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When LIBOR becomes LIEBOR: Reputational penalties and bank contagion

Michele Fabrizi[1] | **Xing Huan**[2] | **Antonio Parbonetti**[1]

[1] Department of Economics & Management, University of Padova, Italy

[2] Warwick Business School, University of Warwick, United Kingdom

Correspondence
Xing Huan, Warwick Business School, University of Warwick, United Kingdom.
Email: xing.huan@wbs.ac.uk

Abstract

We study whether commonality of incentives and opportunity to commit fraud trigger reputational contagion from culpable firms to nonculpable firms. Relying on a sample of 30 banks involved in fixing the London Interbank Offered Rate (LIBOR) and a control sample of 30 banks, we find that banks' reputations suffered substantial damage upon the announcement of their involvement in the scandal. We also document reputational contagion spread from banks that manipulated LIBOR to banks that shared the same incentives and opportunity to commit the fraud. The reputational contagion is more pronounced for large derivatives dealers who have had the strongest incentive to commit the fraud.

KEYWORDS
bank contagion, fraud triangle, operational risk, reputational penalties

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G14, M41

1 | INTRODUCTION

Reputation plays an important role in modern corporate life as a quality-assuring device (Klein & Leffler, 1981), and the growing integration of the international financial market has created multiple channels for the transmission of shocks. This paper addresses the reputational penalties that banks received for involvement in the London Interbank Offered Rate (LIBOR) scandal and the contagion effect on other banks in the LIBOR and connected panels ("LIBOR

banks" hereafter). Extant literature on the spillover effect of through-interorganizational networks, particularly director interlocks, where the directors of firms sit on each other's boards (Kang, 2008), and through the mechanism of generalization by which reputational penalties spill over to other firms (Jonsson, Greve, & Fujiwara-Greve, 2009).

This paper examines the mechanisms through which contagion can be channeled and reputational penalties can spill over from culpable firms to nonculpable firms. Specifically, we argue that reputational penalties spread from the firm accused of misconduct to other firms that share with it the same incentive and opportunity to commit the fraud. Rationalization, the incentive to commit a fraud, and the opportunity to do so are the three elements of the so-called "fraud triangle" developed by Cressey (1973) and used by Certified Public Accountants (CPAs) who seek to understand and manage fraud risk. Commonality of incentives and the opportunity to commit a fraudulent act represent a channel through which generalization and contagion can spread from one firm to other nonaffiliated firms and is the channel investigated in this paper.

The recent high-profile LIBOR scandal that centered on Barclays, Royal Bank of Scotland (RBS), UBS, and a number of other leading global banks has drawn considerable attention. While the damage from the scandal is still being calculated, the LIBOR scandal's setting offers the opportunity to appraise the penalties imposed by the markets and the degree to which bank misconduct can affect other banks. Specifically, the contemporaneous presence of banks accused of LIBOR manipulation and nonaccused banks that sit on the LIBOR panel provides us with a research setting that allows us to test whether commonality of incentives and opportunity to misbehave trigger reputational contagion.

We analyze the security returns of banks that are involved in LIBOR rigging during the period from March 2011 to December 2013 and identify 39 event dates on which banks are accused of or sanctioned for manipulating LIBOR. Relying on a sample of 30 banks involved in fixing the LIBOR and a control sample of 30 banks, we find substantial reputational damage, measured by the banks' stock returns in a 3-day window around the event (i.e., [−1, +1]). We also document a contagion effect of the reputational damage that is passed from banks accused of LIBOR manipulation to nonaccused banks that share the same incentives and opportunity to commit the fraudulent act. We also show that the contagion effect is significantly stronger among banks that are large derivatives dealers who have had the strongest incentives to misbehave. Even when they were not accused of misconduct, they had experienced stronger repulational penalties.

Our paper contributes to the literature in several ways. The LIBOR scandal is in effect an operational risk event that affected multiple banks (McConnell, 2013). Our paper pertains to the literature considering impacts of operational risk events on bank reputation measured by stock returns (Cummins, Lewis, & Wei, 2006; Fiordelisi, Soana & Schwizer, 2014; Gillet, Hubner, & Plunus, 2010; Perry & de Fontnouvelle, 2005; Sturm, 2013). Our first contribution is methodological. While most event studies focus on accused firms, we distinguish between nonaccused banks that could manipulate LIBOR and those that could not. This unique feature of our setting allows us to investigate the contagion effect in a novel and unexplored perspective. Second, our paper contributes to the literature on the LIBOR scandal. Extant literature on the LIBOR scandal focuses on submission banks' reporting behavior of the LIBOR rates during the crisis period (Monticini & Thornton, 2013), and incentives for manipulating LIBOR (Gandhi, Golez, Jackwerth, & Plazzi, 2019; Snider & Youle, 2014; Vaughan & Finch, 2017). Our paper complements these studies by showing how markets react to the disclosure of banks' fraudulent act and distinguishing banks with stronger incentives to manipulate the LIBOR from those with weaker incentives. Third, our paper contributes to the literature on bank contagion by documenting a new channel, represented by commonality of incentives and opportunity to commit the fraud, through which contagion is channeled from culpable firms to nonculpable firms.

Findings in this paper on the reputational effect and contagion effect of the LIBOR scandal could also be of interest to policy makers. The breadth of the contagion effect in the international banking system shown in this paper reinforces the importance of cross-country banking supervision and risk management.

The remainder of this paper is structured as follows: Section 2 provides an overview of LIBOR and the LIBOR scandal. Section 3 reviews the related literature and develops the research hypotheses. Section 4 describes the data and methodology. Section 5 presents the results. Section 6 concludes.

2 | LIBOR AND THE LIBOR SCANDAL

LIBOR is a set of rates first published under the auspices of the British Bankers' Association (BBA) in 1986 that represent the cost of short-term wholesale funds for major banks in the London interbank market. Prior to the transfer of responsibility for administration of LIBOR from BBA to the Intercontinental Exchange Benchmark Administration Ltd. (ICE) on January 31, 2014, LIBOR was calculated and published each business day by Thomson Reuters, to whom major banks submit their cost of borrowing unsecured funds in 10 currencies[1] for 15 maturities,[2] so 150 LIBOR rates are reported daily. For each currency, there is a panel consisting of contributing banks. The submission process requires contributing banks to evaluate the rates at which money may be available in the interbank market. Contributing banks are required to provide a submission based on that particular banks' cost of borrowing unsecured cash for specific currencies and maturities by responding to the following question: "At what rate could you borrow funds, were you to do so by asking for and then accepting interbank offers in a reasonable market size just prior to 11 a.m.?"[3] Thomson Reuters trims the rates by removing the top and bottom 25% and then averages the remainder to create the final LIBOR rates, which are published and available to the world around midday London time. This mechanism has a number of shortcomings since it is hypothetical, subjective, and open to abuse when an unethical person submits a rate (McConnell, 2013), so it is ineffective in preventing manipulation.

On June 27, 2012, Barclays admitted to misconduct related to manipulating the daily setting of the LIBOR and the Euro Interbank Offered Rate (EURIBOR[4]) and agreed to a US$453 million fine settlement with the U.K. Financial Services Authority (FSA), the U.S. Commodity Futures Trading Commission (CFTC), and the U.S. Department of Justice (DoJ). According to the DoJ, certain Barclays swap traders requested that certain Barclays LIBOR and EURIBOR submitters submit LIBOR and EURIBOR contributions that would benefit the traders' trading positions on numerous occasions between 2005 and 2009. Barclays admitted to three types of manipulation: underreporting, overreporting, and holding constant. The motives behind the three types of misrepresentations varied over time, from benefiting derivatives trading positions to appearing more financially sound especially during distressed times (Gandhi et al., 2019; Monticini & Thornton, 2013).

Evidence from the regulators' probe confirmed that the manipulation of LIBOR was not a localized event but part of business-as-usual in the global financial markets, a blatantly unethical and occasionally illegal practice that deliberately and systematically manipulated borrowing rates. One of the key issues reflected through this case is the inherent conflict of interest within the banks in question. Traders made requests to both the internal submitter at the bank and external submitters at third-party banks to influence the LIBOR submissions according to their own trading positions in derivatives and the money markets.[5]

3 | LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

3.1 | Reputational penalties for corporate misconduct

Prior market-based research into corporate misconduct finds substantial losses in the market value of firms that are implicated in misconduct, which suggests reputational effects as an important device in disciplining firms. The strength

[1] AUD, CAD, CHF, DKK, EUR, GBP, JPY, NZD, SEK, and USD.

[2] Overnight, 1 week, 2 weeks, 1 month, 2 months, 3 months, 4 months, 5 months, 6 months, 7 months, 8 months, 9 months, 10 months, 11 months, and 12 months.

[3] The Wheatley Review of LIBOR: Final Report.

[4] EURIBOR is a reference rate overseen by the European Banking Federation. The EURIBOR contributor panel consisted of approximately 42 to 48 banks. Thomson Reuters also acts as an agent for calculation and publishing of this rate. The administration process of this rate is highly similar to the one of LIBOR. However, only the highest and lowest 15% of all quotes are trimmed in EURIBOR calculation.

[5] *In the matter of: The Royal Bank of Scotland PLC and RBS Securities Japan Limited.* U.S. CFTC. February 6, 2013.

of reputational penalties has been examined in a number of different settings, and most of these studies document negative abnormal returns in the selected event period (Alexander, 1999; Karpoff & Lott, 1993; Karpoff, Lee, & Martin, 2008).

Although the literature affirms the role of reputation as a disciplinary mechanism for corporate misconduct, Murphy, Shrieves, and Tibbs (2009) argue that studies have not provided definitive evidence that links allegation-related wealth losses to changes in financial performance. Instead, they find decreased earnings and increased risk as the explanation for the allegation-related effects on wealth and reputation. Among the types of misconduct (i.e., antitrust violations, bribery, copyright violations, and fraud) that have been studied, fraud has the largest negative effect on firms' market value. In studying the types of corporate misconduct, Karpoff, Lott, and Wehrly (2005) find that market reaction to violations of environmental regulations is not, on average, larger than the legal penalties imposed, so losses in share value are attributed to prospective legal sanctions rather than to reputational costs. Perry and de Fontnouvelle (2005) assess corporations' stock price reactions to announcements of major operational loss events and find a reputational loss when a firm's market value declines by more than the announced amount of loss.

Focusing on operational losses by banks and insurance companies, Cummins et al. (2006) obtain results that are consistent with Perry and de Fontnouvelle (2005). Sturm (2013) analyzes reputational damage caused by operational losses in European financial firms and contends that the negative stock market reaction is more pronounced in response to announcements of settlement than it is to the initial indications of the loss, and that reputational damage is more pronounced for banks that are highly leveraged. Gillet et al. (2010) analyze market reactions to announcements of operational loss announcements by financial firms listed in Europe and the United States. Compared to the U.S. firms, European companies usually suffer from more reputational damage. Fiordelisi et al. (2014) suggest that reputational losses in the financial industry are higher in Europe than in North America, while Armour, Mayer, and Polo (2017) analyze the reputational losses sustained by financial firms that are penalized by the regulator in the United Kingdom and find that reputational penalties average nine times the size of the financial penalties. They also note that the size of the penalties leveled in the United Kingdom does not necessarily reflect the seriousness of the wrongdoing as perceived by investors and clients; instead, the disclosure of misconduct itself is the primary source of the reputational damage.

Our first research question is whether the market penalizes banks for accusations of LIBOR manipulation. Reputational penalties in financial markets are an ethical mechanism that internalizes the cost of corporate misconduct in terms of repeated business transactions (Engelen & van Essen, 2011). We suggest that the stock price (i.e., the present value of future cash flows) around the announcement date is a final price generated through the mechanism of multiple underlying channels through which stakeholders, including customers and clients, employees, suppliers, debt holders, and equity holders, penalize the bank for alleged LIBOR manipulation. We expect that, following an announcement of involvement in the LIBOR scandal, banks would experience reputational penalties imposed by the market, measured by a drop in share value. Therefore, we posit our first hypothesis as follows:

H1: The market penalizes banks in the form of reputational damage upon the announcement of alleged LIBOR manipulation.

3.2 | Bank contagion

Extant literature on bank contagion focuses on whether bad news from one bank or a group of banks, such as news about bank failures and financial distress, adversely affects other banks. Aharony and Swary (1983) document a contagion effect in three largest bank failures in the United States but contend that the observed drop in the valuation of solvent banks arises from investors' response to a negative signal instead of a contagion effect. Schoenmaker (1996) employs a larger sample of bank failures and confirms the presence of contagion risk in banking. Docking, Hirschey, and Jones (1997) document a significant negative contagion effect of bank loan-loss announcements. Bessler and Nohel (2000) study the contagion effect of dividend reductions by U.S. banks and document a contagion effect in both

nonannouncing money-center banks and big regional banks. Brewer and Jackson (2002) test for a contagion effect following announcements of financial distress by U.S. commercial banks and life insurance companies, and argue that the documented interindustry effects on shareholder wealth are not purely contagious in nature but are also attributable to factors like the composition of portfolios, geographic proximity, leverage, and regulatory expectations.

Overall, extant literature on the spillover effect of reputational penalties has proposed three main mechanisms through which contagion might occur: (1) economic or exchange ties between firms, (2) interorganizational networks, and (3) generalization. The first mechanism is the most frequently investigated in the literature. Beatty, Bunsis, and Hand (1998) show that SEC investigations of underwriters impose a variety of measurable and significant indirect penalties on their clients, particularly Initial Public Offering (IPO) clients. The reputation of an underwriter and its clients is positively related, and the deterioration of the reputation of the former inevitably affects the later (Beatty et al., 1998). Chaney and Philipich (2002) focus on the Enron audit failure and document that the market imposed reputation penalties to the other clients of the Enron's auditor. Akhigbe, Madura, and Martin (2005) also employ Enron as the research setting and show that adverse news releases about one firm have contagion effects for connected firms, such as suppliers, trading counterparties, and creditors. Jensen (2006) investigates what affected Andersen clients' defection, and shows that accountability-induced status anxiety influenced defections by Andersen's publicly traded clients. Gleason, Jenkins, and Johnson (2008) investigate the contagion effects of accounting restatements and find that investors impose penalties on the restating company's peers. The contagion effect also spreads to companies that use the same external auditor as the restating firm. Bonini and Boraschi (2010) focus on security class-action suits and show that a corporate scandal affects the security issuance and stock price of industry peers. These studies document a negative spillover effect that moves from one company to other organizations that share with it some form of economic or exchange ties, such as clients, suppliers, and industry peers. Kang (2008) examines the second mechanism that can channel contagion: the presence of interorganizational networks. Specifically, Kang (2008) documents a contagion effect of financial reporting fraud from accused to associated firms through director interlocks. Finally, Jonsson et al. (2009) introduce generalization as a third mechanism. Jonsson et al. (2009, p. 195) claim that "individuals observe a single act of deviance, interpret it as potentially harmful or contrary to social norms, and proceed to incorporate the possibility of such events into their general knowledge about organizations." They provide evidence that there are three ways through which generalization can be channeled and reputational penalties can be imposed on nonaffiliated firms: through a shared organizational form,[6] across organizational forms with similar characteristics, and across organizations with characteristics made salient by fraudulent act. Caiazza, Cotugno, Fiordelisi, and Stefanelli (2018) study the effects of sanctions on sanctioned banks and document a spillover effect on nonsanctioned banks that have features similar to those of sanctioned banks.

Our second hypothesis focuses on the mechanisms through which contagion can be channeled. Indeed, as previously described, there is plenty of research documenting the presence of contagion among firms, but the underlying mechanisms are still largely unexplored. Specifically, we focus on firms that have the same opportunity and incentive to commit a fraud, and we argue that contagion can spread from the accused firm to organizations that share with it the same opportunity and incentive to misbehave. As mentioned earlier, rationalization, the incentive to commit a fraud, and the opportunity to do it are the elements of the so-called "fraud triangle" developed by Cressey (1973). This three-pronged framework suggests that fraud is more likely to occur when there is an incentive to commit the fraud, when weak controls or oversight provide an individual or organization with the opportunity to commit the fraud, and when the perpetrator can rationalize the fraudulent behavior. We hypothesize that when one LIBOR bank is accused of manipulation, the reputational penalties spill over to other, nonaccused LIBOR banks since they share with the accused bank the incentive and the opportunity to commit the fraud. Therefore, we posit the following:

H2: The reputational damage suffered by banks accused of LIBOR manipulation has a contagion effect on other banks that share the same incentive and opportunity to commit the fraud.

[6] Organizational forms are defined as organizations that share industry and operational blueprints (Jonsson et al., 2009).

TABLE 1 Balancing property of the matching covariates

Variable	LIBOR	Control	Difference	*p value*
SIZE	13.972	10.315	3.657	0.000
CIR	62.986	79.197	−16.211	0.111
DETA	19.845	1.091	18.754	0.000
LTA	37.212	54.214	−17.002	0.001

Note. This table reports balancing property of the covariates included in propensity score matching to identify control (non-LIBOR) banks.

4 | DATA AND METHODOLOGY

4.1 | Data

We construct a database for a sample of banks that were accused of manipulating the LIBOR between June 2012 and December 2013.[7] We hand-collected news on the LIBOR scandal from four major news providers: BBC News, Bloomberg, *The Financial Times*, and *The Wall Street Journal*. We chose this set of news providers for the following reasons: First, the LIBOR scandal was discovered and published in the United Kingdom, and BBC News provided full coverage of the related news in a section dedicated to the updates on this scandal. Second, the other three news providers, Bloomberg, *The Financial Times*, and *The Wall Street Journal*, are highly specialized in global coverage of financial news. In addition, *The Wall Street Journal* was among the first to raise questions about whether global banks were manipulating the process by "low-balling" a key interest rate to avoid looking desperate in the midst of the financial crisis.[8]

We identify 39 event dates when information regarding the LIBOR investigation was disclosed. For stale news, such as news about market anticipation and news provided by insiders who were familiar with the situation prior to the fine settlement date, we take the earliest available date. Detailed descriptions of each event dates used in our analysis are included in the Appendix in Supporting Information S1. We retrieve market data around the event dates for all banks that belonged to any of three panels: (1) the LIBOR panel, which contains all contributor banks for all currencies; (2) global systemically important banks (G-SIBs);[9] and (3) G14, the 14 largest derivatives dealers that collectively account for more than 80% of all outstanding interest rate derivatives. As shown in the Appendix in Supporting Information S2, most of the contributor banks are G-SIBs. That is, LIBOR contributor banks are large and systemically important. On the other hand, all of the 14 largest derivatives dealer banks are LIBOR contributor banks, indicating an incentive behind the rate manipulation. Some banks, such as Barclays, Citigroup, and UBS, are members of all the three panels while some banks sit on one or two of the three panels. In fact, the combination of information in the Appendices in Supporting Information S1 and S2 show a tendency toward a positive correlation between the number of panels of which a bank is a member and the level of its involvement in the LIBOR scandal. We also pooled the three panels into one set, named "LIBOR banks," as presented in the Appendix in Supporting Information S2. Some of the LIBOR banks were involved in the LIBOR scandal while others were not accused of misconduct. Nonetheless, all banks that sit on any of the three panels had the incentive and the opportunity to be involved in the LIBOR manipulation,

[7] Our sample period starts in June 2012 because, as discussed in Section 2, on June 27, 2012, the scandal was materialized (i.e., regulatory fine) for the first time.

[8] Study casts doubt on key rate. *The Wall Street Journal*, May 29, 2008.

[9] In November 2011, the Financial Stability Board (FSB) published an integrated set of policy measures to address the systemic and moral-hazard risks connected with systemically important financial institutions (SIFIs). In that publication, the FSB identified an initial group of G-SIFIs, namely, 29 G-SIBs, using a methodology developed by the Basel Committee on Banking Supervision (BCBS). The group of G-SIFIs is updated annually based on new data. Since the November 2012 update, the G-SIBs have been allocated to buckets corresponding to the higher loss-absorbency requirements that they would be required to hold. G-SIBs are subject to requirements for group-wide resolution planning and regular resolvability assessments. G-SIBs are also subject to higher supervisory expectations for risk-management functions, risk data aggregation capabilities, risk governance, and internal controls.

TABLE 2 Descriptive statistics

	N	Mean	*SD*	P25	Median	P75	Min	Max
R	3,448	0.002	0.017	−0.007	0.001	0.009	−0.155	0.103
Rf	3,448	0.002	0.001	0.001	0.002	0.002	0.001	0.007
ER	3,448	−0.011	1.670	−0.906	−0.083	0.729	−15.878	9.893
EVENT	3,448	0.055	0.229	0.000	0.000	0.000	0.000	1.000
NONEVENT	3,448	0.253	0.435	0.000	0.000	1.000	0.000	1.000
NONLIBOR	3,448	0.548	0.498	0.000	1.000	1.000	0.000	1.000
SIZE	3,448	12.165	2.083	10.082	12.313	14.331	7.920	14.806
DETA	3,448	11.362	20.116	0.000	2.513	12.604	0.000	78.481
LTA	3,448	44.452	20.419	30.175	43.628	60.885	0.000	79.082
ADJFINE	3,448	0.002	0.049	0.000	0.000	0.000	0.000	1.650
LTB	3,448	−0.018	0.382	−0.250	−0.008	0.197	−2.299	2.546
MKT	3,448	0.118	1.304	−0.748	0.015	0.674	−4.501	8.359
REIT	3,448	0.000	0.008	−0.004	0.001	0.005	−0.038	0.050
CORP	3,448	0.131	0.305	−0.016	0.097	0.293	−0.686	1.167
HY	3,448	0.062	0.353	−0.142	0.010	0.303	−0.696	1.224
FOREX	3,448	0.000	0.003	−0.002	0.000	0.002	−0.018	0.013
SOV	3,448	−3.510	11.963	−8.518	−2.133	4.313	−44.665	22.280
COM	3,448	0.098	0.894	−0.385	0.176	0.511	−2.418	3.449
PLT	3,448	−0.137	0.959	−0.661	−0.029	0.365	−2.270	4.958

Note. This table presents descriptive statistics for 3,448 observations. The sample period is from June 26, 2012 to December 4, 2013. *N* refers to the number of observations, *SD* is the standard deviation, P25 and P75 are the 25th and 75th percentile, while Min and Max refer to the minimum and maximum values. *ER* is multiplied by 100 for ease of presentation. All variables are defined in the Appendix.

given that they were highly interconnected: more than half of interest rate swap trades are between financial institutions rather than between a bank and a customer, and even this trading is concentrated in a small number of large banks (Fleming, Jackson, Li, Sarkar, & Zobel, 2012).

We use this sample of LIBOR banks to test whether (i) the market punished LIBOR banks involved in the LIBOR scandal and (ii) nonaccused LIBOR banks received reputational penalties because they shared with the culpable banks the same incentives and opportunity to misbehave. We refer to the former effect as a reputational effect and to the latter effect as a contagion effect.

Following Kaufman (1994), Docking et al. (1997), and Groppa and Moerman (2004), we use a working definition of contagion as negative stock returns experienced by banks that arise from the disclosure of misconduct by another bank or group of banks. Our definition of financial contagion is close to the spirit of Lang and Stulz (1992) and Kaufman (1994) who regard negative information externalities (spillovers) as contagion.

4.2 | Methodology

Our identification strategy relies on comparing market returns around the event dates for LIBOR banks (both accused banks and nonaccused banks) and a control group of banks that were external to any LIBOR banks. Therefore, banks in the control group were neither involved in the scandal nor had the incentives and opportunity to misbehave since

TABLE 3 The initial emergence of the LIBOR scandal

		Barclays		Nonevent banks			
Date	Event day	Closing price	Daily return	Mean daily return	FTSE250 Daily return	Financial industry daily return	News
March 23, 2011	−1	£2.87	−0.43%	−0.03%	0.05%	−0.75%	
March 24, 2011	0	£2.91	1.27%	0.69%	1.38%	−0.43%	Barclays emerged as a key focus of the investigation by U.K. and U.S. regulators.
March 25, 2011	1	£2.90	−0.31%	−0.18%	0.21%	0.96%	
		Barclays		Nonevent banks			
Date	Event day	Closing price	Daily return	Mean daily return	FTSE250 daily return	Financial industry daily return	News
June 26, 2012	−1	£1.92	−0.95%	−0.61%	−0.06%	−0.17%	
June 27, 2012	0	£1.96	1.90%	2.22%	0.81%	0.85%	Barclays admitted to misconduct. The U.K.'s FSA, the U.S. CFTC, and the U.S. DoJ imposed fines worth US$450m in total.
June 28, 2012	1	£1.66	−15.50%	−0.42%	−0.59%	−0.64%	

Note. This table reports news and stock returns associated with the two key events: Barclays emerged as the key focus of the LIBOR investigation (March 24, 2011) and the first bank to have received financial penalty from the regulators (June 27, 2012). "Nonevent banks" consists of LIBOR banks that have not been accused of having participated in LIBOR manipulation on the event date. "Financial services industry daily return" is the return to a market-capitalization-weighted portfolio consisting of all the U.K. common stocks in COMPUSTAT with SIC code ranging from 6000 to 6500.

TABLE 4 Reputational penalties and the contagion effect

	(1)	(2)	(3)	(4)
	ER	*ER*	*ER*	*ER*
EVENT	−0.191**	−0.190**	−0.187**	−0.187**
	[−2.211]	[−2.308]	[−2.163]	[−2.251]
NONEVENT	−0.193**	−0.199**	−0.180**	−0.187**
	[−2.260]	[−2.330]	[−2.160]	[−2.239]
NONLIBOR	−0.102	−0.115	−0.092	−0.106
	[−1.082]	[−1.207]	[−1.000]	[−1.136]
SIZE	0.002	0.000	0.003	0.000
	[0.163]	[0.003]	[0.187]	[0.022]
DETA	−0.001	−0.001	−0.001	−0.002
	[−0.537]	[−0.693]	[−0.541]	[−0.696]
LTA	−0.003***	−0.003***	−0.003***	−0.003***
	[−2.858]	[−2.882]	[−2.801]	[−2.824]
ADJFINE	0.266	0.346	0.254	0.334
	[0.706]	[0.916]	[0.663]	[0.870]
LTB	−0.023	−0.023	0.044	0.042
	[−0.449]	[−0.444]	[0.813]	[0.775]
MKT	0.988***	0.987***	0.975***	0.973***
	[24.532]	[24.517]	[30.699]	[30.767]
REIT			−2.307	−1.899
			[−0.743]	[−0.604]
CORP			−0.300***	−0.302***
			[−3.215]	[−3.247]
HY			−0.119*	−0.120*
			[−1.872]	[−1.893]
FOREX			−12.397**	−12.458**
			[−2.123]	[−2.124]
SOV			−0.006**	−0.006**
			[−2.518]	[−2.551]
COM			0.087***	0.088***
			[3.292]	[3.305]
PLT			−0.007	−0.006
			[−0.334]	[−0.326]
Constant	−0.031	0.143	−0.028	0.149
	[−0.135]	[0.617]	[−0.120]	[0.647]
Country FE	Yes	No	Yes	No
Year FE	Yes	No	Yes	No
Country×Year	No	Yes	No	Yes
Cluster SE	Bank	Bank	Bank	Bank

(Continues)

TABLE 4 (Continued)

	(1)	(2)	(3)	(4)
	ER	*ER*	*ER*	*ER*
N	3,448	3,448	3,448	3,448
R^2	0.593	0.593	0.596	0.597

Note. This table reports test results for Hypothesis 1 under different specifications: reduced form multifactor model (1 and 2) and extended form multifactor model (3 and 4). Country and year fixed effects are included in (1) and (3) while country×year fixed effects are included in (2) and (4). Robust *t*-statistics are reported in brackets. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively. Standard errors are adjusted for clustering at the bank level. All variables are defined in the Appendix.

they were not included in any LIBOR panels. Our two research hypotheses predict a negative and significant market reaction around event dates for accused and nonaccused LIBOR banks and an insignificant market reaction around event dates for non-LIBOR banks.

The measurement of reputational penalties in the literature is largely based on the assumption that stock price represents investors' expectations concerning the value of the company based on the mechanism of supply and demand, which consists of multiple channels through which stakeholders impose reputational penalties on the company. In this mechanism, reputational penalties imposed by stakeholders are incorporated in a drop in stock price upon the announcement of corporate misconduct. However, reputational penalties are measured in varying ways, among which is to take the residual in market value loss after deducting the amount of either legal sanctions or the announced loss. Some studies, such as Murphy et al. (2009), consider the sum of the loss in market value, drop in earnings, and the rise to reflect the reputational penalty. We adopt the multifactor model from Bessler and Kurmann (2014), in which bank-specific excess returns are regressed on a set of common risk factors, and on event-related dummy variables. The event-related dummy variables provide for mean shifts in returns on event days. Model 1 uses a 3-day event window to test for the reputational effect (H1) for each of the events listed in the Appendix in Supporting Information S1.

$$\begin{aligned} ER_{i,t} = {} & \alpha_0 + \alpha_1 EVENT_{i,t} + \alpha_2 NONEVENT_{i,t} \\ & + \alpha_3 NONLIBOR_{i,t} + \alpha_4 ADJFINE_{i,t} \\ & + BANK\ CONTROLS_{i,t-1} + COMMON\ RISK_t + \varepsilon, \end{aligned} \tag{1}$$

where *ER* is the daily excess stock return for an individual bank, which is the difference between daily stock return (*R*) and risk-free rate (*Rf*). We obtain daily stock price data between June 2012 and December 2013 from COMPUSTAT Security Daily. *EVENT* takes a value of 1 on the day before, the day of, and the day after the event date. If an event takes place on a weekend, the event date is adjusted to the next trading day. If two event windows overlap, we merge the two event windows by extending from the day prior to the first event to the day following the second event. *NONEVENT* takes a value of 1 for the 3-day window around the date on which a LIBOR bank was not accused of manipulation when one or more LIBOR banks were accused. In other words, these nonevent LIBOR banks were not yet officially involved in the scandal (i.e., public/press announcements) when other LIBOR banks were accused to have been involved. Both *EVENT* and *NONEVENT* banks are defined *ex post*. If a bank has been an event bank (i.e., it had already exposed), it belongs to neither the accused nor the nonaccused banks. In order to rule out the possibility that the negative stock returns are industry wide instead of specific to LIBOR banks, we perform propensity score matching (PSM) to identify a group of non-LIBOR banks that are comparable to the LIBOR banks. We match on country and institution type (i.e., first two digits of Standard Industrial Classification [SIC] code) using a set of matching covariates including bank size (*SIZE*), cost-to-income ratio (*CIR*), derivatives exposure (*DETA*), and loans-to-assets ratio (*LTA*). We implement nearest neighbor matching (Rosenbaum & Rubin, 1983) by selecting a control bank (without replacement) for each LIBOR

TABLE 5 Top derivatives dealers

	(1)	(2)	(3)	(4)
	ER	*ER*	*ER*	*ER*
EVENT	−0.192**	−0.191**	−0.187**	−0.187**
	[−2.214]	[−2.311]	[−2.166]	[−2.255]
NONEVENT	−0.102	−0.109	−0.092	−0.099
	[−1.130]	[−1.209]	[−1.048]	[−1.133]
DEALER	0.016	0.017	0.016	0.016
	[0.339]	[0.349]	[0.328]	[0.338]
NONEVENT×DEALER	−0.102*	−0.101*	−0.098*	−0.097*
	[−1.789]	[−1.776]	[−1.720]	[−1.705]
NONLIBOR	−0.091	−0.104	−0.081	−0.095
	[−0.958]	[−1.090]	[−0.876]	[−1.017]
SIZE	0.003	0.001	0.003	0.001
	[0.229]	[0.058]	[0.251]	[0.075]
DETA	−0.001	−0.001	−0.001	−0.001
	[−0.493]	[−0.647]	[−0.499]	[−0.652]
LTA	−0.003***	−0.003***	−0.003***	−0.003***
	[−2.825]	[−2.869]	[−2.775]	[−2.819]
ADJFINE	0.265	0.345	0.253	0.333
	[0.702]	[0.912]	[0.659]	[0.866]
LTB	−0.023	−0.023	0.044	0.043
	[−0.448]	[−0.443]	[0.813]	[0.775]
MKT	0.988***	0.987***	0.975***	0.973***
	[24.527]	[24.512]	[30.692]	[30.758]
REIT			−2.304	−1.897
			[−0.742]	[−0.603]
CORP			−0.299***	−0.301***
			[−3.207]	[−3.238]
HY			−0.119*	−0.120*
			[−1.867]	[−1.888]
FOREX			−12.365**	−12.425**
			[−2.117]	[−2.118]
SOV			−0.006**	−0.006**
			[−2.510]	[−2.543]
COM			0.087***	0.088***
			[3.293]	[3.307]
PLT			−0.007	−0.007
			[−0.337]	[−0.329]
Constant	−0.063	0.112	−0.058	0.119
	[−0.270]	[0.488]	[−0.250]	[0.520]

(Continues)

TABLE 5 (Continued)

	(1) *ER*	(2) *ER*	(3) *ER*	(4) *ER*
NONEVENT+NONEVENT×DEALER	−0.204**	−0.210**	−0.190**	−0.196**
	[−2.370]	[−2.440]	[−2.270]	[−2.340]
Country FE	Yes	No	Yes	No
Year FE	Yes	No	Yes	No
Country×Year	No	Yes	No	Yes
Cluster SE	Bank	Bank	Bank	Bank
N	3,448	3,448	3,448	3,448
R^2	0.593	0.593	0.596	0.597

Note. This table reports test results for Hypothesis 2. *DEALER* is a dummy equals 1 if a bank is one of the 14 largest derivatives dealers (G14). Coefficients for *NONEVENT×DEALER* suggest that the commonality of incentives to misbehave channels the contagion effect of reputational penalties. Robust *t*-statistics are reported in brackets. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively. Standard errors are adjusted for clustering at the bank level. All variables are defined in the Appendix.

bank that has the closest propensity score. Table 1 reports the balancing property of the matching covariates: *SIZE*, *DETA*, and *LTA* significantly differ between LIBOR and control banks. Since our objective here is to find the closest bank for each LIBOR bank, we further control for these three covariates in our subsequent regressions to account for the difference between the LIBOR and control banks.

NONLIBOR takes a value of 1 when a bank is not a LIBOR bank. *ADJFINE* is the fine settlement scaled by the pre-settlement market capitalization. We also control for the following common risk factors that have explanatory power on bank excess stock returns: interest rate risk (*LTB*), market risk (*MKT*), real estate risk (*REIT*), high-grade credit risk (*CORP*), low-grade credit risk (*HY*), foreign exchange risk (*FOREX*), sovereign risk (*SOV*), commodity risk (*COM*), and political risk (*PLT*). Detailed variable definition is reported in the Appendix.

We next corroborate our research hypothesis that deals with the contagion effect by estimating Model 2 that includes an interaction term to test the role of incentive as a mechanism that channels contagion. Specifically, if commonality of the incentive to commit fraud channels the contagion, we should observe a stronger contagion effect among the most active derivative dealers that have the most to gain from a potential manipulation of the LIBOR.

$$\begin{aligned} ER_{i,t} = {} & \beta_0 + \beta_1 EVENT_{i,t} + \beta_2 NONEVENT_{i,t} \\ & + \beta_3 DEALER_{i,t} + \beta_4 NONEVENT_{i,t} \\ & \times DEALER_{i,t} + \beta_5 NONLIBOR_{i,t} + \beta_6 ADJFINE_{i,t} \\ & + BANK\ CONTROLS_{i,t-1} + COMMON\ RISK_t + \varepsilon, \end{aligned} \tag{2}$$

where *DEALER* is a dummy that equals 1 for the 14 largest derivatives dealers, and 0 otherwise. This group of banks, commonly referred to as the G14, could arguably gain the most from manipulating the LIBOR. This classification is widely used in the business press and by organizations like the Bank for International Settlements (BIS). The ISDA Market Survey for Mid-Year 2010 pointed out that G14 banks held 82% of the total notional amount of derivatives that were outstanding by mid 2010. In Model 2, the coefficient of interest, β_4, tests whether the contagion effect is stronger among large derivative dealers that have stronger incentive to misbehave. We expect a negative and significant coefficient for β_4. This additional analysis is particularly well suited to our research setting because the regulators' probe highlights the key role of certain Barclays traders in the LIBOR scandal, who requested that certain Barclays

TABLE 6 First event effect

	(1)	(2)	(3)	(4)
	ER	*ER*	*ER*	*ER*
EVENT	−0.188**	−0.165*	−0.185**	−0.163*
	[−2.318]	[−1.987]	[−2.258]	[−1.941]
FIRST	−0.068	−0.064	−0.013	−0.040
	[−0.528]	[−0.482]	[−0.087]	[−0.264]
EVENT×FIRST	−1.003***	−1.142***	−0.936***	−1.079***
	[−3.804]	[−3.923]	[−3.461]	[−3.628]
NONEVENT	−0.196**	−0.338*	−0.186**	−0.325*
	[−2.334]	[−1.841]	[−2.251]	[−1.762]
NONLIBOR	−0.113	2.841***	−0.105	3.218***
	[−1.194]	[3.038]	[−1.133]	[3.541]
SIZE	0.000	0.596***	0.000	0.674***
	[0.008]	[3.485]	[0.023]	[4.080]
DETA	−0.001	0.044***	−0.001	0.038***
	[−0.661]	[3.776]	[−0.665]	[3.233]
LTA	−0.003***	−0.022	−0.003***	−0.022
	[−2.873]	[−1.182]	[−2.823]	[−1.100]
ADJFINE	0.440	0.491	0.417	0.485
	[1.157]	[1.235]	[1.077]	[1.196]
LTB	−0.022	−0.022	0.043	0.040
	[−0.413]	[−0.417]	[0.784]	[0.709]
MKT	0.988***	0.985***	0.974***	0.975***
	[24.222]	[24.224]	[30.918]	[31.261]
REIT			−1.896	−2.353
			[−0.596]	[−0.736]
CORP			−0.300***	−0.273***
			[−3.256]	[−2.855]
HY			−0.118*	−0.100
			[−1.897]	[−1.608]
FOREX			−12.324**	−11.084*
			[−2.094]	[−1.892]
SOV			−0.006**	−0.005*
			[−2.380]	[−1.960]
COM			0.088***	0.083***
			[3.271]	[3.081]
PLT			−0.007	−0.015
			[−0.354]	[−0.756]
Constant	0.137	−7.790***	0.143	−8.894***
	[0.588]	[−3.107]	[0.619]	[−3.660]

(Continues)

TABLE 6 (Continued)

	(1) *ER*	(2) *ER*	(3) *ER*	(4) *ER*
EVENT+EVENT×FIRST	−0.191***	−1.307***	−1.121***	−1.242***
	[−3.790]	[−3.870]	[−3.540]	[−3.640]
Country FE	Yes	No	Yes	No
Year FE	Yes	No	Yes	No
Country×Year	No	Yes	No	Yes
Cluster SE	Bank	Bank	Bank	Bank
N	3,448	3,448	3,448	3,448
R^2	0.593	0.596	0.597	0.599

Note. This table reports test results adjusting for the first event effect. *FIRST* is a dummy that equals 1 for the first event date (i.e., June 27, 2012). Coefficients for the interaction term (*EVENT×FIRST*) indicate that reputational penalty is stronger for the first event than for other events. Robust *t*-statistics are reported in brackets. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively. Standard errors are adjusted for clustering at the bank level. All variables are defined in the Appendix.

submitters submit LIBOR and EURIBOR rates that would benefit the traders' trading positions, rather than rates that complied with the definitions of LIBOR and EURIBOR.

4.3 | Descriptive statistics

We describe our sample in the following ways. Table 2 reports descriptive statistics for 3,448 daily observations. For ease of presentation, the dependent variable (*ER*) is multiplied by 100. Appendix in Supporting Information S3 reports the strength and direction of correlations between variables. The correlation statistics do not raise concerns regarding multicollinearity.

5 | RESULTS

5.1 | Initial emergence of the LIBOR scandal

Table 3 reports the significant events surrounding the initial emergence of the LIBOR scandal. On Thursday, March 24, 2011, Barclays emerged as a key focus of the investigation by U.K. and U.S. regulators. The following day (Day +1), Barclays' shareholders experienced a raw return of −0.31%, while the financial services industry's capitalization-weighted daily return in the United Kingdom was 0.96%. The capital market's reaction to the initial emergence of the LIBOR probe was weak, particularly compared to the reaction to the first LIBOR settlement on Wednesday, June 27, 2012, when Barclays admitted to misconduct and reached fine settlements with both U.K. and U.S. regulators that amounted to US$450 million. Barclays' shareholders experienced a raw return of −15.5%, equivalent to a £120.27 million loss in firm value, on the following day (Day +1), while the financial services industry's capitalization-weighted daily return in the United Kingdom was −0.64%. The difference between the two event dates suggests that the market did not penalize the bank until the misconduct was affirmed with the financial penalty imposed. An alternative explanation is that the financial penalty issued by the regulators was higher than the market expected. The average raw return of the

TABLE 7 Diminishing event effect

	(1)	(2)	(3)	(4)
	ER	*ER*	*ER*	*ER*
EVENT	−0.318*	−0.319*	−0.326*	−0.328*
	[−1.870]	[−1.881]	[−1.942]	[−1.959]
NONEVENT	−0.249*	−0.258*	−0.230*	−0.241*
	[−1.817]	[−1.895]	[−1.734]	[−1.823]
NONLIBOR	−0.201	−0.213	−0.187	−0.200
	[−1.553]	[−1.644]	[−1.489]	[−1.594]
SIZE	−0.008	−0.009	−0.008	−0.009
	[−0.597]	[−0.665]	[−0.560]	[−0.644]
DETA	−0.005**	−0.005**	−0.004**	−0.005**
	[−2.491]	[−2.591]	[−2.425]	[−2.543]
LTA	−0.002**	−0.002**	−0.002**	−0.002**
	[−2.482]	[−2.466]	[−2.433]	[−2.425]
ADJFINE	0.142	0.181	0.140	0.184
	[0.353]	[0.447]	[0.354]	[0.460]
LTB	0.009	0.009	0.057	0.057
	[0.158]	[0.156]	[0.923]	[0.910]
MKT	1.008***	1.008***	0.976***	0.975***
	[20.258]	[20.221]	[23.469]	[23.395]
REIT			5.224	5.391*
			[1.670]	[1.707]
CORP			−0.284***	−0.285***
			[−3.232]	[−3.235]
HY			−0.182**	−0.182**
			[−2.196]	[−2.193]
FOREX			−12.749*	−12.869*
			[−1.927]	[−1.928]
SOV			−0.004*	−0.004*
			[−1.796]	[−1.796]
COM			0.092***	0.093***
			[3.206]	[3.210]
PLT			−0.000	−0.000
			[−0.009]	[−0.018]
Constant	0.481**	0.601**	0.484**	0.613**
	[2.118]	[2.586]	[2.165]	[2.667]
Country FE	Yes	No	Yes	No
Year FE	Yes	No	Yes	No
Country×Year	No	Yes	No	Yes

(Continues)

TABLE 7 (Continued)

	(1)	(2)	(3)	(4)
	ER	*ER*	*ER*	*ER*
Cluster SE	Bank	Bank	Bank	Bank
N	3,407	3,407	3,407	3,407
R^2	0.600	0.601	0.603	0.604

Note. This table reports test results adjusting for diminishing event effect. Models are estimated using an weighted least squares regression. The weight is calculated as $\frac{1}{event\ sequence}$, which assigns earlier events with higher weights. Robust *t*-statistics are reported in brackets. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively. Standard errors are adjusted for clustering at the bank level. All variables are defined in the Appendix.

remaining nonaccused LIBOR banks on June 28, 2012 (Day +1), was −0.42%, providing preliminary evidence for the contagion effect of the penalty on Barclays' misconduct.

5.2 | Reputational penalties and the contagion effect

Table 4 reports the results from the test for H1 under different model specifications: reduced form multifactor model (columns 1 and 2) and multifactor model controlling for additional common risk factors following Bessler and Kurmann (2014) (columns 3 and 4). We also include country and year fixed effects (columns 1 and 3), and country×year fixed effects (columns 2 and 4).[10] Standard errors, unless otherwise stated, are clustered at bank level (Petersen, 2009). When interpreting the results in the table, note that the single-event results reflect an average return during the event window. The overall sample's abnormal return can be obtained by multiplying each of these reported figures (i.e., the coefficients of *EVENT*, *NONEVENT*, and *NONLIBOR*) by the number of days in the event window (i.e., 3 days). Results in Table 4 suggest that banks that either were accused of or admitted to misconduct experienced an average cumulative abnormal return (CAR) ranging from −0.166% to −0.191% during the 3-day event window. The coefficients for *EVENT* across all specifications are negative and statistically significant, indicating that banks accused of misconduct experienced negative abnormal returns during the periods surrounding the announcement of alleged manipulation, which supports H1. Nonevent banks, in turn, experienced an average CAR ranging from −0.180% to −0.344% during the 3-day period. The coefficient for *NONEVENT* across all specifications are statistically significant and negative, suggesting that the LIBOR banks that were not accused of misconduct experienced negative abnormal returns during the period surrounding the announcement of manipulation, which we interpret as the contagion effect of the reputational damage. The coefficients for *NONLIBOR* are not statistically significant, so the reputational penalties and the contagion effect of the reputational penalties are specific to the LIBOR banks, which mitigates the possibility that our results are due to industry-wide shocks that occurred around the event dates. To further gauge the economic significance of our results, we recast the coefficients in column 4 in U.S. dollars. Across all 3-day event windows, accused banks on average experienced a drop of US$196 million in market value, while for nonaccused banks, the market value on average dropped by US$386 million.

Our theoretical framework posits that contagion is channeled by the commonality of incentives and opportunity to commit a fraudulent act. Consequently, we should expect that contagion is stronger among banks that have stronger incentives and opportunities to misbehave. Table 5 presents results from estimating Model 2, in which we interact the dummy variables *NONEVENT* with *DEALER* to determine whether the contagion effect is stronger for large derivatives dealers that have inherently greater incentive to commit the fraud. As expected, the coefficients for the interaction

[10] We do not include bank fixed effects in our models because the structure of our data does not allow for such specification: We have few events for each bank, and bank fixed effects would absorb a substantial part of the variation that we are interested in.

TABLE 8 Alternative reputational penalty measures

Panel A. Abnormal returns		
	(1)	(2)
	AR	*AR*
EVENT	−0.166*	−0.164*
	[−2.008]	[−2.014]
NONEVENT	−0.155*	−0.160*
	[−1.887]	[−1.947]
NONLIBOR	−0.075	−0.084
	[−0.800]	[−0.899]
SIZE	0.002	0.001
	[0.174]	[0.064]
DETA	−0.001	−0.002
	[−0.635]	[−0.751]
LTA	−0.003***	−0.003***
	[−2.720]	[−2.751]
ADJFINE	0.291	0.355
	[0.758]	[0.971]
Constant	0.271	0.440*
	[1.164]	[1.888]
Country FE	Yes	No
Year FE	Yes	No
Country×Year	No	Yes
Cluster SE	Bank	Bank
N	3,448	3,448
R^2	0.003	0.004

Panel B. Culmulative abnormal returns						
	(1)	(2)	(3)	(4)	(5)	(6)
	CAR[0]	*CAR*[0]	*CAR*[−1, +1]	*CAR*[−1, +1]	*CAR*[−2, +2]	*CAR*[−2, +2]
EVENT	−0.158**	−0.162**	−0.529***	−0.540***	−0.319**	−0.329**
	[−2.197]	[−2.281]	[−2.867]	[−2.927]	[−2.104]	[−2.157]
NONEVENT	−0.213***	−0.217***	−0.560***	−0.573***	−0.474***	−0.482***
	[−3.244]	[−3.284]	[−3.250]	[−3.364]	[−3.019]	[−3.040]
NONLIBOR	−0.049	−0.051	−0.208	−0.217	−0.146	−0.152
	[−0.687]	[−0.725]	[−1.007]	[−1.055]	[−0.727]	[−0.753]
Constant	0.037	0.060	0.146*	0.241**	−0.068	−0.054
	[1.261]	[1.552]	[1.885]	[2.528]	[−1.084]	[−0.633]

(Continues)

TABLE 8 (Continued)

Panel B. Culmulative abnormal returns						
	(1)	(2)	(3)	(4)	(5)	(6)
	CAR[0]	*CAR*[0]	*CAR*[−1, +1]	*CAR*[−1, +1]	*CAR*[−2, +2]	*CAR*[−2, +2]
Country FE	Yes	No	Yes	No	Yes	No
Year FE	Yes	No	Yes	No	Yes	No
Country×Year	No	Yes	No	Yes	No	Yes
Cluster SE	Bank	Bank	Bank	Bank	Bank	Bank
N	4,184	4,184	4,184	4,184	4,184	4,184
R^2	0.006	0.007	0.012	0.015	0.011	0.012

Note. This table reports test results using alternative reputational penalty measures. Panel A reports results based on the use of abnormal returns as a proxy for reputational penalty. Panel B reports results using the reputational penalty measure developed by Gillet et al. (2010) and Fiordelisi et al. (2014). Robust *t*-statistics are reported in brackets. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively. Standard errors are adjusted for clustering at the bank level. All variables are defined in the Appendix.

terms are negative and statistically significant, providing support for the notion that the commonality of incentives to misbehave channels the contagion effect. Thus, H2 is supported.

5.3 | Robustness

5.3.1 | Diminishing event effect

One concern that may affect the robustness of our baseline results is associated with the fact that not all news may be equal to each other, with earlier news being more important than later news. We address this concern in two ways: testing the effect of the first event and accounting for the diminishing event effect by using a weighted least squares regression. Many event studies focus on the first event date when examining the abnormal returns, as in most cases, markets react predominantly strong when the first event takes place. We test this conjuncture by including an interaction term, *EVENT*×*FIRST*, with *FIRST* being a dummy that equals 1 for the first event date (i.e., June 27, 2012). Results, reported in Table 6, suggest that the reputational penalty is stronger for the first event[11] than for other events, which confirms that markets incorporate new information once it becomes available. We further account for this diminishing event effect by employing a weighted least squares regression. The weight is calculated as $\frac{1}{event\ sequence}$, which assigns earlier events with higher weights. Results reported in Table 7 suggest that our results hold even when diminishing event effect is accounted for.

5.3.2 | Alternative reputational penalty measures

We next check the robustness of our results to the choice of reputational penalty measures. We first use abnormal returns, calculated as the difference between a bank's stock return and market return, as a proxy for reputational penalty. Results reported in Panel A of Table 8 are consistent with our baseline results.

[11] In a similar way, we also test the effect of events in the first week and first month, and find no significant coefficients for the interaction terms.

We then follow Gillet et al. (2010) and Fiordelisi et al. (2014) to measure reputational penalty as follows:

$$AR_{i,0}(Rep) = R_{i,t} - \alpha_i - \beta_i R_{mt} - \frac{loss_{i,t}}{market\ capitalization_{i,t}}, \tag{3}$$

where $R_{i,t}$ is the stock return of the accused bank i on day t; α_i is the idiosyncratic risk component of stock i; β_i is the beta coefficient of stock i; and R_{mt} is the return on the banking industry on day t. The α_i and β_i coefficients are estimated for each bank using an ordinary least squares (OLS) regression of $R_{i,t}$ on R_{mt} for a 250-working-day estimation window (from the 31st to the 280th day before the first announcement). $loss_{i,t}$ is the loss amount (i.e., fine settlement) suffered by bank i at time t. $market\ capitalization_{i,t}$ is the market value of bank i's shares at time t. $\frac{loss_{i,t}}{market\ capitalization_{i,t}}$ is equivalent to *ADJFINE* defined in Section 4.2. We then calculate the CAR, $CAR_i(\tau_1, \tau_2)$, for each stock by adding all AR for each time t in the event window $[\tau_1, \tau_2]$.

$$CAR_i(\tau_1, \tau_2) = \sum_{t=\tau_1}^{\tau_2} AR_{i,t}. \tag{4}$$

Panel B of Table 8 reports results for different event windows using the alternative reputational penalty measure: [0], [−1, +1], and [−2, +2]. Results remain unchanged across these event windows using this alternative reputational penalty measure.

6 | CONCLUSION

This paper documents reputational penalties and international bank contagion in the setting of a financial scandal, investigating how organizational actions that are contrary to social norms lead to reputational damage for organizations that share incentives and opportunity to engage in wrongdoing with the offending organization, even if they do not so engage. Specifically, we show that reputational penalties are imposed by the market to nonculpable firms that, simply by sitting on the LIBOR panel, share with fraudulent companies the opportunity and the incentive to misbehave. The results on large derivative dealers demonstrate the ability of shared incentives and opportunities to channel contagion to nonaffiliated firms. Therefore, it has been sufficient for the market to recognize a commonality of incentives and opportunity to commit the fraud to channel reputational penalties from accused firms to nonaccused firms. This paper is relevant to policy makers who seek to influence banks' risk-taking behavior. Solutions to unethical behavior in banking and banking regulation in general require deep and far-ranging actions. Some countries have included ethical guidelines in legislation while others have not. As bank ethics are still often voluntary, the task of disciplining banks falls to market discipline and legal enforcement. Sound and ethical banking demands the joint effort of banks in establishing ethical behavior as a foundation for the industry, the market and regulatory disciplines to guide and supervise bank behavior, and an effective legal environment that provides contextual support for the function of these two devices. Like all studies, ours is not without its limitations. Specifically, because we only have a limited amount of events for each bank, we cannot use bank fixed effects models that would have alleviated concerns about omitted variable bias. Results must be interpreted having this caveat in mind.

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ORCID

Xing Huan https://orcid.org/0000-0003-1845-6367

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APPENDIX: VARIABLE DEFINITION

Variable	Definition	Source
EVENT	Dummy = 1 on the day before, the day of, and the day after the event date (i.e., [−1, +1]) when a bank was accused of LIBOR manipulation. If an event takes place on a weekend, the event date is adjusted to the next trading day. If two event windows overlap, we merge the two event windows by extending from the day prior to the first event to the day following the second event.	
NONEVENT	Dummy = 1 when a bank was a LIBOR bank and was not accused of manipulation when one or more LIBOR banks were accused on the event date. In other words, these nonevent LIBOR banks were not yet officially involved in the scandal (i.e., public/press announcements) when other LIBOR banks were accused to have been involved.	
NONLIBOR	Dummy = 1 when a bank was not a member of the LIBOR panel.	
DEALER	Dummy = 1 if a bank is one of the 14 largest derivatives dealers (G14).	
FIRST	Dummy = 1 on the first event date (i.e., June 27, 2012) on which the LIBOR scandal began.	
R	Daily stock return.	COMPUSTAT
Rf	Risk-free rate. 3-month national/regional treasury-bill rate.	Datastream
ER	Excess return. The difference between a bank's stock return (*R*) and risk-free rate (*Rf*).	
SIZE	Bank size. Natural logarithm of a bank's total assets at fiscal year end.	Bankscope
CIR	Cost-to-income ratio. Operating expenses divided by the sum of net interest revenue and other operating income.	Bankscope
DETA	Derivatives exposure. Total fair value of financial derivatives divided by total assets.	Bankscope
LTA	Loans-to-assets ratio. Total loans divided by total assets.	Bankscope
ADJFINE	Adjusted fine. Fine settlement scaled by the presettlement market capitalization.	
LTB	Interest rate risk. Percentage changes in the market value of long-term assets. The factor is based on market prices of 10-year government bonds.	Datastream
MKT	Market risk. Percentage changes in the market value of the country's banking sector stock market portfolios.	Datastream
REIT	Real estate risk. Percentage changes in the market value of the country's REIT investments. The factor is provided by FTSE/NAREIT.	Datastream
CORP	(High-grade) credit risk. Changes in the default premium between BBB- and AAA-rated corporate bonds. The factor is based on time series maintained by Merrill Lynch.	Datastream
HY	(Low-grade) credit risk. Changes in the default premium between high-yield bonds and corporate bonds. The factor is based on time series maintained by Merrill Lynch.	Datastream
FOREX	Foreign exchange risk. Percentage changes in the trade-weighted currency baskets as provided by the Bank of England. The factor measures the currency value with respect to the currency values of the major trade partners.	Bank of England
SOV	Sovereign risk. Changes in the difference of the (mean) of yields on the 7–10 years government bonds (Greece, Portugal, Spain, Italy) and 7–10 years German Government bonds.	Datastream
COM	Commodity risk. Percentage changes in the S&P GSCI Total Return Index.	Datastream
PLT	Political risk. Percentage changes in gold price against U.S. dollars.	Bank of England