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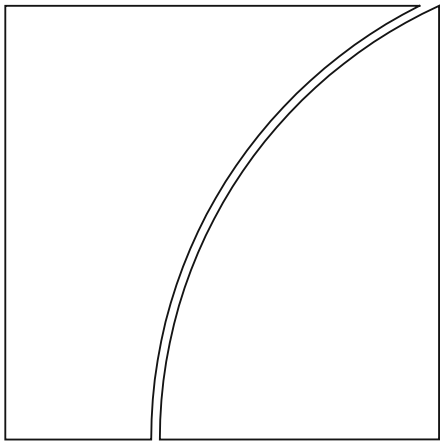

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Implications of Covid-19 for official statistics: a central banking perspective

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Implications of Covid-19 for official statistics: a central banking perspective

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Abstract

The impact of the Covid-19 pandemic on official statistics has been a particularly relevant issue for central banks, as both producers and users of data. As producers, they have been confronted with statistical data gaps that arose and also involved in methodological interventions to address the related challenges. As users of statistics, they needed information to pursue their monetary and financial stability policy objectives in the face of the sharp disruptions caused by the pandemic. The experience of statisticians in various central banks weathering this storm highlighted three main lessons. A first, somewhat reassuring one is the importance of the international efforts made since the 2007–09 Great Financial Crisis to build better-quality, more comprehensive, flexible and integrated statistics. A second lesson is that, despite recent progress, many data gaps remain that have been exacerbated by the crisis. Thirdly, the pandemic also underscored the need to go beyond the "standard" offering of official statistics especially in crisis times. A key requirement is to have more timely, frequent and well-documented indicators to guide policy. Addressing these needs calls for fully exploiting the data sources available, promoting greater data sharing among official statistics producers as well as considering alternative, "big data" sources as a complement to official statistics.

Keywords: Big data, administrative sources, data gaps, statistical methods, public policy.

JEL classification: C18, C82, E58, E66, F30, O30.

"The trouble with our times is that the future is not what it used to be"

Paul Valery

Introduction

The impact of the Covid-19 pandemic (CV19) on official statistics has been a particularly **relevant issue for central banks, as both producers and users of data**. As producers, they have been confronted with statistical data gaps that arose and also involved in methodological interventions to address the challenges caused by the pandemic. As users of statistics, central banks needed information to pursue their monetary and financial stability policy objectives in the face of the sharp disruptions caused by the pandemic. The experience of statisticians in various central banks weathering this storm highlighted three main lessons.

A first, somewhat reassuring lesson is that the occurrence of CV19 underscored the **importance of the international efforts made since the 2007–09 Great Financial Crisis (GFC)**, especially in the context of the Data Gaps Initiative (DGI) endorsed by the G20,[2] to build better-quality, more comprehensive, flexible where relevant, and integrated statistics (FSB and IMF (2009)). As the pandemic struck, policy makers had at their disposal a wealth of statistics that would have been barely available a few years ago. In particular, central banks and financial supervisors realised the potential benefits of accessing very granular data on financial instruments such as loans and debt securities as well as on the balance sheets of key financial institutions. These more granular and deeper "chests" of statistics compiled from input data enabled them to better understand the impact that their measures could potentially have on the economy – such as increased liquidity measures, adjusted financing mechanisms for commercial banks, and other relief measures.

The second lesson is that, despite recent progress, **many data gaps remain that have been exacerbated by the crisis**. This is particularly the case for financial accounts: the ongoing crisis is likely to lead to unprecedented public and private debt levels, calling for a better understanding of the financial interlinkages in the economies, as well as of the distribution of revenues and assets among economic agents. Associated financial risks remain hard to assess in many places, a difficulty that has been reinforced by the impact of financial innovation (eg emergence of new financial intermediaries and risk transfer mechanisms including through derivatives and cross-border operations). These issues were clearly underlined by the turmoil in financial markets observed in March 2020 when CV19 escalated (FSB (2020b)). Addressing them will require important follow up work to comprehensively implement the data collections launched since the GFC (in the context of the DGI as well as among non-G20 jurisdictions), especially with regards to repo transactions, cross-border exposures and derivatives.

Thirdly, the pandemic also highlighted the **need to go beyond the "standard" offering of official statistics especially in crisis times**. A key requirement in the first

[2] The efforts made by G20 countries were accompanied by significant improvement in other economies too, as some DGI recommendations were also applied by non-G20 countries participating in the related data collections (for instance by BIS member central banks) and also because of the global understanding of the benefits realised.

year of CV19 was to have more timely (almost in real time), frequent (weekly or even daily), and well-documented indicators to guide policy. Addressing these needs calls for fully exploiting the data sources available, promoting greater data sharing among official statistics producers as well as considering alternative, "big data" sources as a complement to official statistics.

This paper is organised in three parts. It first reviews the impact of CV19 on the compilation and use of official statistics in the light of the experience of central banks. Second, it looks at the implications of these developments for the design of their statistical functions. Third, it discusses why the pandemic can represent a useful wake-up call for official statistics.

1. The impact of Covid-19 on official statistics

Disruptions in the compilation of reliable official statistics

The occurrence of the pandemic highlighted the need for reliable data, for instance to assess how badly the economy was hurt or to monitor the subsequent recovery and impact of policy responses. Yet policy makers were confronted with a **sudden disruption in official statistics as CV19 escalated**.

(i) The first aspect was, almost literally, **statistical darkness**. Many economic activities (eg air transportation) just stopped, at least temporarily: there was simply nothing to record any more. Alternatively, the statistical apparatus was unable to measure properly the new activities that had quickly replaced others. Case in point was the composition of household spending and the related measurement of consumer price inflation (CPI), as the spending on specific items went to almost zero due to CV19-related lockdowns and social distancing (eg no dinners organised in restaurants, theatres closed), while it surged for other items (eg consumption of take away food and online services). The difficulty for statisticians was to quickly adapt to these changing patterns, noting that the related weights (eg in the CPI basket) are usually adjusted only progressively, often once a year.

Another important example was the impact that CV19 had on external statistics (BoP/IIP; IMF (2020a), ECLAC (2020b)). This reflected for instance the drying up of cross-border activities – eg for non-financial transactions, due to the sudden stop in tourism and goods transportation; the spill over effects of external developments on the resident economy – esp. with the impact in the financial account of related large movements in financial market prices and exchange rates, particularly notable for large corporates in key emerging market economies as CV19 escalated (Avdjiev, McGuire and von Peter (2020)); or the impact of CV19 on import and export volumes and values, with potential distortions in the weights retained for compiling nominal and real effective exchange rates (and thereby for supporting competitiveness analysis).

(ii) Second, **official statistics became more difficult to assemble** properly. Compilation work was hindered by the impact of CV19 on respondent resources through the disruption of normal day-to-day activities, with social distancing rules and office closures (cf ISWGNA (2020) for the general operational issues faced by national accounts compilers). When surveys could still be organised,

their response rates (for both item and unit non-responses) fell, making the proper identification of underlying macroeconomic trends difficult. Moreover, face-to-face interviews proved difficult to organise, reducing the accuracy of household surveys, such as those conducted for unemployment and labour force (ILO (2020)) – for example, the Central Bank of Chile had to postpone the compilation of its Household Financial Survey. The organisation of business surveys to track business climate faced similar challenges, while the closure of various public offices also led to disruptions in the collection/availability of administrative records (eg car registrations).

These challenges were particularly evident for **CPI compilation** (which is of key interest for central banks given their price stability mandate): certain goods and services became unavailable for sale; data collectors were unable to visit bricks-and-mortar stores to measure the price of certain consumption goods; and the limited outlets that were still open might not be in survey samples. Certainly, these difficulties were primarily affecting the work of statisticians located in NSOs, which are traditionally in charge of compiling real sector and price statistics. But they also affected other parts of the national statistical systems, including the statistical function located in central banks, which often also rely heavily on sample surveys. A striking example was related to the discontinued measurement of international travel by the Bank of France during the pandemic, as the regular foreign traveller survey could no longer be conducted (Le Gallo and Schmitt (2020)).

Price statisticians around the world had to **quickly adapt to these compilation difficulties**. A first response was to use the wide range of statistical tools available to deal with missing information, in particular with so-called "imputations" techniques.[3] One option was to simply re-use past observations, for instance to carry forward the past value of missing prices when measuring CPI – but this generally led a downward bias in inflation and an upward bias in real consumption (Diewert and Fox (2020)). Another way was to replace missing data with substituted values so as to be able to generalise statistics that were still representative of targeted populations/firms. A simple approach followed in South Africa was to apply the change of headline CPI to the prices of those missing goods and services (representing 26.5% of the CPI basket), implying that these items made no contribution to the outcome of the changes in the overall headline CPI (SARB (2020)).

In several cases, the imputation for missing values was **facilitated by the availability of additional data sources**. For instance, one could select the prices of certain good displayed on the internet when they could not be observed in physical stores. Similarly, changes in current expenditures and hence in related consumption basket weights could be monitored by analysing "scanner" data, that is by using the barcodes scanned by consumers when purchasing goods in major retail outlets. Another example was Cavallo's (2020) use of credit card-based data to assess the deformation in spending patterns during CV19: he found that consumers spent relatively more on food and other categories with rising prices, and less on items experiencing deflation, implying that CPI headline numbers were underestimated, especially for low income households. However,

[3] For a review of the various imputation procedures and their concrete applications by countries in Latin America and the Caribbean to measure CPI during CV19, see ECLAC (2020a).

such approaches can be difficult to implement, esp. in the vast majority of developing countries that have little auxiliary data and indicator sources, and where survey input can be the main source for official statistics compilation.

(iii) A third important statistical feature raised by CV19 related to the **measurement of economic variables that were distorted because of the outright policy response to the crisis**. As noted above, public restrictions imposed on economic activity led to changes in spending patterns that introduced significant bias in the measurement of activity and inflation. In Australia, for instance, the government implemented temporary free childcare and a number of state authorities announced a range of rental support packages in 2020, in both cases affecting CPI measurement. Moreover, some governments decided to provide temporary subsidies to facilitate the consumption of certain goods – for instance by providing vouchers to pay restaurant bills, or subsidising transport / education / health services. Disentangling the impact of these actions to track underlying inflation and activity trends often proved difficult, due to the size of these interventions, their temporary aspects, and their variety across regions and sectors. Another example was related to the official granting of "rescue" loans to the private sector during the pandemic, which had to be monitored separately from conventional type of financing to support the analysis of the economic situation. In South Africa, for instance, the liquidity measures adopted in response to CV19 had an impact on a wide range of statistics, including the monetary base, commercial banks' balance sheets, and government and finance statistics (SARB (2020)). In Europe, similar relief measures included legislative and non-legislative debt moratoria, options for debtors to ask for rescheduling their payment obligations (such as "rent holidays"), restrictions imposed on financial institutions willing to revoke their credit lines, postponement of loan repayments, and subsidised or government-guaranteed loan programmes. The novelty and wide variety of these measures required ECB statisticians to refine their guidance for the statistical reporting of loans under the AnaCredit initiative (ECB (2020a)). These examples underline the importance for compilers to develop an understanding of how the various government actions were affecting the economy in general, and in particular the financial sector, which is of specific interest for central banks' statistics. But this is not always easy for official statisticians, who have traditionally not been very close to policy makers even when they work in the same institutions. It also raises measurement issues, to ensure for instance that the various policy actions were properly recorded in the framework of the national accounts, or that the various statistical treatments were flexibly adjusted as policy measures were augmented or unwound.

The disruptions described above for the compilation of official statistics have led to an important **dilemma for authorities in charge of public policy like central banks.** On the one hand, the speed and specificity of the crisis called for having more, and more various types of, data at hand to monitor what was going on. On the other hand, compilation difficulties and other priorities reflecting the intensity of the crisis (including new ad hoc data requests) warranted some relaxation in compilation practices and postponing non-urgent data obligations in a pragmatic way. In the Euro area, for instance, the ECB had to balance its need to have reliable supervisory statistics with the fact that reporting banks were facing staff shortages during the lockdown and had to focus on other priorities, calling for some delays in collecting information; as a result, some flexibility was offered in terms of reporting obligations to "*reduce the operational burden on*

banks (…) and enable them to report with an adequate level of data quality" (ECB (2020b)).

Challenges for data users

One of the main repercussions of CV19 has been the **challenges it posed for users of statistics, esp. in central banks, for three key reasons**: first, increased concerns about the disposal and/or accuracy of the indicators being generated by statisticians; second, delays in the availability of official statistics caused by the pandemic; third, the need to deal with larger uncertainty and data revisions.

(i) As regards the first aspect, ie the **lack of sufficient, high-quality information**, this issue was especially evident at the beginning of the pandemic when mitigating measures were not yet well developed. Moreover, users had to factor in the limitations of those statistical techniques used to compensate for reduced response rates, such as imputations, sample methodology adjustment and treatment of structural breaks (cf Box 1 for concrete examples of the difficulties encountered by central bank users). These quality and complexity limitations were particularly evident for the users of survey-generated statistics, which play a central role in the statistical value chain (Bidarbakhtnia (2020)) – in particular, for the compilation of CPI and GDP statistics that became therefore particularly difficult to interpret as CV19 escalated.[4]

In addition, compilation distortions meant that the **data became less comparable across time and/or less representative** of the dynamics of the economy at large, which could lead to inappropriate policy actions. In particular, policy makers' concerns were reinforced in those developing countries with clearly separated sectors in terms of development. Such "dual economies" can be characterised by large income and wealth inequalities, undermining the relevance of the concept of an "average" household. In Chile, for instance, the difficulties to survey households during CV19 made the measurement of the informal sectors of the economy more challenging. Similarly, enterprise size stratification is often biased to a few larger firms dominating industries at national level and smaller size firms operating at regional level; this proved a key issue as non-response sampling problems rose with CV19. For instance, with the greater difficulty to process adequate stratification and methodological adjustments, even a small decrease in the response rate of a survey could cause large changes in average outcomes. Alternatively, biases could be triggered by non-responses that included enterprises that ceased to exist due to CV19 but were still included in sample survey population (SARB (2020)). Another challenge was that aggregate information was not sufficient to properly assess the underlying distributional shifts in the population of interest. Such issues are particularly relevant for central banks in view of their price stability mandate – and, as noted above, the impact of CV19 on inflation was volatile[5] and different across household income groups (Cavallo (2020)), as well as between the types

[4] As noted above, the impact of CV19 on surveys varied across economies depending on the level of development of the National Statistical Systems, and was particularly marked for developing economies.

[5] Cf Cecchetti and Schoenholtz (2020) who argue that the volatility in CPI caused by CV19 could be exacerbated by measurement issues (eg chain-weighting) and that central banks should be looking at ways to filter out such high-frequency noise, for instance by using trimmed-mean price indices.

of price indexes considered (BLS (2020)). But they are also important from a financial stability perspective, which calls for complementing the assessment of the central tendency impact of CV19 with an analysis of its consequences on the tails of the distribution in order to form a comprehensive view of the pockets of risks prevalent in the entire economy.

Box 1

Examples of difficulties faced by central bank users of official statistics

CV19-related general increase in data uncertainty:

- Unobserved indicators: uncertainty created by mitigation techniques (eg for imputed price changes in the CPI)
- Changing economic patterns: eg in the consumption basket due to supply constraints and lockdown rules, resulting in bias in price deflators / real indicators
- Postponement of publication dates
- Large and more frequent data revisions
- Alteration to conventional data collection methods
- More difficult adjustment for seasonal patterns in time series
- Uncertainty related to the extent of inherent biases (eg time variation, impact of the changing economy and policy actions)

Specific issues related to sample surveying:

- Sample representativeness: for instance, sample survey frames are typically drawn from Statistical Business Registers (SBRs), which in turn often rely on taxation information which was distorted by the CV19-related recession and disrupted tax payments
- Outdated profiling information: for instance, enterprises listed in the South African SBR are generally deemed to be active for approximately 18 months after their last tax payment; but those that had ceased operations due to CV19 impact could still be included in the sample frame
- Changes in time series trends: risk of increasing bias and over-estimation
- Survey accuracy: reduced importance for respondents to comply to survey requirements because of other, CV19-related priorities

  Data sharing constraints: the supply of auxiliary information (eg financial statements) could be distorted because of resources issues / statistical delays resulting from CV19

This need for more granular information was clearly evident for authorities willing to understand the **causes of CV19-induced stress in the financial markets, which broadly related to three main categories: short-term funding stress; market structure/liquidity driven stress; and long-term credit stress** (Kothari et al (2020)). In particular, government bond markets experienced heightened turbulence in March 2020, reflecting multiple factors. On the one hand, CVI9 raised investors' risk aversion, with flight-to-safety investment into US Treasuries. At the same time, prices differences between financial instruments led a number of leveraged investors such as hedge funds to take aggressive arbitrage positions. Yet the pick-up in volatility and the deterioration of liquidity in specific market segments such as US futures markets led to forced selling, leading to a perverse spiral of illiquidity, price dislocations

and tighter margin requirements. These tensions quickly affected other markets and the real economy given the importance of the US government bond market as benchmark financial price (Schrimpf et al (2020)).

These difficulties highlighted the importance of having an encompassing view of the financial system, especially by types of market segments, financial instruments, and investors. They were also a stark **reminder of the important data gaps that remain despite the progress achieved** under the DGI, in particular as regards the functioning of the repo market (especially for bilateral repos), the balance sheets of non-bank financial entities such as hedge funds, and the interconnections between the various players in terms of liquidity provision. From this perspective, important financial data collections initiated since the GFC, especially in the context of the DGI, should be finalised, especially for the following **four main areas** that are closely inter-related:

- **Credit flows**. The economic disruptions caused by CV19 highlighted the need for having **more granular information on firms' funding needs**, especially on the size of their cash shortfalls, the ability to finance them, and the way to do so eg through credit lines (Banerjee et al (2020)). Certainly, a limited number of countries have set up large micro data collections exercises that can be of help, in particular in the context of their efforts to compile comprehensive financial accounts. However, there is no global infrastructure to address these issues in a comprehensive and global way, esp. in real time. As a result, many analytical needs were addressed during CV19 by working on the information collected by commercial vendors (cf Goel and Serena (2020)).
- **Securities financing transactions (SFTs).** SFTs such as securities lending and repurchase agreements (repos) are instrumental in supporting price discovery and secondary market liquidity for various market segments and can contribute importantly to an increase in leverage and maturity / liquidity mismatches (FSB (2013)).
- **FX funding needs**. The structural demand for dollar funding appears to have grown in the recent past, reflecting the currency hedging needs of corporates and portfolio investors outside the United States and reduced capacity among commercial banks to address this demand. This has led to a widening in the (negative) FX swap basis, which is the difference between the dollar interest rate in the money market and the implied dollar interest rate from the FX swap market. In normal times, this basis spread should be close to zero assuming perfect arbitrage. Yet with the start of the CV19 pandemic it widened again vis-à-vis the US dollar across major currencies, and central banks had to expand their operations in terms of swap lines and temporary US dollar liquidity arrangements to mitigate market stress (Avdjiev, Eren and McGuire (2020)).[6] These developments clearly underscored the need to **improve the measurement of financial balance sheets' currency composition** for important sectors.
- **Derivatives**. Certainly, many initiatives have been in train since the GFC to address the information gaps related to derivatives, not least the decision to collect granular transaction data through trade repositories (TRs). Yet

[6] Cf Aldasoro et al (2020) for a documentation of the size and usage of the related swap lines.

challenges remain, especially for smaller jurisdictions where data are scarcer and access for central banks is more difficult. There is therefore a clear need for greater coordination at both the domestic and international levels to enhance the quality of TR data, develop their global aggregation, and foster their use for policymaking (IFC (2018)). Moreover, **particular attention should be paid to FX derivatives**, which generally require the actual payment of the notional amount at maturity – which make them a form of debt, unlike many other derivatives; cf Borio et al (2017). One issue is that the amounts involved are recorded off balance sheet, while they can have significant implications for on-balance sheet cash positions. Moreover, they can be used as hedging tools to close on-balance sheet currency mismatches (see Aldasoro et al (2020) for an analysis of these issues and related dollar funding needs from commercial banks). Hence, more data should be collected to be able to monitor conditions in global funding markets, in particular data to assess the direction and amounts of FX trades crossed by currency, maturity, instrument type and counterparty sector/region.[7] This would greatly complement existing information on countries' total (ie on- and off-) balance sheets, and would significantly enhance existing measures of both external debt and foreign currency debt.[8]

(ii) A second problem faced by users during the pandemic has been the **delayed release of various statistics** due to compilation difficulties. Policy makers are traditionally concerned by the fact that, while they need a real-time readout of the economy to take best-informed decisions, official statistical releases are quite lagged, especially in developing economies. They have thus to make decisions with limited information – a challenge that is particularly important for central banks, who need to respond to financial stability risks rapidly to avoid sub-optimal equilibrium adjustments in the economy. The delayed availability of statistics was reinforced in the wake of the CV19 crisis, as many countries imposed lockdown restrictions, which negatively affected data compilation and dissemination tasks within their own statistical value chains. This clearly exacerbated the information challenges faced by policy makers, hampering their assessment of economic indicators and their ability to analyse the situation and take appropriate actions. To try **to avoid making "decisions in the dark", users have therefore been leading the call to generate alternative statistics** in response to the pandemic. Indeed, and as stated by the IMF in its analysis of the impact of CV19 on statistics, "*many traditional official statistics – even those with monthly frequency – are just not sufficiently up to date to be useful at this time. Higher-frequency alternative data are needed to complement official statistics. While the important role of alternative indicators was already recognized before the pandemic, the disruptions of traditional statistics caused by the current crisis have made it more urgent*" (Ducharme et al (2020)).

[7] These elements are not currently captured by the global derivatives statistics published by the BIS that encompass the trading of foreign exchange instruments in spot and OTC derivatives markets as well as of OTC interest rate derivatives (cf Wooldridge (2019) as well as BIS data on https://www.bis.org/statistics/about_derivatives_stats.htm?m=6%7C32). They are under consideration not least in the context of the recommendations of the second phase of the DGI related to cross-border exposures (FSB and IMF (2015)).

[8] For a recent discussion of these concepts, see Avdjiev, McGuire and von Peter (2020).

Yet one issue is **the high volatility of such sources**, with the difficulty to get informative but not too noisy data and their potential estimation bias (especially when the economy is changing rapidly, as was the case during the pandemic). Another challenge is that accessing alternative data sources could, at least initially, lead to significant "red tape" burden to adhere to the related rules and formalities – something that proved a key obstacle when CV19 struck and raised acute data needs. Hence, significant efforts could be devoted to explore how to improve access to these new data sources effectively. Furthermore, a key consideration is that statisticians are better equipped for such exercises, since they comprehend better the involved methodological and quality issues and have the requisite skills to mine alternative sources (structured as well as unstructured, like text information) and compile statistics that can meet methodological and quality tests as would be the case for official statistics that are collected, managed, compiled, disseminated and analysed according to well-defined principles (United Nations (2013)). For instance, the UK Government Statistical Service (GSS), which is a community for all civil servants working in the collection, production and communication of official statistics, has developed top tips for those statisticians who need additional ad-hoc data with a quick turn-around but with a sufficient degree of quality assurance, especially when time and resources are limited (UK GSS (2020)). It is in any case essential to convince users to avoid accessing themselves alternative data sources outside the realm of official statistics, as this could lead to unintended consequences and costly mistakes.

(iii) Third, by impacting both the quality and the timeliness of statistics, the pandemic further complicated users' life because of **increased data uncertainty and revisions**. To say the least, CV19 brought a high level of uncertainty to the statistical world. The shock to the economy, unprecedented since WWII, raised the question of how to "*deal with this type of structural shift and the uncertainty it brings to conventional policy parameters*" (CCSA (2020)). In addition, uncertainties were amplified by the sheer responses of economic agents to CV19-induced disruptions, which are still hard to gauge at the present juncture. For instance, the international financial statistics compiled by the BIS showed that the pandemic-induced turbulence in global financial markets in early 2020 was associated with an halt in the provision of banking credit to emerging market and developing economies; in contrast, global cross-border lending surged in particular because of higher foreign claims on the US official sector, as internationally active banks parked more reserves at the Federal Reserve (BIS (2020)). Moreover, indicators on global banks' exposures suggested that there could be substantial heterogeneity among national banking systems in their reactions to the global financial shock triggered by the pandemic.

Obviously, an important consequence of this uncertainty has been that **official statistics are more likely to be revised significantly as times evolves**. Certainly, it is not a new challenge for policy makers, who have always had to take decisions knowing that the statistics they can look at are subject to future revision. But this difficulty was clearly reinforced by CV19, compared to what would have been the case in the past. The revision policy of official statistics will need to be adapted to address these challenges and preserve statistical quality and integrity – which are both of great importance for users.

2. Implications for the statistical function in central banks

By making statistical compilation work more difficult and bringing various challenges to data users, the pandemic triggered a general review of the statistical function in central banks. Two areas of interest were, first, the identification of the new data needs brought about by the crisis and, second, the adaptation of existing statistical frameworks to ensure the continuous provision of reliable statistics to support policy-making.

New data needs

In view of the impact of CV19 on official statistics, most central banks felt the need to **have more, not less information**. Compared to the situation prevailing before the crisis, attention focused on three major points: timeliness, frequency, and the need to address the new issues raised by the crisis. A key consequence was to spur interest in alternative data sources.

(i) Firstly, with regards to the need for **timely data**, this reflected the fact that the speed of the pandemic and the size of the economic disruptions had called for having more rapid statistics at hand to quickly assess the economic situation. Many central banks simply felt they could not wait for a few weeks before having basic data on say, unemployment, industrial production or inflation. They needed "high-speed" data, almost on a real time basis (Hinge (2020)). The actions taken were multiform. One was to advance the compilation process, sometimes at the price of reduced quality in the aggregates measured. Another was to look for other, more timely indicators that could shed light on specific economic areas. In a large number of countries, this was done by using "traditional" but secondary data sources, for instance, to calculate advance estimates of industrial production based on partial indicators available earlier on electricity consumption and/or on specific supply indicators collected by industry organisations (production of steel, etc). A particularly interesting opportunity was provided by national payment system high-frequency data that are often available easily and immediately for central banks (because of their specific mandates) and that could be used to shed light on macroeconomic developments in Portugal.[9] In Ireland, the central bank similarly found useful value in analysing the data on credit and debit cards and on ATM withdrawals at its disposal (Hopkins, A and M Sherman (2020)). Turning to Chile, electronic invoicing data were used to elaborate high-frequency activity indicators with detailed breakdown by sectors to assess the impact of CV19 on firms' sales and analyse related funding needs (Central Bank of Chile (2020)). Newer types of data sources were also considered, for instance to assess the impact of the pandemic on Japanese household habits based on mobility trends derived from smartphone location data, in order to monitor access to workplaces or activities in recreation areas (Bank of Japan (2020)). Yet these new approaches did raise specific practical issues too. For instance, a number of the new indicators developed incorporated information on electricity consumption which needs to be properly adjusted not only for seasonal effects (like many traditional

[9] Cf the dedicated web page set up by the Bank of Portugal to follow the impact of COVID-19 on the Portuguese economy (https://bpstat.bportugal.pt/conteudos/noticias/633/).

economic indicators) but also for weather conditions, because of the impact of heating and air conditioning on this variable (Casteletti et al (2020)).

(ii) The second and related focus point was **frequency**. Traditional macro statistics are usually available on a quarterly basis for the national accounts, at least in major economies (but often only on an annual basis in the vast majority of developing economies), or at best on a monthly basis (typically the case for data on unemployment, inflation, business confidence, inflation and trade). Yet the dynamics of the crisis called for having information on what was going on more frequently, say on a weekly or even daily basis. A good example was the decisions by several central banks to set up a weekly "economic tracker". In the United States, the New York Fed is now publishing an index summarising the evolution of selected high frequency indicators mainly derived from private sources, like fuel sales, steel production etc (Lewis et al (2020)). In Germany, a similar indicator developed by the Bundesbank also includes web-based data (search queries) and non-economic indicators such as air pollution and pedestrian frequency (Deutsche Bundesbank (2020)). These approaches have several advantages, including their higher frequency, the possibility to mix different types of data (eg daily financial prices, weekly indicators, monthly industrial output and quarterly GDP) and greater timeliness. In addition, an important reported feature is the specification robustness to changes in the way these indices are constructed: the approach followed is often based on principal component analysis, allowing for extracting "common signals" that are relatively independent from the specific underlying series being considered all together. Moreover, these indices do not rely on pre-defined patterns – unlike traditional nowcasting exercises that are often based on the identification of a stable relationship between well-defined variables, such as between economic confidence indicators and industrial output – and this can be quite valuable in unprecedented crisis times.

(iii) The third focus point was to **get information on the new issues raised by the crisis** that were not properly covered by the "traditional" statistical apparatus. As noted above, many central banks realised on the occasion of CV19 the potential of micro data, in recognition of the efforts undertaken in recent years to have a better, more granular access to monitor risks in the financial and non-financial sector as well as to analyse interconnectedness and cross-border spill overs. In particular, many granular datasets had started to be set up since the GFC to collect loan-level data or security-by-security information. The compilation of off-balance sheet information (eg derivatives statistics) has also been enhanced, allowing for a better understanding of how risks can be transferred between economic agents. All this information proved particularly useful when the economy was disrupted by CV19, not only to assess pressure points but also to facilitate the implementation of targeted policy measures. In contrast, when this information was not already available, authorities in a number of countries quickly decided to fill this gap; in Chile, for instance, the central bank introduced new information requirements (in terms of granularity and frequency of banks' loans data) to monitor the effectiveness of the measures adopted by the authorities to directly support business credit.[10] Another example was to use

[10] Cf in particular the exceptional measures adopted by the Central Bank of Chile, including the new credit line facility for commercial banks, access to which is conditional on the growth of credit issuance; see https://www.bcentral.cl/en/web/banco-central/exceptional-measures.

text-mining techniques to build a media-based sentiment indicator for Spain on a daily basis and updated in real time; this proved particularly useful to enhance nowcasting exercises during CV19, in particular compared to more traditional survey-based confidence indicators which are usually available on a monthly basis (Aguilar et al (2020)). Similarly, Amstad et al (2020) have built a new CV19 risk attitude (CRA) index based on internet searches[11] in order to capture investors' attitudes toward pandemic-related risks. Meanwhile, Gerardin and Ranvier (2020) have applied text-mining techniques on the results of the Bank of France's business survey to analyse firms' reactions to the CV19 lockdown. A last example has been the Bank of England's use of high-frequency measures of formal restrictions on activity imposed by governments to contain the spread of Covid-19 (compiled by Oxford University) and of household mobility (based on Apple Mobility Trends Reports[12]) to assess its impact on GDP (Davies (2020)).

Reflecting central banks' increased focus on the points above, a key consequence was the **renewed push for alternative data sources** to complement official statistics (Tissot (2019)). Two main areas of interest emerged. One was to take benefit from the new digital information provided by the "data revolution", namely web-based indicators and other "organic" available as a by-product of the services provided by the wide range of sensors, devices, satellites etc. Recognising that much of these data, as well as the expertise to analyse them, are concentrated outside the public sector, the Swedish Riksbank's decided to open up a collaborative public channel through which academics and the private sector can directly contribute in real time (Hull (2020)). This allowed the exploration of various types of indicators, such as daily retail prices and volumes, restaurant bookings, social media content or company press releases. A second focus area was to make better use of the information contained in large administrative datasets (eg public registers, tax files, supervisory reports etc) that have been collected by authorities for many years without being duly exploited for statistical purposes. While there had been already a gradual recognition of the value of such administrative data since the GFC (Bean (2016)), the pandemic clearly reinforced this trend.

Revising statistical frameworks to better support policy making

Faced with such increased uncertainty, central banks as producers of statistics had to re-assess their production functions and reorganise themselves where needed and appropriate. In general terms, they focussed on three areas.

(i) First, the importance of the economic shock and its uncertain repercussions throughout the economy reinforced the need for **developing a comprehensive overview of the entire economy**, its components and the way they interact – noting that a key point of interest for central banks is to monitor the risks associated with such interconnections. For those many countries in the world that do not yet actively compile institutional sector accounts, a key priority is thus to advance this work so that counterparty positions can be assessed in a consistent and methodologically sound way. As noted by the IMF, the impact of CV19 on official statistics clearly reinforced this need for comprehensiveness. An

[11] For instance searches provided by Google Trends; cf https://trends.google.com/trends/?geo=US.

[12] See https://covid19.apple.com/mobility.

important area from this perspective was the recording of policy actions in response to the crisis, noting in particular that "*inconsistent approaches to recording government support to people and businesses*" could hamper their impact assessment. One example is when a government provides financial support to companies affected by CV19, which could be considered as a financial investment or as simply as a subsidy with no return expected. Depending on the recording of those actions in the macroeconomic accounts, one could have a different picture of the situation in terms of fiscal deficit and public debt (IMF (2020b[13])). Moreover, a different treatment of such operations across countries would undermine any comparative assessment of the national responses taken in response to CV19 and thus potential policy lessons.

(ii) Second, **statistical frameworks have to become more flexible** to address evolving users' needs and the sheer uncertainty created by the crisis. This called statisticians to re-assess the relevance and agility of their tools and methods to deliver required statistics. Key was to be able to meet the (new types of) users' data demands as structural changes were quickly happening. They had in particular to "think the unthinkable", in order to support policy makers despite the high-level data uncertainty brought on by CV19. They also had to be innovative, for instance to deal with the methodological issues induced by the new policy measures taken in response. In fact, the situation caused by CV19 in terms of data needs was similar to the one faced during big catastrophes, such as the Great East Japan Earthquake of 2016 (Bank of Japan (2020a)). This type of crises, because of their magnitude and suddenness and also non-linearities – which disrupt historically-observed econometric relationships between economic variables – lessen the relevance of the predictive power of usual indicators. Hence, while alternative data may provide only limited information in "normal" periods of the economic cycle, they can help to better understand the situation in periods of crisis, at least in the very short term (INSEE (2020)).

(iii) Third, statisticians had to **figure out how complementary data sources and information could be brought into their mainstream statistical frameworks**. One way was to integrate alternative input sources within the conventional methodological process to generate official statistics. Another was to use these additional sources to get supporting and benchmarking data that can act as an "information buffer" in times when conventional official statistics dry up or are lagged significantly. For instance, to address the end to direct questioning of foreign visitors (the "main source") during the initial CV19 period, the Bank of France defined a list of "auxiliary" data sources, such as payment cards, mirror data provided from European countries and mobile networks, that could be accessed to measure international travel as a second best solution (Le Gallo and Schmitt (2020)).

In any case, a key concern is that the new data sources being considered – such as private web-based data, additional regulatory input data, etc – do not present the **same guarantees as official statistics** in terms of uniform definition consistency, time consistency, etc. Statisticians can also face confidentiality/ethical issues when using these data, as well as potential

[13] For a concrete application of the IMF guidance in the case of Australia, see the spotlight on classifying CV19 policy interventions in macroeconomic statistics in Australian Bureau of Statistics (2020).

unintended consequences that could emerge due to combining various, possibly inconsistent data sources.

3. A wake up call for official statistics

The effects of the CV19 pandemic on economic statistics have been far-reaching and necessitated statistical agencies including central banks to adapt to these challenges in an effort to continue to best inform policy makers under difficult circumstances. But it was also a **wakeup call to deal with issues that had been neglected for too long**, with the need to make better use of existing data; revamp macroeconomic statistical frameworks by leveraging in particular on technology innovation; and develop users' experience with statistics, with a focus on data sharing and cooperation.

Making better use of existing data

Given its dynamic nature, measuring economic activity can be a never-ending process: there will always be new structural developments that are not yet measured but should be measured. And, indeed, CV19 was a stark reminder that new challenges can constantly emerge that require more statistical information to be properly addressed. However, before deciding whether additional / other types of data should be collected, one should realise that **currently existing datasets might not be fully exploited** – sometimes simply because potential users are not aware of their existence, or because of the training costs entailed.

From this perspective, the outbreak of CV19 shed light on the **existence of various datasets that may not be known** widely, partly reflecting the fact that significant and rapid progress had been made by numerous economies in developing their statistical frameworks since the GFC. This suggests that simple "quick wins" could be achieved by better publicising the information available. For instance, customs sources could help some developing countries to increase the frequency of their external account statistics, ie to produce monthly figures instead of quarterly or even annual ones. Similarly, data on international financial flows – such as the BIS statistics on cross-border bank credit that are now available for almost all economies in the world on a "mirror basis" (Pradhan and Silva (2019)) – could be used for monitoring countries' external positions esp. in crisis time.

Case in point is the **micro-level information already collected by public authorities, financial institutions** etc which would facilitate the identification of vulnerabilities to potential shocks and support the calibration of macro prudential tools to mitigate these risks (IFC (2016)). This type of information could be hugely beneficial in periods when conventional survey statistics are disrupted by events such as CV19. In particular, it would provide detailed statistics on target populations with a much richer insight on their distribution than what would conventionally be generated by sample surveying. For instance, setting loan-to-value ratio limits for mortgages requires a detailed understanding of the current and historical distribution of household loans, putting a premium on using available granular loan-level data collected by financial institutions. And there is indeed a wealth of data already collected that are not fully exploited; for example, publicly-available information on corporates' credit lines (eg as reported through the regulatory filings for the US

Securities and Exchange Commission (SEC)) could provide useful insights on the demand for credit in times of financial stress. Yet in many places the tools to manage this information are not fully operational, making it difficult to answer in real time questions such as "*where is credit flowing?*". As a second best, many authorities have often to rely on commercial providers eg Bloomberg to monitor credit flows. These suggest that a key task for central banks is to make operational the large and structured financial data sets that are available – arguably a more pressing priority than exploring "new" alternative indicators.

Another example is the need to identify linkages between economic agents, esp. through common exposures that could favour the contagion of shocks. Counterparty information from eg instrument-level databases could be helpful in this regards, calling for enhancing the resilience of the underlying market infrastructure, especially by supporting the further development of global identifiers including parent relationships (LEIROC (2016)) so as to assess non-bank institutions and their interconnections with other parts of the financial system as well as their impact on system-wide risk (FSB (2020a)). Granular bank-level data could also shed light on the linkages between borrowers and specific intermediaries and facilitate the identification of the distribution of risks and systemic effects – which can be hidden by aggregated-level statistics, for instance when assets and liabilities are "matched" at the level of one sector but not at the level of a single but large institution, whose failure could put the entire system at risk.

Turning to so-called "**alternative" or "big data" sources, they currently mostly fall outside the official statistics boundary**. They can be quite diverse, comprising for instance third-party information, anecdotal evidence collected from economic units, data scraped from the internet as well as listed firms' financial results. As noted above, they could provide timelier, more frequent and complimentary insights to traditional, survey-based statistics. One point highlighted during CV19 was the potential value of "economic intelligence", eg more anecdotal information collected from various sources such as industry information, the press or even social media. This information (eg trading updates, company results, analysts' reports etc) can help contextualise the official statistics produced and mitigate potential compilation disruptions. And, indeed, a number of developing economies have expressed interest in looking at the experience of those countries where established economic intelligence functions had helped to mitigate the impact of the crisis to supplement (unavailable) official data and support policy decision making.

In addition, the pandemic suggested that central bank **statisticians may have to go beyond the traditional area covering economic and financial statistics**. Indeed, the various lockdowns imposed in 2020 highlighted the importance of web-based information, for instance to assess the importance of "paid for online" services in today's market economy, as well as the role played by "free" online services and the contribution they can make to economic resilience and human well-being. Furthermore, additional indicators could be looked at to facilitate the assessment of the resilience of an economy, especially in the area of health, sustainable development (eg impact of climate change) and more generally to get a better understanding of the role played by well-being issues (including factors such as public governance, the impact of inequalities, etc). As highlighted with the last global crises (GFC, CV19), a main objective would be to enhance global risk management cooperation to strengthen the resilience of increasingly complex economic and financial systems to potential systemic risks and "butterfly effects" (Goldin (2020)).

Revamping macroeconomic statistical frameworks by leveraging on technology innovation

Realising the full benefit of supplementary data to support official statistics calls for a **reassessment of our macroeconomic statistical frameworks** – in a way similar to what was undertaken in response to the GFC especially with the launch of the DGI endorsed by the G20. Such a review should focus first on ensuring an adequate integration in "main stream" measurement frameworks of the wide range of supplementary data sources available (eg the internet of things, micro-level data sets). It also calls for making further progress on the necessary IT underlying infrastructure to enhance the management of the increasing amount and variety of statistics compiled as well as the governance of the associated processes (IFC (2020)).

However, such a fundamental review may take time and energy. One solution would be **to start by enriching the financial accounts framework** that is already available in several jurisdictions. This framework can provide a plethora of potentially useful information across the main institutional sectors, including the full view of income, assets and liabilities across an economy (Çakmak et al (2020)). The addition of supplementary data sources would enhance this basis of information, to effectively inform monetary and financial stability policy decisions and facilitate the assessment of their implementation. It would also facilitate the compilation of distributional financial accounts (ECB Expert Group on Linking macro and micro data for the household sector (2020)).

Another way is to build on recent technological developments to **develop datasets which reflect the entire target population** or at least a much larger sample thereof. The importance of the CV19 related economic fallout suggests that this may be a good investment to augment conventional data compilation exercises (which have traditionally been based on a representative samples, drawn randomly from a broader population). In particular, a well-defined input sources development strategy could help to mitigate the uncertainty and risk associated with disruptions observed in the compilation of official statistics as happened during the crisis. However, developing such additional data sources is a long-term endeavour that can be costly and compete with the limited resources of national statistical systems. It would also require statisticians to refine the tools at their disposal to mine, analyse and compute them. The drive towards alternative data sources is therefore not necessary a saving grace, even for those developing economies that often face very specific problems with traditional statistics compilation processes

Other innovative ways in which statisticians can also expand the borders of their conventional statistical framework is by **using online surveys** to increase response rate. One can also re-apply some official statistics to serve other purposes in case of disruptions. An example of this would be economies that used various indicators (eg electricity consumption, monthly industrial production, business confidence) to infer some proxy of GDP during CV19. Another way would be to expand bi- or multivariate time series analyses in order to develop official statistics based in parallel on conventional inputs and on web-based data sourcing – for instance to identify possible relationships between such complementary approaches and develop alternative process supporting the compilation of official data (with the caveat that those relationships may not be stable over time, depending for instance on the state of the economy or on policy actions).

Lastly, **digital innovation could more generally help to accelerate the production of official statistics**. A more automated linking between granular (eg institution- and instrument-level) datasets available in the economy and the macro statistical frameworks could help to compress compilation times, provide more frequent indicators, and reduce revisions. As analysed above, this would be of great interest for users in central banks.

Supporting users' experience with statistics by promoting data sharing and cooperation

CV19 has forced **statisticians to revisit the services they provide to their stakeholders**, for instance to increase the frequency and/or timelines of their estimates to better support policy decision. It was also an opportunity to revisit general user experience with official statistics. Several issues deserved to be considered for this purpose. For instance, are users utilising the generated statistics to their full potential? Are they made sufficiently aware of the opportunities of specific data sets? Where should users turn to get statistical information and how should the official statistical framework be set up to facilitate this process?

The starting point is that **thinking the unthinkable has become a key priority** for statisticians supporting policy makers in the aftermath of CV19. The reason is that CV19 has triggered structural shifts in the economy, destabilising existing relationships and leading to unprecedented policy decisions. Proactive action in the face of such uncertainty is critical: without appropriate data, policy makers will have at their disposal irrelevant historical estimates, or will simply have to rely on anecdotal evidence, which would clearly be sub-optimal given the issues at stake.

One way to go for answering these questions is **cooperation**. CV19 highlighted the importance of ex ante coordination among public authorities so that adequate processes were already in place to allow for an effective exchange of information when the crisis occurred. This also requires to develop data sharing within and between agencies producing statistics so that databases can be linked in a coherent way, also helping to limit the reporting burden for the economy (IFC (2015)). The South African Reserve Bank is for example currently developing a framework for a consumer credit register serving multiple stakeholders with the intention to deliver granular information on consumer loans. Moreover, the need for statisticians to deal with new, alternative sources and to try to be prepared for the unthinkable puts a premium on the sharing of experience, not just to access data but also to get a better sense of their actual content/limitations. In particular, statisticians would benefit from knowing about the initiatives that have worked in other fields, to the extent that these can be at least partially emulated in their own areas.

At the international level, the sudden data needs highlighted by CV19 underlined the merit of having a good exchange of economic information between countries. Point in case refers to those places for which the impact of activity in a large trading partner is of key importance. For instance, the Bank of Japan devoted significant attention at the start of CV19 on the high-frequency indicators available for Japan's main trading partners, such as traffic congestion in China and motor vehicle sales in major advanced economies (Bank of Japan (2020b)). Another successful example has been the increased sharing of granular data between authorities at the global level initiated after the GFC and that proved particularly helpful in monitoring the consequences of the current pandemic. In particular,

balance sheet information about systemically important banks is now regularly stored and analysed on behalf of participating supervisory authorities in the BIS-hosted International Data Hub.[14] In addition, the international community quickly responded to the crisis by promoting platforms allowing statisticians to exchange on experience a well as to provide general guidance on methodological issues posed by CV19. For instance, the International Monetary Fund (IMF) has launched a Special Series on COVID-19 to assist compilers on a wide range of topics, such as the treatment of restructured loans, the recording of government support to households and businesses, continuity in external sector statistics, etc. Similarly, the Organisation for Economic Cooperation and Development (OECD) has set up a Tackling coronavirus website with a dedicated workspace to exchange best practices and experiences. Turning to Eurostat, it has published numerous guidelines and methodological notes in the context of the pandemic, for instance on the treatment of time series, the statistical implications of policy measures, the estimation and imputation of missing data, and seasonal adjustment techniques. Last but not least, the BIS Irving Fisher Committee on Central Bank Statistics (IFC) has maintained a Covid-19 Statistical resources page to provide information on statistical initiatives among central banks, national statistical institutes, academia and international organisations (included the Eurostat-IMF-OECD initiatives referred to above) regarding the production, dissemination and use of economic and financial statistics.[15]

Another avenue is to **develop a "central marketplace" to increase accessibility to official statistics**. This is already being implemented in a number of countries, and may well be expanded at the global level – for instance by asking relevant international agencies to set up unified statistical portals where information (eg actual data values, input source, compilation methodologies, potential limitations etc) from different countries could be made centrally available.[16] It would also provide an opportunity for statisticians to provide guidance to the users of their data, including policy makers, market analysts, journalists etc. This is key to promote statistical literacy and communicate on the context behind the numbers considered. Such a global information repository would have been particularly helpful during CV19, by facilitating users' navigation through the official statistics available despite the disruptions mentioned above. For instance, many users were looking for guidance to deal with increased uncertainty and in particular to rely on alternative sources to supplement official statistics with a sufficient degree of confidence. Statisticians are surely the best placed to advice users on these types of issues depending on specific situations: for example, to judge which data sets had been disrupted the most (eg real versus financial variables), their degree of reliability, and how they should be interpreted. Statisticians can thus play an instrumental role to improve statistical

[14] At the global level, the main improvements achieved with the DGI have been related to the regulated banking sector, especially with the recommendations to improve the collection of international banking statistics and the set-up of the BIS-hosted international data hub for global systemic institutions (Bese Goksu and Tissot (2018)).

[15] See https://www.bis.org/ifc/covid19.htm.

[16] For instance by building on the US experience of the Federal Reserve Economic Data (FRED) data service, which is updated daily and allows access to over 500,000 financial and economic data series from more than 100 public and proprietary sources. At the international level, the Principal Global Indicators is an initiative that aims to facilitate the monitoring of economic and financial developments for G20 jurisdictions and is a joint undertaking of the Inter-Agency Group of Economic and Financial Statistics (IAG).

literacy amongst various stakeholders, in turn enhancing the usefulness of the information they provide.

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