

World Bank — G20 Data Analysis (Python API + Tableau)

Author: Saketh Danthuri

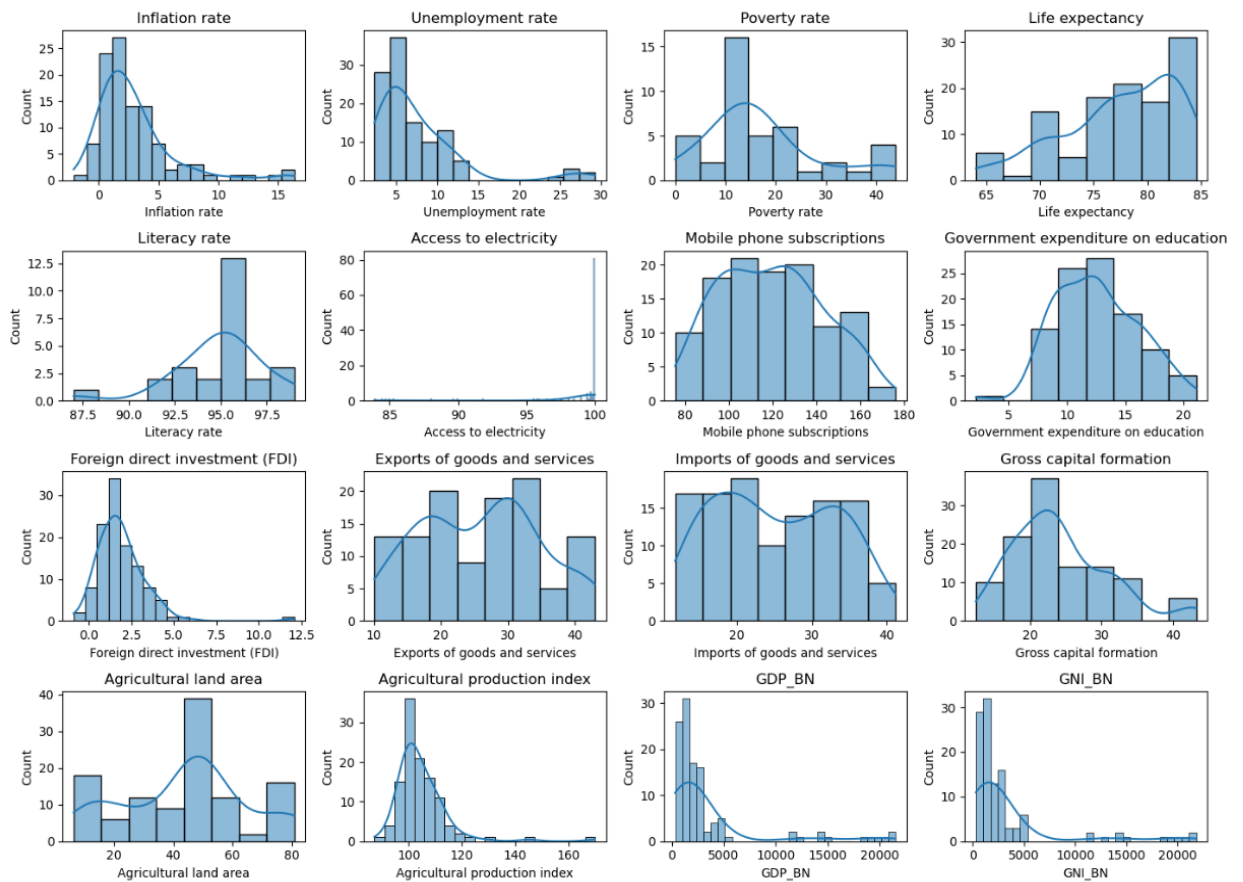
Business Problem

The G20 economies account for the majority of global GDP, trade, and population. Understanding their development patterns is critical for policymakers, businesses, and investors. This analysis leverages World Bank indicators and Tableau dashboards to identify strengths, risks, and opportunities across these countries.

Exploratory Data Analysis Insights

- GDP vs Gross Capital Formation: Highlights differences in investment intensity relative to GDP size.
- Exports vs Imports: Reveals trade surpluses and deficits; Germany and Korea show strong export surpluses while the US has persistent deficits.
- Mobile Subscriptions vs GNI: Shows digital penetration relative to income; high-income countries lead, but emerging economies show rapid adoption.
- FDI Distribution: Varies widely, with advanced economies attracting steady inflows while some emerging markets remain volatile.
- Inflation & Unemployment: Inflation rates are stable in advanced economies but more volatile in emerging markets. Unemployment spikes highlight vulnerability to shocks.
- Access to Electricity: Nearly universal in most G20 countries, but disparities remain in emerging members.
- Education Spending vs Literacy: High spending does not always yield proportional literacy improvements, suggesting efficiency gaps in public service delivery.

	count	mean	std	min	25%	50%	75%	max
Inflation rate	108.0	3.0	3.0	-2.0	1.0	2.0	4.0	16.0
Unemployment rate	114.0	8.0	5.0	2.0	4.0	6.0	9.0	29.0
Poverty rate	42.0	17.0	11.0	0.0	11.0	14.0	20.0	44.0
Life expectancy	114.0	78.0	5.0	64.0	74.0	78.0	82.0	85.0
Literacy rate	26.0	95.0	2.0	87.0	94.0	95.0	96.0	99.0
Access to electricity	114.0	99.0	4.0	84.0	100.0	100.0	100.0	100.0
Mobile phone subscriptions	114.0	120.0	24.0	75.0	102.0	120.0	136.0	176.0
Government expenditure on education	101.0	13.0	4.0	2.0	10.0	12.0	15.0	21.0
Foreign direct investment (FDI)	114.0	2.0	2.0	-1.0	1.0	2.0	3.0	12.0
Exports of goods and services	114.0	26.0	9.0	10.0	19.0	27.0	32.0	43.0
Imports of goods and services	114.0	25.0	8.0	12.0	18.0	24.0	33.0	41.0
Gross capital formation	114.0	24.0	7.0	12.0	19.0	23.0	28.0	43.0
Agricultural land area	114.0	44.0	21.0	6.0	28.0	46.0	55.0	81.0
Agricultural production index	114.0	105.0	10.0	87.0	99.0	102.0	108.0	170.0
GDP_BN	114.0	3390.0	4839.0	324.0	1072.0	1675.0	2767.0	21540.0
GNI_BN	114.0	3405.0	4888.0	315.0	1043.0	1662.0	2807.0	21822.0



Data Filtering

For this project, I filtered the raw World Bank datasets to include only G20 economies.

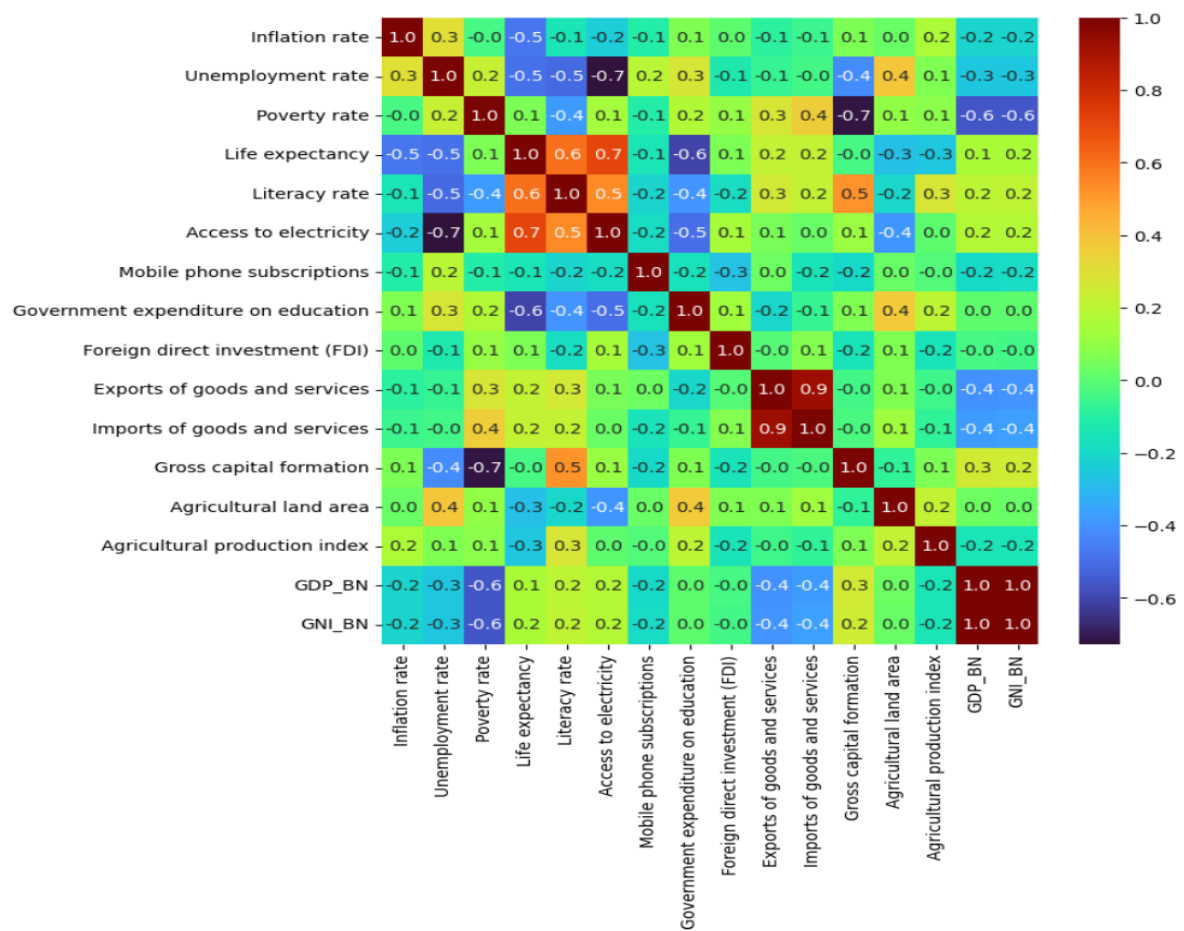
This ensures a focused comparison and removes noise from non-G20 countries.

Additionally, missing values and inconsistent time periods were handled by:

- Dropping indicators with excessive missingness.
- Aligning data to a common timeframe (2015–2020).
- Normalizing country codes for consistent joins across datasets.

Correlation Insights

- GDP vs Life Expectancy: Positive correlation, but diminishing returns at higher income levels.
- Population vs GDP Size: Large populations (China, India) strongly influence GDP totals but not always GDP per capita.
- Education Spending vs Literacy: Weak correlation, highlighting that quality and efficiency matter as much as spending levels.



Research Questions & Key Findings

1. Which economies dominate global GDP growth?

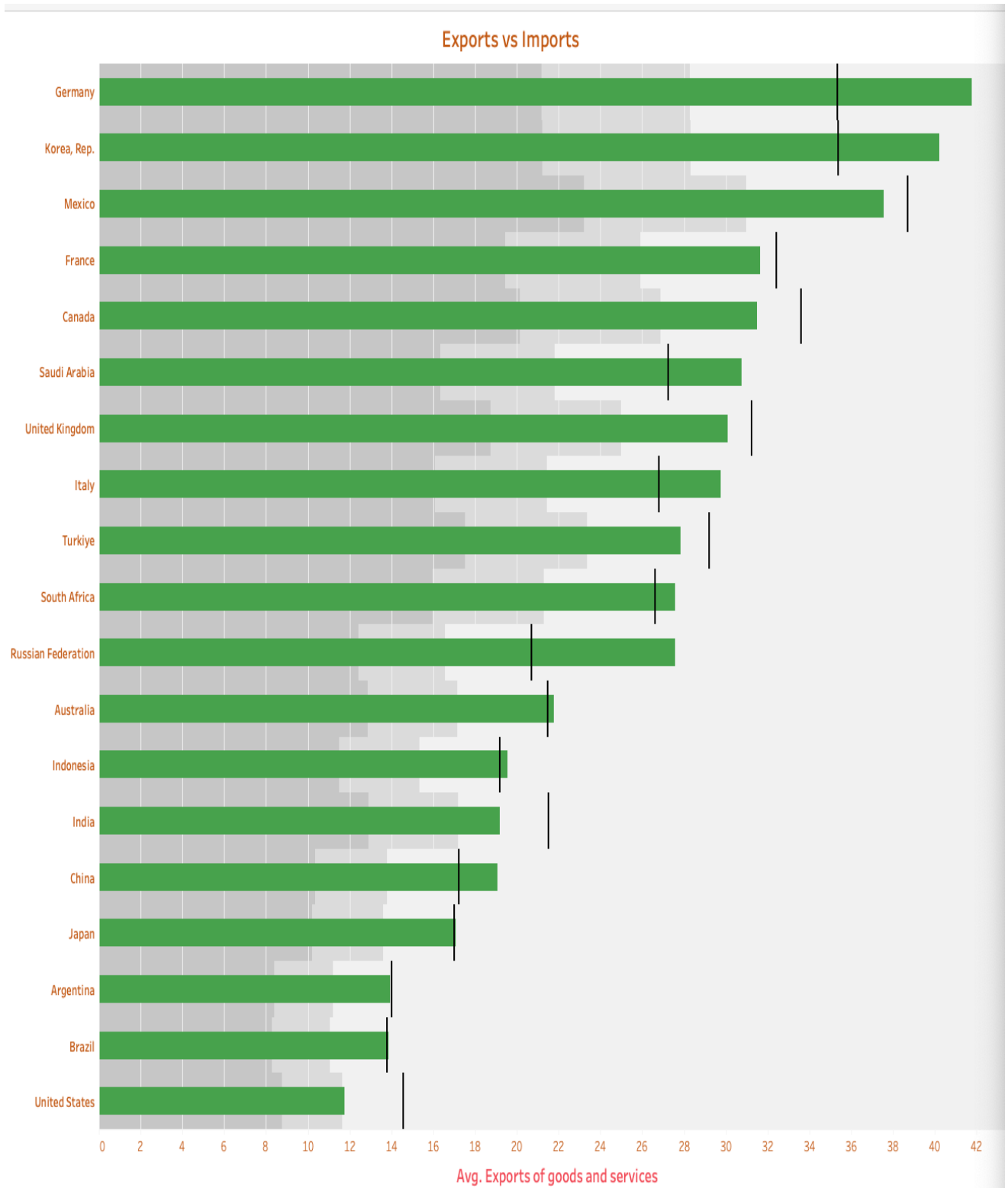
- The US and China remain dominant, with India emerging as a fast-growing contributor.

GDP vs Gross Capital Formation



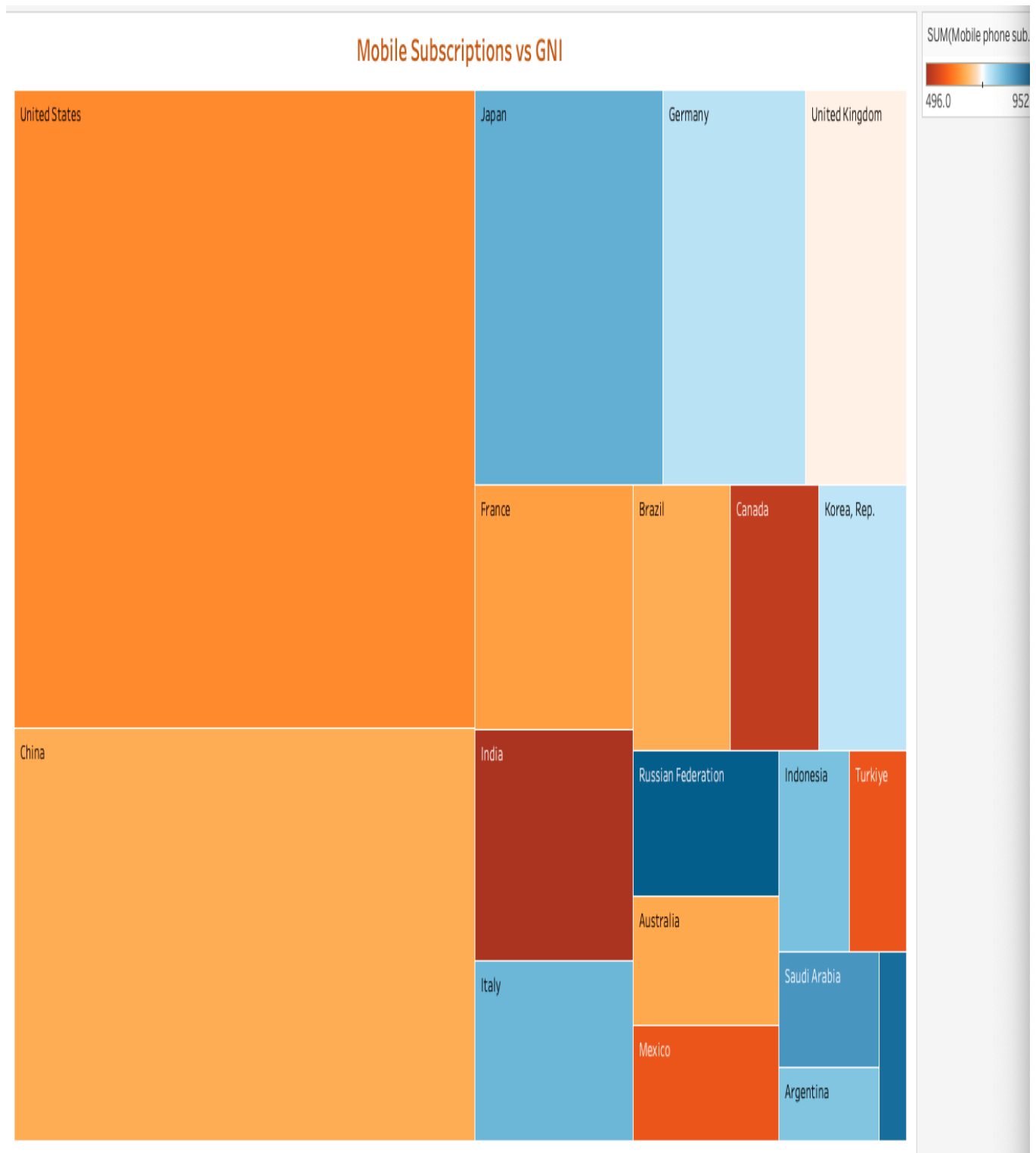
2. How do trade balances impact growth sustainability?

-Persistent US deficits and German surpluses highlight risks of imbalance and dependency.



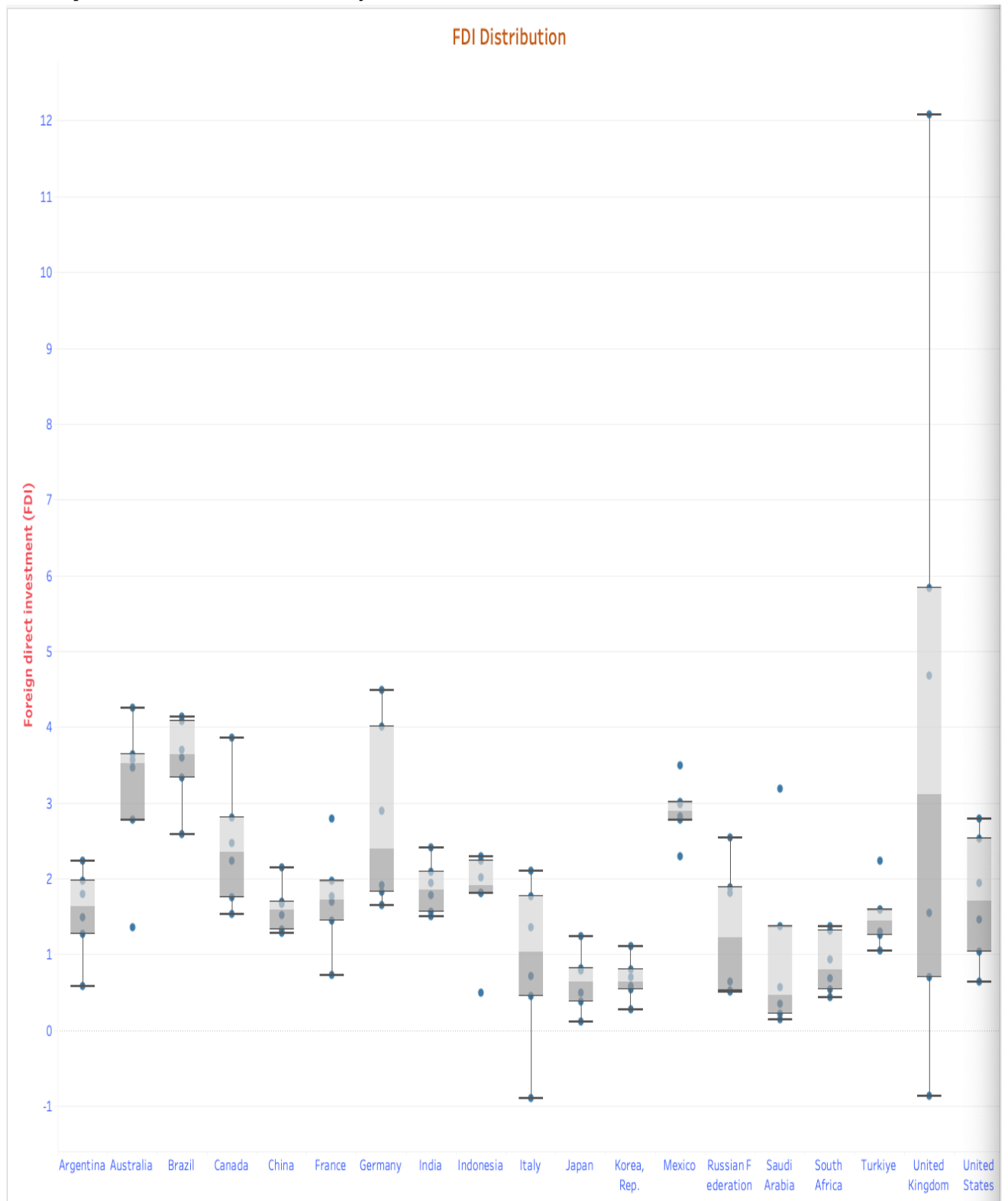
3. Do higher digital penetration rates align with higher income levels?

- Yes, but emerging markets show rapid adoption, offering future growth potential.



4. How do FDI patterns vary across G20 economies?

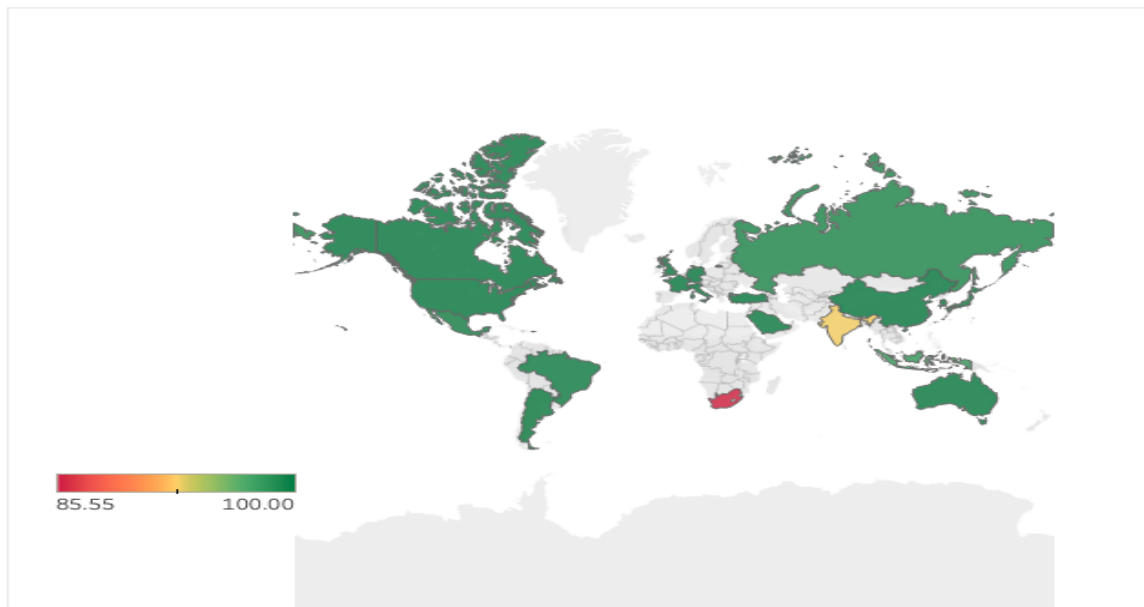
Advanced economies attract consistent inflows, while emerging markets show volatility tied to political and economic stability.



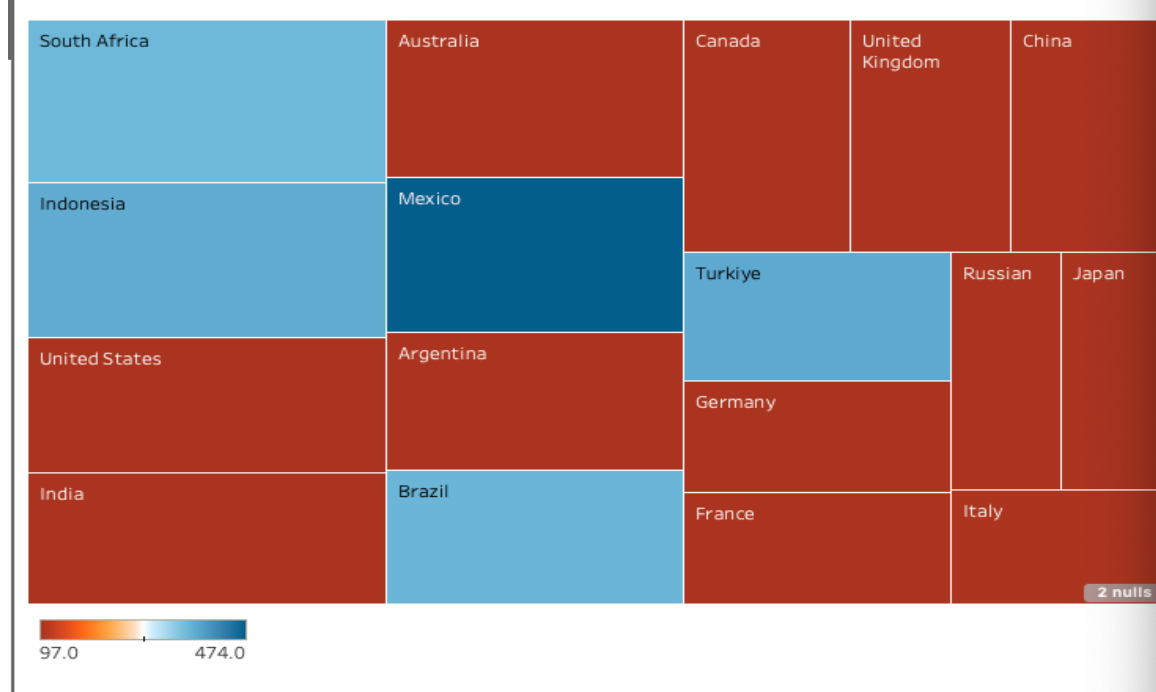
5. Are public services keeping pace with growth?

Infrastructure access is strong, but education outcomes show mixed efficiency despite high spending.

Access to Electricity



Efficacy of Govt Education Spending



Actionable Insights & Recommendations

- For Policymakers: Balance trade strategies, invest in education efficiency, and address inflation volatility in emerging economies.
- For Businesses: Prioritize high-demand markets with strong digital adoption and stable FDI inflows.
- For Investors: Monitor trade imbalances and inflation risks; opportunities exist in fast-growing emerging markets with improving infrastructure.

Final Recommendations

- Leverage G20 insights to balance short-term growth with long-term sustainability.
- Promote trade diversification to reduce dependency risks.
- Enhance public service efficiency in education and infrastructure.
- Use digital adoption as a leading indicator for consumer market opportunities.
- Strengthen cooperation on climate and energy to sustain growth without raising emissions.

Appendix

