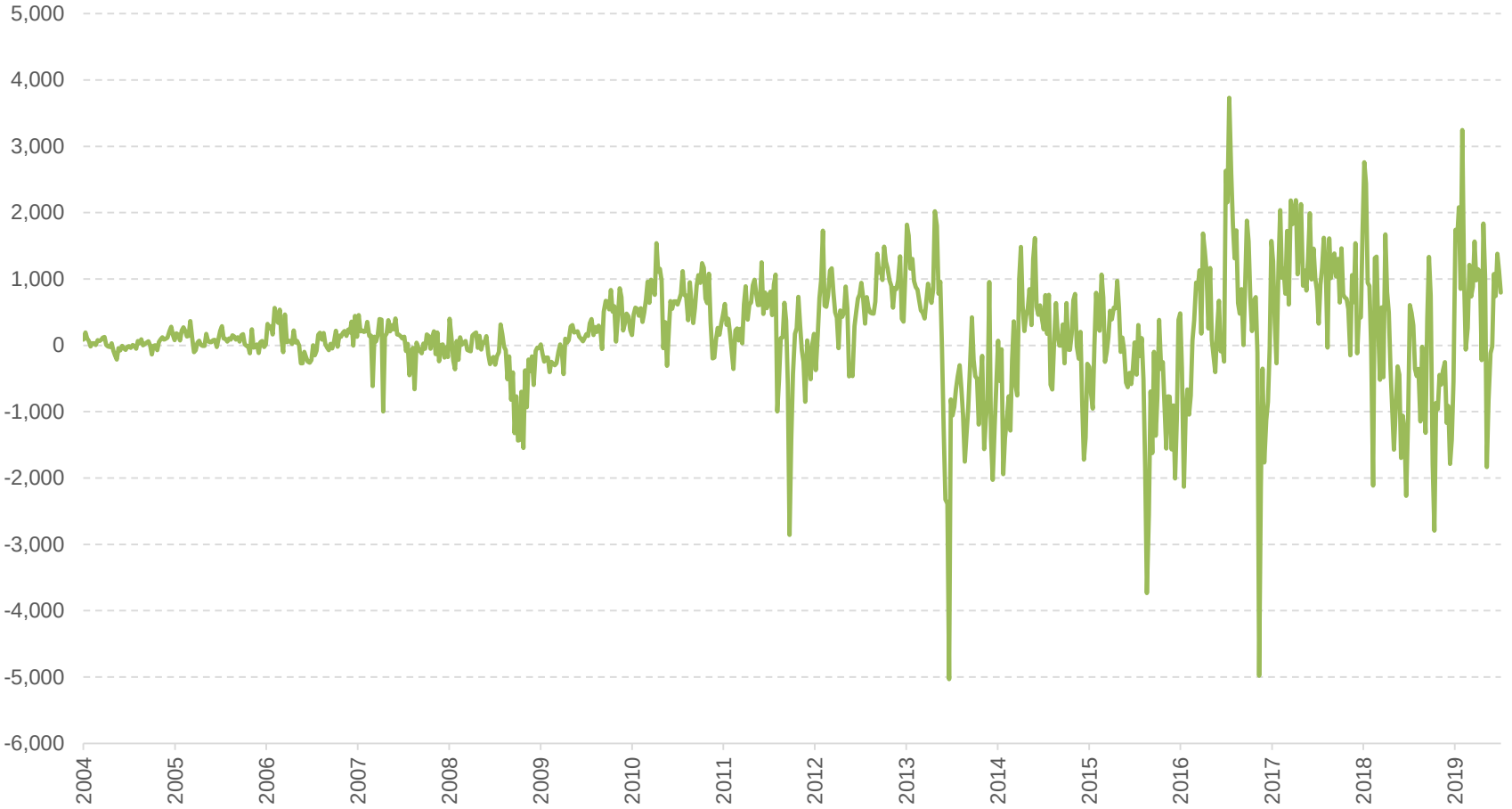
- ✓ **A rise in the dollar-denominated debt issued by nonfinancial firms in EMEs.**
- ✓ **Vulnerability. But also, complacency?**

Foreign denominated debt issued by nonfinancial EMEs firms



Notes: Debt issue in foreign currency in international markets by emerging market and developing economies. All maturities. In thousand million USD. Issuance by non financial firms. The last datapoint corresponds to 2018:4Q. See the next slide for the list of countries included. **Source**: BIS.

Bond Flows based on EPFR



Notes: Weekly data. In million of USD. Total weekly fixed income inflows. **Source:** EPFR Global. **Countries:** Argentina, Brazil, Chile, China, Colombia, Czech Rep., Hungary, Indonesia, Malaysia, Mexico, Philippines, Poland, Romania, Russia, S. Africa, S. Korea, Thailand, and Turkey.

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Capital Flow Volatility and Liquidity Risks

- **Significant Risk: Liquidity**.

  Strong increase in the demand for higher risk assets (long-term bonds, corporate bonds, EMEs assets).

  - ✓ **Recent regulation**, such as heavier capital weights and operating restrictions, have reduced traditional market-makers' capacity.
  - ✓ **High concentration of players and investments.** Dominant players: GAMs. ETFs, as well as specialized investors such as HFTs, dominate investments (crowded trades).
  - ✓ **Growing operation of anonymous electronic platforms**, which dominate automated operations (intense liquidity demand vs. supply).
    - ❖ Liquidity provision by algorithms during stress periods (i.e., kill switches).
  - ✓ **Investment vehicles (funds) offer more liquidity than that allowed for by their investments.**

Interconnectivity and Financial Stability

- **Complexity, Liquidity and Financial Stability.**

  Low rates and instability. At least three channels: increased risk taking; credit standards are relaxed; increase the appeal of Ponzi games.

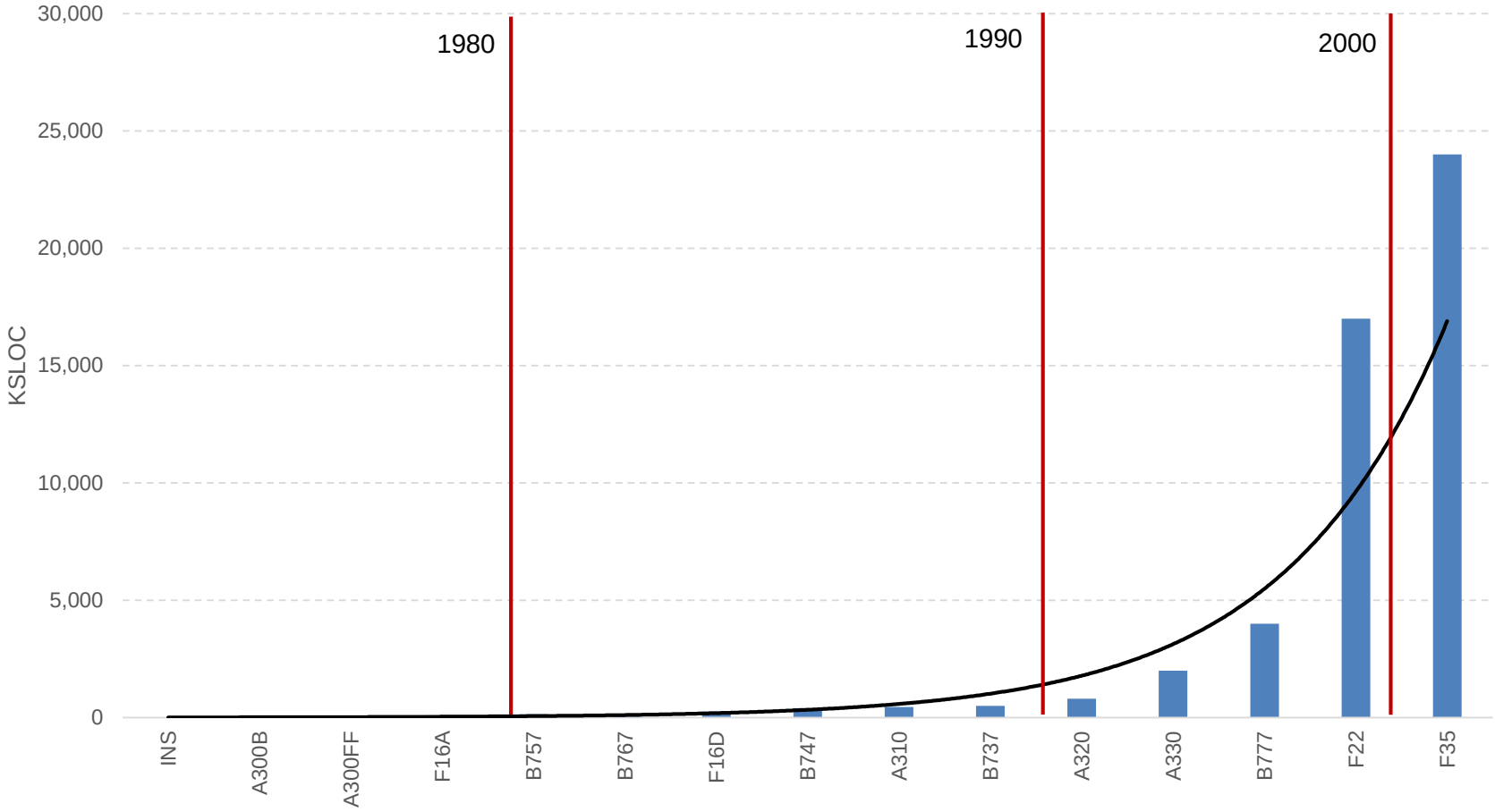
  Fintech increases complexity through **rises in interconnectivity and structural features** of the ecosystem. An important aspect is the lack of information, as well as models to detect vulnerabilities and anomalies.

  ✓ IT applications through interfaces. **Large increases in the number of software** interacting with each other **lead to a strong rise in the complexity of systems.** Linear increase in software size exponentially rises complexity and **maintenance costs**. They also increase **vulnerability points**.

  ✓ **Interconnectivity and direct and indirect exposures.**
  - ❖ Importance of indirect exposures. Portfolios overlap is an important source of contagion and systemic risk.
  - ❖ Concentration of certain asset holdings and asset fires-sales.

  In general, more complexity makes regulation more challenging.

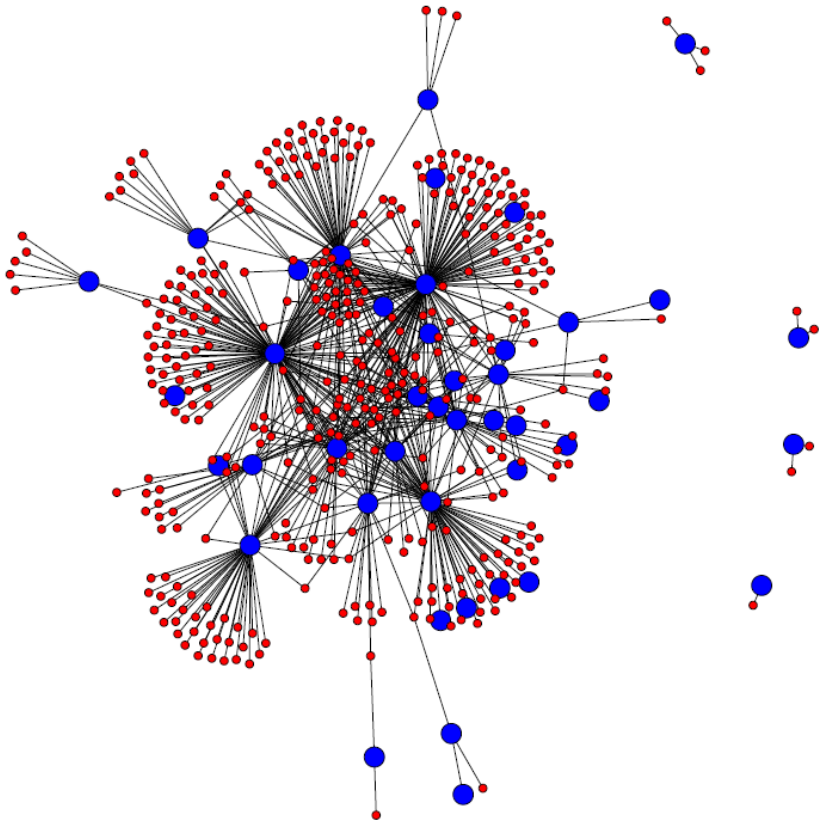
Growth of Software Complexity in Aircraft



Note: Thousands of Lines of Code (KSLOC) Used in Specific Aircraft over Time.
Source: System Architecture Virtual Integration (SAVI) program. https://savi.avsi.aero/about-savi/savi-motivation/

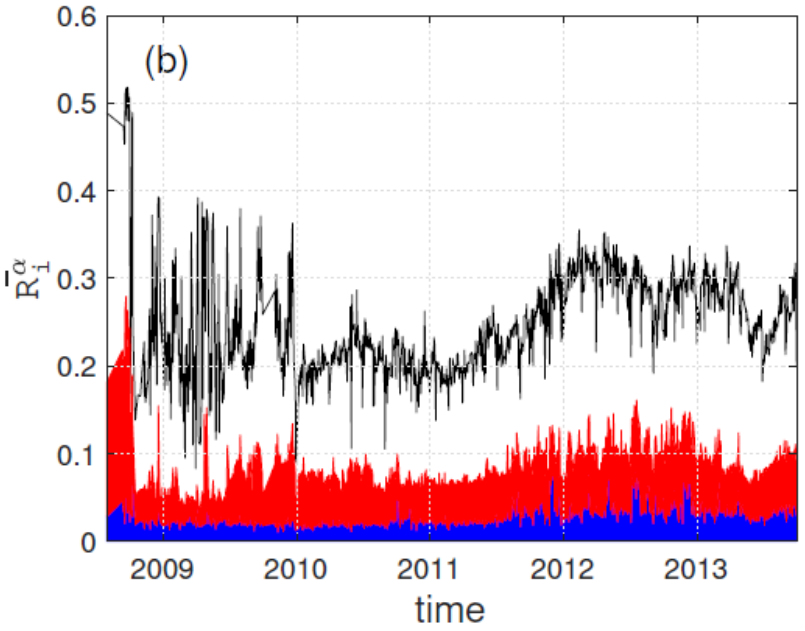
Systemic Risk in Private Banks, Mexico

Banks Network: Blue nodes stand for Banks, Red nodes stand for securities



Source: Poledna, Martinez-Jaramillo, Caccioli, and Thurner, 2019.

Risk due to Direct Exposures in Blue, due to Overlapping Portfolios Exposures in Red; and Total Risk in Black. (R Measures Systemic Risk in the Banking Sector)



Source: Poledna, Martinez-Jaramillo, Caccioli, and Thurner, 2019.

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Final Comments

The interaction of various elements in the context of a Global Monetary Game has led to a considerable increase in the volatility of capital flows.

- ✓ *This is possibly one of the most important challenges that EMEs currently face in terms of macro management.*
- ✓ *Under these conditions, it´s very important that central banks understand the different (and changing) aspects of the Global Monetary Game.*
- ✓ *Case in point: GAMs have substituted banks as the dominant players in EME financial markets. GAMs are of a different nature (mainly unleveraged), and face different incentives.*
- ✓ *The interaction between fund managers and fund shareholders can be thought of as a principal agent relationship.*
- ✓ *Adequate liquidity provision is crucial for EMEs to absorb shocks efficiently.*
- ✓ *Technological progress, for all its uses and benefits, can play an important role in liquidity shortages, and can have adverse effects on financial stability through increased interconnectivity (system complexity and indirect exposures).*
- ✓ *Main line of defense against capital flow volatility is sound macro management, strengthening institutions and incentivizing the economy to be productive. No shortcuts.*

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Thank you!

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Appendix

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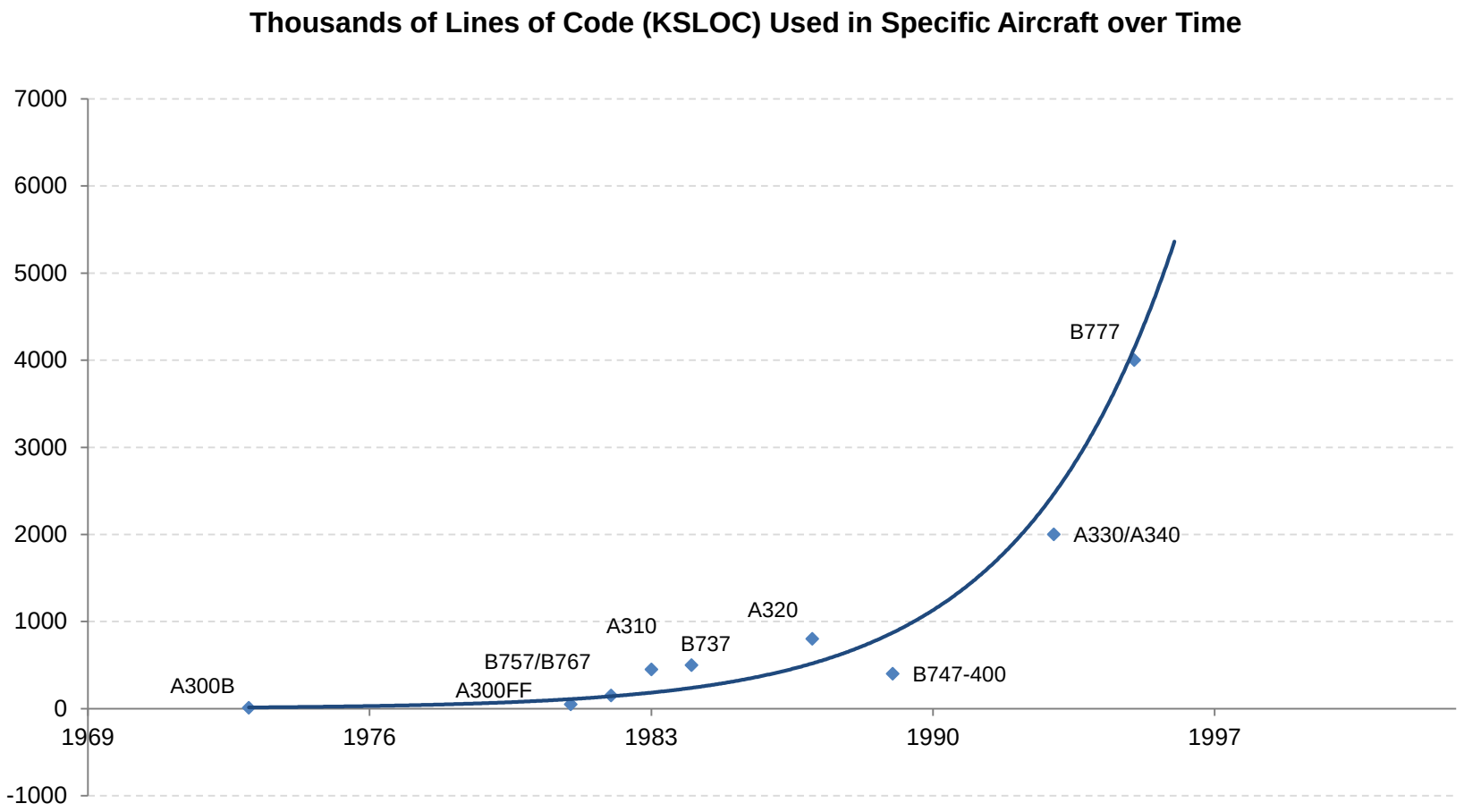
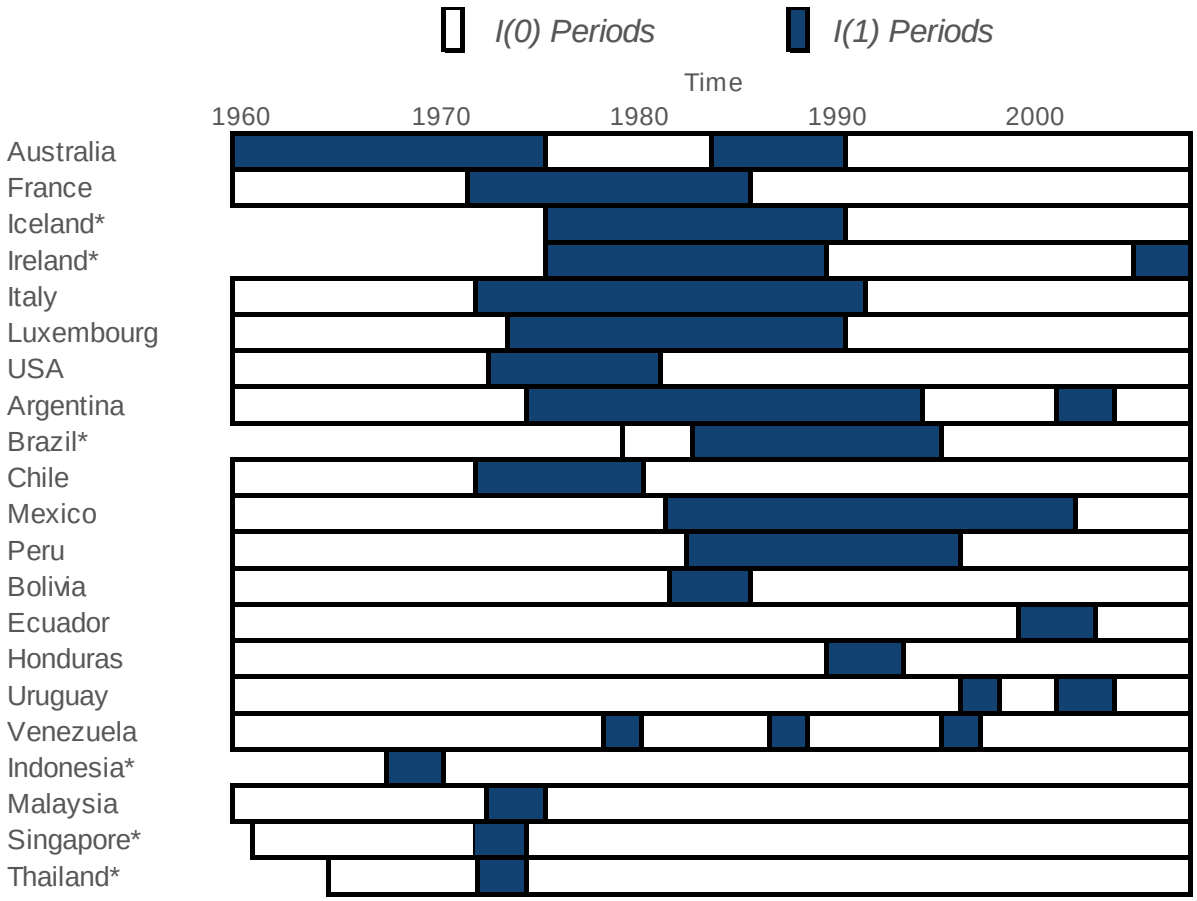
Software Complexity in Commercial Aircrafts



Source: https://savi.avsi.aero/

Inflation stationarity



Notas: * For this group of countries, the first observation is not 1960:01. The first observation is indicated with a vertical line.
Source: Noriega, Capistrán y Ramos-Francia (2013). "On the dynamics of inflation persistence around the world." Empirical Economics. 44(3.)

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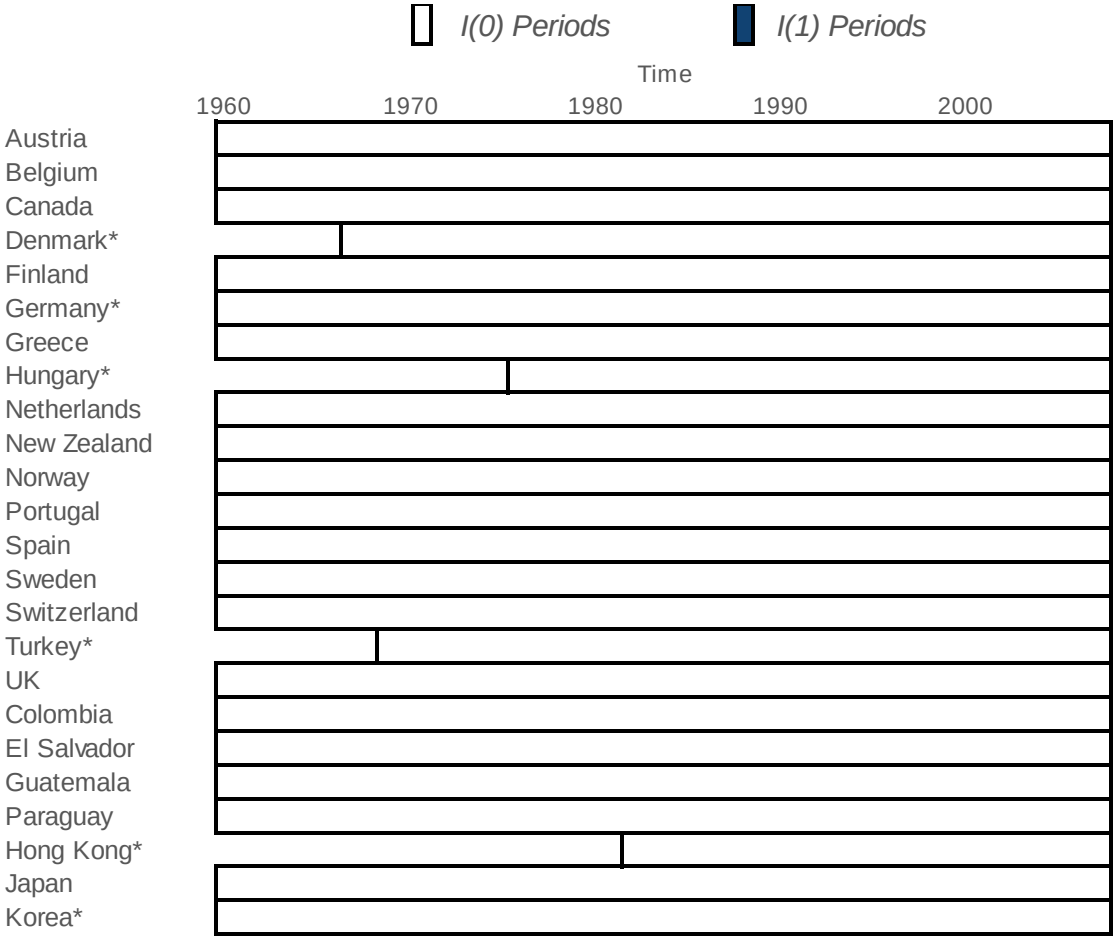
Inflation stationarity (continuation)



Notes: * For this group of countries, the first observation is not 1960:01. The first observation is indicated with a vertical line.
Source: Noriega, Capistrán y Ramos-Francia (2013). "On the dynamics of inflation persistence around the world." Empirical Economics. 44(3.)

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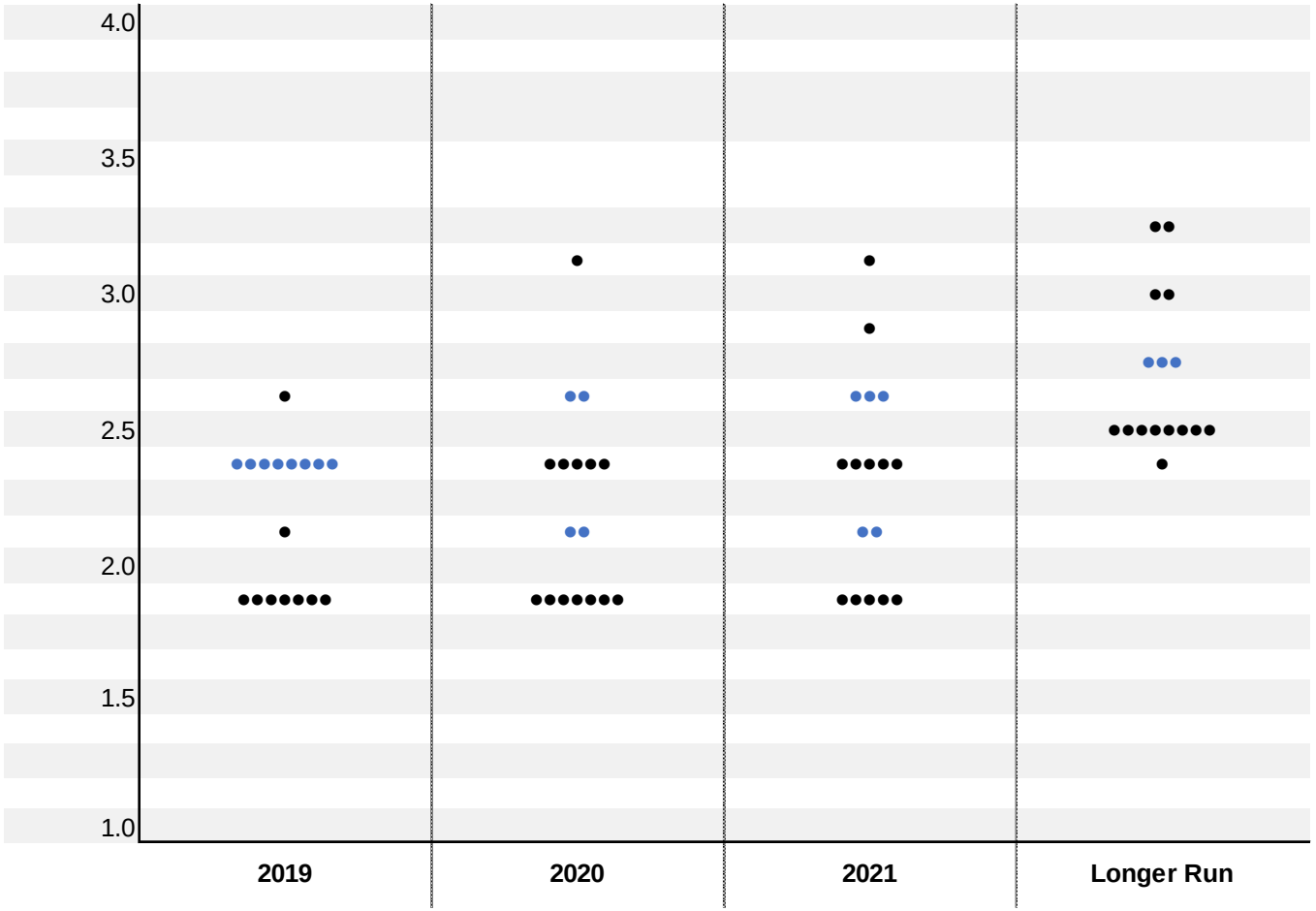
Foreign denominated debt issued by nonfinancial EMEs firms – Country List

Emerging markets and developing economies: Albania, Algeria, Angola, Argentina, Armenia, Azerbaijan, Bangladesh, Belarus, Belize, Benin, Bolivia, Botswana, Brazil, Brunei, Bulgaria, Cameroon, Chad, Chile, China, Chinese Taipei, Colombia, Congo, Congo Democratic Republic, Costa Rica, Cote d'Ivoire, Croatia, Cuba, Czech Republic, Dominican Republic, Ecuador, Egypt, El Salvador, Ethiopia, Fiji, French Polynesia, Gabon, Georgia, Ghana, Grenada, Guatemala, Guinea, Haiti, Honduras, Hungary, India, Indonesia, Iran, Iraq, Israel, Jamaica, Jordan, Kazakhstan, Kenya, Korea, Kuwait, Kyrgyz Republic, Laos, Lesotho, Liberia, Libya, Macedonia, Malawi, Malaysia, Mali, Marshall Islands, Mexico, Moldova, Mongolia, Montenegro, Morocco, Mozambique, Myanmar, Namibia, Nauru, New Caledonia, Nicaragua, Niger, Nigeria, North Korea, Oman, Pakistan, Papua New Guinea, Paraguay, Peru, Philippines, Poland, Qatar, Romania, Russia, Rwanda, Saudi Arabia, Senegal, Serbia, Seychelles, South Africa, Sri Lanka, St. Lucia, Sudan, Surinam, Tajikistan, Tanzania, Thailand, Trinidad and Tobago, Tunisia, Turkey, Turkmenistan, Turks and Caicos Islands, Uganda, Ukraine, United Arab Emirates, Uruguay, Uzbekistan, Venezuela, Vietnam, Yemen, Zambia, and Zimbabwe.

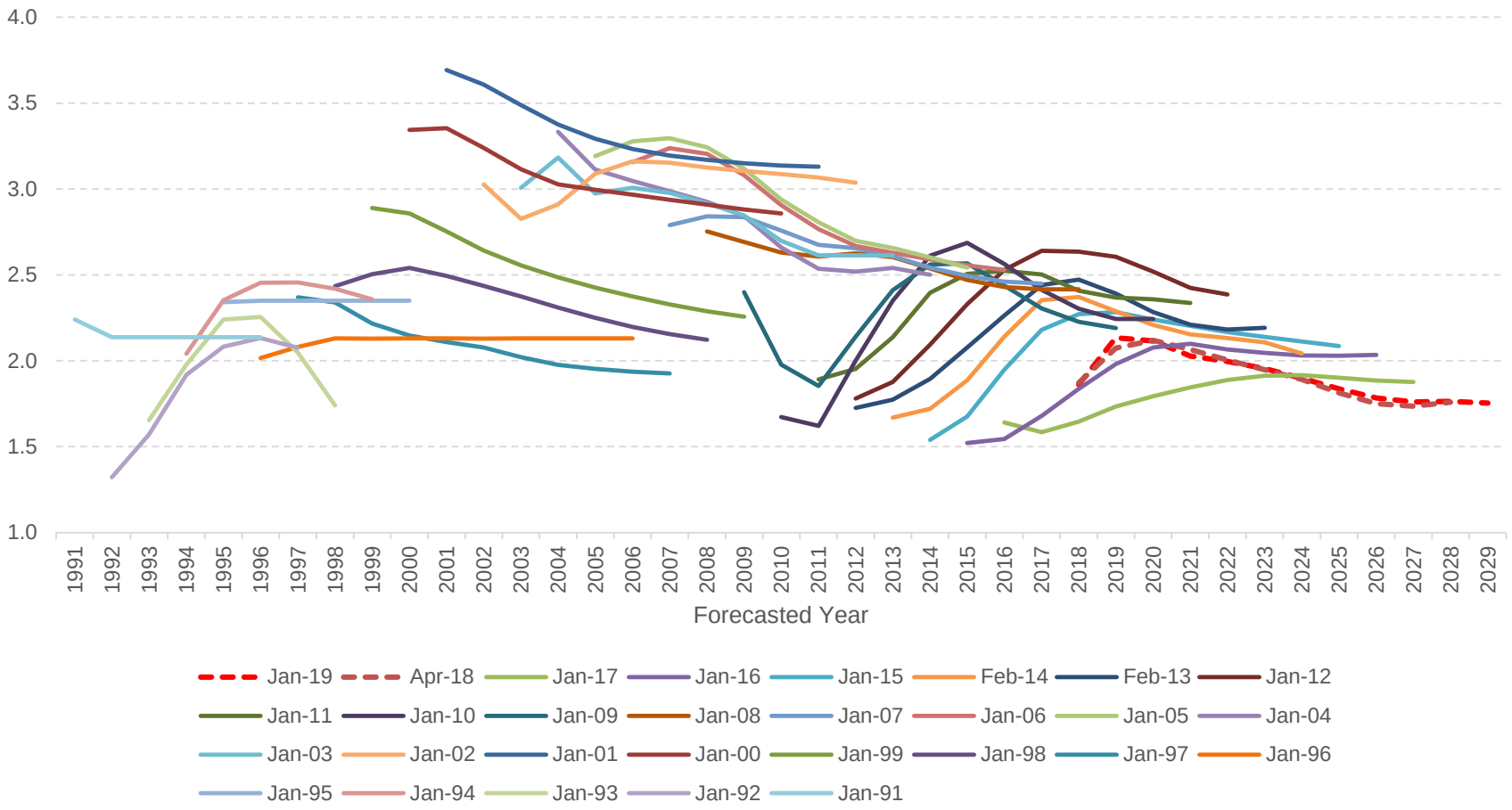
Source: BIS

FOMC Dot Plot



Note: The blue dots indicate the median**.**
Source: CME Fed Watch Tool.

U.S. Potential Growth Expectations



Notes: Annual growth rates.
Source: Congressional Budget Office.

EMEs and AEs

- **New payment technologies and MP**

  Central Bank Digital Currencies (CBCD)

  - ✓ *In general, a payments system can be token- or account-based.*
  - ✓ *CBCD could facilitate the systematic and transparent conduct of MP.*
  - ✓ *A CBDC would probably have some advantages.*
  - ✓ *AEs´ central banks seem to have a preference toward increasing the efficiency of account-based payment systems.*

  Stablecoins

  - ✓ *A stablecoin is a Distributed Ledger Technology (DLT)-based asset.*
  - ✓ *Stablecoins could offer gains in payment´s speed and efficiency.*
  - ✓ *Transactions with stablecoins are monitored to the extent that authorities have access to DLTs or exchanges in which stablecoins are operated.*
  - ✓ *Broad use of private cryptocurrencies, a stablecoin, would in general not be preferred by policy makers.*