New developments in official statistics – A central banking perspective after Covid-19

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Executive summary[2]

The experience of central banks has underlined the potential of alternative data sets to deliver statistics that are higher-frequency as well as more timely, flexible and granular than traditional ones. These are urgently needed to help policymakers follow macroeconomic developments and support policy decisions. In particular, the new, unconventional sources of information that have emerged with the digital transformation of our societies show a lot of promise (Hammer et al (2017)). They can cover many realms of the economic and financial sphere that are still difficult to capture through more traditional data collections. And they are potentially available in near real time, facilitating the conduct of economic policy especially in the face of unexpected shocks.

Yet these new data sources can come with huge numbers, multiple formats and high noise-to-signal ratios, **making them difficult to use systematically in policymaking and statistical production**. Some of these challenges might be addressed with appropriate engagement rules between public agencies and private data providers; others require further adequate improvement in our statistical and analytical methodological work.

Meeting all these challenges will make life easier for the statistical and policymaking communities. It's worth noting here that what may at first sight look like an information gap does not necessarily reflect a lack of relevant data, but rather a failure to transform existing indicators into useful knowledge (Drozdova (2017)). This is even more the case in today's evolving information society: torrents of data are constantly generated, collected and stored by both public and private agents. This means that perceived information gaps do not necessarily require new reporting exercises, as they may arguably be filled if statisticians and policymakers can quickly tap into existing data that could be turned into useful information, for instance to get timelier or higher-frequency measures of common phenomena or to cover new, unexplored statistical domains.

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[2] This overview draws on the presentations made on the occasion of the various Invited Paper Sessions (IPSs) organised by the IFC at the 63rd biennial World Statistics Congress (WSC) of the International Statistical Institute (ISI) organised in The Hague, Netherlands, on 11–15 July 2021 on a virtual basis.

The views expressed here are those of the authors and do not necessarily reflect those of the Bank of Italy, the BIS, the ECB, the IFC or any of those institutions represented at the WSC. We thank Pieter Everaers for support and helpful comments.

1. Introduction

Central banks have an almost unique perspective on official statistics, being at the forefront of both the production and the application of economic and financial data. On the one hand, they produce statistics on a wide variety of domains, especially the financial system, that are of key relevance for a broad range of economic policymakers. On the other hand, central banks make extensive use of diverse data sources in pursuing their objectives, especially their monetary policy and financial stability goals. Both roles demand constant attention to the economic and financial environment and the fitness-for-purpose of statistics and analytical tools and products.

A key challenge is that **this environment is constantly changing, which requires the official statistical framework to evolve continuously**. In Japan, for instance, digitalisation has brought new types of service (eg internet advertising) that need to be considered when measuring inflation; this has also called for the development of new types of statistical method at the Bank of Japan, eg to adjust for quality changes. Moreover, while available statistical products and methods are designed to describe what is known to be relevant to decision-makers, this knowledge is not fixed in time, since new policy issues constantly emerge. These discontinuities in both the supply of statistics and the demand for them can be substantial, especially when large and unusual shocks occur that expose gaps in economic and financial information.

The vulnerabilities underlying the 2007–09 Great Financial Crisis (GFC), for example, went almost unnoticed by policymakers at first because of the lack of suitable statistics. However, through swift and globally coordinated action, the most critical data gaps were singled out and action plans designed to address them, especially via the Data Gaps Initiative (DGI) endorsed by the G20 (FSB and IMF (2009)). In the decade or so since the GFC, **extensive work has been done to close the most pressing data gaps and strengthen the ability to monitor global economic financial developments**. These improvements proved their worth when the pandemic struck: policymakers had at their disposal statistics of a quality and variety that would have been barely possible a few years ago (IFC (2021b)). The potential of this new information for monitoring risks in the financial and non-financial sector as well as for the analysis of interconnectedness and cross-border spillovers was underlined during the Covid-induced financial markets turmoil in March 2020 (FSB (2020)).

New lessons have emerged from the pandemic. One is the sheer speed of developments during a crisis, underlining the importance of high-frequency, well documented and timely indicators to support evidence-based policy. This calls for statistical frameworks to become more flexible and granular with the aim of addressing the evolving needs of users and help them monitor fragilities (De Beer and Tissot (2020)). Another lesson is that the (unexpected) nature of the shock has clearly expanded the range of statistics that central banks must look at. The unpredictability of the data needs that arise when a shock hits the economy means that instruments and arrangements are needed for the key phenomena to be measured as soon as they become relevant. A third lesson is that the disruptions caused to the traditional statistical production process, for example, due to the suspension of key surveys, have highlighted the need to look at less conventional and still untapped sources of alternative information (Biancotti et al (2021)). These sources

can be essential when assessing the resilience of today's economies, for instance, if they help to measure phenomena that are not well captured by standard statistics.

Reflecting the importance of these issues for central banks, the Irving Fisher Committee on Central Bank Statistics (IFC), an affiliated member of the International Statistical Institute (ISI), organised specific sessions at the 63rd ISI World Statistics Congress (WSC) in July 2021 that focused on **the contributions of central bank statisticians around the world and the challenges they face**. The focus was relatively broad, covering first the new developments observed in official statistics, including the changing role of central banks as data producers and cooperation issues with national statistical organisations (NSOs). Attention was also paid to the impact of innovation, particularly as regards the relevance of data integration and advanced analytics in decision-making, the implications of the digital economy for official statistics, and ways of addressing the measurement challenges raised by globalisation. Lastly, this proved a useful opportunity to review the main statistical and methodological challenges posed by the pandemic and to reflect on how the lessons learned could be generalised and turned into permanent solutions.

From this perspective, a key message is the **need to broaden the ability of central banks to face future shocks that, like Covid-19, can test the resilience of our economies in unexpected ways**. This could be achieved by developing higher-frequency, more granular and timelier indicators, taking advantage of the growing availability of alternative data sources. In particular, the increased digitalisation of today's societies is bringing new types of information that can complement and expand traditional analysis and statistical measurements. Besides, a wealth of granular "financial big data" sets derived from traditional registers could be more effectively used, for instance loan-by-loan credit registers (Schubert (2016)).

Artman shows that **valuable information can be extracted from micro data sets** on FX market transactions or derivatives to develop an early warning system supporting the analysis of corporate cash flow and export performance. Similarly, Radke et al underline the merit of using highly granular (security-by-security) information to enhance European measurement of cross-border portfolio investment and external debt in international investment positions. Turning to Japan, the greater use of financial reports disclosed by financial and non-financial institutions has been instrumental in improving the accuracy of the flow of funds accounts. But reaping the full benefits of such alternative data sources (eg the internet of things, administrative-type registers, textual messages) can raise several important challenges.

2. Lessons to be learned from the Covid-19 pandemic

A first important lesson for producers of official statistics is the need for more timely information. The official measurement of real economic activity offered by the usual GDP statistics is produced only on a quarterly frequency (in advanced economies, at best, while a large number of less developed countries still rely on annual figures) and often with a substantial delay with respect to the period of interest. Policymakers thus have to rely on tracking other types of qualitative and quantitative indicator to gather real-time signals. Fortunately, a number of statistical techniques have been developed over time to extract timely and reliable signals about economic activity in advance of GDP releases. Such "nowcasting methods" have become all the more relevant during the pandemic, as the economic situation evolved

at an unprecedented speed for quite some time and along dimensions unseen before. For instance, Ginker and Suhoy apply this kind of method to the Israeli economy to develop a monthly index of economic activity. They use a so-called collapsed dynamic factor model that first synthesises the main signals embedded in the available monthly series, extracts a limited number of summary factors and then jointly models these factors to obtain a nowcast estimate of quarterly GDP growth.

For reliability, **these techniques require a relatively large number of high-frequency series**. This can be a problem for small economies, where the supply of such indicators is often hampered by the resources available. In Albania, for instance, recent crises have underscored the need to collect micro-level household data to better assess the importance and impact of external remittances. Yet even large economies may not have a sufficient number of suitable high-frequency indicators, for instance, because of their limited time span. Moreover, these indicators can also be subject to large disruptions, as was seen in the early stages of the pandemic: there was a pressing need to monitor economic developments on a real-time basis but the collection of traditional high-frequency indicators such as economic surveys was hindered by lockdown restrictions (Bidarbakhtnia (2020)).

A telling example of these difficulties was related to the measurement of inflation. The compilation of consumer price indices (CPIs) during the pandemic suffered from the disruption of the data collection process (reflecting eg the closure of bricks-and-mortar stores) as well as from large swings in consumer behaviour, caused both by the shutdown of entire sectors (eg restaurants) and by dramatic changes in spending preferences (eg less travelling). These factors posed important challenges to the measurement of inflation dynamics, and hence to the design of adequate policy measures. A key reason is that traditional inflation measures rely on an annual updating of consumer basket weights, which arguably became quickly outdated as the pandemic struck (see Cavallo (2020) and Surico et al (2020)).

To **address these challenges**, Kouvavas et al have developed an experimental index to measure inflation during the 2020 pandemic. Using retail and services turnover data, they were able to calculate CPIs based on monthly updated weights to take into account high-frequency pandemic-related shifts in consumption patterns. Their estimates show that measured inflation for the euro area would have been slightly higher in 2020, as compared with the headline indicator (by around 0.2 pp), and lower in 2021 (reflecting the reversal of pandemic-related spending disruptions following the gradual normalisation of the situation and the lifting of lockdowns). However, and as with the above-mentioned challenges with GDP nowcasting exercises, one difficulty was finding adequate and timely data sources to track rapid changes in consumption weights; this difficulty was exacerbated by the disruption to several data collection processes at the height of the pandemic.

The examples above underline **the vulnerability of existing statistical production and policy design processes to shocks such as Covid-19, precisely when the smooth functioning of these processes is most needed**. One silver lining is that ample room exists to mitigate these difficulties by tapping into alternative data sources, especially those that are less subject to pandemic-related disruption. For example, the data from online activities were not disrupted by lockdowns and could still provide a realistic and timely picture of what was going on, especially in comparison with official statistics that arrived on a less timely or punctual basis. For example, data from online retail trade platforms as well as from providers of payment services continued to be available, allowing for real-time monitoring of spending

patterns and prices. Similarly, a number of alternative sources such as smart meters (eg electronic devices recording electric consumption), mobility trends derived from smartphone location data, or even air pollution data were used during the pandemic to complement other sources of high-frequency measurements of real economic activity (see Deutsche Bundesbank (2020) and Lewis et al (2020)).

Moreover, **in addition to providing "hard" alternative data on relevant economic phenomena, digitalisation has also expanded the scope for considering other types of indicator**. This can be the case for "soft" factors, such as confidence indicators, which can play an important role in shaping and predicting economic dynamics, even though they may not be on the traditional radar screen of statisticians (Aguilar et al (2020)). For instance, Armas and Tuazon have adopted this kind of approach to use freely available data on internet searches to assess investor sentiment amid the pandemic and study the response of financial market prices to changes in risk attitudes. They find that this "soft" information could be statistically significant when monitoring daily stock market developments in Asian markets, thus potentially enhancing the design of policymaking processes.

More generally, **social media have become important sources of information** providing real-time insights on public behaviour and sentiment. This information can increasingly be extracted with the development of powerful big data analytics (eg text-based analysis or machine learning tools) that allow the signals collected to be deciphered and turned into statistical inputs complementing more traditional indicators to support policy. For instance, Jensen et al show that the combination of multiple data sources using innovative techniques might pave the way to using granular transaction data to support anti-money laundering policies. Similarly, Carboni et al show how ML learning algorithms have been effectively used to improve the compilation of balance of payments statistics at the Bank of Italy.

3. Challenges looking forward

Crises are learning experiences. The pandemic, just like the GFC a decade earlier, unveiled deficiencies and weaknesses in the traditional statistical apparatus. It is therefore an opportunity to reflect on how to address such shortcomings, in particular by identifying and filling relevant data gaps and reorganising processes so that the infrastructure underpinning official statistics can be better prepared for future emergencies.

As analysed above, one major lesson from the current crisis is that the disruptions in data collection exercises and the need to better monitor the swift changes that occurred in agents' preferences and behaviours require **innovative strategies to make up for the unavailability (or limited informativeness) of a number of traditional statistical sources**. These often called for the use of new and/or unconventional data sources, reflecting several developments: the large data sets produced as an organic by-product of business operations (Groves (2011)), the wealth of administrative registers maintained by public agencies that, up to now, have rarely been exploited for statistical purposes (Bean (2016)), the footprints of increased digitalisation that have emerged in many parts of modern life, and the improved techniques for processing unstructured data sets such as text.

These varied alternative sources have proved particularly helpful to statisticians and policymakers during the pandemic, by complementing conventional data sources (or substituting for them) in the face of compilation disruptions, providing more timely and/or frequent signals when needed, and offering new insights on phenomena that were not well captured by traditional indicators. For instance, the pandemic has underlined the need to enhance the measurement of environmental topics (eg climate change) and socioeconomic factors (eg distributional aspects and inequalities as well as financial inclusion issues), and which could be addressed in the next phase of the DGI, as envisaged by the G20 after 2021 (G20 Italian Presidency (2021)).

At the same time, a **number of challenges did arise in accessing alternative data sources, as recognised by most central banks** (IFC (2021a)).

First, **the systematic use of these data sources for statistical and policy purposes requires an adequate degree of stability,** although they are pervasive and provide an increasing amount of information on various aspects of economic and financial activities. They need to be both available and continuously accessible to justify the methodological and technical investments needed to exploit them. However, the continuity and consistency over time of the output generated based on new alternative sources is not always guaranteed. For instance, methods developed in stressed times may not work well under more normal conditions (INSEE (2020)). Moreover, a certain amount of experience is needed to judge the true quality of new indicators. As an example, Google Flu Trends was initially intended to provide estimates of influenza activity based on Google Search queries but was discontinued in the mid-2010s (Lazer et al (2014)). Furthermore, newly developed data sets may not pass the test of time if economic agents change their habits and hence their digital footprints. For instance, how far should policymakers rely on analysing messages collected by social media, given that the public use of these media may change or even fade away in the future?

Second, **the apparent breadth of new alternative data hides at least two drawbacks that need to be addressed from a statistical methodological perspective**. On the one hand, digital data are often generated by online or digitally savvy agents and activities. This can lead to substantial hard-to-assess composition biases that may well increase over time. For example, social media content is generated by people who actively participate in these forums. Similarly, web searches are generated only by those interested in the specific topic. As such, these data are unrepresentative of the whole population of policy interest (not everybody is on Twitter). Hence they can embed significant selection bias which must be properly understood, if not addressed, so that they can be reliably used (Mehrhoff (2019)). On the other hand, the sheer novelty of new alternative data sets often means that the significance of the information is unclear and requires additional efforts to be fully understood. For example, measuring the number of clicks made for specific web searches does not provide information on why these searches were undertaken. These difficulties are reinforced by the velocity and high frequency of alternative sources of information, with data users confronted with often unfavourable signal-to-noise ratios (Lane (2021)).

Third, **the information content of the data sources ultimately depends on their intended use**. Alternative statistics can be used as benchmarks to forecast official statistics, for instance in the case of GDP nowcasts. Yet one may also wish to use observed underlying correlations to make inferences that support policy

recommendations. This puts a premium on ensuring transparency in the sources used for such purposes, given the risk of reaching false conclusions due to unobserved confounding factors. Hence a key public policy issue is how alternative information sources (ie private commercial data sets or public registers that were not initially set up for a statistical purpose) and the data producers located outside the national statistical systems feature vis-à-vis the Fundamental Principles underlying the quality of official statistics (UN (2013)). Given that many of the new data sets have a global nature, this would require their governance to be strengthened at the international level, with a broad focus so as to cover the entire production and use of statistics, including alternative sources (IFC (2021c)).

Fourth, **important issues are raised when new types of data are integrated into the infrastructure for the production official statistics**. Coping with an avalanche of data in various formats requires adequate IT, skills, and budget (IFC (2020)). It also calls for adequate registers, identifiers and aggregation rules so as to transform granular data points into meaningful macroeconomic aggregates. Last but not least, clear data-sharing agreements, standards (eg SDMX (IFC (2016)) and processes are necessary to mobilise various data sources in a coherent way. For instance, and as argued by Muench et al, the crisis has underscored the limitations of the current regulatory reporting process especially in times of intense stress, calling for its increased digitalisation to enhance banking regulation efficiency.

One way to go, as advocated by Colangelo et al, is to **accelerate statistical standardisation** through for instance, the establishment of a single data dictionary (see the European Banks' Integrated Reporting Dictionary (BIRD)). Another is to **enhance international data-sharing to make use of mirror data**, whether published or otherwise, for instance between banks and counterparty sectors, when dealing for example with incomplete statistical coverage, as highlighted by Pradhan et al, or when addressing the important asset/liability discrepancies that continue to exist at the global level, as done by Schmitz in Europe.

A final recommendation, put forward by de Beer and Tissot, is to use the new phase of the DGI to **enhance the global statistical infrastructure to improve existing core statistics and address new data needs**. As examples of the potential benefits, better information could be obtained on foreign control relationships, as argued by Vieira and Ferreira Lemos, or an enhanced understanding of intragroup operations of multinational enterprises and the role of global financial centres such as Luxembourg, in turn supporting the analysis of the effects of economic and financial globalisation. At the same time, improved standardisation and sharing of data between trusted institutions already in the statistical production phase can also help to reduce the reporting burden for respondents, since every data point is collected only once.

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