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UNIVERSITY OF OXFORD

Catherine R. Schenk
University of Oxford

Moving Money: Public and Private Interests in the Architecture of Global Payments"

S.A. James & J.L. Foorman, 'Balanced banks have chip on both shoulders', *International Financial Law Review*, 6(7), p. 29. (1987)

erc
European Research Council

Challenges in the global payments system

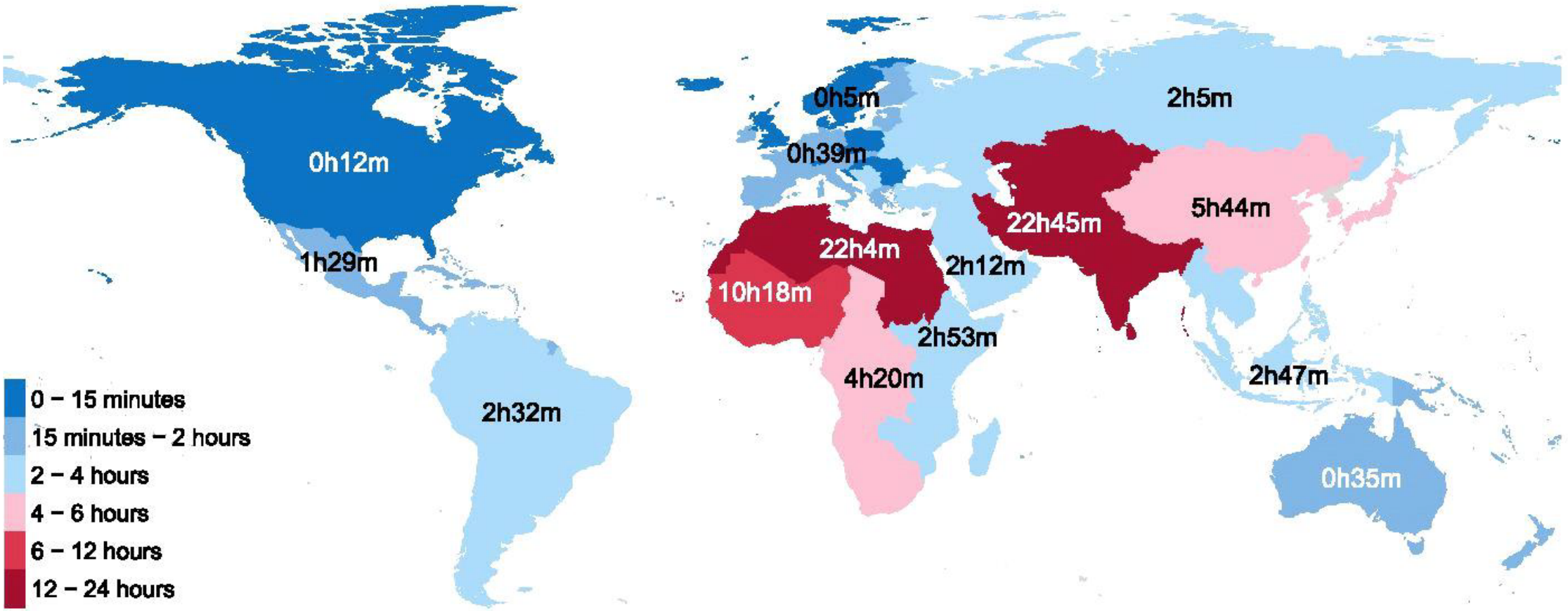
- Fundamental plumbing of globalisation
- Desiderata: low cost, fast, secure, stable, transparent – KYC/AML/CFT
- Network externalities – convergence of standards/technology, currency
- Gatekeeper rents – bottle necks, inequality

- Contraction of bilateral correspondent banking links: geography, currencies
- Points of fragility – settlement risk, fragmentation of liquidity, interoperability, hacking, fraud,

- Sanctions, AML/CFT, geopolitical fragmentation
- Innovation and proliferation: digital currencies, stablecoin, DLT, DeFi
- Global payments system a G20/FSB/CPMI Priority & Roadmap 2020

Median end-to-end processing time by beneficiary region (SWIFT gpi)

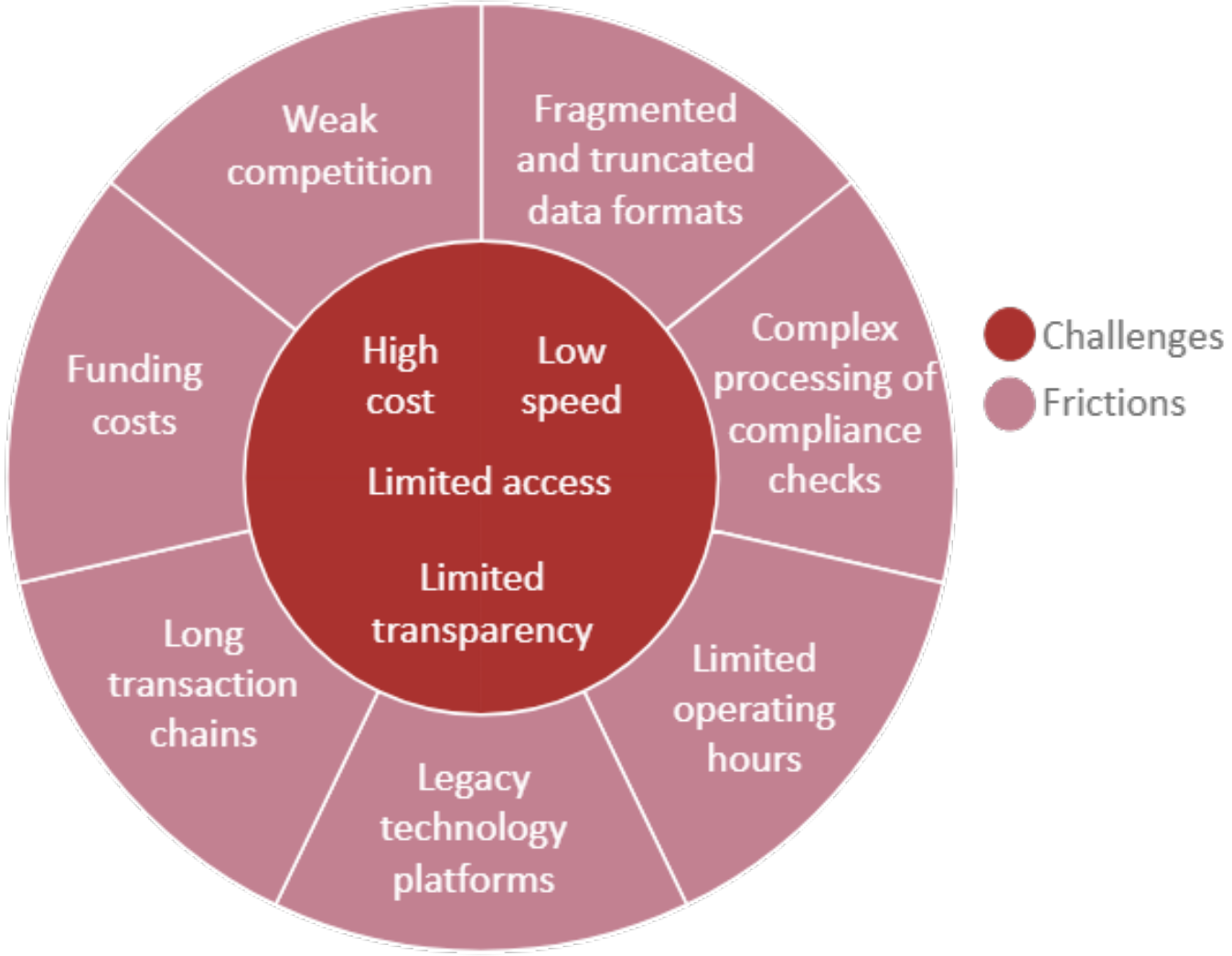
Inefficiency of Cross-border Payments



Sept-Oct 2020

Source: BIS, CPMI (2022) Nilsson, Bouther, van Acolezen, Cohen

Cross Border Payments – G20 Initiative



Source :CPMI (2020), 'Stage 2 Report to the G20 – Technical Background Report', July
https://www.rba.gov.au/publications/annual-reports/psb/2021/box-a-the-g20-roadmap-to-enhance-cross-border-payments.html

60 years of Cross-Border Payments Architecture

- CHIPS: 1970
  - CHAPS etc, RTGS
- SWIFT messaging: 1977
- CLS continuous linked settlement: 2002

- Complex clearing networks/technology superimposed on traditional bilateral correspondent banking relationships
- Concentration in hierarchy of international banks v network externalities
- No central bank or government wants to be an ex ante lender of last resort to the global payments system – but want it to be robust to failure

Outline

- Evolution of Global Payments Technologies 1870-2010
  - Persistence of Correspondent Banking
- Innovation of Global Payments Systems 1970s
  - CHIPS – example of payments and settlement
  - SWIFT – example of messaging system
- What themes arise from this history?
  - Public vs private sectors

- Future of Global Payments
  - Fragmentation?
  - Crypto, Blockchain, Stable Coins, CBDC

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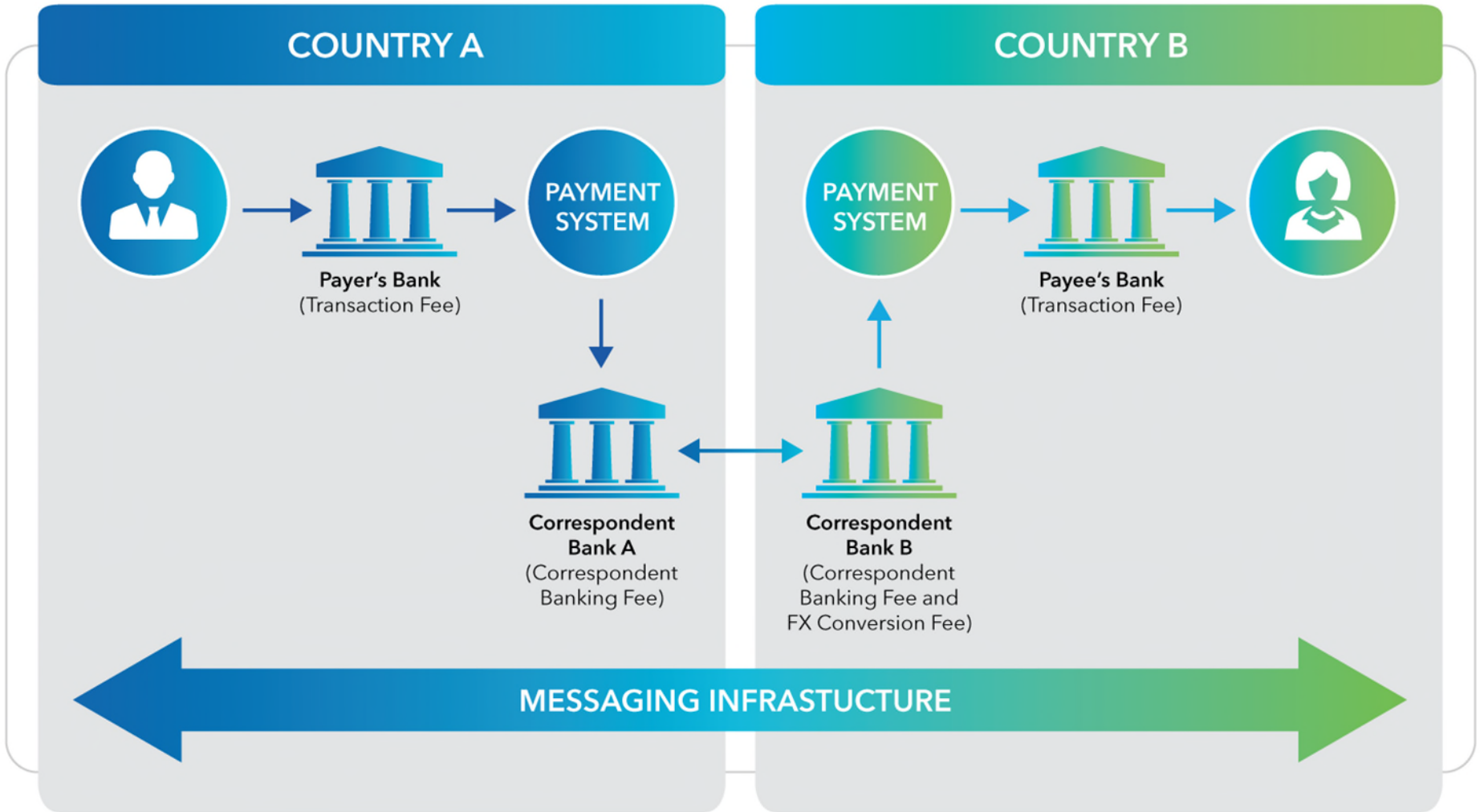
THE CORRESPONDENT BANKING MODEL

Source: Aite Group

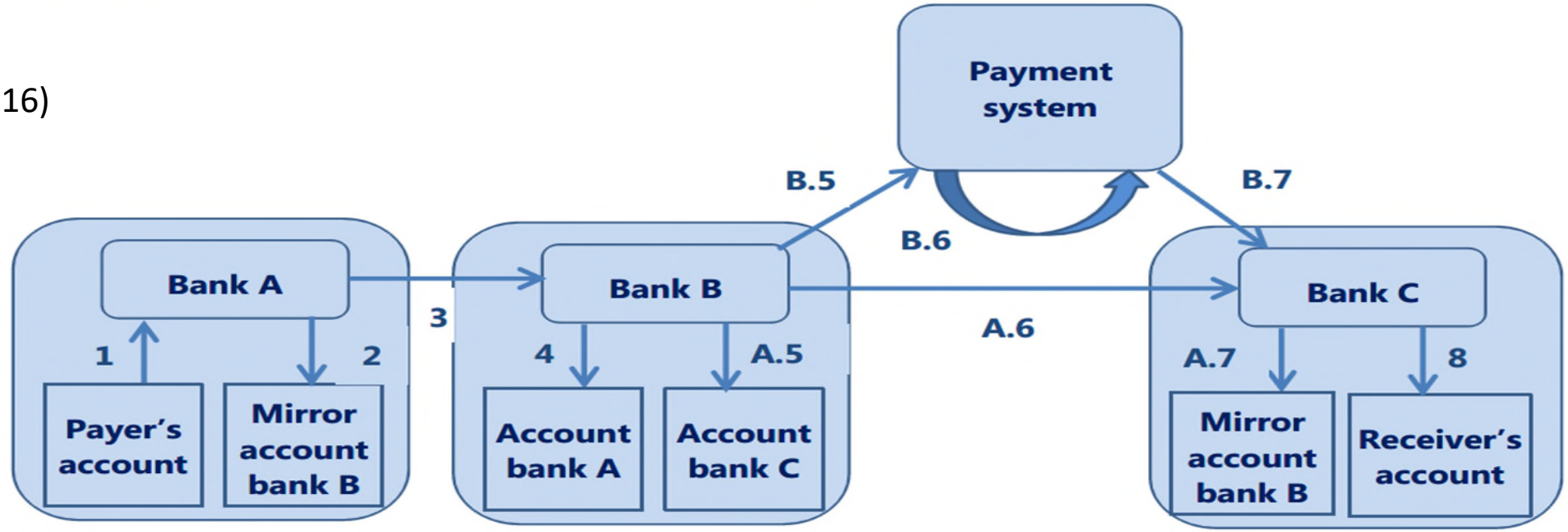


Source: Federal Reserve

Figure 1

Payments settled via correspondent banking

Source:
CPMI (2016)



1. Debiting of payer's account with bank A
2. Crediting of bank B's mirror account with bank A, which is kept for accounting purposes
3. Payment message from bank A to bank B via telecommunication network
4. Debiting of bank A's account with bank B (loro account)

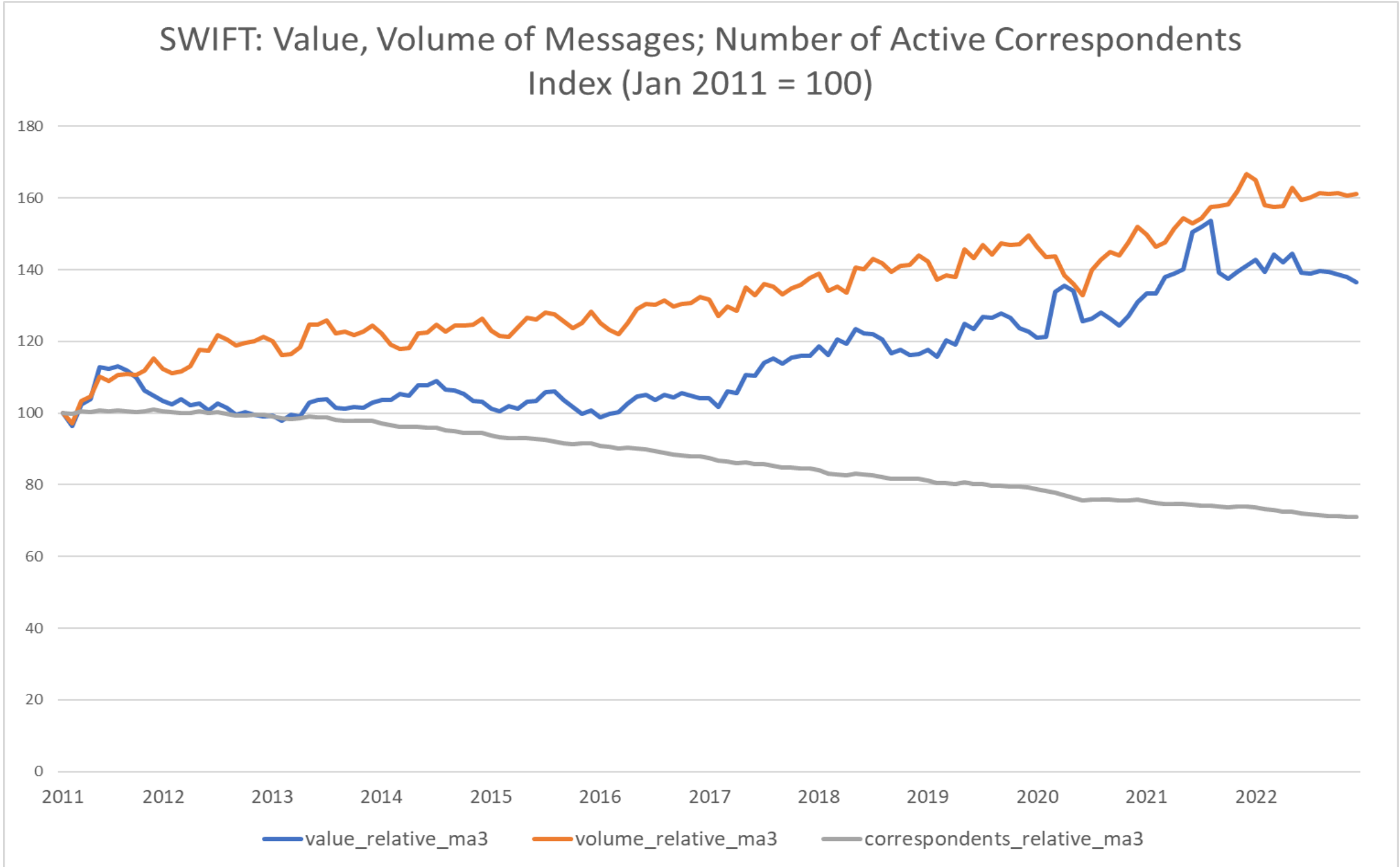
A. Use correspondent bank only

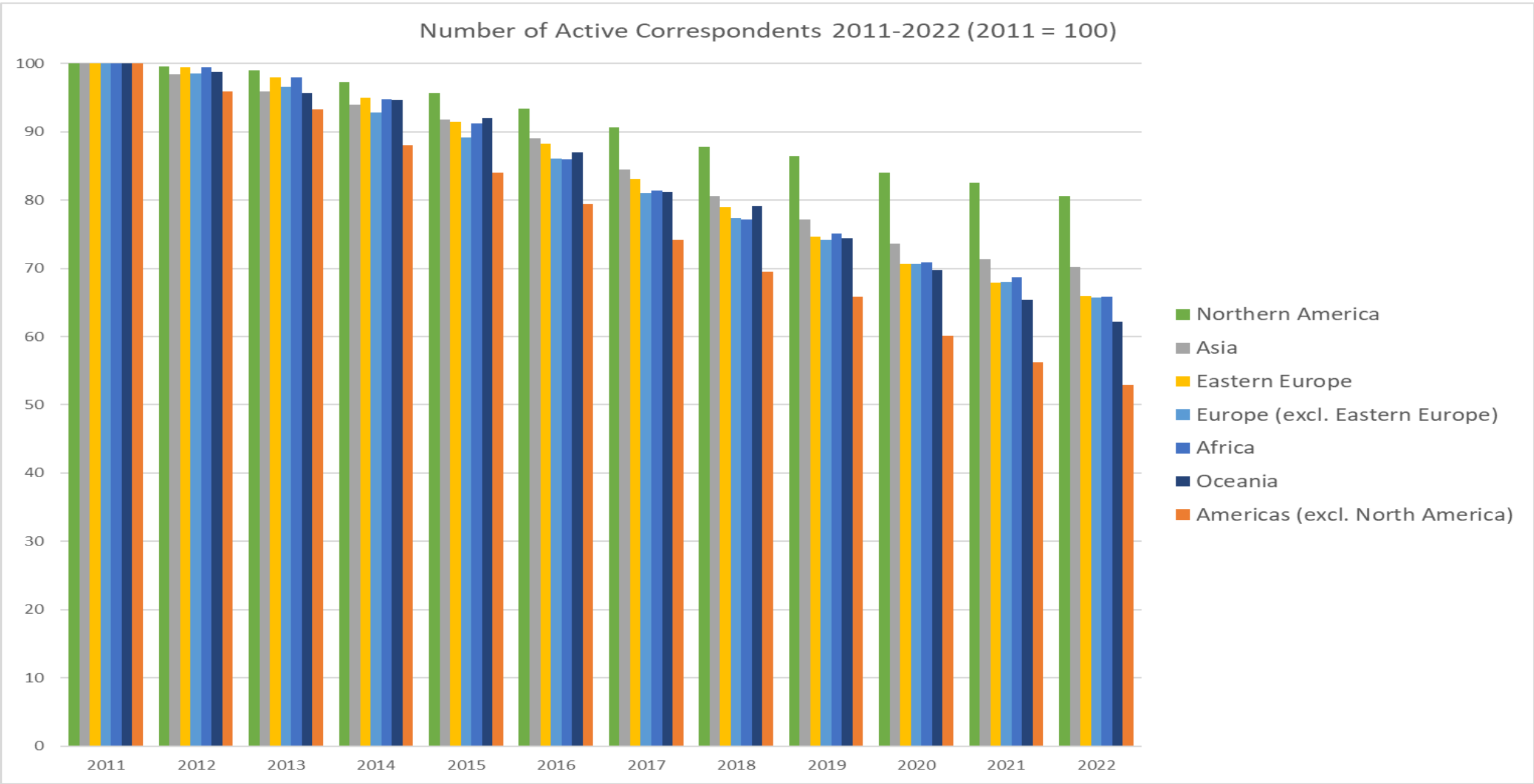
5. Crediting of bank C's account with bank B
6. Payment message from bank B to bank C via telecommunication network
7. Debiting of bank's B mirror account with bank C, which is kept for accounting purposes
8. Crediting of receiver's account with bank C

B. Involvement of payment system

5. Payment message from bank B to payment system
6. Settlement via payment system
7. Payment message from payment system to bank C
8. Crediting of receiver's account with bank C

Source: ECB, *Ninth survey on correspondent banking in euro,* 2015, adapted from Danmarks Nationalbank, *Payment systems in Denmark,* 2005.


SWIFT: Value, Volume of Messages; Number of Active Correspondents
Index (Jan 2011 = 100)
180
160
140
120
100
80
60
40
20
0
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021
2022
value_relative_ma3
volume_relative_ma3
correspondents_relative_ma3


Number of Active Correspondents 2011-2022 (2011 = 100)
100
90
80
70
60
50
40
30
20
10
0
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021
2022
Northern America
Asia
Eastern Europe
Europe (excl. Eastern Europe)
Africa
Oceania
Americas (excl. North America)

Literature on Correspondent Banking

- USA
  - Richardson (2007)
  - James and Weiman (2010)
  - Das, Mitchener & Vossmeyer (2018)
  - Mitchener & Richardson (2019)
  - Calomiris, Jaremski & Wheelock (2019)
- International:
  - London: Mollen (2012), Mollen & Michie (2012)
  - Australia: Merrett (1995) Panza & Merrett (2018) Chan (2001)
  - SWIFT: Scott & Zachariadis (2014)
- Contemporary
  - Meinster & Mohindru (1975)
  - Palmer (1990)
  - Lawrence & Lougee (1970)
  - Naughton & Chan (1998)
- Current issues:
  - Gustitus, Bean & Roach (2001)
  - Grollman & Jutsra (2017)
  - von Peter & Rice (2020)
  - CPMI @ BIS/FSB
  - Borchert et al (2023)

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Evolution of structures

- Instruments: Bill of exchange, letter of credit, vostro/nostro bank accounts (branches, agencies, correspondent banking)
- Platforms: post, telegraph, telex, computer (hub and spoke), digital (network), distributed ledger
  - Privacy, speed, reliability, cost, codes
- Clearing and Settlement: (time and counterparty risk), RTGS (link to central banks)

- Correspondent Banking – persistent throughout

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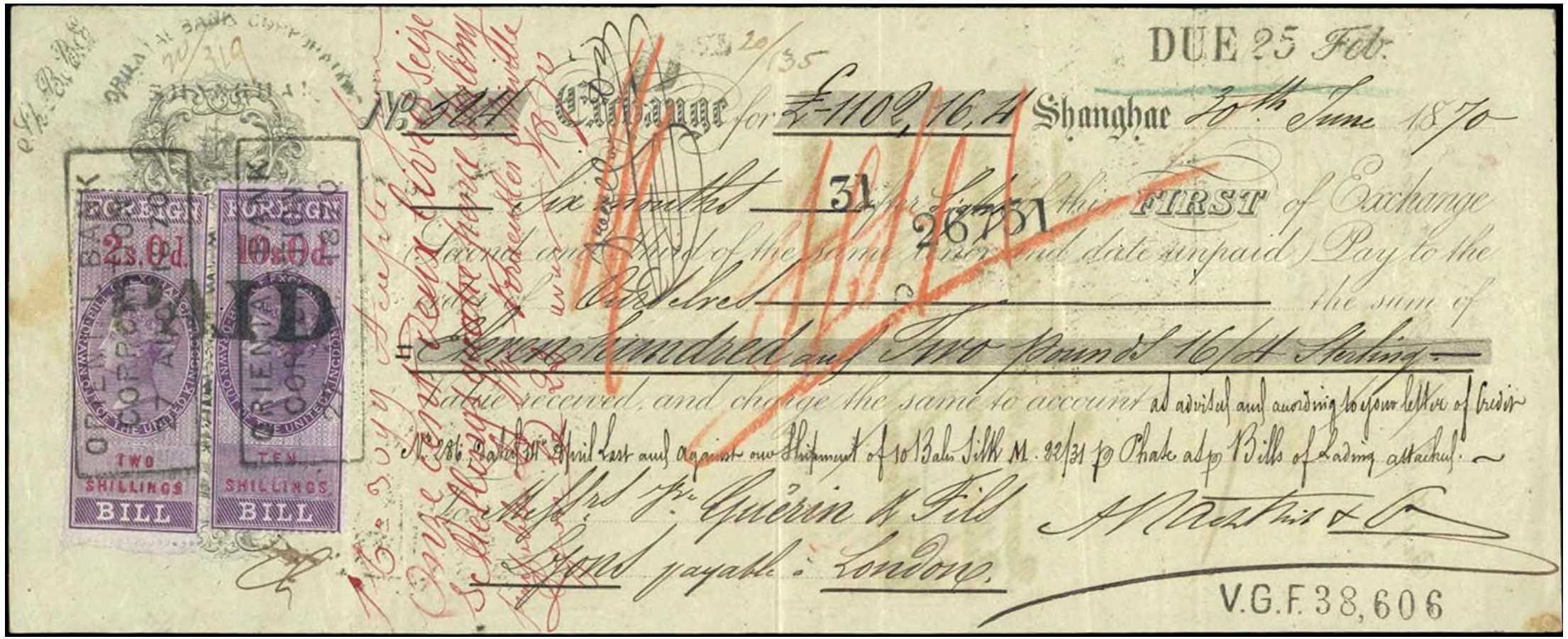
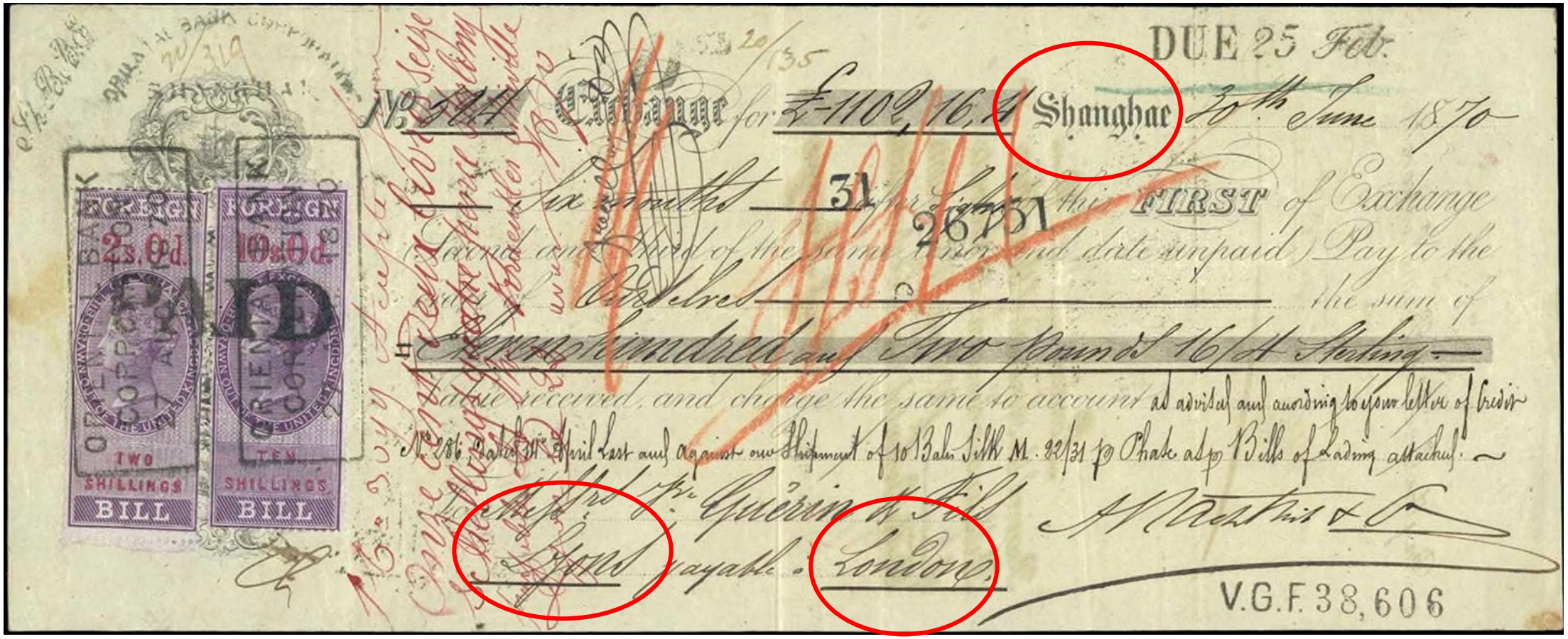


1870 Bill of Exchange – drawn in Oriental Banking Corpn, Shanghai, acceptor/guarantor in Lyons France, payable in London, linked to Bill of Lading/letter of credit/trade documentation, 8 months maturity

Discounted, sometimes multiple times by multiple banks/discount houses, UK tax paid

Posted, Information Telegraphed, Adjustment of Bank Ledgers



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- **Correspondent Banking – persistent throughout**

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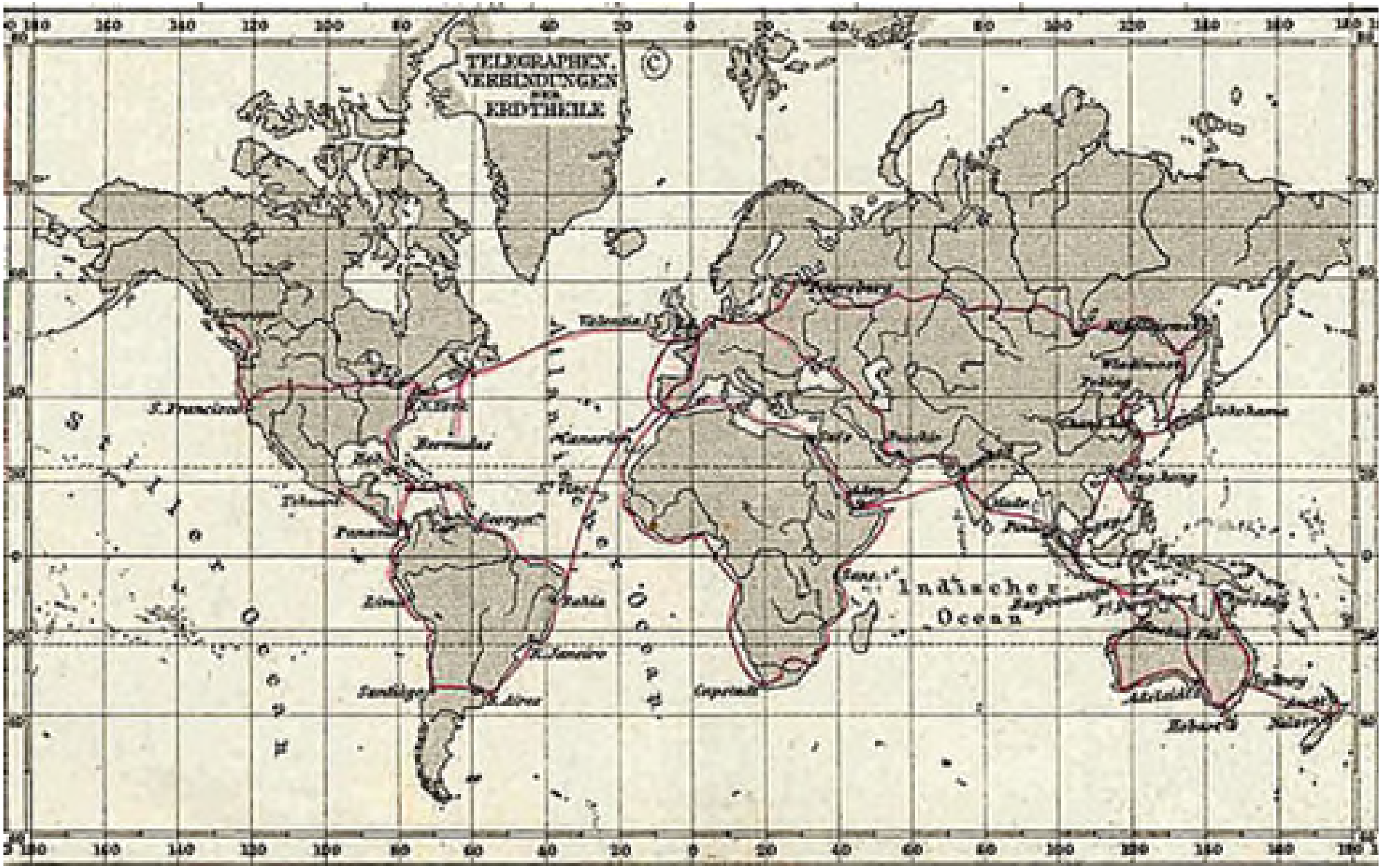
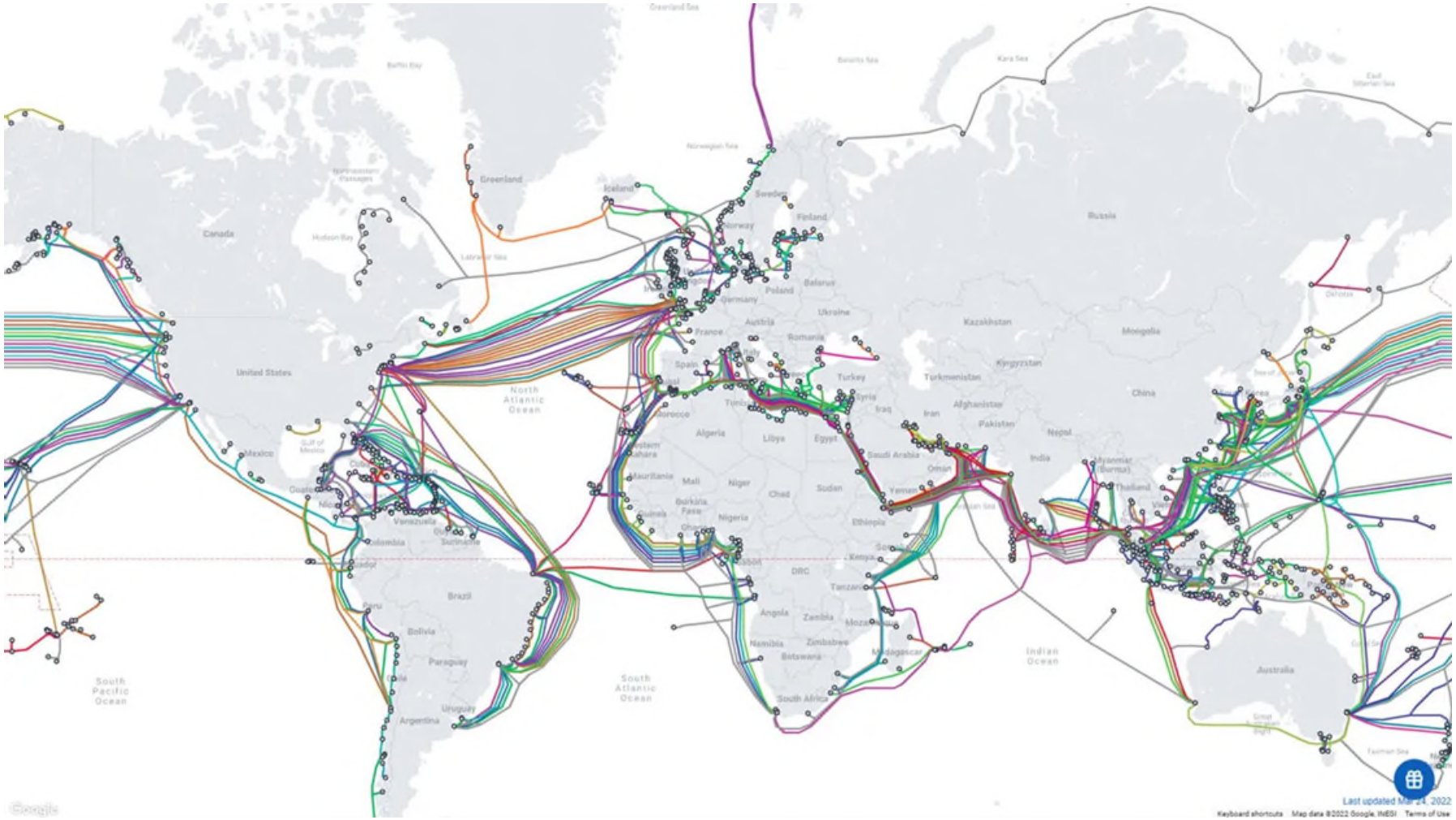


Major Telegraph Routes 1891


EASTERN TELEGRAPH Co.'s SYSTEM AND ITS GENERAL CONNECTIONS.
ARCTIC OCEAN
ARCTIC SEA
SPITZBERGEN
GREENLAND
BAFFIN BAY
Melville Sound
Behring Sea
NORTH AMERICA
PACIFIC OCEAN
BRITISH ISLES
ROUSSIAN EMPIRE
Sea of Okhotsk
PERSIA
Sahara or Great Desert
INDIAN OCEAN
Coral Sea
WESTERN AUSTRALIA
TASMANIA
ZEALAND
SOUTH AMERICA
ANTARCTIC OCEAN

1901



Submarine Cables 2022: Internet Traffic incl. SWIFT

Public vs Private Interests

Cross-border Payments System –a public good, carries a public cost in case of failure, but private sector control

- **Private** origins of global payments among banks in the 19th century
  - post/telegraph publicly owned, LoLR Discount Bills
- 1914-1960: **Public** Sector dominates (payments agreements, exchange controls)
- **Private** Sector Settlement and Messaging
  - CHIPS in 1970 (95% transactions are cross-border)
  - SWIFT messaging system in 1969-1977

- Role of Technology – experimental, expensive, staff costs (telex to computer)
- Role of ideology – best left to the banks
- Coordination Problems:
  - guidance not responsibility, primacy of national sovereignty

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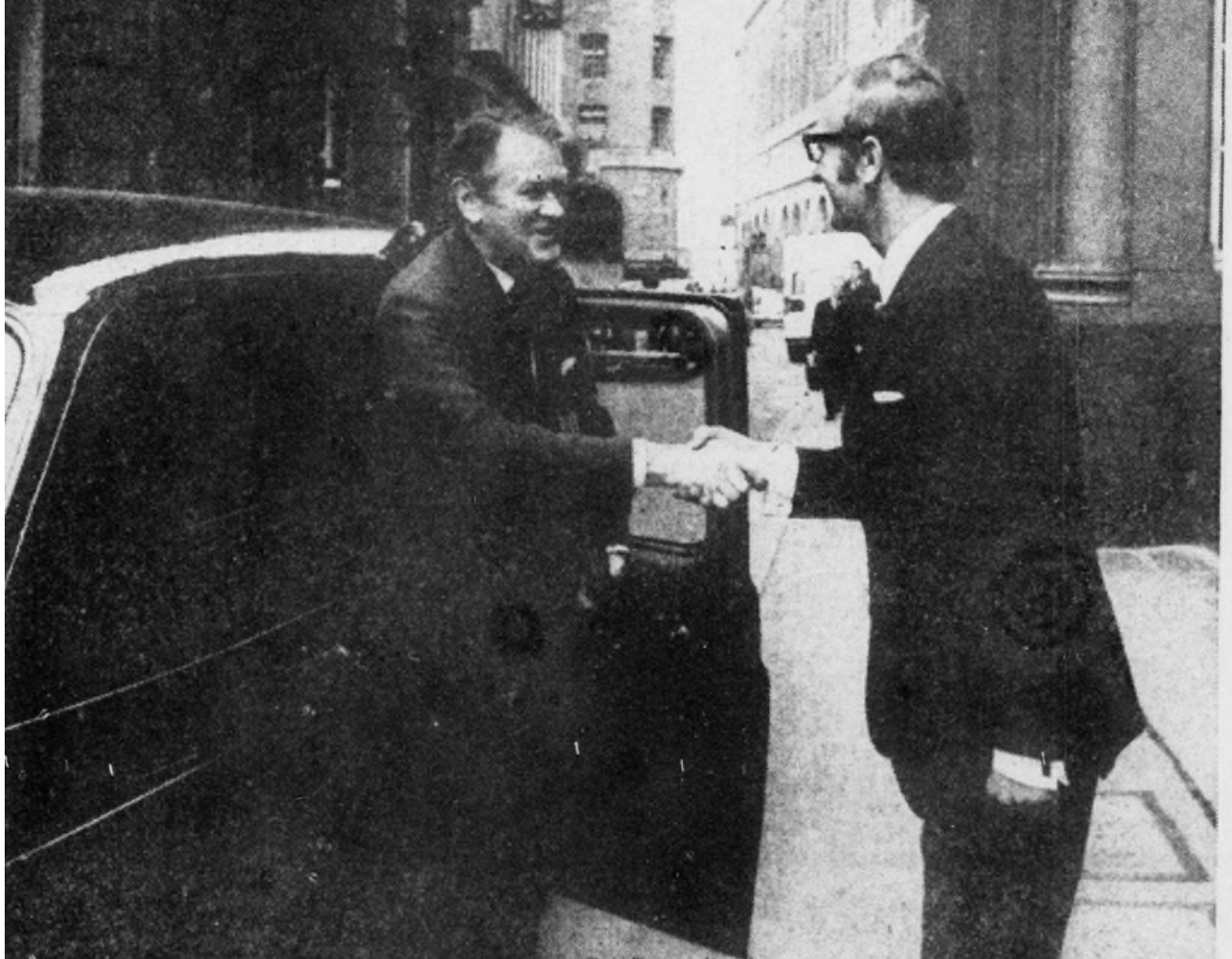
Context for 1960s-1970s

- Early 1960s – Eurodollar market surge in global payments, integrated cross-border inter-bank market
- Late 1960s – rush/panic among banks to internationalise (Schenk 2017)
  - Branches
  - Subsidiaries
  - Cooperative Strategies, consortia
- Market Risk: floating exchange rates
- Operational Risk: ‘Paper Crunch’ (Seligman 2003)
- Operational Risk: weak internal controls, complexity
- Credit Risk/Settlement Risk/Liquidity Risk – counterparty/systemic

Daily Telegraph
May 1970



Bob Rummell calls on a client, an overseas bank in London.

A Chaseman is the bankers' banker. He serves overseas banks in London and London banks overseas.

A Chaseman has the world at his fingertips

Take Chaseman Bob Rummell, Manager-Correspondent Banking in London. Had over twenty years' foreign banking experience with Chase. His job: taking care of the interests of banks who bank with Chase. He arranges full correspondent facilities anywhere in the world, including arranging collections, the exchange of credit information, depositing foreign currency and providing standby credit in Euro-dollars or any other Euro currency.

A vast international network enables the Chaseman to move fast. Through Chase branches, associates and correspondents he can locate problems almost before they happen. And steer you clear of them.

Chase Manhattan is the biggest correspondent bank in the world. It can form an ideal extension of your own banking system and keep you in touch with up-to-the-minute information on international markets, their currencies, industries and prospects.

Chaseman Bob Rummell is your link with this unique banking network. A network with the world at its fingertips. Call him at 01-600 6141. And start the globe rolling.

You have a friend at Chase Manhattan

The Chase Manhattan Bank,
Woolgate House, Coleman Street, E.C.2.
Berkeley Square Branch,

Clearing House Interbank Payments System

- 1970 – demand driven (too many cheques, too many messengers, too many clerks, focused on last daily clearing)

‘one New York bank had its payments staff drop from an average of 22 years in the bank to an average of 8 months in a two-year span’ (Crowley FRBNY 5 July ‘74)

- Technological innovation available (adapted from domestic use)
- All day entries through computer terminals, final netting out at end of day, 30 minutes to meet any deficit, final payment through FRBNY
- New York Clearing House Members only
  - Associated members, Edge Act subsidiaries

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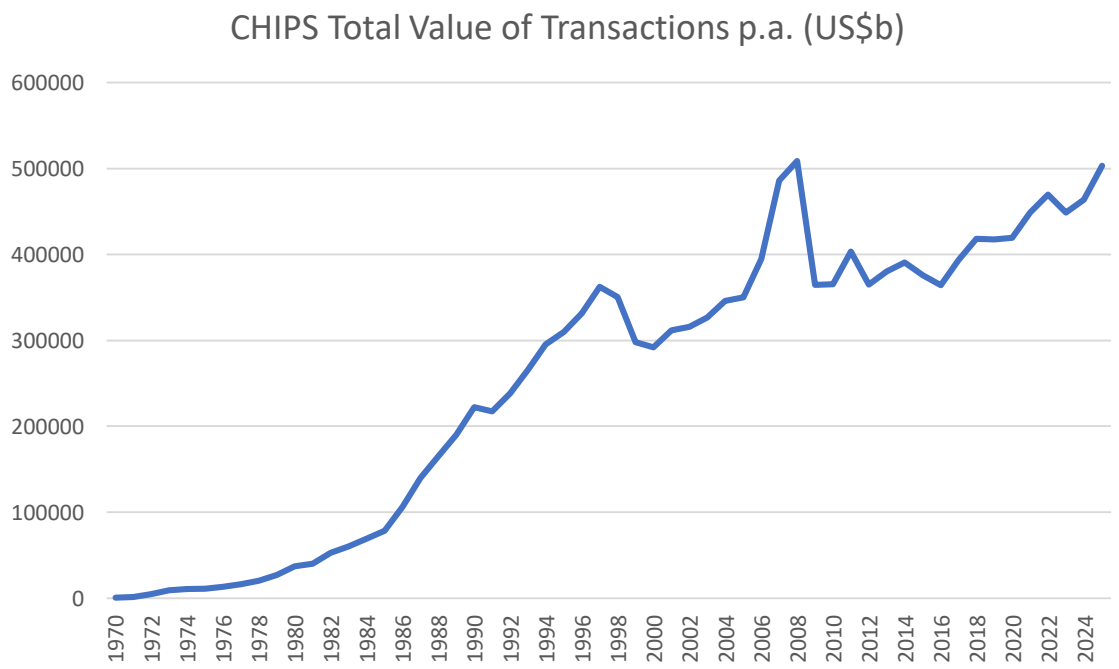
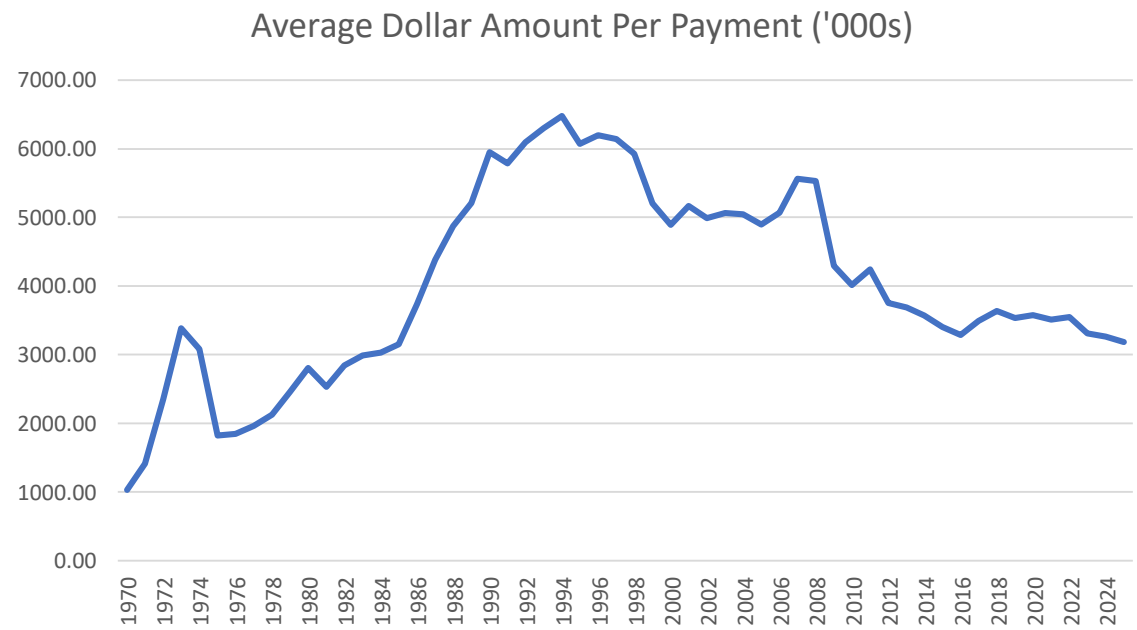
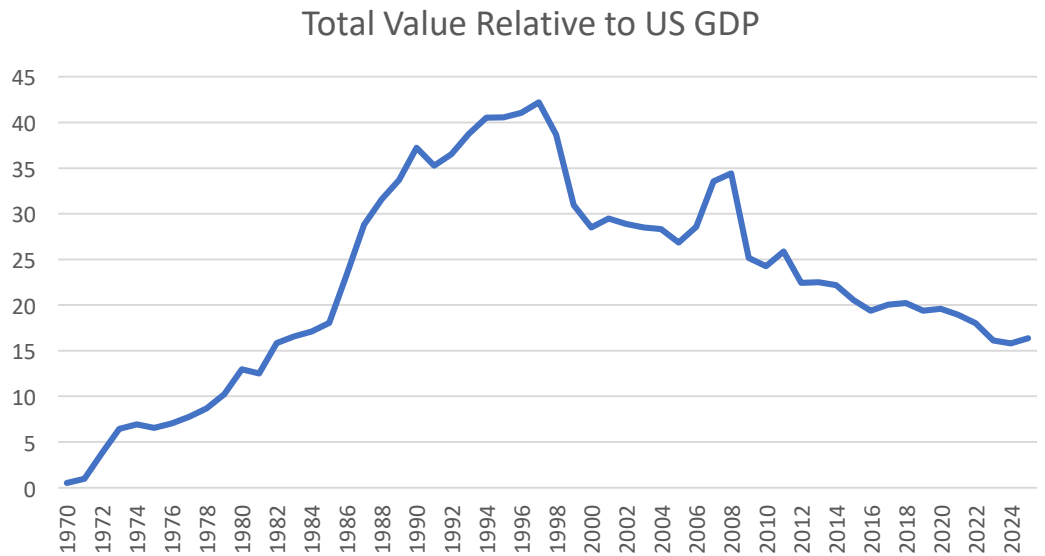
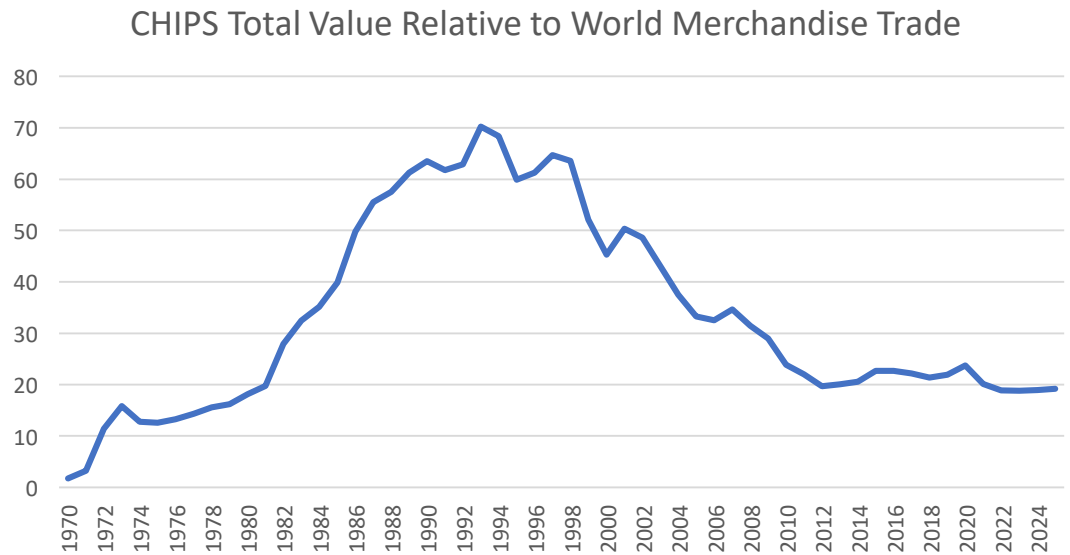

CHIPS Total Value of Transactions p.a. (US$b)
600000
500000
400000
300000
200000
100000
0
1970 1972 1974 1976 1978 1980 1982 1984 1986 1988 1990 1992 1994 1996 1998 2000 2002 2004 2006 2008 2010 2012 2014 2016 2018 2020 2022 2024


Average Dollar Amount Per Payment ('000s)
7000.00
6000.00
5000.00
4000.00
3000.00
2000.00
1000.00
0.00
1970 1972 1974 1976 1978 1980 1982 1984 1986 1988 1990 1992 1994 1996 1998 2000 2002 2004 2006 2008 2010 2012 2014 2016 2018 2020 2022 2024


Total Value Relative to US GDP
45
40
35
30
25
20
15
10
5
0
1970 1972 1974 1976 1978 1980 1982 1984 1986 1988 1990 1992 1994 1996 1998 2000 2002 2004 2006 2008 2010 2012 2014 2016 2018 2020 2022 2024


CHIPS Total Value Relative to World Merchandise Trade
80
70
60
50
40
30
20
10
0
1970 1972 1974 1976 1978 1980 1982 1984 1986 1988 1990 1992 1994 1996 1998 2000 2002 2004 2006 2008 2010 2012 2014 2016 2018 2020 2022 2024

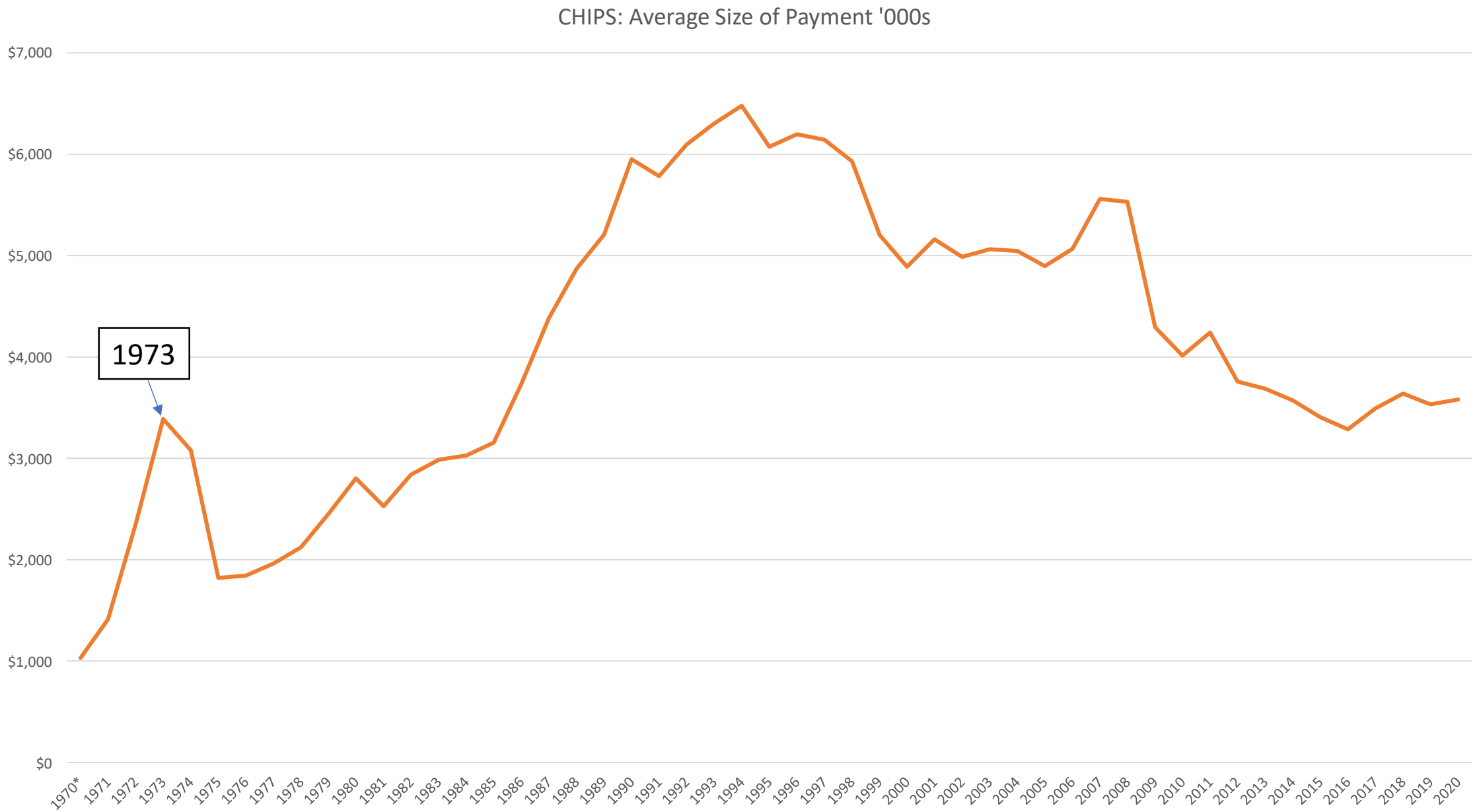
CHIPS – Issues 1970-1986

- Associate members don't have direct access: clearing through Clearing House members
- FX payments immediately available but matching Dollars not available until next day: Clearing House Funds
- Friday funds not available until Monday: strategic holding over to put into money markets
- Daylight Overdrafts: float/deposits covers only a tiny proportion of turnover even for small respondents
- Time change NY-London-Europe: NY clearing not completed before European banks close

'it is a business in which trust and confidence is essential'
Crowley FRBNY 5 July '74

Herstatt Bank Collapse: July 1974

- Fraud, insolvency
- German authorities close Herstatt before dollar payments to cover FX payments on behalf of Herstatt
- Exposes counterparty risk in CHIPS
  - Chase Manhattan: main correspondent bank
- Next day retrieval of FX payments (symmetric to dollar settlement)
- Sharp fall in turnover
- Sharp and sustained fall in average size of transaction


CHIPS: Average Size of Payment '000s
$7,000
$6,000
$5,000
$4,000
$3,000
$2,000
$1,000
$0
1973
1970*
1971
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1974
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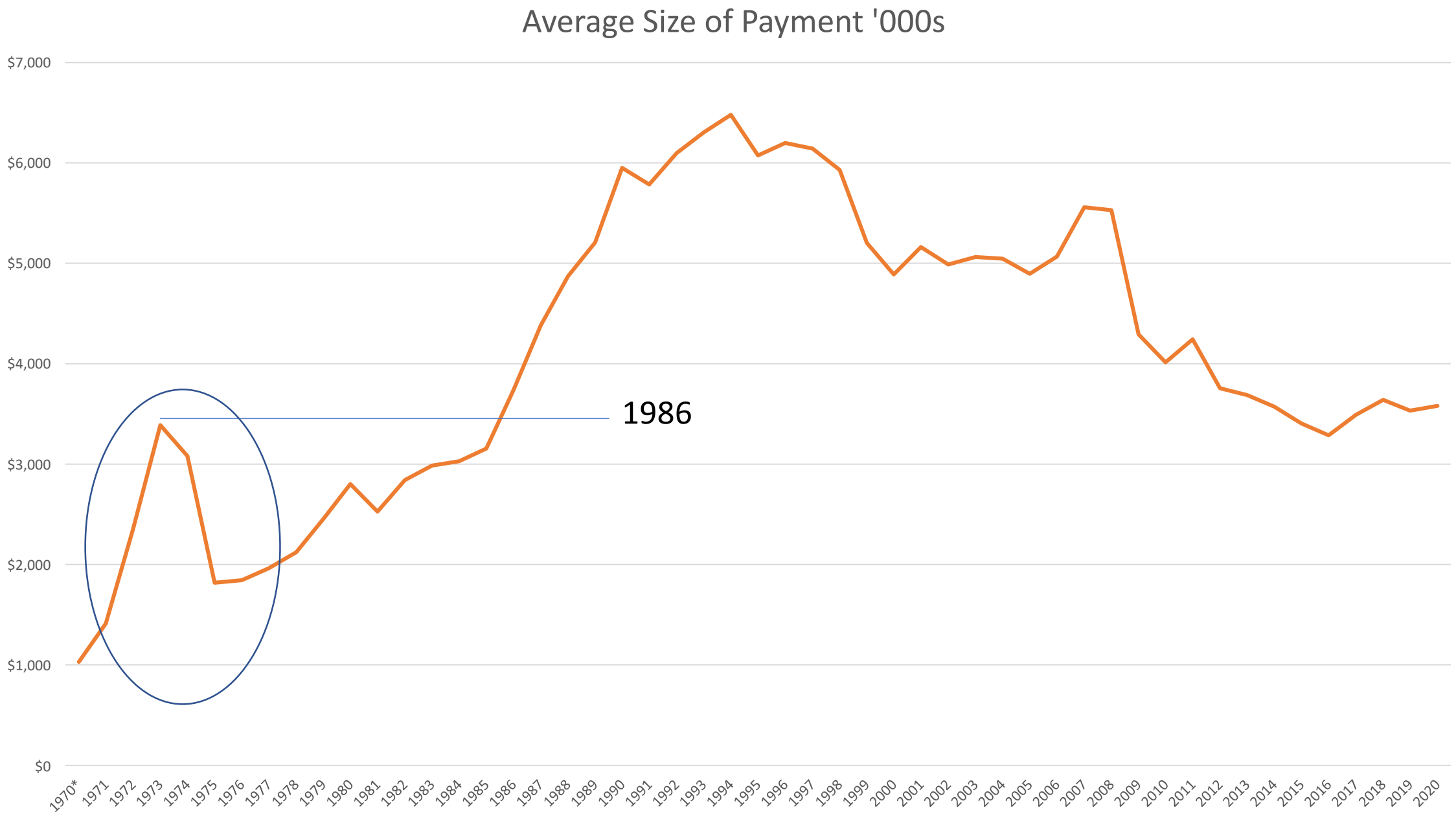
Average Size of Payment '000s
$7,000
$6,000
$5,000
$4,000
$3,000
$2,000
$1,000
$0
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1970*
1971
1972
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2018
2019
2020

After Herstatt Failure

- Pressure from FED -> CHIPS reduces risk: minimum capital, quicker settlement (1989 $54 billion intraday credit, but Deferred Net Settlement until 2000)

- Political pressure to stop Fedwire competing with CHIPS (reassertion of private interests, payments services not part of mandate)

- Multilateral oversight – BIS Group of Experts on Payment Systems 1980
  - Committee on Payment and Settlement Systems (CPSS) 1990
  - Pressure on banks to develop a stable cross-currency clearing system
  - Committee on Payments and Market Infrastructures (CPMI) 2014

Real**T**ime**G**ross**S**ettlement through central banks – takes another 10 years

- CHAPS (London) – operations taken over by Bank of England in 2017 “to enhance financial stability in the UK”

Origins of CLS – competing schemes

- Bilateral netting: FXNET, Valunet, SWIFT Accord
- Multilateral netting ECHO (European) vs Multinet (USA/Canada)
  - Technical computer problems
  - Legal jurisdictional problems, enforcement of contracts
  - Minimum liquidity standards, robust to shocks
  - Design – concentration or dilution of counterparty risk
- Lamfalussy Minimum Standards 1990 @ BIS
- Bankers neglect FX risk: moral hazard, miscalculation
- Urging and eventually threats from central banks (regulatory capital through Basel Cttee)

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Exposure (Credit and Liquidity Risk)

Percent of G10 banks reporting the time between cancellation deadline and receipt identification for FX payments against USD: **1996** BIS survey

	>48 hours	24-48 hours	<24 hours
JPY	12%	81%	7%
BEF	9	80	11
FRF	8	81	11
DEM	5	79	16
ITL	7	77	16
NLG	9	76	15
SEK	8	73	19
CHF	5	73	21
ECU	7	72	22
GBP	4	72	24
CAD	3	59	38

‘over 60% of the banks in the surveys are still underestimating their exposures’

CPSS Allsop Report, BIS, Basel, 1996

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CLS Bank 1997 – to overcome Herstatt Risk

BIS CPSS calls repeatedly for *private sector* initiative in 1990s

"The chosen strategy was founded on the belief that the private sector, with the active support of the public sector, had the power to contain the risk that first came into focus at the time of the 1974 failure of Bankhaus Herstatt" (CPSS 1998)

Survey, identify and cajole doesn't work

Banks threatened with enhanced regulatory capital against FX exposure

- Begins operations **2002**: 39 banks, 7 currencies (USD, GBP, JPY, EUR, CHF, AUD, CAD)
- Limited membership; limited currency

SWIFT: Society for Worldwide Interbank Financial Telecommunications

- Messaging not Payments or Settlement (mostly)
- 1969 – 1977: long time in gestation
  - European integration 1969 (banking groups/consortia: SFE, EBIC)
  - ICT innovation
  - US banks' challenge
  - ISO, UNCITRAL – international harmonization of standards
- Herstatt Bank and Franklin National Bank among founding members

- Network Externalities (need to be inclusive)
- Computing Expertise (scarce and expensive)

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Public v Private Sector

- BIS Meeting of Experts in Computing Jan 1969
- BIS to provide multilateral inter-central bank payments and clearing? No
- BdeFrance, FRBNY, NBBelge – crucial to take leadership
- 1971 Central bank participation in Steering Committee – rejected
- Central banks join on same basis as commercial banks
- 1971-1973 Review of Central Bank involvement: not necessary without Clearing

- SFE – meeting December 1969 Message Switching Project
- 1970 – Consultation and expansion of MSP Steering Committee
- 1971 – National Working Groups

- 1973 Incorporation of SWIFT
- 1977 Launch

1998 – Negotiated Oversight by G10 Central Banks – systemically important

Rocky Start – 3 years late

- Technical delays – Computer supplier (same as CHIPS)
- Expensive – fees, equipment, conferences
- Rulebook evolving: uncertainty
- More used for payments messages than account reconciliation
- Governance – non-profit Brussels cooperative, Central Banks and BIS refused direct board membership
- Membership: benefit to early adopters/incumbents
- Central banks join (gradually)

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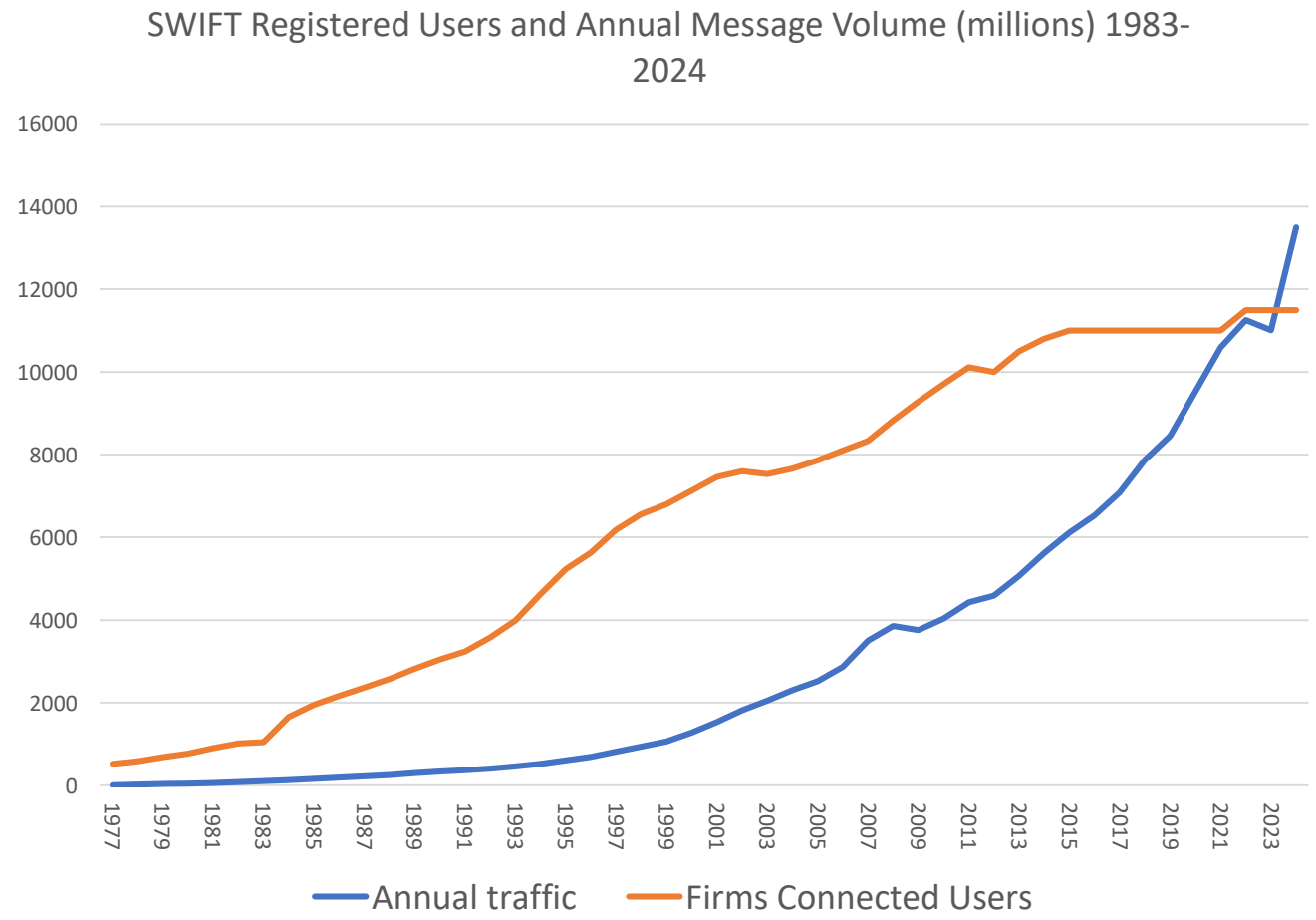
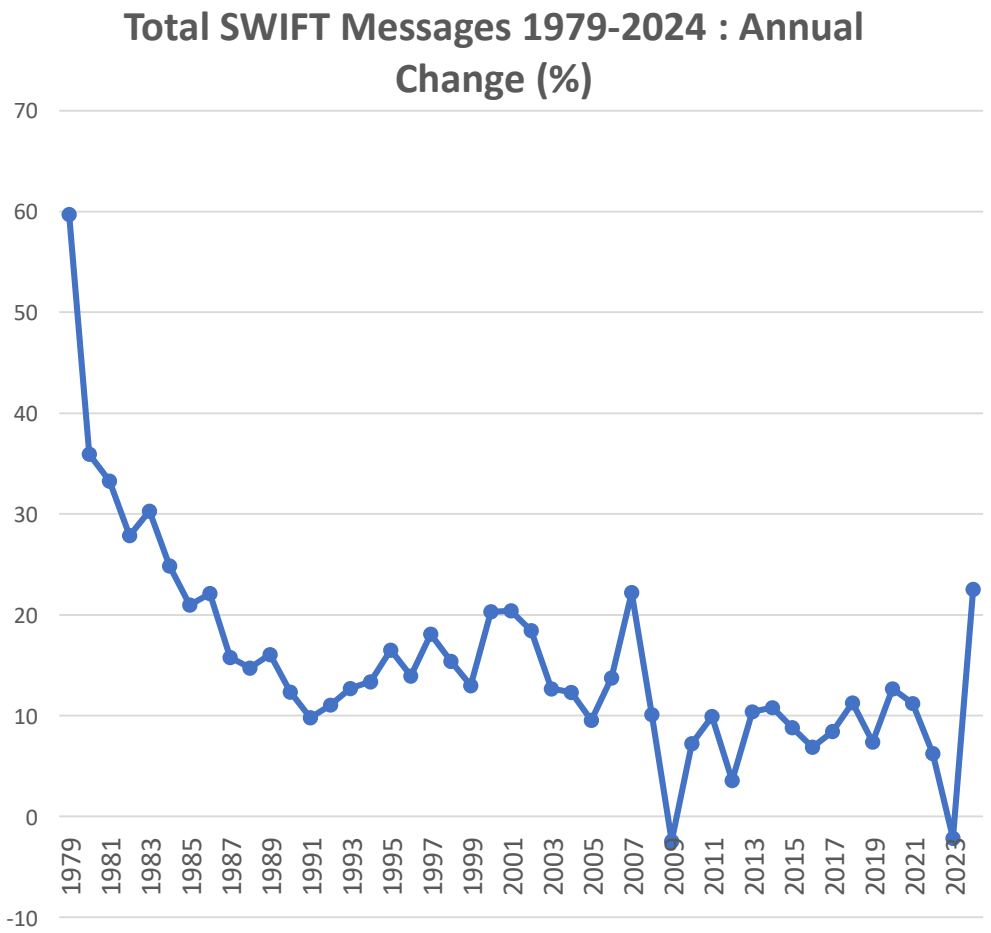

SWIFT Registered Users and Annual Message Volume (millions) 1983-2024
16000
14000
12000
10000
8000
6000
4000
2000
0
1977
1979
1981
1983
1985
1987
1989
1991
1993
1995
1997
1999
2001
2003
2005
2007
2009
2011
2013
2015
2017
2019
2021
2023
Annual traffic
Firms Connected Users


Total SWIFT Messages 1979-2024 : Annual Change (%)
70
60
50
40
30
20
10
0
-10
1979
1981
1983
1985
1987
1989
1991
1993
1995
1997
1999
2001
2003
2005
2007
2009
2011
2013
2015
2017
2019
2021
2023

Balance between public and private interests

- Not necessarily Darwinian ‘survival of the fittest’
  - Inertia, barriers to entry, interests of incumbents, legal uncertainty
  - Tension between rents and network externalities
- Not inevitable that payments systems in private sector
  - Fedwire in USA
  - CHAPS – operations taken over by Bank of England in 2017 to enhance systemic stability,
  - RTGS: But extra challenges for cross-border
- Public Sector Benign Neglect?
  - Payments the business of [correspondent] banks from 19thC
  - Weak IT skills in public sector/central banks
  - International coordination problems (Basel Committee 1975, CPSS 1990)
- Correspondent Banking Technology persists for 150 years
  - Sending coded messages, inter-linked private ledgers, fees, cross-selling

SWIFT – private instrument of public policy

- 2001: secret subpoenas
  - USA/EU Conflict, Relocation of Servers but continued sharing of data
  - Tsy USecy Levey ‘For two years, I have been reviewing that [SWIFT] output every morning. I cannot remember a day when that briefing did not include at least one terrorism lead from this program’ (2006)
- 2012: Iranian financial sanctions through SWIFT
  - Europe tries alternative for humanitarian payments
- 2012-2015: CIPS
- 2022: Russia & Belarus sanctions

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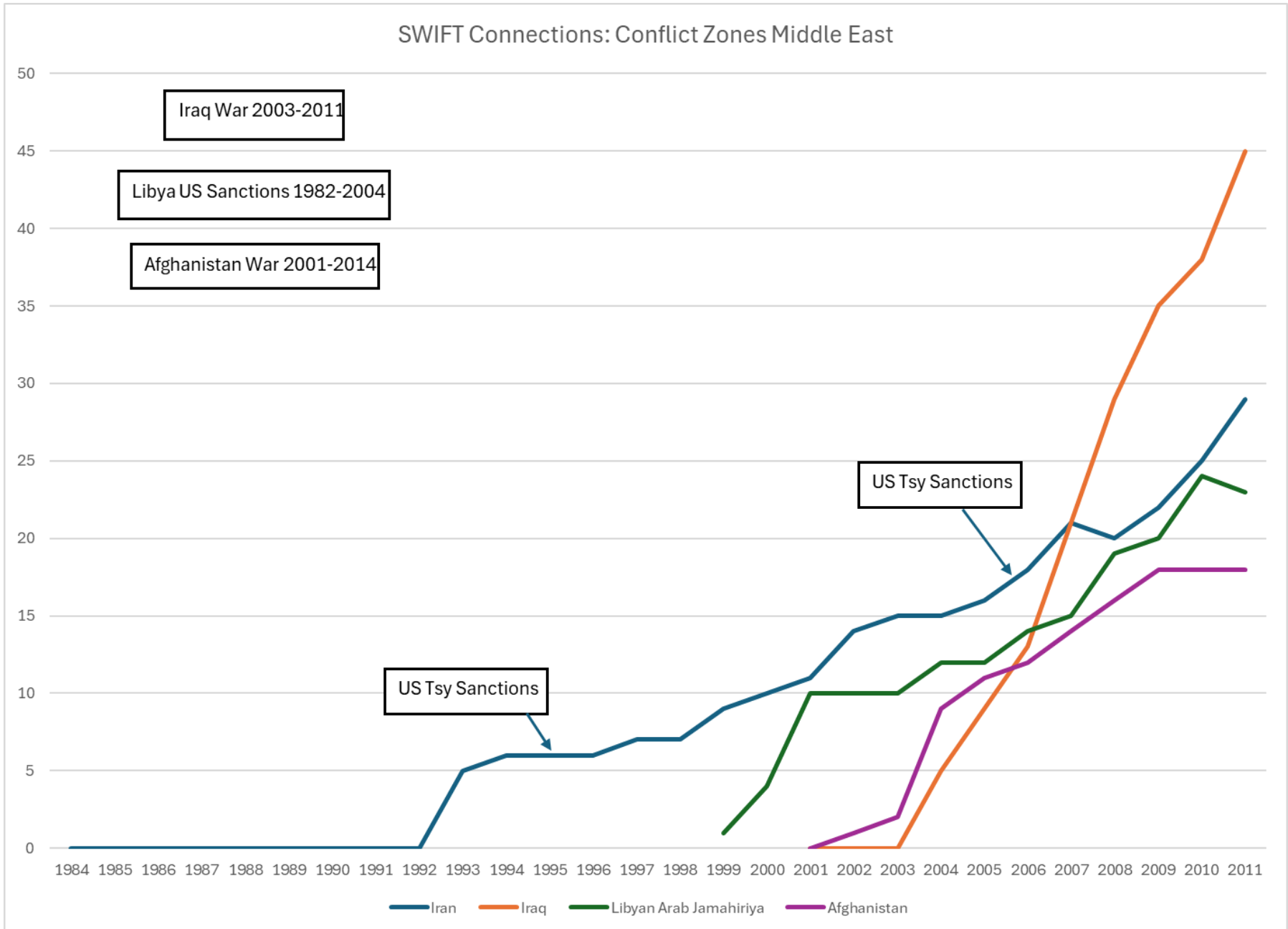
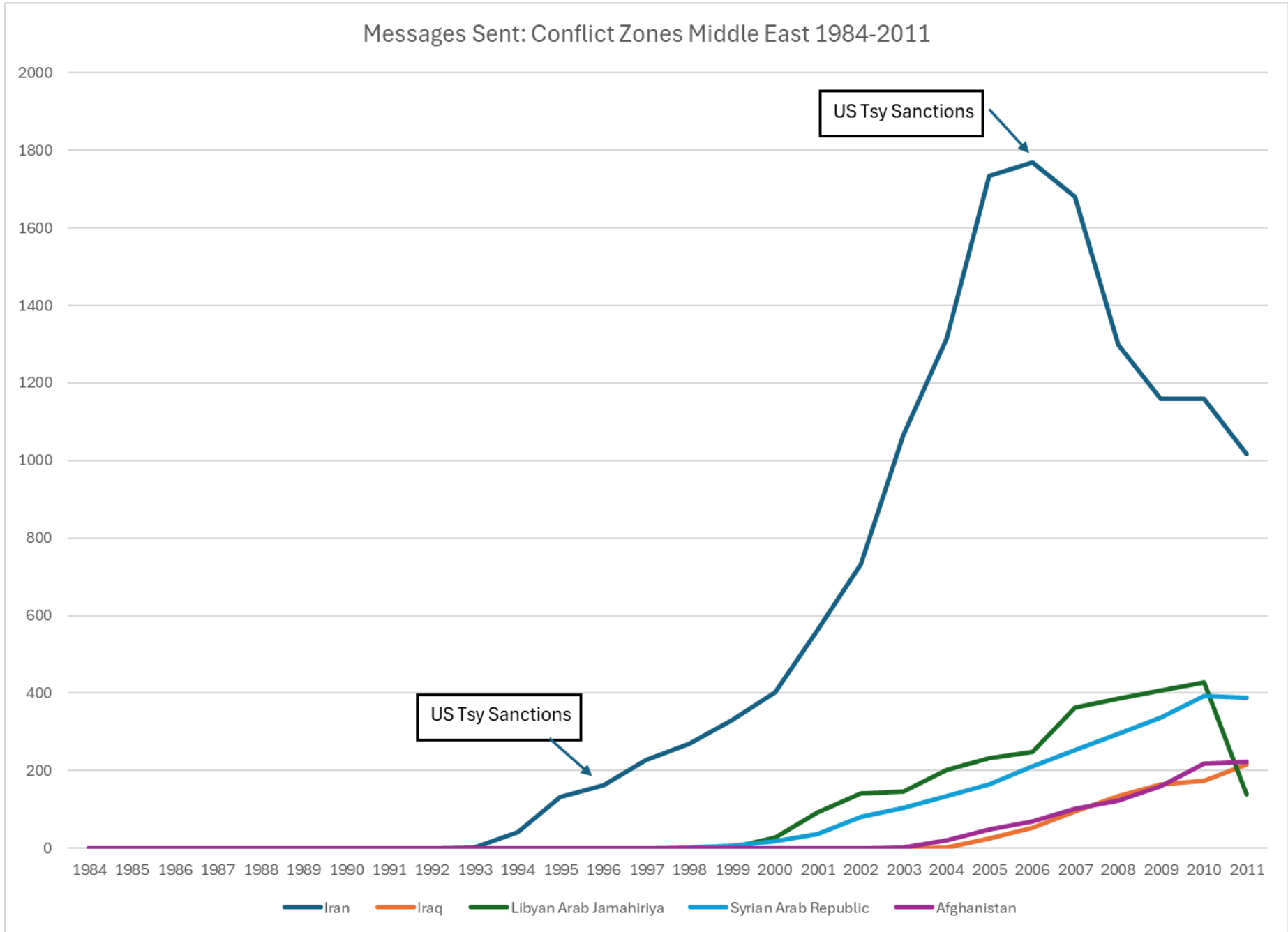
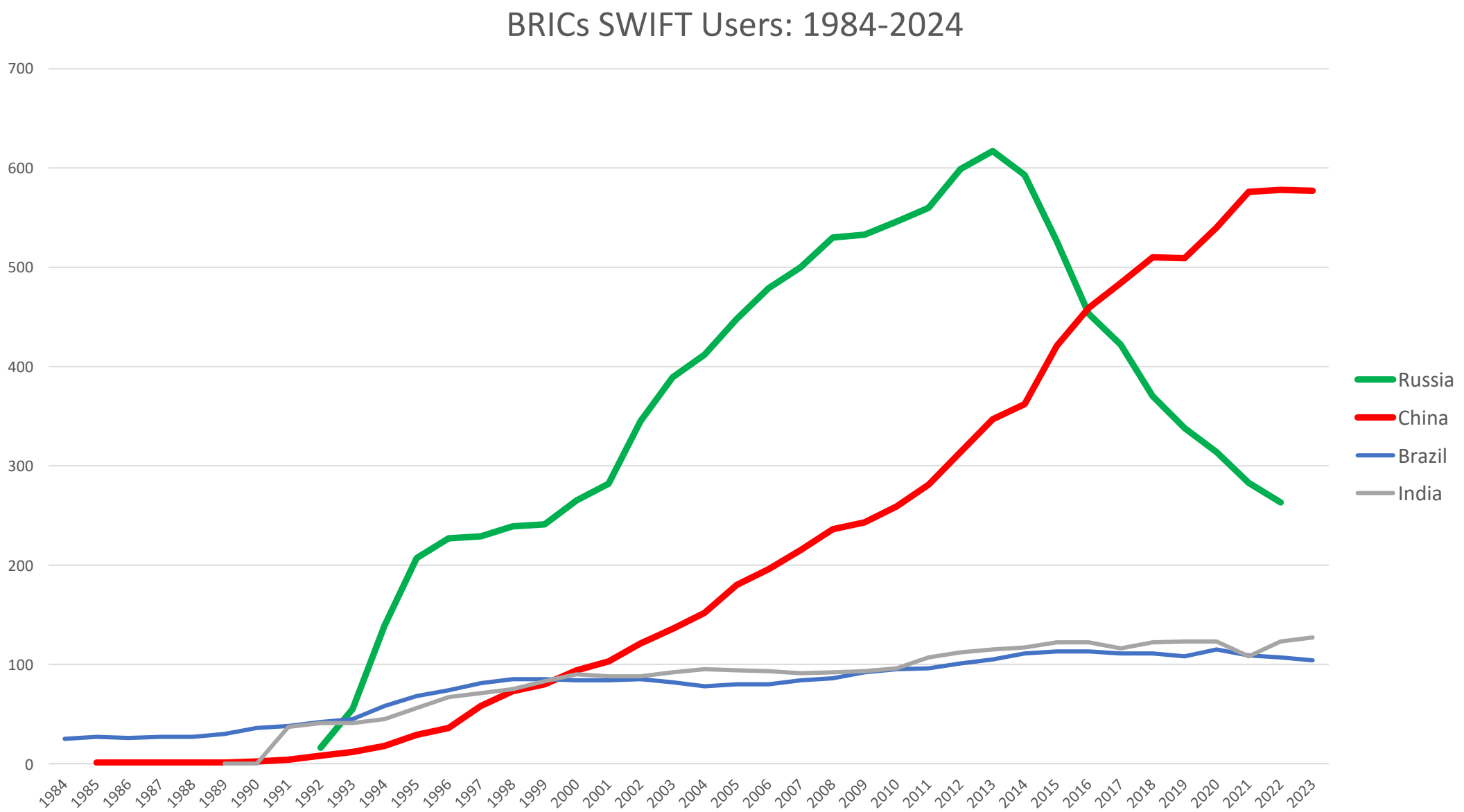

SWIFT Connections: Conflict Zones Middle East
50
45
40
35
30
25
20
15
10
5
0
Iraq War 2003-2011
Libya US Sanctions 1982-2004
Afghanistan War 2001-2014
US Tsy Sanctions
US Tsy Sanctions
1984 1985 1986 1987 1988 1989 1990 1991 1992 1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011
Iran
Iraq
Libyan Arab Jamahiriya
Afghanistan


Messages Sent: Conflict Zones Middle East 1984-2011
2000
1800
1600
1400
1200
1000
800
600
400
200
0
US Tsy Sanctions
US Tsy Sanctions
1984 1985 1986 1987 1988 1989 1990 1991 1992 1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011
Iran
Iraq
Libyan Arab Jamahiriya
Syrian Arab Republic
Afghanistan


BRICs SWIFT Users: 1984-2024
700
600
500
400
300
200
100
0
1984
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
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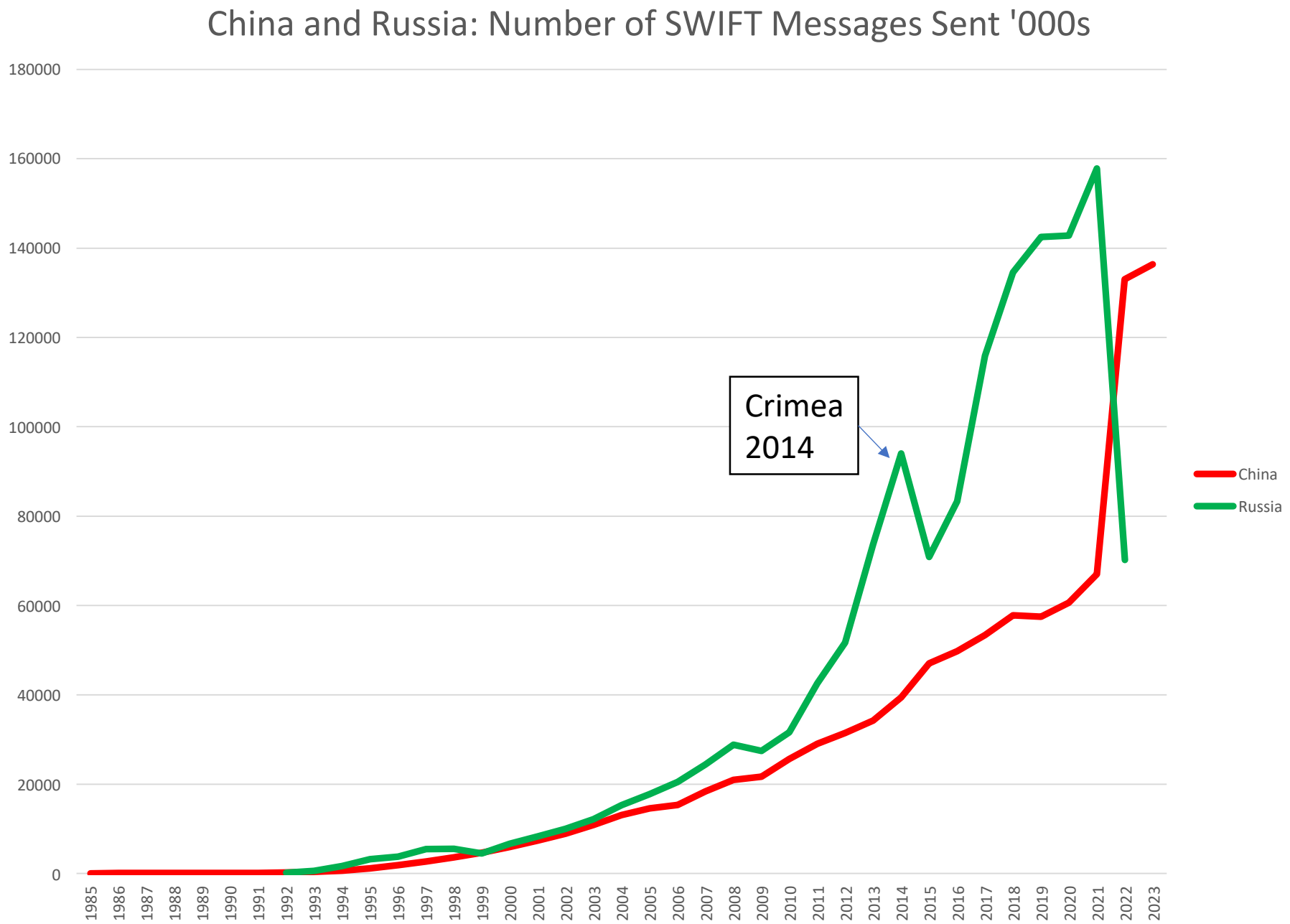
2021
2022
2023
Russia
China
Brazil
India


China and Russia: Number of SWIFT Messages Sent '000s
180000
160000
140000
120000
100000
80000
60000
40000
20000
0
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
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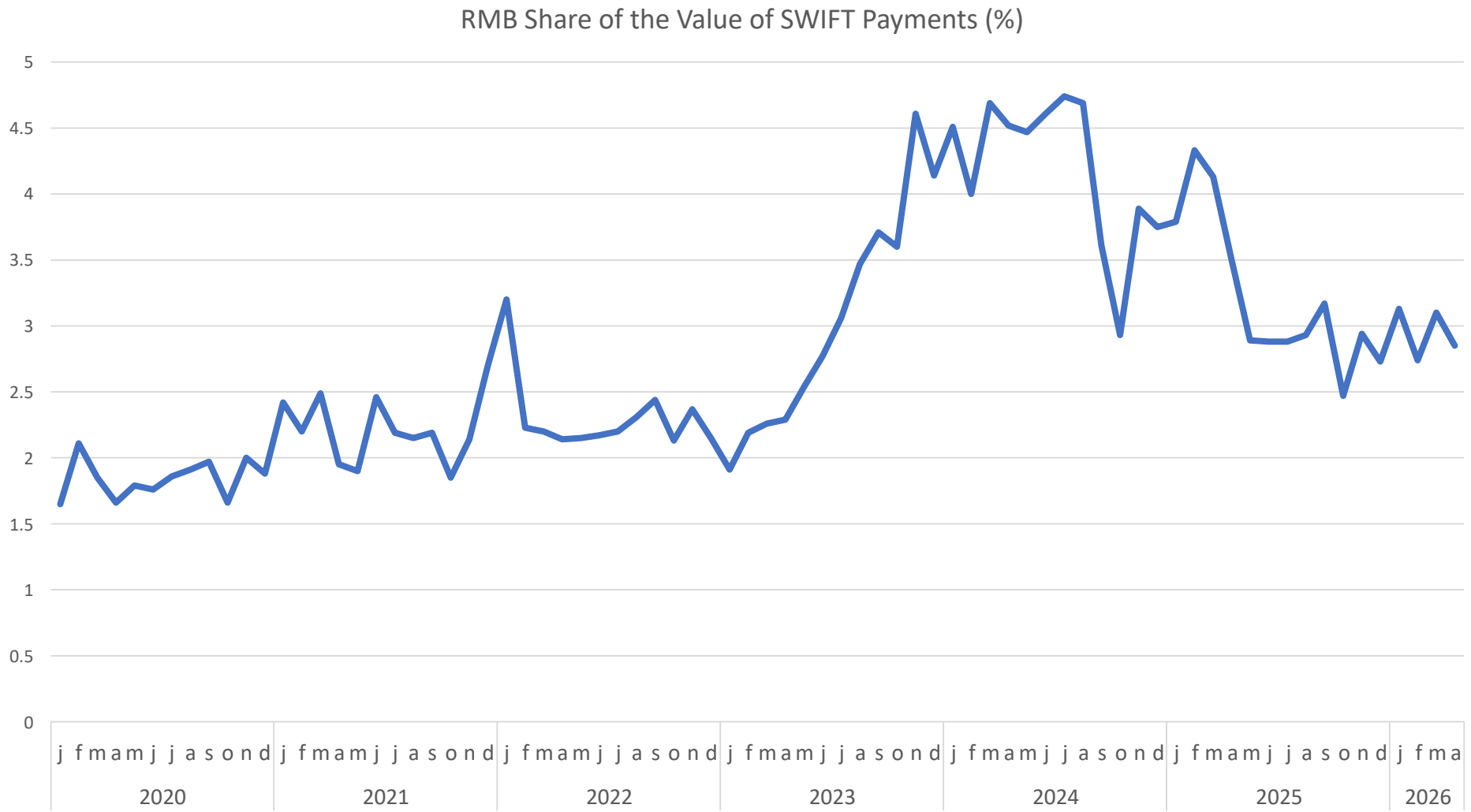
2019
2020
2021
2022
2023
Crimea
2014
China
Russia

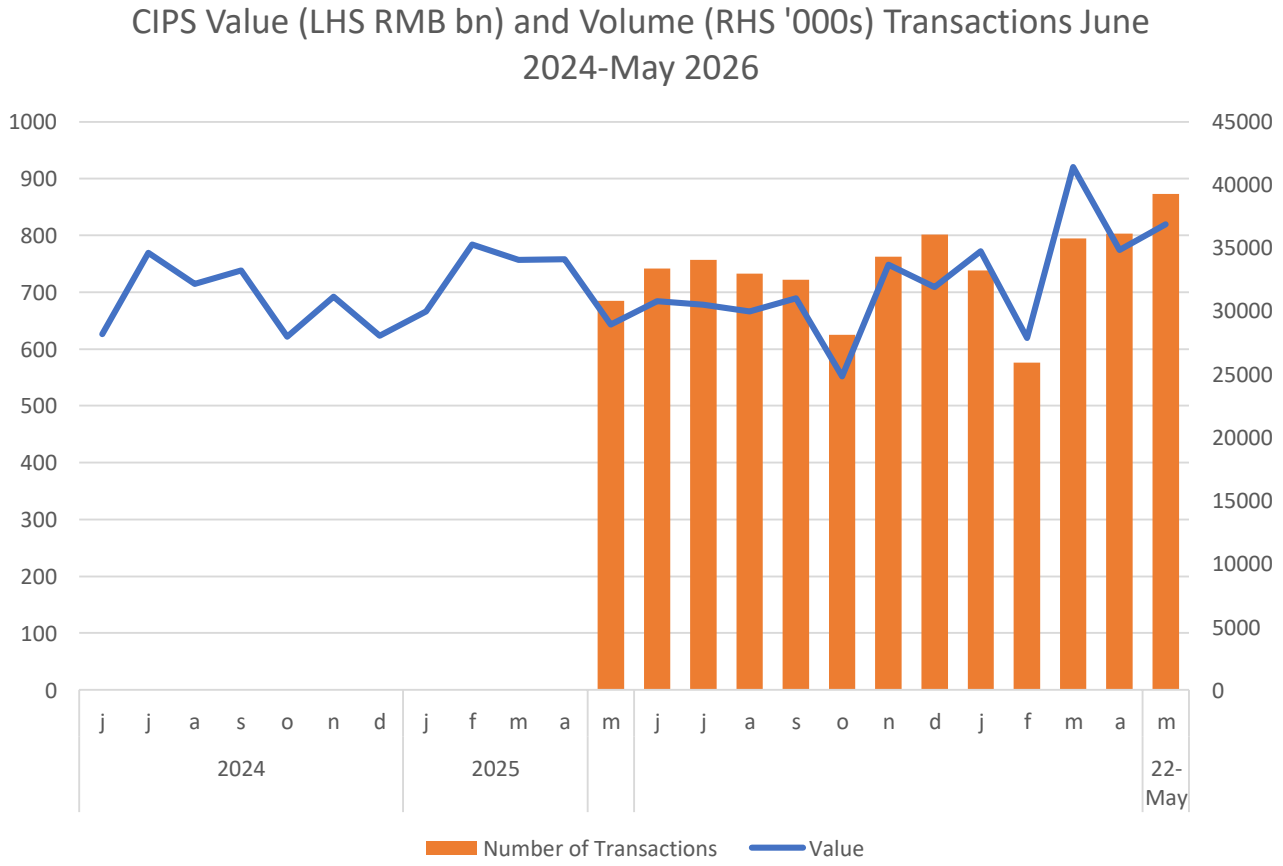


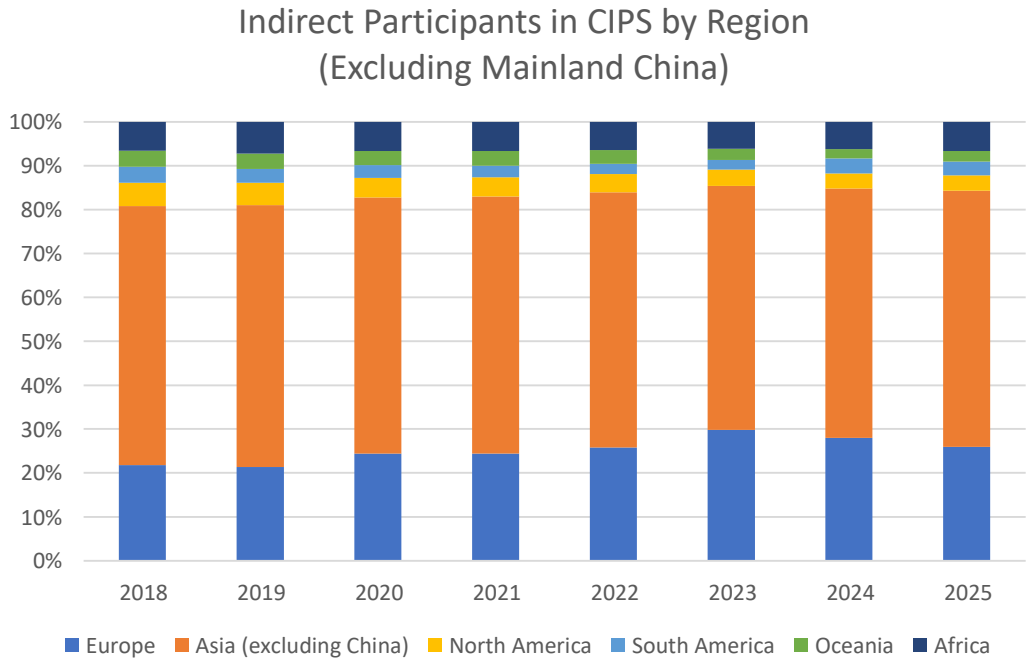
2024/25 EU and US threaten to sanction Chinese Banks for allegedly enabling trade with Russa

China – CIPS RMB payments

- Uses SWIFT messaging
- 194 direct participants (c. 10 non-Chinese)

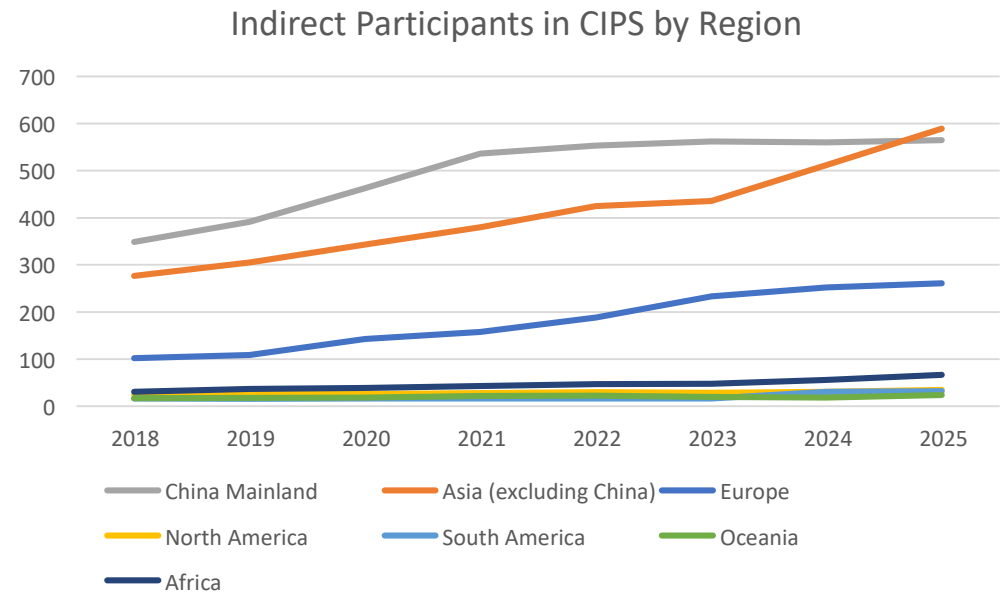
	CIPS	London CNH Clearing	HK FX Market	CHIPS	CLS
2024 Daily Turnover (US$ Billion)	97	232	700	1900	7000





- Value and Volume of CIPS traffic increasing?

- Dominated by participants in China and Asia and by Chinese-controlled banks



Digital Currencies as Means of Exchange

- Tether and other ‘stable coins’: speed, cost, transparency (DLT)
  - Borrow credibility from public money through anchor to central bank money
  - Cheaper, faster, private, scale-able?

- CBDC – cross-border challenging: experiments since 2019
  - Governance, harmonization, supervision, backstop, privacy

GloCoBank

Conclusions - Themes

- Public v private interests
  - Conflict over transparency, rents
  - Common interest in harmonized standards
  - Common interest in network externalities (risks of universality)
  - Persistence of Correspondent Banking Framework
- Politics may lead to dis-integration
  - Increase in regulatory costs for small volume links
  - Government sanctions on banks/central banks
  - Proliferation of systems: e.g. CIPS
- Digital currencies, Stablecoin may [finally?] make correspondent banking obsolete?

Cross-border Payments System – a public good, carries a public cost in case of failure, future role of public sector?