The possibilities and limitations of derivatives statistics collected by central banks

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1. Introduction

Financial derivatives are undoubtedly part of the core area of financial innovations, the topic being addressed at this conference. There is plenty to discuss, particularly since credit derivatives are among the suspects for contributing to the financial troubles we are currently witnessing. However, when talking about derivatives, statisticians should not limit themselves to the credit derivatives segment. Rather, they should look at the derivatives market as a whole and thus also examine the market for interest rate, currency, equity and commodity products. If I am not mistaken, the BIS has until now always taken this broad approach with its derivatives statistics; and rightly so, as each area's conceptual and practical problems are closely linked to the others.

2. The need for derivatives statistics

2.1 Overview

Central banks, together with the BIS, are the most important producers of derivatives statistics. The demand for them to produce additional data has increased, motivated by a variety of expectations. However, there is no single type of derivatives statistics that can serve all purposes. I would like to emphasise that statistical aims and data collection and compilation methods are closely linked.

The first question we need to ask is why we are collecting derivatives statistics – what is our aim? Over time three aims have emerged, and are repeatedly restated:

1. Derivatives statistics should provide input for various national accounts and balance of payments aggregates
2. Derivatives statistics should provide data for monetary analysis purposes
3. Derivatives statistics should satisfy information needs in connection with macroprudential issues

2.2 National accounting needs

Let me start by looking at the first aim – the provision of input data for national accounting and balance of payment purposes. The methodological requirements for these data are clearly specified and are internationally binding. The current regulations can be found in the 1993 System of National Accounts (SNA 93) and fifth edition of the IMF Balance of Payments Manual (BPM 5) updates, which were adopted in 2000. From a national accounting perspective, the derivatives are obviously not of interest for their unique ability to

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isolate and take on risks, but solely in terms of their objective characteristic as financial assets, expressed by their individual market prices. Whether they are over-the-counter derivatives or traded on the stock exchange makes no difference. Compared to other financial assets, such as loans, deposits or securities, derivatives are by no means special from a national accounts perspective. Therefore all of the usual national account conventions also apply. One of these conventions is particularly important for us, namely that all data must be location-based. This means both that the sample must be defined according to the residency criterion, and also that the counterparty classification must be based on the domicile of the direct counterparty. Derivatives statistics for national accounts purposes are national statistics. The Bank of England has carried out ground-breaking work in this area. In recent years, many central banks have extended their collection systems correspondingly, with a desire to improve the balance of payments database as the decisive factor in many cases.

2.3 Monetary analysis needs

The second aim I would like to talk about briefly is the provision of data for monetary analysis purposes. Here the derivatives are no longer of interest as assets, but rather as risk transfer instruments, transferring interest rate, currency, credit or other risks. Here too, as in the case of national accounts, it makes no difference whether the derivatives are over-the-counter derivatives or are traded on the stock exchange. We need to address the question of how credit provision and the payment of deposits are influenced by the redistribution of risks induced by derivatives. In addition, the statistics must be produced in such a way that the link between the credit/deposits and the derivatives that change their risk profile can be traced. This means that, if they are to fulfil their task, the statistics must show hedging relationships.

There are serious doubts as to whether statistics can do this. In order to assess a derivative's hedging effect, the exposure that is to be hedged would have to be known. We do not know this, however, because we do not know the extent to which institutions have already hedged their positions, irrespective of derivatives, through offsetting transactions, collateral, securing guarantees and other measures to mitigate risks. Moreover, banks predominantly manage their risks on the basis of portfolios, which do not depend at all on the hedging relationship between individual transactions. If banks' transaction data are subsequently still consolidated and condensed within the context of statistical compilation, the results can hardly be expected to provide a deeper insight into the resulting risk redistribution.

However, demarcation issues also raise significant problems. This is because, like national accounts, which I mentioned briefly at the start, monetary analysis also has to comply with the residency principle, meaning that all aggregates – as in the case of the national accounts methodology – would have to be compiled on a local basis. However, this is not suitable for risk analysis, as the local unit is not liable for a bank's risks; the company is as a whole, including its branches and subsidiaries, regardless of location. Similarly, a bank's counterparty risks apply not only to its direct counterparties, but to the entire corporate group to which the counterparty belongs. This is complicated by the fact that top-performing, internationally active banks have centralised risk management, meaning that an underlying transaction and the hedging of this transaction can be completed and, of course, also posted in completely different places. Therefore, in the case of aggregates calculated on a locational basis, there is little chance of being able to identify the link between the underlying transactions and the hedging provided by derivatives.

In conclusion, the notion of developing derivatives statistics that are of great benefit to monetary analysis is very optimistic.

2.4 Macroprudential needs

I would now like to address the third, perhaps most important aim to which derivatives statistics are commonly believed to contribute, namely the provision of information in relation to macroprudential issues. In terms of financial market stability, this is purely a matter of the damage potential of derivatives transactions. In other words, we are looking exclusively at a risk-oriented analysis. Here, we must make a distinction between over-the-counter derivatives and those traded on the stock exchange because each has a different level of potential risk. Asset issues, as in the case of national accounts, do not play a role and the issue of how a derivative transaction affects monetary aggregates is also of secondary importance. This has the methodological consequence that, from a financial market stability point of view, derivatives statistics must be calculated on a consolidated basis, and counterparties defined in accordance with the ultimate risk principle. It also means that the focus should be on large, systemically relevant banks. All in all, this is a typical banking supervision perspective.

Calculated on this basis, the relevant data may be quite interesting for the broader public. However, an individual central bank that usually has direct access to banking supervision sources gains only a small amount of information from the derivatives statistics of four, five or eight systemically relevant banks. The banking supervision departments are already familiar with the relevant figures before the statisticians have calculated the first amounts. The situation thus differs from that of national accounts and monetary analysis, for which statistics provide the only source of data.

However, central banks are not able to extract data from their own figures on the scope and structure of the markets in which the institutions they supervise operate. Depending on the circumstances, such data may only be obtained by collecting the findings of many individual central banks and forming a comprehensive picture from them. Thus, although the aggregation of banking supervision data promises hardly any additional benefits on a national level, it opens up new perspectives on a global level. It therefore makes sense for central banks to pass on their figures to the BIS, who will – currently at six-month intervals – use them to form global OTC derivatives statistics.

3. Usefulness of global aggregates

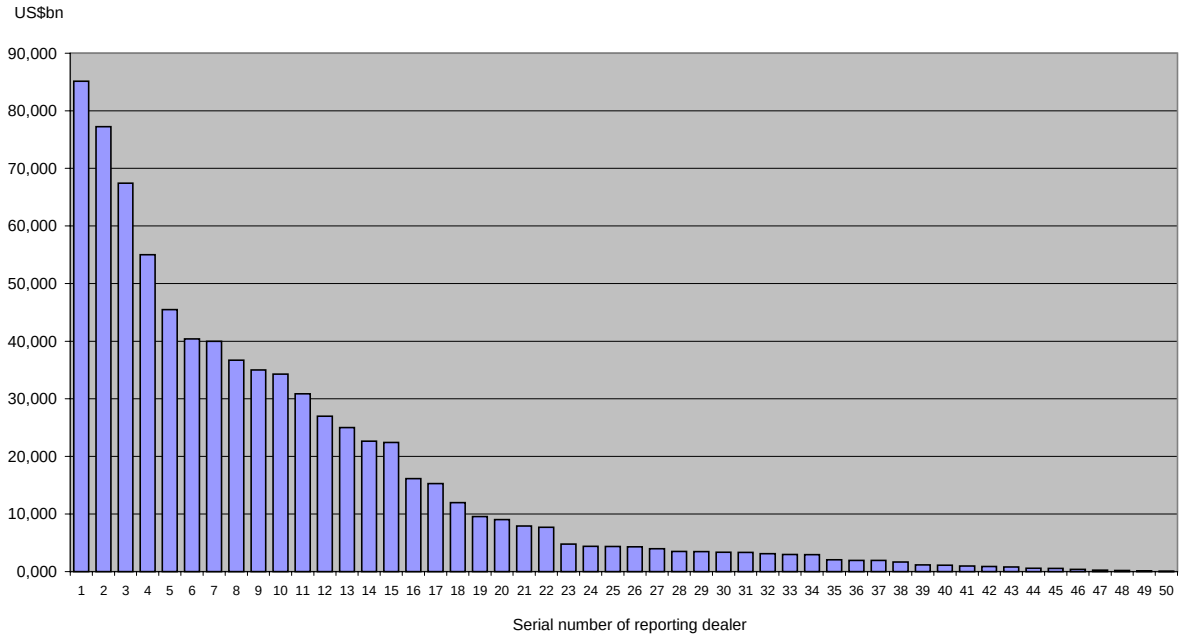
Admittedly, we must have realistic expectations. The conclusive risk transfer figures, which we would have been so pleased to calculate under the monetary analysis objective discussed above, cannot be ascertained from the BIS aggregates either. But we nevertheless find out who the decisive market players are and how great their commitment is. Here an important distinction must be made between reporting dealers, who dominate the market and provide liquidity, and the other market participants, who are not always, but are increasingly likely to be, end users. Important market parties, such as hedge funds, can be found among these end users. They are not governed by their own disclosure requirements, and information on their market position can, at present, simply be obtained from the counterparty information of the BIS reporting banks. In this area the BIS statistics still have hidden value.

However, if we take another look at the reporting dealers in the BIS statistics, we can see that they indeed form the backbone of the derivatives market. There are currently 55 banks who act on either side as the counterparty for almost 90% of the outstanding contract volume worldwide. However, the market shares are not evenly distributed among reporting dealers. The measures of concentration (Herfindahl indices) calculated by the BIS already indicate this. However, it is also evident in the corresponding figures from the published annual reports of the reporting dealers. I admit that examining such figures requires estimates here

and there, but these are unlikely to change the scale of the figures and this is what we are looking at here (see graph).

BIS semiannual OTC derivatives statistics
Notional amounts of OTC derivatives outstanding
at end-December 2007 by reporting dealer

In billions of US dollars



In the illustrative diagrams, the institutions that report for the semiannual OTC derivatives statistics are plotted on the x-axis according to the size of their derivatives transactions. I have recorded only 50 of the 55 reporting banks because I was unable to locate the corresponding figures for five smaller Japanese institutions. I have therefore treated these five banks, the contribution of which is not particularly significant, as a single institution.

The diagram is impressive as it shows that 20 rather than 55 banks actually set the tone in global derivatives transactions. In actual fact, 90% of all positions posted are attributable to the 20 largest institutions. From a stability perspective, this is a cause for concern. From an information efficiency point of view, the result is good. You need only to look at 20 banks to view (almost) all of the market.

What is the significance of this result for BIS derivatives statistics? First, it means that the measures of concentration are important. My example produces a Herfindahl index of 560, meaning that the total volume of outstanding contracts would be distributed between 18 banks if all institutions had equal market shares. You find an equal share equivalent of a similar size more often if you examine the Herfindahl calculations that the BIS carries out in great detail for individual risk categories and groups of instruments. You can therefore assume that the corresponding distributions are similarly unimodal, as in my example.

You could also conclude from the high concentration attributable to only a few reporting institutions that extending the sample, as has sometimes been considered, would be likely to increase the volume of reported amounts only slightly and would therefore be of no great benefit. This is certainly a good argument if we are talking about making the statistics workload more manageable and keeping the data compilation time to a minimum. However, not only the large aggregates should be examined. In the case of market segments that are not completely covered by the present sample, extending the sample would certainly make sense.

4. Conclusions

At the start I distinguished three aims that give us an incentive to compile derivatives statistics. The likelihood of achieving these aims varies:

1. A closed and largely practicable concept allows central banks to collect derivatives statistics so that they have a database for the national accounts and balance of payments.
2. By contrast, it is not possible to collect meaningful data for monetary analysis purposes as a result of the difficulties in recording hedging relationships statistically and the incompatibility of the statistical concepts for recording both risk positions and monetary aggregates.
3. Producing a global aggregate of national data, which is primarily banking supervision-oriented – for example, the OTC derivatives statistics of the BIS – provides important market information in macroprudential terms.