Chasing Data

Framing the Opportunity for Central Banks in the Digital Age

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The Nobel Prize-winning economist, Robert Solow, famously said in the late 1980s, "You can see the computer age everywhere but in the productivity statistics." Today, one might borrow from Solow to say "You can see the data revolution everywhere except in official economic statistics." Perhaps no one is more aware of that data gap than central bankers themselves.

Tasked with managing the macroeconomy, monetary policy authorities depend on economic data to inform the decisions that impact the economic wellbeing of the entire population. But when it comes to the importance of data for central banks, monetary policy is just one area.

Central banks also rely on data to promote financial stability by supervising the banking system, as well as managing the reserves and financial assets of a nation. And in the process, they face many constraints such as tight budgets, strict oversight and regulations.

In this paper, we lay out the opportunities and challenges facing central banks in the digital age in order to frame key issues. We then dive deeper into these issues in a research project with the Official Monetary and Financial Institutions Forum (OMFIF) that culminates in a solutions-driven report in 2023.

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New data sources, tools and technologies offer many opportunities

The financial crisis of 2007-2009 and its aftermath was something of a catalyst for the use of big data by central banks. As European Central Banker Benoît Cœuré explained in a 2017 speech that reflected on that tumultuous period, "Both traditional statistical datasets and our models proved at times inadequate to support the decision-making process, reflecting long-time lags, linear assumptions and the absence of more granular information."[1]

Since then, Central banks around the world have been building their big data capabilities. According to a 2020 survey of central banks, 80 percent said they used big data in some way compared to only a third, five years earlier.[2]

Central banks have substantial expertise in using large, structured data sets comprised of reporting from financial institutions, surveys and credit registries for example. They have recently started exploring non-traditional data sources for their economic analysis such as unstructured data sets (social media, images scraped from the internet, information sent by sensors/connected devices, sentiment data from media, press releases), micro-level data (firms' financial statements, official press releases), and data from third parties (mobility reports, internet searches).[3] A recent study on how the Federal Reserve Bank has become more responsive to market conditions over time in making policy decisions also confirms the growing importance of non-traditional data for decision making.[4]

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New data sources are increasingly being included in how central banks are measuring economic performance. For example, Japan has included internet advertising when measuring inflation. In Europe, there has been a drive to use new micro-level data, such as online operations in trading platforms, credit card payment transactions, mobile banking data, records related to securities settlement and cash payment systems, clearing houses and repurchase operations and derivatives settlement, as well as commercial and retail transactions and consumer internet purchases to monitor financial risks.[5] And of course,

Central banks are increasingly incorporating ESG data into their assessments of economic performance, financial stability, and asset allocation.

using high-frequency data sources and new economic models can also help bring economic statistics (which typically provide a snapshot of the economy from the past) into the present. Known as "nowcasting," the process involves models that synthesize wide ranges of data at mixed frequencies.[6] These models produce high-frequency forecasts that can be updated almost in real time. For example, the GDG Now forecast of US real GDP growth by the Federal Reserve Bank of Atlanta is updated up to seven times a month.[7]

Studies show that it is also possible to develop proxy indicators, which can be used for GDP nowcasting when macroeconomic information is lacking. Linking search data to enhance consumption metrics is one example.[8]

But there are many more applications of new data beyond economic statistics for central banks, including:

Monitoring Markets

For example, the Monetary Authority of Singapore uses machine learning to spot market manipulation.[9]

Developing Early Warning Systems

For example, the Central Bank of Turkey has developed a real-time monitoring tool to extract insights from microdata sets on FX market transactions or derivatives to develop an early warning system.[10] These tools can be particularly helpful for oversight.

Monitoring Sentiment

For example, several central banks are using natural language processing to produce economic or policy uncertainty indices from textual data, or to gauge sentiment in response to monetary policy announcements.[11]

There's no "one size fits all" approach to capturing the opportunities of the digital age

Technology does not stand still. And neither do risks to financial stability and the global economy. Think of the Covid pandemic, more frequent and more severe climate events, and the extreme volatility of digital financial assets, for instance.

That means central banks face a moving target when it comes to new data and the technology and platforms they need to support it. Add to that regional differences and country-specific regulations, and it soon becomes clear there's no "one size fits all" for central banks wanting to capture the promise of the digital age.

A significant challenge for central banks is typically a lack of reliable and high-powered IT infrastructure to allow big data capabilities and access to different data sources at scale across the bank. And investment in IT infrastructure is a prerequisite for storage and processing of large and complex data sets. While central banks are exploring how to set up big data platforms, the progress has been slow-to-date.[12]

Next, much of the data collected in central banks is in aggregated format and lacks sufficient granularity to perform drilldowns and develop accurate analytical modelling. Data inconsistencies across various data sources can create anomalies while compiling and validating. Some platforms are able to ingest data effectively but are not able to cleanse, aggregate, and sort into a user-friendly format. As a result, central banks are left with a lot of data that cannot be used effectively.

Another hurdle for central banks is how to compete in the war on talent and win data scientists who are in high demand in the private sector, where compensation is typically higher.[13] Having the right talent can lead to major innovation and productivity improvements for organizations.[14]

When it comes to new data sources, there are also the challenges of not only securing those sources, but testing the reliability over time, and then communicating publicly about the changes or additions. Then there are reputational, legal and ethical factors that can limit the use of big data sources by central banks. For example, data privacy laws may prevent central banks from accessing and using data obtained through alternative sources. There is also a need for establishing data governance and regulatory architecture to combat issues such as potential data breaches.

ESG data presents several regulatory challenges as well. In Europe, for example, central banks have indicated in conversations that they find the data sources for some local companies very challenging, making meeting regulatory obligations difficult. Then there's the challenge of the standardization of ESG data and different regional approaches.

A way forward

Consideration of developing cloud capabilities will need to be weighed by each central bank as a way forward to capture the digital opportunity. Cloud boasts the ability to store and aggregate large amounts and–different–sources–of data, in combination with powerful technologies, such as machine learning and natural language processing, to leverage that data.

Organizations that build and maintain their own software operations and data solutions are often distracted by something that could be done more efficiently by others. Adopting a cloud-based, software-as-a-service model enables them to remove this distraction and focus instead on their core business. The cost of maintaining internal infrastructure is eliminated, and in the cloud, organizations pay only for the capacity they use. Eliminating the administrative burden, along with the performance and scale the cloud offers, can result in increased productivity and would enable firms to develop and introduce more innovative solutions for clients. The upfront investment for migrating to cloud can yield long-term payoffs not just in cost and operational efficiency, but also in better investment decisions.

The cost efficiencies gained by retiring on-premises systems can be further amplified by one of the cloud's most compelling benefits: resiliency. Organizations already utilizing cloud solutions or were accustomed to conducting operations offsite prior to the COVID-19 pandemic, for example, were often better positioned for a less disruptive transition.

Resiliency is crucial to maintaining business continuity in the face of disruptions such as a sudden and sharp rise in capacity needs. Cloud design can accommodate significant fluctuations in processing or data volumes, and is built to autonomously respond to and recover from failures.

While cloud-based systems offer clear potential for central banks, the threat of cyberattacks and data privacy concerns have hindered widespread adoption. But new private cloud solutions are being created that may begin to remove this hurdle for many central banks. However, there is still a way to go. The move to the cloud for a central bank is a delicate balance between innovation, catching up with the state of the art, and most importantly protecting sensitive data, which in many cases is classified as confidential or secret, hence the need for local cloud solutions that are driven by the data privacy laws of individual countries. Furthermore, data must not be allowed to be exported to other countries where data protection is less strict and may be vulnerable to unauthorized third parties.

In addition to having the right technology platform and associated services to deliver homogenized data sets, central banks also need an integrated data strategy that is key to deploying successful enterprise data management.

Conclusions

This article marks the beginning of a joint research project between State Street and OMFIF to better understand the challenges and opportunities facing central banks in the digital age and provide concrete solutions. We believe the benefits to the global economy and financial system from central banks modernizing their approach to data could be substantial. But central banks may not be able to do it alone. Given the many demands on central banks in the global economy, becoming data scientists may not be their competititve advantage. Collaboration with trusted partners in everything from technological infrastructure to data strategy can help central banks revolutionize their operations in the digital age. And while the adoption of the cloud is not without challenges, we are optimistic that cloud technology and related solutions are evolving rapidly and will deliver significant benefits to the world's central bankers.

Endnotes

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