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London Review of Books

All Those Arrows

Donald MacKenzie

- *Fool's Gold: How Unrestrained Greed Corrupted a Dream, Shattered Global Markets and Unleashed a Catastrophe* by [Gillian Tett](#)
Little, Brown, 338 pp, £18.99, April 2009, ISBN 978 1 4087 0164 5

Few people's reputations have been improved by the credit crisis. One is the BBC's Robert Peston; another is Vince Cable. A third is Gillian Tett, capital markets editor of the *Financial Times*. Prior to the crisis, she and her team were the only mainstream journalists who covered in any detail the arcane world of 'credit derivatives'. Tett saw – however imperfectly – the huge risks that were accumulating unnoticed within that world, and spoke out about them.

Fool's Gold begins in a conference room in Nice in spring 2005. Tett admits that at that point she was baffled by the technical language – 'Gaussian copula', 'attachment point', 'delta hedging' – used by the participants. However, before joining the *FT* she had conducted fieldwork in Soviet Tajikistan for a PhD in social anthropology, and the ethnographer in her was now reawakened. The conference reminded her of a Tajik wedding. Those attending it were forging social links and celebrating a tacit world-view – in this case, one in which 'it was perfectly valid to discuss money in abstract, mathematical, ultra-complex terms, without any reference to tangible human beings.'

She whispered to the man sitting beside her, asking who the key actors in the ceremony were – those up on the conference hall's stage. 'They used to all work at J.P. Morgan,' he answered. 'It's like this Morgan mafia thing. They sort of created the credit derivatives market.' The answer surprised her. J.P. Morgan was not Goldman Sachs; it wasn't an exciting bank. It bore the name of America's most celebrated financier, but it was 'dull': safe, boring, perhaps a little snobbish. (When its current chief executive, the now well-respected Jamie Dimon, joined the bank from Bank One, whose headquarters were in Chicago, Tett reports that one Morgan banker muttered: 'Not another retail banker from Hicksville, USA!')

The core of Tett's book, which is by far the most insightful of the first wave of books on the crisis, is the story of J.P. Morgan's credit derivatives team. For all the bank's traditionalism – the door staff at its London offices wouldn't look out of place outside the Ritz – it was quietly innovative. One of the team's driving forces was a young Englishwoman, Blythe Masters; another, Terri Duhon, makes no secret of her upbringing in a trailer in Louisiana; central to its technical work was an Indian mathematician, Krishna Varikooty. Boisterousness that would have horrified John Pierpont Morgan was tolerated. At one gathering in Florida, one of the team's managers broke his nose when drunken colleagues were pushing him into a hotel swimming-pool.

The team's pivotal innovation, introduced in December 1997, was a deal they called 'Bistro' (Broad Index Secured Trust Offering). For a decade, banks had been experimenting with credit derivatives, which are ways of separating out the 'credit risk' involved in lending (the

risk that borrowers will default on their obligations, failing to make the required interest payments or not repaying their loans) and turning that risk into a product that can be bought and sold. Bistro helped make this tentative activity big business: it transferred to outside parties the credit risk of loans totalling \$9.7 billion that J.P. Morgan had made to 307 companies. The scheme was an influential version of a CDO (collateralised debt obligation), and like other CDOs, Bistro was divided into ‘tranches’, of which originally there were two. Investors in the lower or ‘junior’ tranche received a healthy rate of return, 375 basis points over Libor (London Interbank Offered Rate), which is the average rate at which a panel of leading banks report they can borrow from other banks.^[*] (A basis point is a hundredth of a percentage point.) This compensated the junior investors for the fact that their investments would bear the initial losses, beyond a small reserve built up during the deal’s first five years, should any of the 307 borrowers default.

Only if those losses were to exceed the entirety of the investments in the junior tranche would the holders of Bistro’s senior tranche – which paid only 60 basis points over Libor – suffer. The loans that made up Bistro were well diversified across industries, and were made predominantly to blue-chip companies, so losses to Bistro’s senior tranche seemed unlikely enough for Moody’s – one of the three leading credit rating agencies, along with Standard & Poor’s and Fitch – to award the tranche its highest rating, Aaa.

Aaa was a rare distinction. Only a dozen corporations and fewer than two dozen governments were judged worthy of it: neither Italy nor Japan has an Aaa rating. (Standard & Poor’s recently indicated that the UK is now in some danger of losing its top rating.) Blythe Masters had formidable powers of persuasion, which helped when selling a deal that looked ‘like a science experiment, with all those arrows’, as one investor quoted by Tett described Bistro’s documentation. Yet 60 basis points over Libor, for an investment judged safer than the sovereign bonds of some of the world’s leading economies, was the most powerful argument of all: an investor would normally struggle to find an Aaa investment that yielded as much as Libor.

For J.P. Morgan, Bistro solved one problem and potentially addressed a second. First, while the 307 corporations were generally low risks, even the most creditworthy borrowers can default. So \$9.7 billion in loans was a significant constraint on the bank’s future lending. Bistro removed that constraint. Second, the Basel Capital Accord, signed by the world’s leading banking regulators in 1988 and implemented by them in 1992, forced banks to carry reserves equal to 8 per cent of their risk-weighted lending. While certain categories of lending – to other OECD banks, for example – qualified for a reduced reserve requirement, loans to even the safest industrial corporation incurred the full 8 per cent, a figure that bankers felt was far larger than justified by the risks involved. J.P. Morgan hoped that the transfer of credit risk achieved by Bistro would persuade regulators to reduce that requirement considerably, and Tett reports that Masters and her colleague Bill Demchak pushed the Federal Reserve and the Office of the Comptroller of the Currency to clarify what exactly would be needed to achieve that.

Bistro differed from earlier CDOs in that it did not, in fact, transfer to external investors all the credit risk of the \$9.7 billion of loans. The junior and senior tranches amounted in total to only \$700 million; the bank believed that the chances of losses ever exceeding that figure were too tiny for it to be worth paying investors to shoulder them. The regulators, however, demanded that the bank do something to remove that residual ‘unfunded risk’ before they would relax the 8 per cent capital requirement.

The residual risk was like a topmost tranche, sitting above the senior tranche; it would come into play only if losses entirely wiped out the latter. The senior tranche was Aaa, as safe as it gets; the residual 'super-senior' tranche (as the J.P. Morgan team christened it) was safer than safe. To satisfy the regulators, however, the team turned to the Financial Products division of the leading US insurer, AIG. Sharing J.P. Morgan's analysis that the super-senior tranche was ultrasafe, AIG agreed to insure it against all remaining losses, charging an annual premium of only a fiftieth of 1 per cent of the sum insured. From the viewpoint of AIG, it was small-scale business, but apparently highly profitable: by covering an effectively non-existent risk, the firm earned \$1.8 million a year.

In that little afterthought to Bistro – what to do with the super-senior tranche – lay the germ of much of the credit crisis, especially its disastrous effects on many of the world's leading banks. Bistro-like deals started in the world of corporate borrowing, but from 1999 began also to be implemented in the world of consumer debt, especially mortgages. Lenders actually had a longer experience of packaging mortgages into securities than of packaging corporate debt into CDOs, and mortgage-backed securities had acquired an admirable reputation for safety. They have a structure like that of CDOs, with different tranches carrying various levels of exposure to risk. The safest, Aaa tranches had impeccably default-free records, and even the riskier tranches had performed well: indeed, on average better than corporate bonds with the same ratings. It wasn't that people never defaulted on their mortgages – they did – but the securities were designed to take this into account, for example by building up reserve funds (analogous to but usually proportionally larger than Bistro's small reserve) that would absorb the anticipated losses. For many years, such provisions proved in general fully adequate.

What happened from 1999 onwards was that mortgage-backed securities, which already represented one layer of packaging of debt, started to be repackaged into CDOs, thus creating a Russian doll product: a tranced, packaged product each component of which was itself a tranche of a packaged product. Given their excellent reputation, putting mortgage-backed securities rather than corporate bonds or loans inside CDOs might seem a small step. Yet when in 1999 Bayerische Landesbank, which had become involved in the US mortgage market, approached J.P. Morgan to package \$14 billion of bundles of mortgages and other forms of predominantly consumer debt into a Bistro structure, there were initially serious doubts within the Morgan team.

The problematic issue was correlation, which is at the core of evaluating a CDO. Low correlation means that defaults are essentially idiosyncratic events, with the consequence that only the bottommost tranche of a typical CDO is at significant risk. High correlation means that if defaults happen they tend to cluster, and the clustering of defaults puts investors in the higher, apparently safer, tranches at risk of loss. Participants in the emerging credit-derivatives market tended to be confident that they had a fair grasp of the correlation of corporate defaults. The rating agencies had large databases of such defaults from which the extent of clustering could be inferred at least roughly, and other market participants often took the easily measured level of correlation between the moves of different corporations' stock prices as a guide to the correlation of their net asset values. (The link between the latter and default is that the most important cause of corporate default is bankruptcy, which can be thought of as happening when a corporation's net asset value falls below zero: that is, when its liabilities exceed its assets.) Clearly, the correlation of the asset values of two different corporations was unlikely to be zero, since general economic conditions will affect both; it wasn't likely to be 1.0 either, since that would indicate perfect correlation. A commonly used

figure was 0.3: it was, for example, the standard level of correlation between the asset values of firms in the same industry that Standard & Poor's initially assumed in CDO Evaluator, the software system it began using in 2001 to rate CDOs.

The credit crisis has inured us to gigantic numbers – losses measured in billions or trillions of dollars – but we need to pay attention to its small numbers as well if we're going to understand it properly. A correlation of 0.3 was modest. If it was correct it was highly unlikely that the senior tranche of a CDO such as Bistro would suffer a loss – unlikely enough to warrant an Aaa rating – and effectively inconceivable that the super-senior tranche would be hit.

However, the figure of 0.3 was produced by analysis of corporate debt. How could one estimate the equivalent correlation for mortgage-backed securities? Paradoxically, their safety was a disadvantage in this respect: there was effectively no record of default that could be scrutinised for traces of clustering. Nor did such securities trade often enough for the correlation of their prices to be measured: most investors simply held them until they matured. Intuitively, though, it seemed conceivable that defaults in bundles of mortgages or other forms of consumer debt could be quite highly correlated, because of the likely influence of factors such as the overall unemployment level, and that could make a CDO based on mortgage-backed securities an unduly risky product.

Terri Duhon, who led the Bayerische Landesbank mortgage-backed CDO, told me in an interview that some of her J.P. Morgan colleagues doubted at first that the deal should go ahead: they argued that 'there is no way we should be doing this because it's way too correlated.' Tett reports that Krishna Varikooty, for example, was concerned by a correlation risk that seemed to him to be unquantifiable. After intensive discussion and analysis, and very conservative structuring of the deal, the team eventually agreed that it was safe to go ahead (it helped that, unlike in many more recent deals, the ratings of the underlying assets were high – around 95 per cent had Aaa ratings – and none of the securities was based on sub-prime mortgages). Yet the reservations remained, and from this point onwards, J.P. Morgan constructed only one further large CDO, and a limited number of smaller ones, in which the underlying assets were bundles of mortgages.

Consequently, the bank remained on the sidelines as the once largely distinct worlds of CDOs and mortgage-backed securities became more closely linked from 2002 onwards. It was an encounter of two subtly different cultures, with, for example, quite different mathematical approaches. The CDO world developed explicit and increasingly elaborate models of correlation – the 'Gaussian copula' that initially puzzled Tett is one of them – while the mortgage world handled the phenomenon entirely implicitly. In most investment banks, and also – as far as I have been able to discover – in the New York head offices of the rating agencies, separate groups or departments handled mortgage-backed securities and CDOs based on corporate debt. In investment banks, for instance, those different departments seem to have had surprisingly little to do with each other. The two cultures never really merged; instead, the CDO, a structure invented by the corporate-debt world, was applied to the products of the mortgage world.

Members of both cultures now see the encounter as corrupting. 'They' – constructors of CDOs based on mortgage-backed securities – 'took our tools' and misused them, one specialist in corporate credit derivatives told me a few weeks ago. Those with a background in mortgage-backed securities blame CDOs (with some justice) for being indiscriminate

buyers of those securities, concerned only with their ratings and the spreads (increments over Libor) they offered. Two experienced industry observers, Mark Adelson and David Jacob, suggest that a fatal point was reached when CDOs became almost the only purchasers of the riskier tranches of mortgage-backed securities. Previously, those tranches had either been guaranteed against default by specialist insurers, or bought by canny investors, who would carefully assess the risks involved. These insurers and investors acted as a brake on the riskiness of the lower tranches, and thus on the overall riskiness of mortgage-backed securities, and they demanded a healthy rate of return for taking on the risks. They were displaced by those buying tranches in order to package them into CDOs, who were prepared to buy them at lower rates of return, and who cared a lot less about their riskiness, because those risks were going to be passed on to investors in the CDOs.

With the brake removed, the construction of CDOs based on mortgage-backed securities became a fast-moving assembly line (participants frequently turn to machine metaphors when describing the process). Brokers sold mortgages knowing that they could readily be sold on in the form of mortgage-backed securities. Instead of having to worry whether the couple sitting on the other side of their desk really had the wherewithal to keep up their payments, all that mattered were the dozen or so quantitative characteristics – such as borrowers' FICO (Fair Isaac Corporation) creditworthiness scores – that influenced rating agencies' mortgage models. The constructors of mortgage-backed securities no longer had to satisfy specialist insurers or experienced investors: CDOs had an apparently insatiable demand for those securities.

If the assembly line was to keep moving, it was essential that the higher tranches of its final products – CDOs in which the underlying assets were mortgage-backed securities – gained Aaa ratings. A critical issue was the likely correlation of mortgage-backed securities. Standard & Poor's, for example, used the same system, CDO Evaluator, that it employed for CDOs based on corporate debt, and it used the same modest baseline correlation assumption, 0.3, for mortgage-backed securities that it initially used for corporations within the same industry. (S&P would later reduce this last figure, while increasing its assumption about cross-industry correlation.) These baseline correlation figures could be increased by the analysts rating a specific CDO if it was highly concentrated in a particular industry or consumer debt sector. I haven't been able to ascertain the equivalent figures used by the other agencies, whose methods differed somewhat from Standard & Poor's, but the similarity of their ratings to S&P's suggest similar judgments. I am focusing on S&P simply because – commendably – it seems to have been more explicit than the other agencies, in the publicly available documentation for CDO Evaluator, about the crucial assumptions underpinning the system.

The choice of 0.3, or a number close to it, as the baseline was critical: one specialist told me that even a moderate increase in the baseline correlation assumption, to 0.5 for example, would have made many CDOs based on mortgage-backed securities much less attractive, perhaps even not economically viable. However, as far as I can discover, analysing CDOs built out of mortgage-backed securities using only modest correlation levels seems in general to have been uncontroversial. Certainly, the performance of mortgage-backed securities offered little reason to be more stringent when rating CDOs based on them. For example, S&P's statistical analyses suggested a correlation of mortgage-backed securities lower than 0.3; this figure was retained as a baseline because it was understood that the correlation would rise when economic conditions became less benign.

Had the world remained as it was in 2002, the agencies' assumptions and ratings might well have turned out to be perfectly appropriate. The trouble with an assembly line, though, is that it produces identical products. The only person outside J.P. Morgan I've found so far who thought at the time that the correlation estimates being used to analyse CDOs of mortgage-backed securities were much too low had made the discovery by accident. In a previous job as an auditor, he had checked the statistical tables that the sellers of mortgage-backed securities provide to prospective buyers. These tables show the breakdown of the underlying loans by state, FICO score, loan-to-value ratio and so on. When checking the tables for one security, he inadvertently used the loan tape (the underlying mortgage data) for another, and found that they were in almost complete agreement. 'These deals' – apparently different mortgage-backed securities – 'were the same deal,' he told me. Even geographical dispersion of the underlying mortgages across the US (a desirable feature when an individual mortgage-backed security was considered in isolation, because it reduced exposure to the vagaries of a particular local housing market) had the paradoxical effect of increasing the homogeneity of different mortgage-backed securities. In a situation of severe economic stress – falling house prices, rising unemployment – it wasn't just that some of those securities would perform badly; they all would. Instead of correlation remaining modest, my interviewee came to fear that it would be close to perfect.

Specialists in mortgage-backed securities in the US have not been entirely surprised at the fraud and malpractice that has come to light: it was always present, and has changed only in scale. (There was a US sub-prime crisis in the late 1990s, which only specialists seem to remember.^[†] It was much more limited in scale, but it revealed extensive over-optimistic accounting by lenders.) That mortgage defaults have risen, and the value of repossessed homes fallen, is not in itself surprising to specialists, although the size of the changes certainly is. At least some of them began to suspect that long-standing statistical relationships – for example between individuals' credit scores and the risk that they would default on their mortgages – had ceased to be valid, but as far as I can tell this didn't happen until as late as 2006, by which time the processes that led to the credit crisis were well underway. One problem, for instance, seems to have been that as individuals' scores increasingly determined their access to credit and the rates of interest they had to pay, they found ways to manipulate those scores. A modest web-based industry developed which arranged (in return for a fee of one or two thousand dollars per person) for people – in some cases, apparently, dozens of people – with low credit scores to be added as 'authorised users' to the credit card account of someone with a high score and an impeccable payment record. It took just a month or two for the benefits of the primary cardholder's regular payments to feed through into improvements in the credit scores of the card's 'renters'.

If CDOs backed by mortgages had worked as the J.P. Morgan team had envisaged when designing Bistro, the losses to investors in those CDOs that the US housing bubble and its collapse have caused, though very large, would have been spread widely across the many institutions that bought tranches of such CDOs. As Tett notes, what has shocked the members of that team – many of whom now work for other banks and hedge funds, but still stay in touch – is the concentration of such losses, especially at apparently sophisticated global banks such as Bear Stearns, Lehman Brothers, UBS, Citigroup, Merrill Lynch, Morgan Stanley and the Royal Bank of Scotland.

The primary vehicle by which risk was concentrated was Bistro's afterthought, the super-senior tranches of CDOs. Even the riskiest mortgage-backed CDOs – those that predominantly bought 'mezzanine' (next-to-lowest) tranches of mortgage-backed securities –

have super-senior tranches that are bigger than all the other tranches put together. These super-senior tranches were hard to sell to most outside investors, because the need for attractive returns on lower tranches means a super-senior tranche can offer only a slender increment over Libor. By 2005, Tett reports, that spread was as low as 15 basis points.

Thus many banks did as J.P. Morgan did with Bistro: they kept the super-senior tranches, sometimes insuring them via AIG or specialist bond insurers. (Adelson and Jacob point out the irony: risks that mortgage experts in the insurers would have charged heavily for or perhaps even declined were insured in packaged form in huge amounts – and quite cheaply – by different departments of the same firms.) If only a handful of deals had been insured in this way, it would have made perfect sense. As Tett observes, however, AIG insured super-senior tranches amounting to \$560 billion. Its bail-out by the US taxpayer dwarfs that of any bank, and it keeps rising (the current total is \$173 billion). But AIG cannot be allowed to fail, because the loss of these crucial super-senior insurance contracts could bring much of the banking system down with it.

Perhaps most surprising of all, top banks also bought super-senior tranches originated by other banks. If you are a top bank, you can borrow at around Libor (that is, after all, what Libor means); if you are particularly well regarded, it may be possible to borrow at a rate a tiny bit lower than Libor. So you could borrow at Libor or below, buy a tranche that seemed safer than safe, and from it earn a slender spread over Libor. It looked like free money. It was especially tempting to traders whose banks ‘charged’ them for their use of capital, in the systems by which traders’ profit is measured, at around Libor, and credited them with the small additional spread that super-senior tranches offered. The slenderness of the spread meant that you had to do the trade on a very large scale to earn a really big bonus, so traders did just that.

As I’ve already indicated, the vulnerability of super-senior tranches is correlation. Losses on uncorrelated assets are unlikely ever to impact on super-senior tranches. When correlation approaches 1.0, however, a CDO’s asset pool starts to behave like a single investment. It may suffer no defaults, or it may default effectively in its entirety. If the latter happens, even the super-senior tranche, safer than safe, is doomed.

As the historian of economics Perry Mehrling has pointed out, events in financial markets cast shadows ahead, not behind. What has loomed over the banking system for the last two years is the shadow of the gigantic, system-wide default of the super-senior tranches of all the CDOs based on the US mortgage-backed securities issued towards the end of the bubble. (Residential mortgages have been the focus of most of the attention, but there are also lots of problems with commercial mortgages.) Although, alas, the losses will not stop there, most immediately at risk have been CDOs made up primarily of the mezzanine tranches of sub-prime mortgage-backed securities issued from late 2005 on. Defaults have risen enough, the value of repossessed homes has fallen enough, and the structure and composition of these securities has been similar enough, that as far as I can tell almost all such tranches have been or will be completely wiped out. If a CDO contains little but such tranches, even its super-senior portion faces close to total losses. So far, only a limited portion of those losses have actually been realised. The banking system is braced for the rest of them but, with the massive aid of taxpayers, it is, one hopes, now well enough capitalised to survive these and the other losses that sharp recession will bring.

Unfortunately, this analysis – that the crux of the problem has been not in CDOs per se but in the uncomfortable encounter between the world of CDOs and that of mortgage-backed securities – remains only a hypothesis. The world of corporate CDOs has itself manifested some of the phenomena of the mortgage CDO assembly line: increasingly risky loans were made to private equity firms and to other highly indebted corporate borrowers because it was possible to package and sell on those loans in the form of CDOs. I've just come back from New York, where I asked some of those I spoke to about the magnitude of the problems that may lurk beneath the still comparatively quiet surface of this sector of the CDO market, which, although not as large as the mortgage sector, is still huge. My interviewees seem convinced that while the problems are real, they are on nothing like the same scale: the amount of truly irresponsible lending to corporations was much smaller. I hope they are right.

At its heart, Tett's tale is a moral one. She believes that the history of the J.P. Morgan credit derivatives team shows that banking can be technically innovative while remaining responsible. Her readers may fear that the anthropologist has gone native, but I don't think so. I have met a good number of the people she is writing about, and have studied many of the same events, and I largely share her judgment. In particular, J.P. Morgan's decision not to set up a mortgage CDO assembly line has saved the bank from the catastrophic losses so many of its peers have suffered; unlike theirs, its solvency has never been in doubt. It is too easy just now to condemn all of those who work at the heart of the financial system as either rogues or fools. Tett is right to emphasise that despite all the pressures and all the temptations, prudent banking was still practised – sometimes – even at the centre of history's largest ever credit bubble.

11 June

[*] Donald MacKenzie wrote about CDOs in the [LRB of 8 May 2008](#) and about Libor in the [issue of 25 September 2008](#).

[†] It is discussed in the final chapter of an excellent book that, while more limited in scope and more technical than Tett's, deserves to be better known: *Subprime Mortgage Credit Derivatives* by Laurie Goodman et al (Wiley, 344 pp., £55, July 2008, 978 0 470 24366 4).

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