AI in central banking: use cases, opportunities and challenges

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The views expressed are those of the presenter and do not necessarily reflect the views of the BIS.

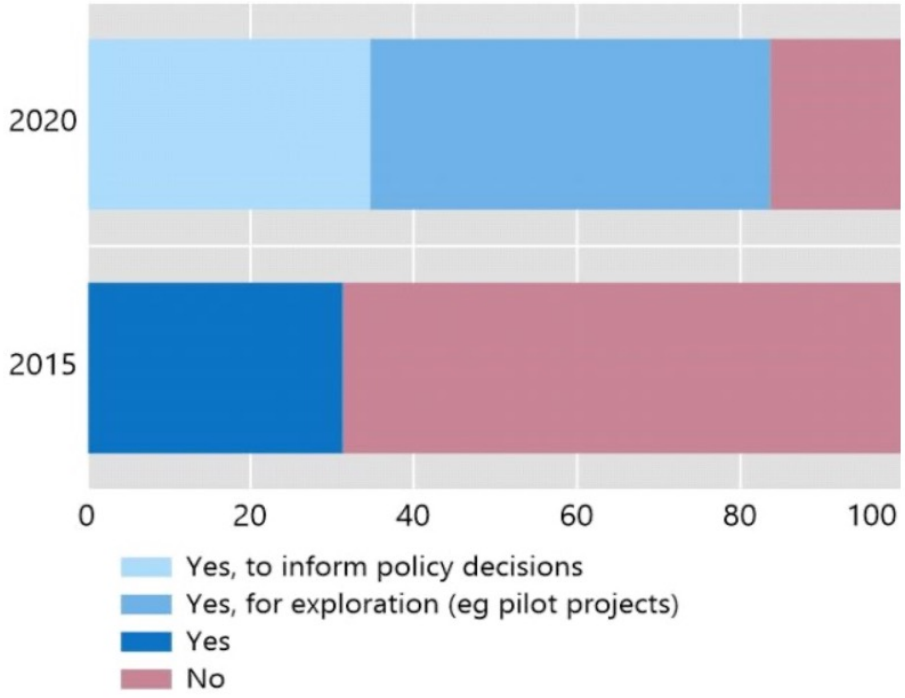
Use of big data: 2015 vs 2020

Are you currently using any big data sources?

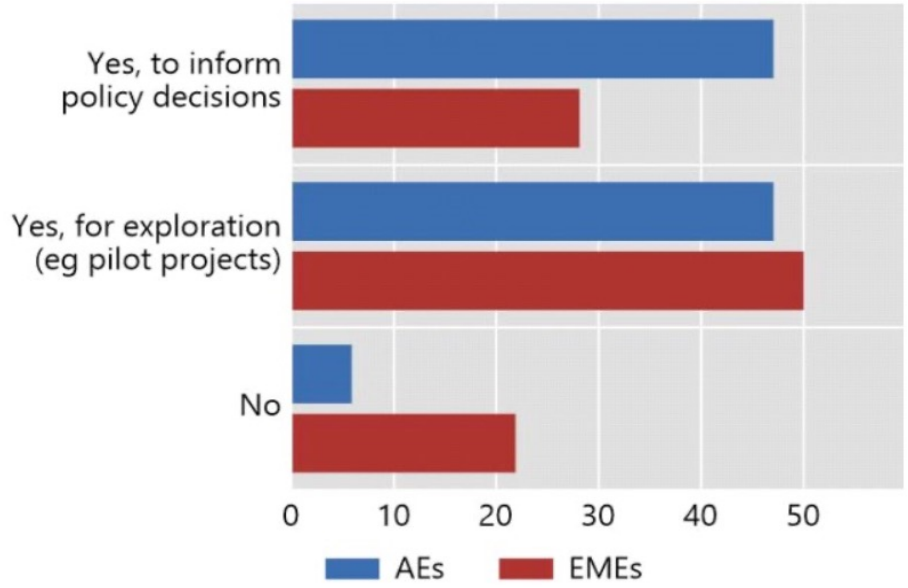
In per cent of respondents

Graph 4

All responses



AEs versus EMEs



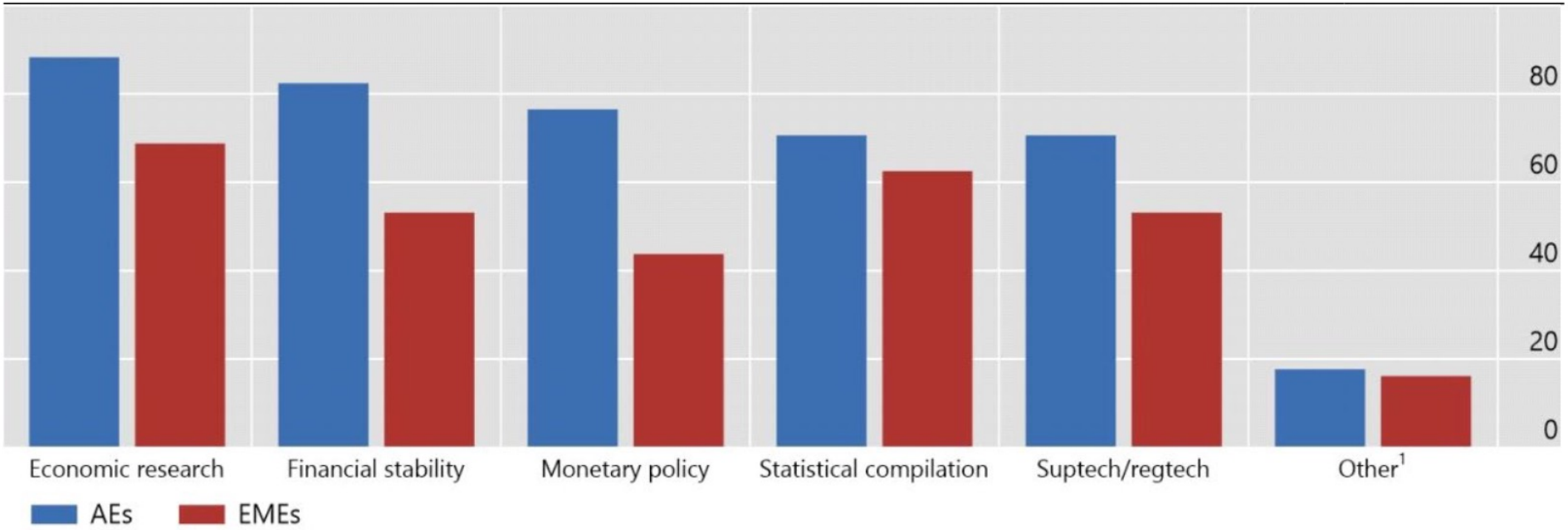
Sources: IFC big data survey (2020); authors' calculations.

For what do central banks use big data?

For what general purposes does your institution use big data?

In per cent of respondents

Graph 6



[1] Includes monitoring crypto-assets, cyber security, impact and network analysis.

Sources: IFC big data survey (2020); authors' calculations.

Current use cases of big data and machine learning in CBs

1. Information collection and statistical compilation

2. Macroeconomic and financial analysis to support monetary policy

3. Supervision and financial stability

4. Oversight of payment systems

Selected list of central bank use cases of machine learning

Table A1

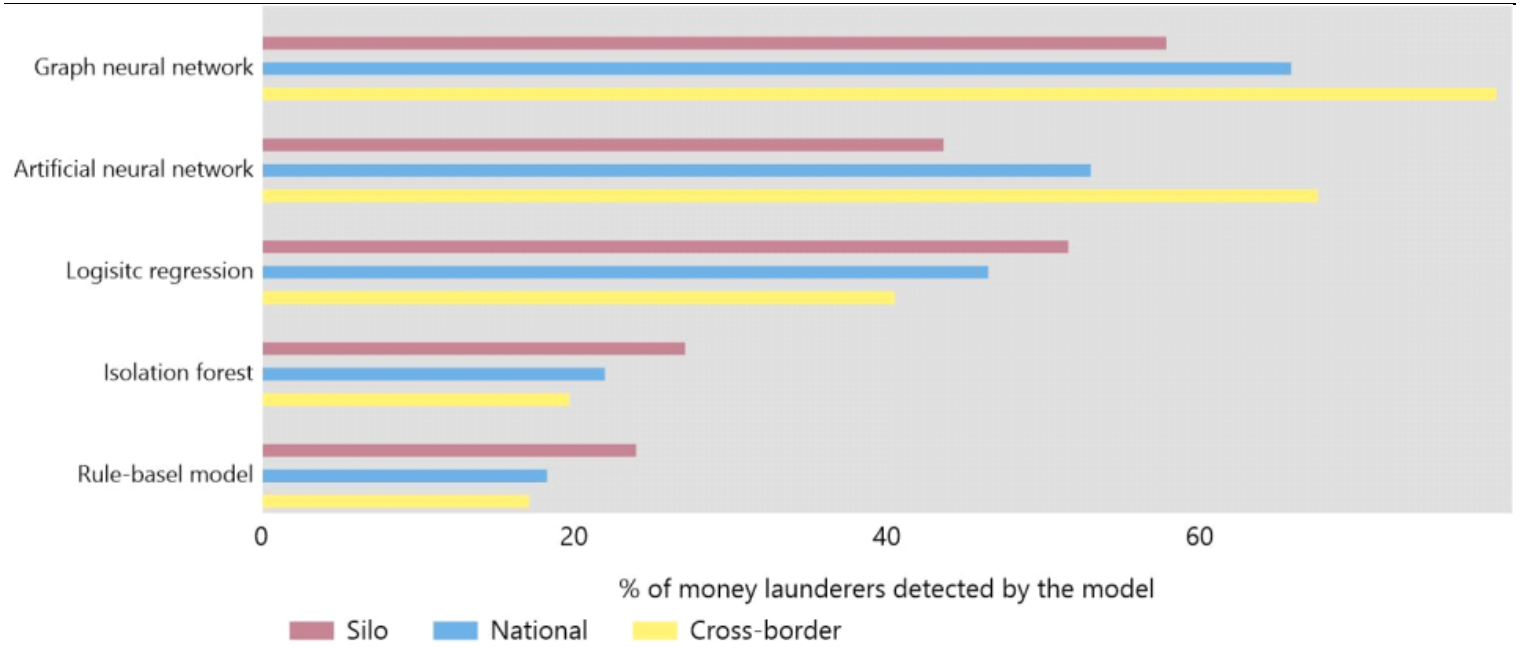
Main method	Application type			
	Information collection	Macro/financial analysis for monetary policy	Payments oversight	Supervision
Tree-based methods	Banco de Portugal, Bank of Israel, Deutsche Bundesbank, ECB, Magyar Nemzeti Bank	Bank Indonesia, Bank of France, Reserve Bank of Australia, Reserve Bank of New Zealand	Central Bank of Iceland	Bank of France, Bank of Italy, Bank of Japan, Banco de Portugal, Bank of Spain, Central Bank of Brazil
Neural networks	ECB	Bangko Sentral ng Pilipinas, Bank Indonesia, Bank of Canada, Bank of Korea, Central Bank of Chile, Central Bank of Malaysia, Bank of Canada, Bank of England, Deutsche Bundesbank, ECB	Bank of Canada, Bank of Italy, Bank of Thailand, Central Bank of Ecuador, De Nederlandsche Bank	Bank of France, Bank of Greece, Central Bank of Brazil, Deutsche Bundesbank, Hong Kong Monetary Authority
Large language models	Deutsche Bundesbank	Bangko Sentral ng Pilipinas, Bank Indonesia, Bank of Korea, Deutsche Bundesbank, Federal Reserve	Bank of Korea	Central Bank of Malaysia, ECB, Federal Reserve
Other techniques	De Nederlansche Bank, Deutsche Bundesbank	Bank of Italy, Czech National Bank, South African Reserve Bank		Bank of Canada, Bank of Slovenia, Bank of Spain, Bank of Thailand, Central Bank of the Republic of Austria[1], ECB[1], Federal Reserve, Monetary Authority of Singapore[1]

See Araujo, Doerr, Gambacorta and Tissot (2024): "Artificial intelligence in central banking", BIS Bulletin no 84.

[1] Specific technique not disclosed publicly.

BISIH's Project Aurora uses synthetic data on money laundering activities to compare various models, including isolation forests and neural networks

Machine learning models' performance in different monitoring scenarios



Source: BIS Innovation Hub (2023): *Project Aurora: The power of data, technology and collaboration to combat money laundering across institutions and borders*.

LLMs are neural networks that are trained to predict the next word in a given sequence of text – and transformers revolutionised the process

- Language is about context:

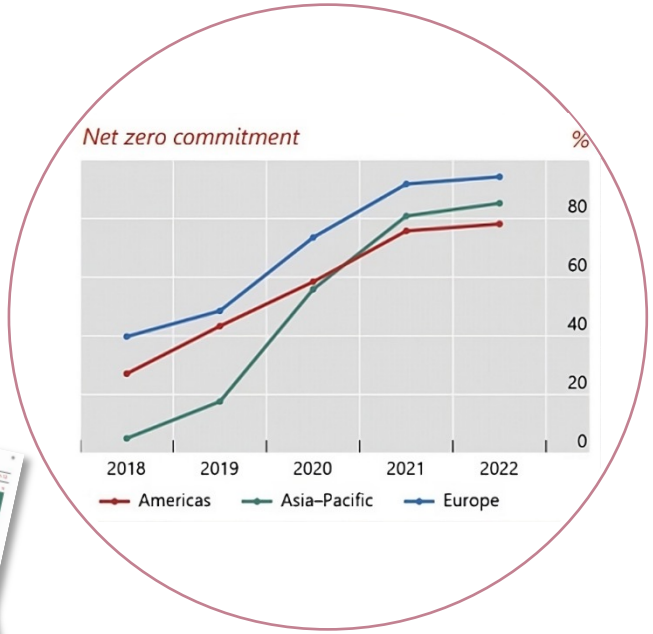
Rick Deckard went looking for **trouble**.

Trouble went looking for **Rick Deckard**.

- Transformers capture the relationship between different components of a text – even if they are far apart

Gen AI: what are the benefits?

- Ease of use: gen AI can be used for different purposes without much expertise
- Turning unstructured into structured data
- Examples include Project Gaia or "asset embeddings"



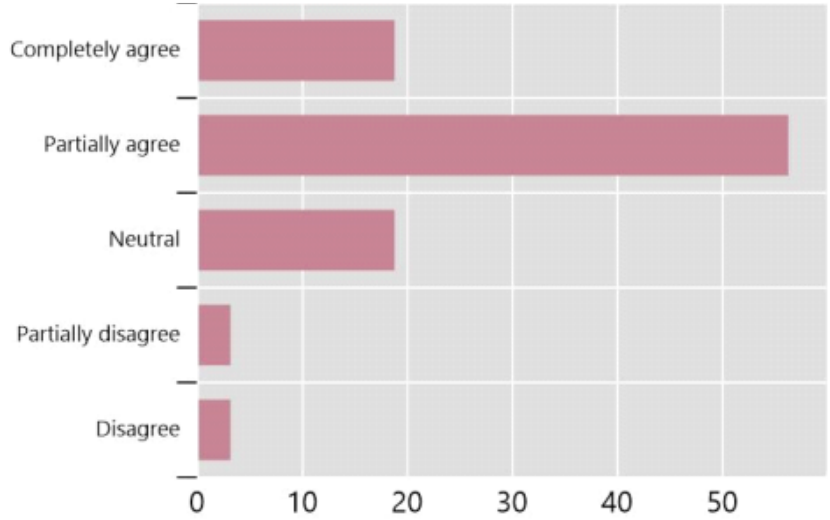
Cyber security experts see more benefits than risks of gen AI, and expect automation of routine tasks

Opportunities from the adoption of gen AI for cybersecurity in central banks

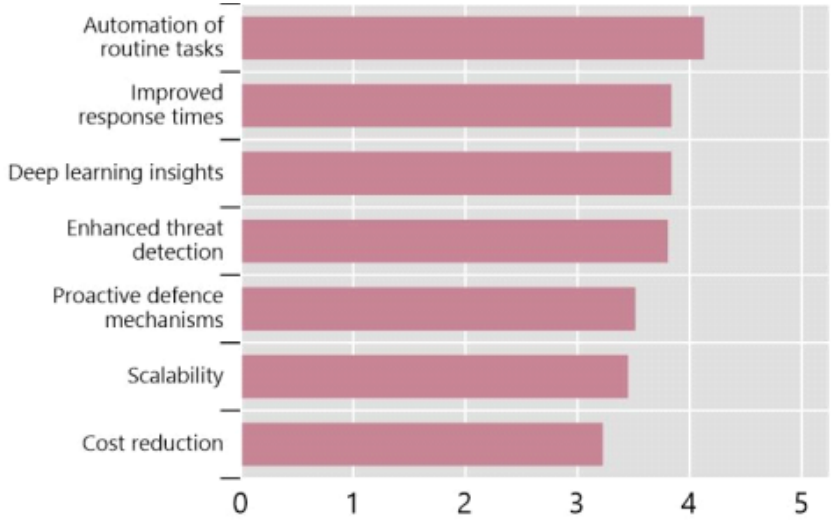
As a percentage of respondents

Graph 5

A. Gen AI brings more benefits than risks



B. B. Benefits for cybersecurity



Based on responses from 32 participants from a survey conducted among the members of the Global Cyber Resilience Group (GCRG) in January 2024

Source: adapted from Aldasoro, Doerr, Gambacorta, Notra, Oliviero and Whyte (2024).

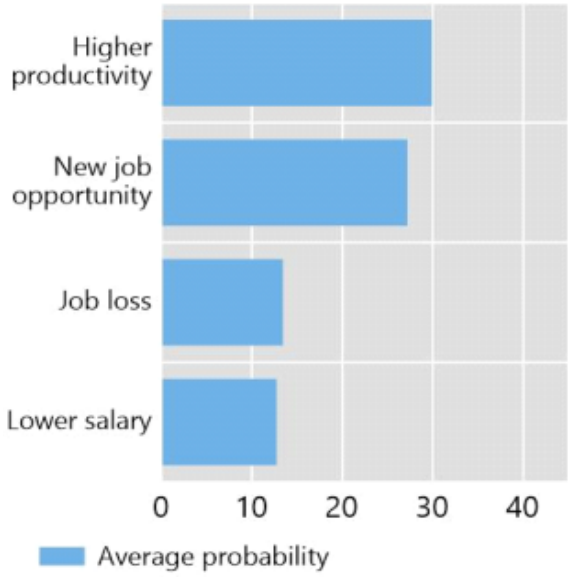
Aldasoro, Doerr, Gambacorta, Notra, Oliviero and Whyte (2024): "Gen AI and cyber risk in central banking", BIS Paper, forthcoming.

Gen AI: Highway to automation or stairway to job security?

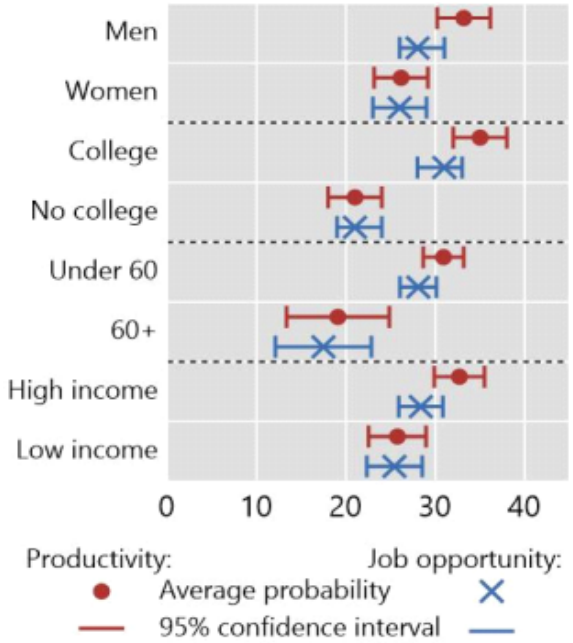
Gen AI and job perspectives

Graph 2

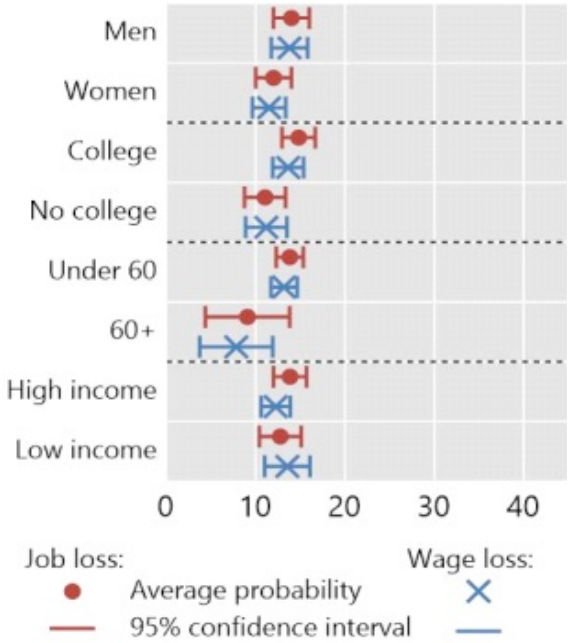
A. Gen AI is expected to bring more benefits than risks



B. Expected benefits differ across demographic groups…



C. ..while risks do not.



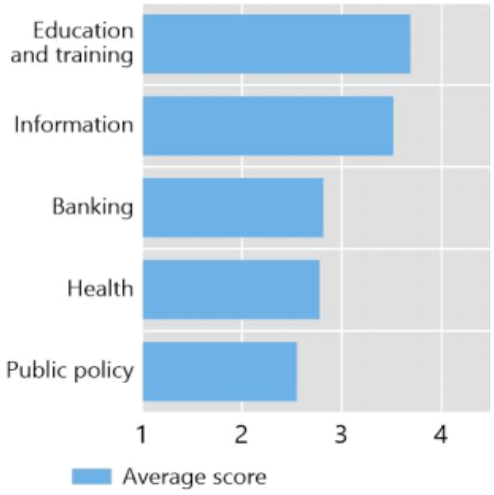
For more details, see Aldasoro, Armantier, Doerr, Gambacorta and Oliviero (2024): "Survey evidence on gen AI and households: job prospects amid trust concerns", BIS Bulletin, no 86.

Conclusions

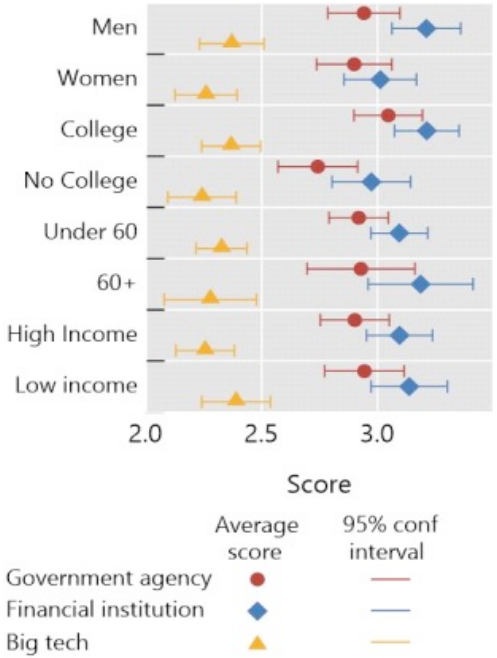
- AI does not come without challenges …
  - hallucinations, explainability, biases, …
  - lack of trust + privacy concerns, …
- … but offers many opportunities

In gen AI we (do not) trust — Graph 3

A. OK Computer? Trust in gen AI vs human-operated services…



C. Trust to safeguard data varies by counterparty



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References

Araujo D, S Doerr, L Gambacorta and B Tissot (2024): "Artificial intelligence in central banking", BIS Bulletin, no 84 [LINK]

Aldasoro I, O Armantier, S Doerr, L Gambacorta and T Oliviero (2024): "Survey evidence on gen AI and households: job prospects amid trust concerns", BIS Bulletin, no 86 [LINK]

Aldasoro I, S Doerr, L Gambacorta, S Notra, T Oliviero and D Whyte (2024): "Gen AI and cyber risk in central banking", BIS Paper, forthcoming

Doerr, S, L Gambacorta and JM Serena (2021): "Big data and machine learning in central banking", BIS Working Papers No 930 [LINK]