



Assessing the macroeconomic impact of OTC derivatives regulatory reforms

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Let me start by thanking the South African Reserve Bank, the National Treasury and the Financial Services Board for inviting me. It is a privilege to speak this afternoon at the Emerging Markets Dialogue on OTC derivatives. And, it is always a pleasure to return to South Africa.

Today I would like to discuss the findings of the Macroeconomic Assessment Group on Derivatives (MAGD). The Group, which I chaired, brought together nearly 30 member institutions of the Financial Stability Board (FSB), and worked in close collaboration with the IMF. We also took guidance from academics and other official sector working groups, and we consulted with private sector OTC derivatives users and infrastructure providers. The Group developed and employed models that provide an estimate of the benefits and costs of the proposed reforms. Its final report was published on 26 August 2013 and is available on the BIS website.²

Before I turn to the Group's findings, let me offer a few examples to illustrate why OTC derivatives should be centrally cleared and collateralised. These are the stories of Amaranth Advisors, Long-Term Capital Management (LTCM) and American International Group (AIG).

Three examples: Amaranth Advisors, Long-Term Capital Management and AIG

In September 2006 Amaranth Advisors, a US-based hedge fund specialising in trading energy futures, lost roughly \$6 billion of its \$9 billion in assets under management and was liquidated. With the exception of its shareholders, most people watched with detachment. By contrast, eight years earlier, the impending collapse of LTCM provoked horror and financiers sprang into action to work out its debt without bankruptcy. One big difference was that Amaranth was engaged in trading natural gas futures contracts on an organised exchange, while LTCM had entered thousands of OTC interest rate swaps.

Futures and swaps differ in that futures are standardised and exchange-traded through a clearing house. This distinction explains why Amaranth's failure provoked a yawn, while LTCM's threatened a crisis. This suggests that regulators, finance ministries and central bankers should be pushing as many derivatives as possible onto central counterparties or

¹ The views expressed here are those of the author and do not necessarily reflect those of the BIS or the Macroeconomic Assessment Group on Derivatives. I would like to thank Jacob Gyntelberg and Nick Vause for their work in supporting the MAGD.

² The MAGD report can be found at <http://www.bis.org/publ/othp20.htm>.



clearing houses. Recent regulatory reforms insist on central counterparties (CCPs) or central clearing as the standard for global derivatives markets.

Consider a simple model for thinking about the problem posed by LTCM. Imagine a set of three institutions engaged in OTC activities, arranged in a circle. And, assume that each has a long position with the person to their right and a short position in the exact same contract with the person to their left. Everyone in this circle is perfectly hedged with a zero net position. But think of what happens if one goes bankrupt and breaks the circle; each of the other two is now exposed: one long and the other short. Expand the number around the circle to 10 or 20 and the problem does not essentially change.

This example is not hypothetical. It is common to offset a derivative position not by buying back the original contract from the original counterparty, but rather by entering into a new derivative contract for an offsetting payoff with someone else. As a result, any serious deterioration in the creditworthiness of one of the dealers, with the resulting flight to quality by its counterparties, creates a surge of demand for new derivative positions with other counterparties.

This counterparty risk can be reduced substantially by moving to centralised clearing, with its combination of collateralisation and, especially, multilateral netting. On the latter, multilateral netting can compress gross notional amounts by as much as a factor of 10. So, if LTCM had been forced to clear centrally, they might have had about \$150 billion in swaps outstanding, not \$1.5 trillion.

Turning to AIG, its London-based Financial Products Group, managed to sell enormous amounts of credit risk insurance without the liquid resources necessary to cover potential cash calls. By end-June 2008, AIG had taken on \$446 billion in notional credit risk exposure as a seller of credit risk protection via credit default swaps (CDS).

AIG's unhedged and largely uncollateralised sales of nearly half a trillion dollars of insurance represented a significant concentration of credit risk in a financial institution that ultimately did not have the cash to meet crisis-related calls. This concentration threw into stark relief the risks to both individual institutions and the global financial system arising from the vast amount of CDS trading – and showed that those risks were larger and more severe than anyone had realised.

The lesson from the AIG example is less about central clearing than it is about collateralisation and information. Would AIG have been able to write nearly half a trillion dollars face-value of insurance if they had been forced to post cash or other collateral? And, if counterparties had been informed about the scale of the position on an exchange, would they have continued to do business with AIG?

These examples illustrate the rationale for the new regulatory framework now being implemented. No wonder that authorities have pushed for the combination of central clearing, margining and capital requirements in both the new international standards and the new national regulations.



Analytical approach

Turning now to the work of the MAGD, let me summarise the approach and then give you some sense of the Group's estimates of the costs and the benefits.

The main benefit of the regulatory reforms is the prospect of a lower frequency of financial crises caused by OTC derivatives exposures. The main cost is a reduction in trading activity resulting from higher prices for risk transfer and other financial services. Graph 1 in the hand-out links the main benefits and costs of reforms to long-run GDP. Let me walk you through this schematic diagram.

Benefits

Starting with the benefits, please focus on the blue boxes at the top of the diagram. Broadly speaking, the Group agreed to focus on the balance sheets of OTC derivatives dealers. The idea is that if a shock to one dealer is large enough, it ripples through the system, driving up leverage and eventually creating a crisis. The boxes describe the propagation of shocks; the benefits should be understood as arising from an attenuation or elimination of the propagation effect.

The details of the analysis are straightforward. Following a shock (1), the default probability of the immediately affected dealer rises (2). Next, the dealer's counterparties incur mark-to-market losses in the form of an increase in what's called the credit valuation adjustments (or CVA) applied to derivatives exposures (3). This is a valuation adjustment that reflects the reduced likelihood that the derivative counterparty will actually make good on the contract. These losses then reverberate through the system of OTC derivatives exposures as follows: rising default probabilities lead to mark-to-market losses that drive up leverage (4), thereby further increasing default probabilities (2). This cycle repeats until the leverage of all institutions in the network settles down to new higher values.

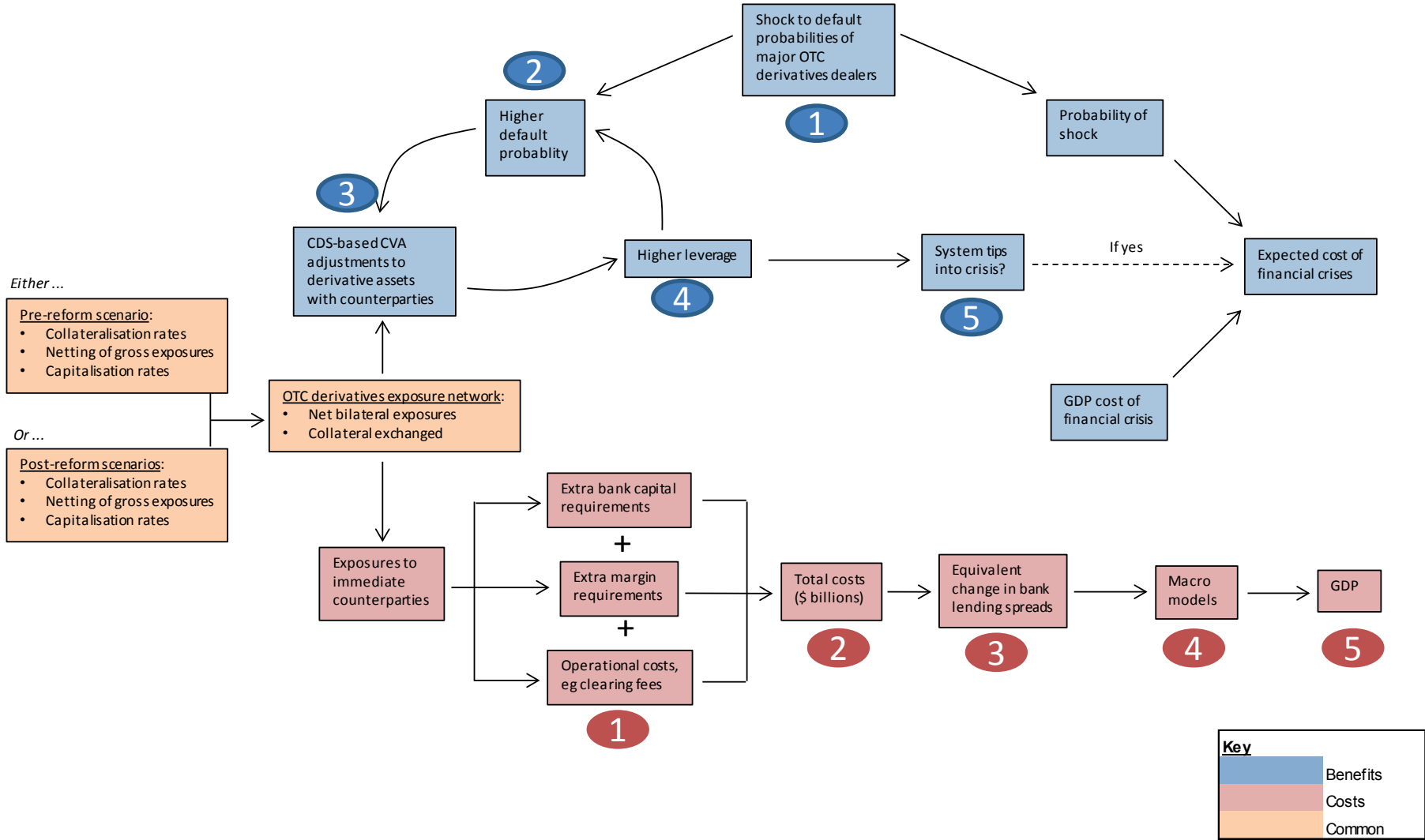
The larger the initial change in bank default probability, the higher will be the leverage of the system when it stabilises. Based on historical experience, the group assumed that institutions with a leverage ratio above 40 experienced financial stress. And, when a sufficient proportion of institutions in the network have leverage ratios at or above this level, the financial system tips into crisis (5).

Turning to a few numbers, the Group estimates that, pre-reform, the annual probability of such an event materialising is 0.26%. Using information from a previous macroeconomic assessment of regulatory reforms, we can say the median cost of such a crisis is about 60% of annual GDP.³ Putting these together leads to the conclusion that the expected cost of OTC derivatives-induced crises in the absence of reforms is 0.26% of 60% equalling 0.16% of GDP.

The Group concluded that, post-reform, exposures will be sufficiently collateralised that no plausible increases in default probabilities will be able to generate a financial crisis through OTC derivatives exposures. Hence, once the reforms are implemented, the probability of such a crisis will become negligible (absent the remote possibility that a central counterparty fails). Hence, the expected benefit of the reforms is around 0.16% of GDP.

³ Basel Committee on Banking Supervision, "An assessment of the long-term economic impact of stronger capital and liquidity requirements", 2010, <http://www.bis.org/publ/bcbs173.pdf>.

Graph 1: Schematic of the analytical approach





Before turning to the costs, I think it is worth responding to criticism of this approach. First, some critics have argued that, by focusing on derivatives exposures, the Group has ignored the impact of multilateral netting on other unsecured creditors. The main claim is that multilateral netting dilutes other unsecured creditors.

This is correct. Multilateral netting does dilute non-derivatives-related claims to some extent. However, this is neither new, nor is it unique to derivatives. In fact, repos, covered bonds and any other secured loans result in dilution and subordination. For repos, that counterparties can close out a position and seize collateral in default has led to comment and worry for some time. Given that this is all well known, I would think that it is already reflected in the pricing of the instruments involved. Presumably no one will be terribly surprised by this when it is applied to derivatives, and so the impact will be muted. It is a stretch to see how this redistribution of a part of the risk associated with OTC derivatives transactions increases systemic risk.

A second concern that has been raised is that the regulatory insistence on increased collateralisation will simply redistribute counterparty credit risk, not reduce it. To see the point, take the simple example of an interest rate swap. The primary purpose of the swap is to transfer interest rate risk. But the mechanics of the swap mean that there is always a risk that the parties involved will not pay. This is a credit risk. In the case where the swap is completely uncollateralised, it is clear that the instrument combines these two risks: interest rate (or market) risk, and credit risk.

Now think of what happens if there is collateralisation. At first it appears that the credit risk disappears, especially if there is both initial margin to cover unexpected market movements and variation margin to cover realised ones. But the collateral has to come from somewhere. Getting hold of it by borrowing, for example, will once again create credit risk.

The point is that, by collateralising the transaction, the market and credit risk are unbundled. I would argue fairly strenuously that unbundling is the right thing to do. Unbundling forces both the buyer and the seller to manage *both* the interest rate and the counterparty credit risks embedded in a swap contract. In the past, some parties seem to have simply ignored the credit component. Unbundling sheds light on the pricing of the two components of the contract. A more transparent market structure with more competitive pricing will almost surely result in better decisions and hence better risk management, risk allocation and ultimately lower systemic risk. The AIG example is a cautionary tale that leads us in this direction.

Despite these concerns, I remain convinced that the Group's analysis accurately captures the benefits of the proposed reforms. Multilateral netting combined with reduced leverage will strengthen the derivatives counterparty network without weaken other parts of the system.

Costs

I now turn to a brief description of the MAGD's analysis of the costs of the reforms. Again, looking at the schematic diagram in Graph 1, I draw your attention to the maroon boxes on the lower right-hand side. The strategy is to compute the costs of the increased capital and margining requirements (1 in the graph), combined with the rise in operating costs (2), translate those into increases in lending spreads (3), then using a macro model (4) and finally into changes in GDP (5). I will go through each of these in turn.

Starting with bank capital requirements, these arise from the new CVA charge that will be levied against uncollateralised bilateral OTC derivatives exposures and the new charges against trade and default fund exposures to CCPs. These requirements will likely make banks reduce their leverage and finance more of their assets with equity rather than debt. The Group estimates this additional financing cost as the difference between the cost of equity and the cost of debt, multiplied by the dollar value of the additional equity that will be required to meet the requirements imposed by the reforms. This estimate is an upper bound



since it assumes that the cost of the bank's external funding, both for debt and equity, does not fall as leverage and, hence, risk decrease.

The second source of additional costs for financial institutions stems from the requirement to post additional margin for OTC derivatives – whether because of new requirements for OTC trades or from the reallocation of exposures to central counterparties. The Group estimated this cost as the difference between the cost of funding the purchase of collateral-eligible assets and the interest received when they are posted as collateral, multiplied by the volume of extra collateral that will be needed under the reforms. Again, this estimate is an upper bound because it ignores the improved pricing of OTC derivatives that is likely to follow from the reduction in counterparty risk due to increased collateralisation.

The direct cost of central clearing infrastructure is a third source of additional expense for financial institutions. The Group estimates these costs from the known clearing fees and spreads on collateral already levied by major CCPs currently operating.

The sum of these three costs – those from holding more capital, posting additional margin and facing additional clearing fees – yields the total cost of the planned regulatory changes.

Assuming that this cost is fully recovered from borrowers, it is mapped into an increase in the lending spread. Using macroeconomic models, this is then converted into an estimate of the reduction in (long-run) annual GDP.

Collateral availability and the cyclicity of margins

Before I summarise the Group's main findings, let me briefly address two additional concerns about the impact of the regulatory reforms: collateral availability and the cyclicity of margins.

Will these requirements, combined with liquidity regulation, increases in collateralised funding and the like, result in a shortage of collateral? Central banks and regulators are well aware of these concerns and asked the Committee on the Global Financial System (CGFS) to look into the possibility. The recent report by the CGFS, however, found no evidence or expectation of any lasting or widespread scarcity of such assets in global financial markets.⁴ To quote from that report:

“Current estimates suggest that the combined impact of liquidity regulation and OTC derivatives reforms could generate additional collateral demand to the tune of \$4 trillion. At the same time, the supply of collateral assets is known to have risen significantly since end-2007. Outstanding amounts of AAA- and AA-rated government securities alone – based on the market capitalisation of widely used benchmark indices – increased by \$10.8 trillion between 2007 and 2012. Other measures suggest even greater increases in supply.”

The second concern is that requiring market participants to post initial margins and capital to cover the risk of potential changes in counterparty credit quality will destabilise the system as these measures would be procyclical. Here, I would like to stress that this is only true if initial margins and capital requirements related to credit valuation adjustments are set too low initially. It is very important that their levels are calibrated to be high enough to serve their purpose through the entire business cycle as well as during periods of market stress. I am very optimistic that stress testing, as currently envisaged, will take care of this.

⁴ Committee on the Global Financial System, “Asset encumbrance and the demand for collateral assets”, *CGFS Papers*, no 49, May 2013, <http://www.bis.org/publ/cgfs49.pdf>.



Also, as we see from the AIG example, the whole point of having CVA capital requirements is to make market participants more sensitive to possible declines in the quality of counterparty credit risk. Risk-sensitive margins force counterparties to internalise externalities and thus lead to a more stable system. AIG shows what can happen when banks mistakenly act as though an AAA rating is a good substitute for collateral. In short, some procyclicality in CVA capital may be better than the procyclicality we experienced in this case.

Main findings

Turning to the MAGD's main findings, the Group noted that the benefits and costs depend on how the reforms affect derivatives portfolios and the structure of the derivatives market more broadly. In particular, responses will alter the degree of netting of counterparty exposures. With this in mind, the Group analysed three scenarios that differ on the prevalence of central clearing and the efficiency of netting. For example, in the central scenario, the Group assumes netting removes roughly three quarters of the bilateral gross exposures while the share of all contracts that moves onto CCPs rises from 40% to 60%.⁵

In the central scenario shown in the middle column of Table 1, the Group estimates that the cost is equivalent to a 0.08 percentage point increase in the cost of outstanding credit. Using a suite of macroeconomic models, the Group estimates that this could lower annual GDP by 0.04%. Subtracting this from the benefits of 0.16% of GDP per year gives the resulting net benefit of +0.12% of GDP per year. Importantly, this estimate varies little across the post-reform scenarios because the reforms demand collateralisation of the vast majority of net counterparty exposures, whatever their size.

Macroeconomic benefits and costs of OTC derivatives regulatory reforms

Change in expected annual GDP after full implementation and effects of reforms; in per cent

	Low-costs scenario (high netting)	Central scenario	High-costs scenario (low netting)
Benefits ¹	+0.16	+0.16	+0.16
Costs ²	-0.03	-0.04	-0.07
Net benefits	+0.13	+0.12	+0.09

¹ Reduction in output losses from financial crises, computed as the estimated decline in the probability of financial crises propagated by OTC derivatives exposures multiplied by the average cost of past financial crises. ² Effect on GDP of higher prices of financial services, as evaluated by a range of macroeconomic models. The table reports the GDP-weighted median effect calculated by these models.

Table 1

⁵ Pre-reform and in the "low-cost" scenario, netting is also assumed to remove roughly three quarters of the previous exposures. The share of contracts that are moved onto CCPs rises from 40% to 70%. In the "high-cost" scenario, netting is assumed to have no effect on exposures. The share of contracts that are moved onto CCPs rises from 40% to 60%.



Conclusion

Let me conclude by acknowledging that, as with any impact assessment, uncertainties remain that the Group could not resolve. Let me highlight two:

- (1) The lack of access to actual bilateral exposure data (ie net of collateral) related to OTC derivatives; and
- (2) The paucity of quantitative modelling techniques that allow for a joint analysis of the costs and benefits.

It was not possible for the MAGD to obtain a complete set of data on the actual structure of the bilateral exposures (including net of collateral) related to OTC derivatives. Going forward, securing appropriate detailed information would improve the capacity of the regulators and central banks to perform analysis of OTC derivatives market functioning and reforms.

Due to the tight timeline for the analysis, it was not possible to design, let alone implement, new quantitative models and techniques for assessing the benefits and costs of OTC derivatives regulatory reforms in a common analytical framework. Clearly, more work is needed to guide and to improve our understanding of the likely macroeconomic impact of regulatory reforms that target the use of derivatives as well as other types of financial contracts.

Despite employing only the limited available data and making heroic modelling assumptions, the Group's conclusions are unambiguous: the economic benefits of derivatives market reforms are likely to exceed their costs. And, as central clearing is important to realising these benefits, regulators and market participants must work to clear as many OTC derivatives as possible centrally, with either a modest number of central counterparties or central counterparties that interoperate. This should include efforts to harmonise the rules governing cross-border transactions so that market participants have equal access to CCPs.

Thank you for your attention.