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

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

<table>
<thead>
<tr>
<th>Purpose</th>
<th>AEs</th>
<th>EMEs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Economic research</td>
<td>80</td>
<td>60</td>
</tr>
<tr>
<td>Financial stability</td>
<td>80</td>
<td>60</td>
</tr>
<tr>
<td>Monetary policy</td>
<td>60</td>
<td>40</td>
</tr>
<tr>
<td>Statistical compilation</td>
<td>80</td>
<td>60</td>
</tr>
<tr>
<td>SupTech/RegTech</td>
<td>80</td>
<td>60</td>
</tr>
<tr>
<td>Other¹</td>
<td>20</td>
<td>10</td>
</tr>
</tbody>
</table>

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>
<thead>
<tr>
<th>Main method</th>
<th>Application type</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Information collection</td>
</tr>
<tr>
<td>Tree-based methods</td>
<td>Banco de Portugal, Bank of Israel, Deutsche Bundesbank, ECB, Magyar Nemzeti Bank</td>
</tr>
<tr>
<td>Large language models</td>
<td>Deutsche Bundesbank</td>
</tr>
<tr>
<td>Other techniques</td>
<td>De Nederlanske Bank, Deutsche Bundesbank</td>
</tr>
</tbody>
</table>

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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

<table>
<thead>
<tr>
<th>A. Gen AI brings more benefits than risks</th>
<th>B. B. Benefits for cybersecurity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Completely agree</td>
<td>Automation of routine tasks</td>
</tr>
<tr>
<td>Partially agree</td>
<td>Improved response times</td>
</tr>
<tr>
<td>Neutral</td>
<td>Deep learning insights</td>
</tr>
<tr>
<td>Partially disagree</td>
<td>Enhanced threat detection</td>
</tr>
<tr>
<td>Disagree</td>
<td>Proactive defence mechanisms</td>
</tr>
<tr>
<td></td>
<td>Scalability</td>
</tr>
<tr>
<td></td>
<td>Cost reduction</td>
</tr>
</tbody>
</table>

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).

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

Gen AI and job perspectives

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

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.
References


