Using micro data to support evidence-based policy

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Abstract

Micro data offer new opportunities to support macroeconomic analyses and guide policy decisions. They are obviously indispensable for the monitoring task of micro prudential authorities conducted at the level of specific firms. Institution-level data is also required for the implementation of actions targeted at precise market segments or instruments under the new financial stability frameworks developed after the crisis. For instance, the design, calibration and implementation of macroprudential tools (eg loan-to-value limits, debt-servicing limits) require close monitoring of available data. Perhaps more importantly, granular data are in increasing demand to properly assess the effectiveness of macro-financial policies and mitigate possible unintended consequences over time (eg agent behaviours in response to these policies, overall impact on the economy). The use of such "Quantitative Impact Studies" has also proved instrumental to decide when, and how, to reverse previous policy decisions.

Keywords: financial stability; granular data; policy making; quantitative impact studies.

1. Introduction: the legacy of the Great Financial Crisis in terms of data requirements

A key element of the policy response after the Great Financial Crisis (GFC) of 2007-09 was to enhance the availability of financial statistics esp. to address financial stability issues (Borio, 2013). In 2009, the International Monetary Fund (IMF) and the Financial Stability Board (FSB) issued The Financial Crisis and Information Gaps report to explore information gaps and provide appropriate proposals for strengthening data collection (International Monetary Fund and Financial Stability Board (2009)). The legacy of the GFC in terms of data requirements should not be underestimated. Huge amounts of data have to be mobilised to address the needs related to financial supervisory tasks, the set-up of new regulatory standards and the developments of macroprudential frameworks. The required information is both at the macro level and, increasingly, and the micro level.

But a key driving factor has been the growing information needs to support evidence-based policy. With the increased use of micro policy tools and the designing of policies based on quantitative information, there is a growing demand for granular data to set up policies, ensure their effective implementation, monitor their impact, and revise them afterwards in case of need. This trend is, obviously, raising significant challenges for public statisticians, as it requires the build-up of well-defined survey processes, IT systems and fully automated workflows to ensure in particular a certain degree of replicability and sufficient data quality checking.

2. The need for more granular information for monitoring purposes…

The Great Financial Crisis (GFC) of 2007-09 highlighted that system-wide financial stress can arise from developments observed at the level of specific firms (eg Lehman Brothers) or financial market segments or instruments (eg US subprime mortgages). While fragilities may, at a first glance, appear to be limited to specific areas, they can in fact have implications for the financial system as a whole. Looking only at aggregated data is thus not enough, and can prove meaningless or even sometimes misleading. For instance, a country-wide indicator can reflect the homogeneous situation of a group of economic agents or, in contrary, the combination of idiosyncratic positions. Non-linearity effects mean

that, on average, the signification of aggregate numbers can differ from the addition of individual situations.

More granular information needs therefore to be taken into consideration, especially to monitor those individual institutions that are relevant from a system-wide, macro perspective (Tissot (2016)). But, in practice, such a monitoring can be quite challenging. Financial fragilities may differ significantly across economic agents both at a point in time as a well as over time. Correctly assessing them often requires the understanding of what lies behind aggregated numbers and the in-depth digging into the data (Cadete de Matos (2015).

Obviously, national financial supervisors have been the first in line to ask for more data in order to assess the situation of the institutions under their supervision. A key attention has been paid to enhancing national supervisory practices after the GFC. In particular, the Basel Committee on Banking Supervision (BCBS), which is hosted by the BIS and represents national banking supervisors, issued in 2012 the revised *Core principles* for effective banking supervision and the associated *Core principles methodology* (BCBS (2012)) to facilitate countries' assessment of their supervisory systems and the identification of areas for improvement. These principles primarily deal with supervisory powers, responsibilities and functions (focusing on effective risk-based supervision and the need for early intervention and timely supervisory actions) as well as supervisory expectations of banks (emphasising the importance of good corporate governance and risk management, as well as compliance with supervisory standards). More generally, they also aim to address risk management weaknesses highlighted in the GFC, by highlighting the importance of eg greater supervisory intensity for systemically important banks, a system-wide perspective to address financial stability risk, adequate measures to reduce both the probability and impact of a bank failure, sound corporate governance practices, and the key role of market discipline. Covering all these elements obviously require the collection of a wide range of data for supervisory purposes.

At the international level, significant efforts have also been made to collect granular data for monitoring global systemic institutions. This work, promoted by the Financial Stability Board (FSB), has been conducted with the operational support of the International Data Hub (IDH) set by the BIS (see FSB (2011) for the initial overview of this project). The senior authorities supervising the major financial centres govern this data collection and share institution-level information deemed relevant for the stability of the global financial system. Strict procedures have been set up to ensure accuracy, confidentiality, completeness and timeliness of these statistics, as well as to coordinate banks' compliance with reporting guidelines to achieve international comparability. For this purpose, accessing granular information is also in high demand. A large amount of micro data has already started to be collected for a subset of the global systemically important banks (G-SIBs) characterised as of "systemic importance" by the FSB and the BCBS (BCBS (2013)). They encompass a variety of micro indicators – based on banks' assets (exposures), liabilities (funding) and off-balance figures (contingent positions) – aiming at assessing interlinkages among the institutions surveyed as well as with their key counterparties ("network effects") and the concentration of these institutions in specific sectors and markets ("size effects"), with various frequencies (eg weekly, monthly and quarterly).

3. … as well as for the development of micro prudential regulation, …

Going beyond the monitoring of institutions for supervisory purposes, the GFC also triggered a swift and ambitious set of reforms to revise the regulation governing the activities of financial institutions. These regulatory developments have also led to an increased demand for more granular data. One major focus was on banking entities, not least because of the important role they played during the GFC. The BCBS has in particular developed an ambitious and comprehensive Basel III Framework in recent years to strengthen the regulation, supervision and risk management of the banking sector

(BCBS (2011)). The new rules aim primarily at improving banks' ability to absorb shocks arising from financial and economic stress, whatever the source; enhancing risk management and governance; and strengthening banks' transparency and disclosures. Since a key objective is to raise the resilience of individual institutions to periods of stress, this regulatory approach has clearly an institution-level, or microprudential, perspective.

In a nutshell, the Basel III Framework comprises several elements that all have important implications as regards the amounts of granular information that need to be reported by supervised institutions:[1]

- Its key element is the minimum capital requirement, which constitutes the Pillar 1 of the Framework. A bank should have a minimum level of equity defined in relation to its assets, based on a risk-based approach – ie the level of capital required depends on "weights" reflecting the nature of the risks of the respective assets. This is complemented by a clause to ensure that specific capital instruments can be written off or converted to common equity if the bank is judged to be non-viable – contingent convertible bonds or "CoCos". In addition, a capital conservation buffer is added to the capital requirement with the effect to limit discretionary distributions when the buffer is not complete. Furthermore, a countercyclical buffer has to be set up at time of rapid credit growth to limit the build-up of financial fragilities. All these capital requirements are reinforced by rules regarding specific risk such as (complex) securitisation exposures, the trading operations conducted by the banks for their own purposes (the "trading book", in contrast to the "banking book"), the assessment of counterparty credit risk, exposures to central counterparties (CCPs), etc. Moreover, a non risk-based leverage ratio serves as a backstop to risk-based capital requirement, and specific additional loss absorbency requirements are set for "systemic" banks.
- There are also regulatory measures related to liquidity, with the requirements for banks to have minimum high quality assets in case of stress, the "liquidity coverage ratio", and a longer-term structural liquidity standard (the "net stable funding ratio") to cover liquidity mismatches.
- These various liquidity and capital requirements are supplemented by a wide range of actions that supervisors may request when reviewing banks' risk management (this supervisory review constitutes the Pillar 2 of the Framework) as well as specific disclosure requirements to be fulfilled by the institutions themselves in order to enhance market discipline (the Pillar 3).
- Stress testing is also a particularly important risk management tool used by banks in the Basel capital and liquidity frameworks. It supplements other risk management approaches and measures and basically aims at providing an indication of how much capital might be needed to absorb losses should large shocks occur. Supervisors in many jurisdictions have been increasingly supporting the use of such tests since the GFC. Since the range and complexity of the "stress scenarios" considered can be large, the amount of micro data that needs to be reported has increase substantially.[2]

New regulation is also progressively developed for other type of financial institutions, such as insurance companies. One difficulty however is to develop a "common" approach for dealing with institutions that belong to different sectors and which have different business models and risk profiles, eg commercial banks, asset managers, insurance companies, CCPs etc. Another difficulty is the fact that a number of financial intermediaries are much less regulated or are even imperfectly captured by the statistical apparatus. Even large non-financial corporates can play a key role in financial markets, for instance when acting as counterparts to financial systemic institutions. Yet a last issue is the need for cross-border and cross-sector cooperation so as to regulate properly large financial institutions that

1 See BCBS's Basel III overview table on http://www.bis.org/bcbs/basel3/b3summarytable.pdf.
2 For the data implication of regulatory stress tests, see for instance Sudjianto (2017).

operate across borders and sectors. Again, these various challenges further add to the complexity and variety of the granular information that need to be collected and analysed.

4. … macro prudential frameworks, …

The post-GFC regulatory response did not only raise additional data demand at the level of the specific institutions of interest to the relevant authorities. There has been also an increase in information requests related to the wider financial system. A key driver has been the greater focus on systemic risks.

A number of ambitious macroprudential frameworks have indeed been implemented since the GFC with the aim of (i) strengthening the resilience of the financial system and (ii) controlling financial booms and thereby the subsequent busts (see FSB (2011a)). The primary goal has been to better monitor systemic risk risks, and in particular, its two key dimensions, ie the cross-sectional dimension (ie to how financial risk is distributed within the system at a given point in time) and its time dimension (ie how financial fragilities progressively build up over time). As noted above, the Basel III Framework itself has a "macroprudential overlay", comprising a number of rules that go beyond a simple micro perspective – to deal with, for instance, the situation of systemic banks and the procyclicality of the financial system.

More generally, the flourishing of the various macroprudential policy frameworks, instruments and indicators across countries since the GFC, and even before, in particular in Asia following the regional crisis in the late 1990s (Gadanecz and Jayaram (2016)). A variety of macroprudential measures have been adopted, focussing on specific instruments (eg underwriting standards for mortgages, explicit loan-to-value limits, debt servicing ratios), creditor sectors (eg capital buffers for banks), and borrowers (eg taxation, structural measures addressed to specific market segments). The designing, calibrating and implementing of such policy tools requires mixing micro- and macro-level data as well as the quantification of the interactions between the specific macroprudential policy tools and other monetary and fiscal policies as well as the overall global financial environment (see BIS (2015)). This has raised significant data needs. As macroprudential policymaking increasingly relies on quantitative analysis, more dat can be obtained by "*leveraging existing sources of information but may also call for new investment*" (IMF, FSB and BIS (2016)).

For instance, detailed household information has proved to be a key building block in developing macroprudential tools in those countries willing to address the financial stability risks associated with rising household debt and buoyant housing market. This is needed to compute indicators such as debt service-to-income or to constrain bank lending at a sufficient granular level – for instance, when the policy maker wants to target over-indebted households and/or specific type of loans such as mortgages. Another example has been the integration of various sources of financial information – eg Central Credit Registers (CCR) or Central Balance Sheet Databases (CBSD) – into large granular data sets providing comprehensive balance sheet information from both a creditor and a borrower perspective. The underlying entity-level information can be utilised not only for micro-level supervision (eg for credit and counterparty risk analysis of banks) but also with a more "macro" focus (eg to assess connections between financial institutions and analyse contagion effects). As highlighted by Shin (2017), the challenge is both to drill down to firm-level data and "drill up" to global aggregates at the same time.

The rising demand for more granular information, reflecting a structural shift as well as new, concrete policy needs, has put a premium on integrating it properly not least to to facilitate economic analysis (IFC (2016)). This requires a proper identification of the micro data foundations and a comprehensive and consistent aggregation process to move to the macro level. Another challenge is to access

granular information covering cross-sector and cross-border activities. The shadow banking sector is a case in point from this perspective: its activities cannot easily be captured through either the usual (micro) prudential reporting framework or the traditional (macro) System of National Accounts – the subsector "non-monetary financial intermediaries" can provide only a very rough estimate of the broad trends in the credit intermediation performed outside the regular banking system (FSB (2015)). Moreover, there are severe limitations in capturing the cross-border dimension of shadow banking, which can obscure the risks emanating from these entities. One way forward, explored by the international statistical community in the context of the Data Gaps Initiative endorsed by the G20, is to integrate aggregate "SNA-type" information with more granular data (OECD (2016)).

5. … and evidence-based policies more generally

The post-GFC period has also seen an expansion of more general requests to support macroeconomic analyses and guide policy decisions by mobilising institution-level data. The focus is not only the monitoring task of authorities conducted at the level of individual institutions, but rather the implementation of more macro policy actions. This has led to a rising demand for granular data to properly assess the effectiveness of a wide range of public policies and mitigate possible unintended consequences over time (eg agent behaviours in response to these policies, overall impact on the economy). Moreover, this information can be useful to decide when, and how, to reverse previous policy decisions.

Micro data certainly present several benefits from this perspective. First, they are rich enough to be used for various policy purposes, ie macro- and microprudential, fiscal, structural and monetary policies, so that multiple users can use them. Second, data sources that are granular enough can be combined to take into consideration multiple dimensions. A third benefit is the flexibility allowed by micro data, as new information requests can be addressed more easily without having to organise another ad hoc statistical collection exercise. This, at least in the longer run, should also reduce the reporting costs and burden on economic agents.

As a result, the collection of micro data has facilitated two main evolutions. The first has been the development of policy tools that need to be applied at a granular level. An obvious example, as noted above, is the growing variety of macroprudential measures adopted after the GFC. But this has been also the case for other macro policies, such as monetary policy: the assessment of (granular) credit risk is instrumental in determining the quality and conditions of assets that can be used as collateral in monetary policy operations, and which have been in increasing demand in the aftermath of the GFC with the development of quantitative easing policies. Similarly, a number of fiscal policy actions have been taken in a granular way to prevent financial fragilities, for instance to moderate specific market segments considered to be overheating.

The second key evolution has been the reworking of the designing of public policies so as to better incorporate quantitative information. So-called "Quantitative Impact Studies" (QIS) have now become a central element of the new indicator-based frameworks developed to, among other tasks, draw the lessons of previous policies, assess the ex-ante impact of new measures, identify additional areas of weakness, and clarify the functioning of policy by measuring feedback effects, behavioural responses and unintended consequences.

6. The increasing relevance of impact studies for banking regulation

The importance of QIS exercises has become particularly obvious in the area of financial regulation, with the active involvement of the various standard-setting bodies hosted by the BIS in Basel. Various

Basel-based groups such as the International Data Hub, the FSB and the International Association of Insurance Supervisors (IAIS) are also increasingly participating in this new way of steering and implementing policy. Almost all new regulatory initiatives are now supported by some kind of granular data collections, something that was almost inexistent before the GFC. Moreover, QIS facilitate the assessment of the cross-impact of the various regulatory requirements introduced in parallel: for instance, by shedding light on how banks' leverage ratio would evolve in response to change in their capital ratio requirements.

The BCBS has been clearly leading this evolution, by developing in the recent decade or so a large number of evidence-based material to support various initiatives pertaining to banking capital regulation, liquidity rules, the selection and measurement of G-SIBs (Basel Committee on Banking Supervision, 2015), etc. Ongoing banking regulatory work is now underpinned by an extensive quantitative framework for the collection and analysis of institution-level data (Ingves, 2013).

BCBS QIS type work began in the earnest in the early 2000s.The initial aim was to gather information to assess whether the Committee has met its goals, by collecting the necessary data across a wide range of banks to capture their differing risk profiles. The first impact studies were organised in the early 2000s to support the Committee's efforts to develop the Basel II Framework, study the impact of the new proposals on minimum capital requirements (ie Pillar 1), monitor banks' ability to implement the rules, assess the related data needs, and refine the calibration of the framework.

This preliminary work proved instrumental when the GFC occurred and public authorities decided to develop the Basel III standards to address its consequences. The new capital adequacy and liquidity standards announced in 2009 were immediately followed in 2010 by a comprehensive QIS exercise to assess their impact (BCBS (2010)). The assessment covered the main parts of the Framework, including both its microprudential and macroprudential elements – namely, higher and better-quality capital, better risk coverage, the introduction of a leverage ratio as a backstop to the risk-based requirement, measures to promote the build up of capital that can be drawn down in periods of stress, and introduction of two global liquidity standards. A total of 263 banks from 23 member jurisdictions participated in this exercise. This included 94 Group 1 banks (ie those that have Tier 1 capital in excess of €3 billion, are well diversified and are internationally active) and 169 Group 2 banks (ie all other banks).

So the key novation was that the design of the new standards was, as from the beginning, based on the collection of adequate information at the level of the individual institutions to which those standards applied. The simulation did not take into account any transitional arrangements, as it assumed the full implementation of the Basel III package, and no assumptions were made about banks' profitability or behavioural responses, such as changes in bank capital or balance sheet composition.[3] But, complementing this approach, the BCBS and the FSB also set up a Macroeconomic Assessment Group (BIS (2010)) to analyse the economic impact of the reforms over the transition period.

In addition to this initial work related to the designing of the new standards, QIS exercises have also become a key element for monitoring their rigorous and globally consistent implementation. This was particularly needed because the new standards were initially designed with a gradual phasing-in period up to 2019/20, not least to allow the banking sector to progressively adjust to the stricter standards without putting in danger the global recovery after the GFC. One therefore needed to collect regular information to help the monitoring of the implementation of the new standards during the long transition period, assess their impact and be able to address unintended consequences.

[3] For that reason, the QIS results are not comparable to industry estimates, which tend to be based on forecasts and consider management actions to mitigate the impact and which incorporate analysts' estimates where information is not publicly available.

To this end, the Committee has since 2012 established a rigorous reporting process to regularly review the implications of the Basel III standards for banks. For instance, the Basel III Monitoring Report published in February 2017 presented the results of the latest exercise based on data as of 30 June 2016 provided by 210 banks, comprising 100 "Group 1 banks", including the 30 G-SIBs, and 110 "Group 2 banks" (BCBS (2017)). On a fully phased-in basis, the data showed that virtually all participating banks meet both the Basel III risk-based capital minimum Common Equity Tier 1 (CET1) requirement of 4.5% and the target level CET1 requirement of 7.0% (plus the surcharges on G-SIBs, as applicable). The QIS also provided evidence that banks have continued to reduce their capital shortfalls relative to the higher Tier 1 and total capital target levels. Additional information was also made available on banks' after-tax profits prior to distributions, the shortfall related to the minimum requirements for Total Loss-Absorbing Capacity (TLAC) set up by authorities for specific group of G-SIBs, and banks' positions vis-à-vis Basel III's liquidity requirements – the Liquidity Coverage Ratio (LCR) and the Net Stable Funding Ratio (NSFR). Lastly, ad hoc complementary information can be collected for a subset of the surveyed banks to shed light on some particular aspects of the BCBS regulators work: the February 2017 Report included for instance two special features, on the *impact of the revised minimum capital requirements for market risk* and on the *interaction of regulatory instruments.*

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