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Abstract: Until the Great Recession, the largely unregulated over-the-counter (OTC) markets had received little attention from compliance officers, regulators, and lawmakers. Perhaps more important than the lack of regulatory framework as such, the markets were widely perceived to be sufficiently large, liquid, efficient and competitive to withstand manipulative and collusive attempts by traders and banks. However, the status quo was radically altered in 2012, when it was revealed that major international banks had systematically manipulated the world's most widely used interest rate benchmark. The 'LIBOR scandal' was quickly followed by a 'Forex scandal' and the discovery of grave misconduct in a range of other OTC benchmarks and markets. At the time of writing, government bonds traded on electronic trading platforms are under particular scrutiny. This paper draws on the concepts of conspiracies (Smith 1776), beauty contests (Keynes 1936) and sabotage (Veblen 1921) to reflect on why it took so long for the scandals to be discovered.

Keywords: banks, beauty contest, conspiracies, financial regulation, LIBOR, manipulation, OTC markets, sabotage

JEL Classification Numbers: E43, F31, G14, G15, G18

Over the last decade, global over-the-counter (OTC) markets have been rocked by manipulation scandals. The London Interbank Offered Rate (LIBOR) scandal revealed that major international banks had systematically manipulated a money market benchmark labelled as "the world's most important number". This was quickly followed by the discovery of widespread misconduct by banks in the world's largest market: the foreign exchange market. Currently, regulators are preoccupied with investigating "spoofing", a manipulative tactic which appears to be prominent in government bond markets on electronic trading platforms. For example, following a $920 million fine imposed on JP Morgan, the Commodity Futures Trading Commission (CFTC) argued that the bank's activity had "involved hundreds of thousands of spoof orders" over at least eight years (CFTC 2020).

The gigantic manipulative schemes have been met by record-breaking fines and settlements. Stricter regulation has also been implemented, and some cases have resulted in criminal charges. More sophisticated control, compliance and surveillance mechanisms have been introduced. These reforms have ultimately been to protect consumers and regain trust in financial markets and the institutions associated with them.

However, what has not been adequately addressed is how it all was possible. How could the world's most widely used financial benchmark be rigged for years without people on the outside noticing? Why did large companies not see banks colluding when setting the price on their foreign exchange orders? How could the largest bank in the US submit hundreds of thousands of manipulative orders to major exchanges for years without triggering any warning signal whatsoever?

The Anatomy of Three Scandals

LIBOR was invented in the 1980s to initially serve as a benchmark in the expanding syndicated loan markets. In the absence of a transparent money market *per se* (as such transactions are confidential), LIBOR was supposed to reflect interest rates for different maturities and currencies. It came to be used as a reference rate in financial derivatives, student loans and credit card debt and as a crucial indicator of potential stress in the

financial system. The benchmark was generated through a mechanism which consisted of an exclusive group of banks. The LIBOR scandal revealed that major international banks had systematically manipulated the benchmark - not only to profit from LIBOR-indexed derivatives that panel banks had on their books, but also as a means to portray themselves as relatively safe and sound during the financial crisis (Stenfors 2014ab).

Manipulation of the LIBOR and equivalent interest rate benchmarks was achieved internally (within panel banks) and externally (between panel banks and brokers) (Muchimba 2022). Internally, derivatives traders requested the submitters of money market information to submit rates that favoured their derivative positions. Further, in certain instances internal money market traders and derivatives traders faced a conflict of interest as they were also submitters of money market information[1]. Externally, panel banks made requests to fellow panel banks to submit rates that favoured their positions. Additionally, they requested brokers to submit "false and misleading" interest rate information in the market[2]. With enormous profits or losses at stake in the $400 trillion LIBOR-indexed derivatives market (not to mention the perils of being subject to a bank run), the incentives of manipulation were quite obvious.

The Forex scandal, by contrast, entailed the actual buying and selling of currencies to produce a fake benchmark. Overwhelmingly, the focal point was the so-called WM/Reuters 4 p.m. fix – a daily snapshot intended to capture the fair price of exchange rates during the closing minute of the London market. The benchmark was generated by calculating an average of actual trading activity around 4 p.m. Banks accepting "fix orders" from clients would guarantee execution at the fix price. Multinational companies, pension funds and asset managers had increasingly gotten into the habit of leaving fix orders to banks daily. Problematically, the orders incentivised banks to manipulate the fixed price higher if the client had left an order to buy, and vice versa – and that was what the banks did.

[1] For example, despite the inherent conflict of interest Rabobank allowed submitters of money market information to trade in money derivatives products (FCA 2013).

[2] Since brokers were engaged in matching cash lenders and borrowers in the interbank market, and derivatives activities, they possessed. information on the general view of the market based on their knowledge and evaluation. To this effect, brokers were in regular contact with panel banks.

OTC markets are increasingly traded on electronic trading platforms. Since the COVID-19 pandemic, new working-from-home habits have spurred this on, and the change has been most notable in the US Treasury bond market. The development has been a blessing for algorithmic and high-frequency traders, who require access to electronic market venues (Stenfors and Susai 2021; Stenfors et al. 2022). As a result, in its latest incarnation, the government bond market has become increasingly susceptible to sophisticated manipulation such as spoofing. Spoofing entails submitting a fake order with the intent to cause other market participants to react *as if* the supply or demand in the market has changed.[3]

Crime and Punishment

In his classic article "Crime and Punishment: An Economic Approach", Gary Becker constructs a model that incorporates "the behavioural relations" concerning the economics of crime (Becker 1968). The key variables are crimes (or offences), arrests, punishments and convictions, and the associated costs and benefits. In the spirit of what is to become standard economic theory, the perpetrators are assumed to be rational and individualistic at the outset. Becker portrays a rather cynical picture of humanity, where anyone and everyone would turn into a bank robber if the benefits outweighed the costs and probabilities of getting caught and convicted. Rather than following a conscience, doing what is socially acceptable, or obeying the law, crime and punishment essentially become a mathematical optimisation problem.

The economic approach outlined by Becker can not only be applied to the LIBOR and Forex scandals but also to misconduct in the government bond market, which is increasingly traded electronically. The trading platform can be conceptualised as the bank that will be robbed, because the probability of being caught and convicted is deemed to

[3] An example of a spoof would be the following. An (anonymous) manipulator submits a "genuine" sell order to an electronic order book. The manipulator then also submits a very large but not particularly aggressive order from the other side. Because other market participants interpret the new, very large, buy order as a signal that the market price is likely to increase, the genuine sell order is executed. Immediately thereafter, the manipulator cancels the fake buy order.

be non-existent. Perversely, the $920 million settlement between JP Morgan and the CFTC represents the largest-ever spoofing fine imposed by a regulator.

The actions taken by regulators and lawmakers confirms that the issues, throughout the three scandals, have been approached from this perspective. Banks paid approximately $10 billion in LIBOR-related fines, and a similar amount was paid for behaviour related to the FX markets. It is too early to provide an estimate on spoofing, but it is also likely to cost banks billions in fines and settlements. In addition, banks have been forced to improve their accountability, controls and surveillance. Also, benchmarks have been reformed to become more robust and market-like. Thus, the diagnosis of the "puzzle" of systematic manipulative and collusive has involved familiar remedies such as a reduction of incentives, greater transparency, more competition and accountability – with the intent to shift the "equilibrium" of crime and punishment to a more appropriate point.

Problematically, no matter how convenient it might be to put the blame on incentive structures and the lack of controls and oversight, it offers little insight into how such gigantic markets could be manipulated systematically and without discovery.

Adam Smith and Conspiracies

Financial markets directly linked to the state are typically traded OTC rather than on an exchange. It is, therefore, logical that financial crises have almost exclusively been linked to one more of the three most prominent "state-linked" OTC markets – namely, the money market (e.g. the financial crisis of 2007-00), the government bond markets (e.g. the European sovereign debt crisis) and the FX market (e.g. the 1994 Mexican peso crisis). Further, OTC markets are decentralised and require a relationship between the buyer and the seller or the borrower and the lender. Since the transactions involve money and credit, banks become the natural counterparties. Through long-standing primary dealership or market-making agreements with their governments and central banks, the banks have historically tended to provide liquidity to each other and the market as a whole (Stenfors 2018; Stenfors and Susai 2018). Thus, communication between competing banks is natural in OTC markets, and this is, of course, reinforced by the fact

that the structure has been created by the very same banks (Stenfors and Lindo 2018). Logically, the list of perpetrators involved in the manipulation scandals has read like a "Who's Who" in global banking.[4]

Here, the famous quote by Adam Smith goes a long way in illustrating the almost inevitable outcome of banks getting together in exclusive LIBOR panel meetings or electronic chat rooms by invitation only (a favourite meeting point for FX collusion): "*People of the same trade seldom meet together even for merriment and diversion, but the conversation ends in a conspiracy against the public or contrivance to raise prices.*" (Smith [1776] 1976: 145). However, contrast Smith's depiction with the neoclassical version by Becker: "*Firms in a collusion are assumed to choose probabilities of detection, punishments to violators, and prices and outputs that minimize their loss from violations, which would at the same time maximize their gain from colluding.*" (Becker 1968: 206). Notice, in particular, how prospective colluders have been stripped of social capabilities and, instead, been equipped with a toolbox of mathematical formulae enabling them to ponder whether or not to be part of the murky club.

John Maynard Keynes and Beauty Contests

According to what has become standard economic theory, the rules of the game are provided exogenously. From the perspective of the perpetrator, it merely becomes a matter of navigating through an external set of parameters to maximise profits and, at the same time, keep risks low of being caught and convicted. It is, therefore, not surprising that the spotlight in the LIBOR and Forex scandals was shone on the "rotten apples" who had broken the rules or abused the system. However, the observation that the structure and rules of LIBOR and WM/Reuters 4 p.m. fix had mainly been invented and controlled by the banks themselves received less attention. Moreover, little interest

[4] There were 18 regular USD LIBOR submitters around the time of the Great Recession: Bank of America, Bank of Tokyo Mitsubishi, Barclays, BNP, Citi, Crédit Agricole, Crédit Suisse, Deutsche Bank, HSBC, JP Morgan, Lloyds Bank, Norinchukin Bank, Rabobank, RBS, Royal Bank of Canada, Société Générale, Sumitomo Bank and UBS. At least 14 of them have since paid fines or settlements in relation to LIBOR manipulation or collusion. Also, at least 14 of them have paid fines or settlements in relation to FX manipulation or collusion.

was shown in how the rules of the game had evolved over time or the interaction between the people writing them and supposedly following them.

Here, the classic passage by John Maynard Keynes is illuminating:

"Professional investment may be likened to those newspaper competitions in which the competitors have to pick out the six prettiest faces from a hundred photographs, the prize being awarded to the competitor whose choice most nearly corresponds to the average preferences of the competitors as a whole: so that each competitor has to pick, not those faces which he himself finds prettiest, but those which he thinks likeliest to catch the fancy of the other competitors, all of whom are looking at the problem from the same point of view. It is not a case of choosing those which, to the best of one's judgement, are really the prettiest, nor even those which average opinion genuinely thinks the prettiest. We have reached the third degree where we devote our intelligences to anticipating what average opinion expects the average opinion to be. And there are some, I believe, who practise the fourth, fifth and higher degrees." (Keynes 1936: 156)

The Keynesian beauty contest is often quoted as illustrating animal spirits and herd behaviour in financial markets – in stark contrast to the rational and individualistic behaviour in mainstream economic models. In addition to explaining how and why asset prices may deviate from their "fundamental value", the beauty contest can also express how social behaviour gradually can evolve into an informal rulebook. Recall how a new game at a school playground often develops. Bob notices that a group is engaged in an exciting new game and asks if he may join. "Sure, as long as you follow the rules, which are…." After a few rounds, Bob learns the tricks, tweaks the original rules with the others to make them more practical, and later other children also want to join in. This time, Bob says "sure" and, eager to position himself as part of the core group, recites the rulebook as if it was the most natural thing in the world. Children come and go, become better at playing the game, and after a while, nobody remembers or cares who invited the rules.

Table 1: Traders at Three Different Banks (Citibank, JP Morgan and UBS) Discussing Whether to Invite a Fourth Trader into a Private Chat Room

Bank / Trader	Time	Transcript
Bank Z Trader:	7:49:55	are we ok with keeping this as is
	7:50:27	ie the info lvls [*levels*] & risk sharing?
Bank X Trader:	7:50:27	well…
Bank Z Trader:	7:50:30	that is the qu[estion]
Bank X Trader:	7:50:32	you know him best obv…
	7:50:39	if you think we need to adjust it
	7:50:43	then he shouldn't be[] in chat
Bank Y Trader:	7:50:54	yeah that is key
	7:51:00	simple question [Bank Z trader]
	7:51:08	I trust you implicitly [Bank Z trader]
	7:51:13	and your judgement
	7:51:16	you know him
	7:51:21	will he tell rest of [*his trading*] desk stuff
	7:51:26	or god forbin his nyk [*New York trading floor*]…
Bank X Trader:	7:51:46	yes
	7:51:51	that's really imp[ortant] q[uestion]
	7:52:01	dont want other numpty's in mkt [*the market*] to know
	7:52:17	but not only that
	7:52:21	is he gonna protect us
	7:52:33	like we protect each other against our own [*bank*] branches
	7:52:46	ie if you guys are rhs* .. and my nyk is lhs..ill say my nyk lhs in few
Bank Z Trader:	7:53:52	what concerns me is that i know he'll never tell us when at risk…

Source: CFTC (2014). Note: [clarification by the CFTC] and [*clarification by authors*]. * If an FX trader has orders to sell of the first currency listed in any currency pair, it is often referred to as being on the left-hand side, or "lhs." If an FX trader references right hand side, or "rhs," it indicates that the FX trader is a buyer of the first currency listed in a
currency pair.

The beauty contest is precisely how the LIBOR fixing mechanism should be conceptualised (Stenfors 2014a). LIBOR submitters are, essentially, forced to second-guess the action by other LIBOR submitters – and deception is reinforced so that it becomes subconsciously "part of the game". The Forex scandal often involved different banks colluding in chat rooms – akin to contemporary and electronic version of the smoke-filled cigar lounge alluded to in Adam Smith's depiction of a conspiracy. Indeed, bond, money and FX markets have largely been unregulated or self-regulated compared to exchange-traded stock markets. Consequently, what should be regarded as ethical and proper behaviour has often evolved as conventions through the interaction between the key players.

The Keynesian beauty contest offers a critique of, and alternative to, the concept of "fundamental value" and "equilibrium" in financial markets. When it comes to spoofing, the logic of the beauty contest is central. A spoof order is never intended to result in a transaction where a buyer and a seller meet at an equilibrium price. Instead, the most basic assumption underpinning the manipulative tactic is that the behaviour of human

traders (or computer algorithms programmed by humans) is influenced by what they think others *might* do.

Table 2: JP Morgan Spoofing Example from 3 June 2010

Time	Activity	Authors' note
14:05:55.480	Trader A at JP Morgan places a genuine order to sell 20 U.S. Treasury bond futures contracts at $122.25000	The face value of 20 Treasury bond futures contract is $2 million.
14:05:57.523	Trader A places a spoof order to buy 2,000 U.S. Treasury bond futures contracts at $122.21875	Notably, the spoof order was 100 times larger than the genuine resting order. According to the CFTC (2020), the intent of the spoof order was "to create the illusion of demand, deceive other market participants, and artificially move the market price higher."
14:05:57.582	Trader A's genuine resting order is filled	Notice that the genuine resting order is filled after just 59 milliseconds following the spoof order
14:05:58.430	Trader A cancels the spoof order	The spoof order is cancelled within one second of the genuine order being filled.

Source: CFTC (2020).

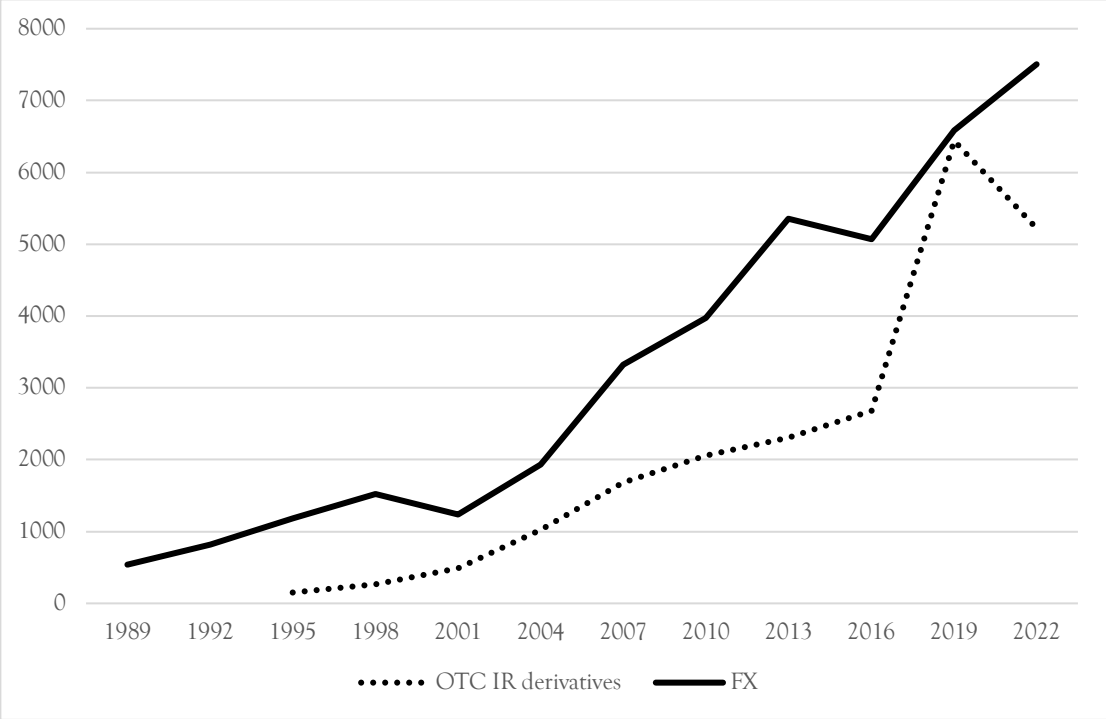
Thorstein Veblen and Sabotage

Thorstein Veblen (2001 [1921]: 4) refers to sabotage as *"the deliberate, although entirely legal, practice of peaceful restriction, delay, withdrawal, or obstruction used to secure some special advantage or preference."* Further, sabotage *"commonly works within the law, although it may often be within the letter rather than the spirit of the law."* (Veblen, 2001 [1921]: 6). Thus, whereas sabotage typically would encompass ruthless tactics, it would still - to some degree - involve playing by the rules.

Indeed, the trio of scandals covered in this paper contains an almost endless array of examples where banks have enriched themselves and harmed others. Still, in most cases, they have not explicitly broken the law. There was neither a law nor a regulation banning the submission of a false LIBOR. Instead, the rule book, written by the banks themselves in conjunction with British Banking Association (BBA), a lobby organisation, merely contained a threat of expulsion from the club in the case of wrongdoing.[5] Thus, the sabotage could have been said to include keeping control of the process and restricting outsiders from joining the LIBOR panel club. The sheer volume of LIBOR derivatives traded (mostly among banks) contributed to the illusion that LIBOR represented a large and liquid market (Stenfors and Lindo 2018; Muchimba and Stenfors 2021).

[5] Amazingly, the LIBOR scandal was not deemed serious enough for expulsion.

Figure 1: Daily Turnover of OTC Interest Rate Derivatives and FX (USD millions, April)



Source: BIS (2022).

The victims of the LIBOR sabotage included companies, pension funds and other banks that had entered into LIBOR-indexed contracts in the opposite direction to the manipulative banks. It also encompassed central banks, policymakers, risk managers and ordinary citizens that were misinformed regarding the urgency and severity of the stress in the money and credit market during the most devasting financial crisis in generations. By contrast, the victims of the Forex sabotage were clearly targeted, and always included the bank's major clients. The size of the market also strengthened the perception that the market was too large to be systematically manipulated. *"I'm sceptical of the ability of traders to manipulate the major currencies in a meaningful way given the massive size of this market. Governments themselves often have a difficult time moving foreign-exchange markets through their interventions,"* an academic told Bloomberg when the Forex scandal was revealed (Vaughan et al. 2013).

According to Anastasia Nesvetailova and Ronen Palan (2013), Veblenian sabotage before the financial crisis of 2007-09 included the innovation of complex financial instruments. A similar logic can be used to understand the sabotage in the government bond market, now increasingly traded on electronic market venues. Spoofing is about creating a mirage, and algorithms are excellent tools in doing exactly that.

Concluding Notes

In contrast to the exchange-traded equity market, the bond, money and foreign exchange markets were widely perceived to be immune from attempts of misconduct in the form of manipulation and collusion. This proved to be more than naïve. However, despite quite clearly involving *money*, it would be a mistake to explain the recent scandals merely from the perspective of profit and loss, crime and punishment, and individualistic rationality. Most importantly, such an approach would neither have led to the discovery nor a deeper understanding of the flaws of the financial market structures.

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