UNITED STATES DISTRICT COURT
SOUTHERN DISTRICT OF NEW YORK

IOWA PUBLIC EMPLOYEES' RETIREMENT SYSTEM, *et al.*, Plaintiffs, v. BANK OF AMERICA CORPORATION, *et al.*, Defendants.	Case No. 17-cv-6221 (KPF) (SLC) Hon. Katherine Polk Failla

JOINT DECLARATION OF DANIEL L. BROCKETT AND MICHAEL B. EISENKRAFT IN SUPPORT OF (1) MOTION FOR FINAL APPROVAL OF THE CREDIT SUISSE AND NEW SETTLEMENT AGREEMENTS, CERTIFICATION OF THE SETTLEMENT CLASSES, AND FINAL APPROVAL OF THE PLANS OF ALLOCATION, AND (2) MOTION FOR ATTORNEYS' FEES, LITIGATION EXPENSES, AND SERVICE AWARDS

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Pursuant to 28 U.S.C. § 1746, we, Daniel L. Brockett and Michael B. Eisenkraft, declare as follows:

1. We are, respectively, partners of the law firms of Quinn Emanuel Urquhart & Sullivan, LLP ("Quinn Emanuel") and Cohen Milstein Sellers & Toll, PLLC ("Cohen Milstein"). Our firms are interim co-lead counsel ("Co-Lead Counsel") for the class in the above-captioned action (the "Action"). By orders dated February 25, 2022, and September 1, 2023, the Court granted preliminary approval to the Credit Suisse Settlement Agreement and the New Settlement Agreement (collectively, the "Settlements"), and preliminarily appointed our firms as Co-Lead Counsel for the Settlement Classes. ECF Nos. 529, 654. We have been actively involved in prosecuting and resolving this Action since mid-2017. We are familiar with the case history and have personal knowledge of the matters set forth herein.

2. Collectively, the Settlements provide for $580,008,750 in cash payments (the "Settlement Funds") to members of the Settlement Classes. The Settlements also contain certain forward-looking measures that are intended to provide additional value to the classes by promoting a competitive stock lending market, and by requiring Defendants to cooperate in Plaintiffs' continuing case against the Bank of America Defendants. The Settlements would resolve the Action with respect to all Defendants except the Bank of America Defendants.

3. At the same time, the Settlements avoid the substantial risk, expense, and delay of taking this Action to trial against the Settling Defendants, including the risk that the Settlement Classes would recover less than the amount of the Settlement Fund at trial, or nothing at all, after additional years of litigation.

4. The Settlements were reached after hard-fought, arm's-length negotiations among experienced counsel. Based on our extensive pre-suit investigation, our familiarity with the

challenges the Action faces after litigating it for over six years, and a thorough analysis of the record including our work with world-class experts during the class-certification process, we believe the Settlements are an outstanding result for the Settlement Classes.

5. For these reasons and those set forth below, we believe the Settlements should be approved. We therefore respectfully submit this declaration in support of Plaintiffs' motion for final approval of the Settlements, and for Plaintiffs' and Co-Lead Counsel's motion for an award of attorneys' fees, expenses, and for named Plaintiffs' service awards.

I. CO-LEAD COUNSEL'S PROSECUTION OF THE ACTION

6. This case is very complex and required significant investments in time and resources, even relative to other major antitrust class actions. The case examines collusion in the stock lending market, a crucial but little-known corner of the financial markets where expertise is closely held among a small number of financial professionals. Plaintiffs seek to establish a conspiracy spread across several years that impacted multiple boycotted products, including anonymous all-to-all trading platforms and data transparency providers.

7. To prove our case, we had to gather many millions of documents and records from a myriad of parties, take and defend nearly 100 depositions, and employ complex economic theories for showing antitrust impact and damages. Plaintiffs' damages model required intensive analysis of millions of individual stock loan transactions. These were drawn from more than 100 different sets of transactional data, all of which had to be cleaned and merged. And at every turn, Co-Lead Counsel faced numerous, well-funded defense counsel, all of whom fought zealously for their clients.

8. In sum, over the past several years, Co-Lead Counsel have worked tirelessly for the benefit of the class. Co-Lead Counsel's work has included, among other things:

- Pre-suit investigation of the facts and legal theories that formed the basis for Plaintiffs' allegations, including reviewing publicly available information, identifying and interviewing key industry insiders, and consulting with industry experts to understand the market structure and economics;

- Successfully defending against Defendants' motions to dismiss, including lengthy briefs and extensive pre-motion oral argument;

- Negotiating extensive document discovery with Defendants and third parties, resulting in more than half a *billion* pages of produced documents;

- Negotiating extraordinarily complex transactional data discovery from Defendants, including evaluation of sample data productions, extensive database-by-database analysis and correspondence to interpret Defendants' productions, and ultimately analyzing a total of 12.9 *terabytes* of data produced by Defendants;

- Litigating numerous discovery motions, including disputes over Defendants' search terms, Defendants' production of profit and loss and transactional data, and Defendants' attempts to pierce Co-Lead Counsel's work product;

- Taking and defending nearly 100 depositions, including many of the antitrust bar's first virtual depositions during the onset of the COVID-19 pandemic;

- Responding to dozens of interrogatories and 211 requests for admission, including preparing (in response to Defendants' contention interrogatories) a 77-page narrative history of the alleged conspiracy with citation to hundreds of record documents, and issuing over 20 interrogatories to each Defendant and 322 total requests for admission on Defendants;

- Working with non-testifying experts to improve our understanding of issues such as platform construction and operation, central counterparty operations, and Basel III financial regulations and risk assessments;

- Briefing a motion for class certification, consisting of a 50-page opening memorandum with 162 exhibits, including two expert reports, a 35-page reply brief with 16 exhibits, including two more expert reports, and a 5-page sur-sur-reply with another expert report;

- Working with three world-renowned economists to develop a viable class certification model based on cutting-edge economic theory, extensive real-world comparator evidence, and a damages model that required creation of the most comprehensive set of observations of real-world stock lending transactions ever collected in this market, drawing on nearly 13 terabytes of data;

- Deposing Defendants' four testifying experts and defending depositions of Plaintiffs' three testifying experts;

- Arguing class certification during a full-day hearing after months of preparation, the scope of which can be illustrated with the 169 PowerPoint slides Plaintiffs prepared for potential use during the hearing;

- Opposing Defendants' objections to Magistrate Judge Cave's Report and Recommendation and filing a limited objection to the Report and Recommendation;

- Negotiating the two Settlements now before the Court, including preparing for and attending a two-day mediation with retired U.S. District Court Judge Layn Phillips, as well as months of negotiations with Defendants conducted both with and without Judge Phillips's help; and

- Successfully briefing the Court's preliminary approval of the Settlements and managing the notice and allocation process in concert with expert settlement administrators.

A. Co-Lead Counsel's Efforts to Uncover the Wrongdoing and Plead the Initial Claims

1. Co-Lead Counsel conduct extensive pre-filing investigations and file a best-in-class initial pleading

9. Before filing suit, Co-Lead Counsel invested months of attorney time and substantial expenses in investigating the possibility of an anticompetitive boycott in the stock lending market. This investigation was carried out "from scratch," without any precipitating government investigations or public reports.

10. Based on our extensive pre-filing investigation, Co-Lead Counsel filed the first complaint in the Action in August 2017. ECF No. 1. Our 238-paragraph initial complaint detailed, for the first time in a public forum, Defendants' successful efforts to boycott potential new entrants into the stock lending market.

2. Co-Lead Counsel continue the investigation and file the Amended Class Action Complaint

11. In November 2017, Co-Lead Counsel filed the Amended Class Action Complaint. ECF No. 73. At 144 pages and 398 paragraphs, the amended complaint was more than one and a half times the length of the initial pleading. It added new allegations based on months of

additional analysis and investigation, and new details based on further interviews with former industry insiders. As the Court noted in its opinion denying Defendants' motions to dismiss, the amended complaint included direct evidence of a conspiracy, including:

a. A statement by John Shellard, a Managing Director at J.P. Morgan and an Equilend Board member, at an August 7, 2013 meeting that there was a "general agreement among [the] directors [of Equilend]" that "industry advances should be achieved from within EquiLend," rather than through third parties such as AQS, SL-x, and Data Explorers.

b. A statement by Thomas Wipf, Morgan Stanley's Global Head of Bank Resource Management, that he and William Conley agreed that Morgan Stanley and Goldman Sachs needed to "get a hold of this thing," meaning they needed to act together to acquire and shut down AQS.

ECF No. 123 at 46-48 (quoting Amended Complaint ¶¶ 239, 295-96).

3. *Co-Lead Counsel oppose Defendants' motions to dismiss*

12. In January 2018, the Court held a two-hour initial pretrial conference to discuss the amended complaint, Defendants' potential grounds for dismissal, and whether Plaintiffs would seek further amendments. ECF No. 102. During that conference, Co-Lead Counsel detailed the "thorough investigation" they had done in order to "plead collusion claims with the level of detail and specificity that are alleged in" the amended complaint. *See, e.g.*, ECF No. 102 at 11:18-12:11.

13. Later that same month, Defendants filed two motions to dismiss the amended complaint. In addition to 63 pages of briefs, Defendants submitted two supporting declarations and two exhibits in support of the motions. ECF Nos. 106-11.

14. In March 2018, Co-Lead Counsel filed 65 pages of briefing in opposition to Defendants' motions to dismiss. ECF Nos. 112-13. Defendants filed an additional 32 pages of reply briefs. ECF Nos. 114-15.

15. In September 2018, the Court issued a 93-page order denying in full Defendants' motions to dismiss. ECF No. 123. The Court acknowledged the parties' detailed briefing, stating: "The Court pauses to observe that the briefing on all sides was excellent, for which the Court extends its gratitude." *Id.* at 3 n.1.

16. In October 2018, Defendants each answered the amended complaint. ECF Nos. 128-134.

B. Co-Lead Counsel's Discovery Efforts

17. In November 2018, shortly after the Court's decision on Defendants' motions to dismiss, Co-Lead Counsel diligently set about to coordinate discovery, proposing a schedule in November 2018. ECF No. 136. Co-Lead Counsel thereafter vigorously pursued discovery in this case over the course of more than two years. Discovery at every turn was long and zealously fought. Fact discovery ultimately closed on October 20, 2020, except for certain depositions that were taken after the close of fact discovery, *see* ECF No. 363, and responses to certain written discovery requests, which were due on December 11, 2020, *see* ECF No. 371.

1. Co-Lead Counsel negotiate the production of, and then review, over 500 million pages of documents

18. This case involves five different named Plaintiffs (the "Class Representatives," Iowa Public Employees' Retirement System, Los Angeles Country Employees Retirement Association, Orange County Employees Retirement System, Sonoma County Employees' Retirement Association, and Torus Capital, LLC), six Prime Broker Defendants (Bank of America, Credit Suisse, Goldman Sachs, JPMorgan, Morgan Stanley, and UBS), and Equilend.

Each produced documents, as did numerous third parties, including the boycotted platforms and transparency providers (AQS, SL-x, and Data Explorers), agent lenders (State Street, Blackrock, Northern Trust, Bank of New York Mellon), and central clearinghouses (the Options Clearing Corporation and the Depository Trust & Clearing Corporation).

19. Defendants issued three different sets of production requests, totaling 116 requests. These requests called for not only emails and other types of correspondence, but also complex financial data and records. Working with Co-Lead Counsel, the Class Representatives spent extensive time searching for, reviewing, and eventually producing responsive documents. Altogether, the Class Representatives produced 621,337 pages of documents. That review included detailed privilege analysis to avoid the production of documents protected by the attorney client privilege or work product protection.

20. Co-Lead Counsel issued four sets of requests for production, totaling 110 requests, on the Prime Broker Defendants. In total, the Prime Broker Defendants produced 8,741,565 pages of documents. Co-Lead Counsel also issued four sets of request for production, totaling 102 requests, to Equilend. In total, Equilend produced 502,748,194 pages of documents.

21. Co-Lead Counsel also served 42 subpoenas to a total of 36 third-party entities or corporate families. In response, those third parties produced 1,682,310 pages of documents.

22. Co-Lead Counsel's document database in this case contains over 513 million pages of discovery materials. That database is massive, containing 4.7 terabytes of information.

23. Given this extraordinary volume of information, Co-Lead Counsel employed a variety of review techniques. We used cutting-edge technology-assisted review and predictive coding tools to efficiently identify the most important documents. We supplemented these tools with linear review by specialized discovery attorneys of potentially important document sets and

targeted searches. From more than half a billion pages of produced documents, we were able to identify hundreds of key documents substantiating Plaintiffs' claims.

2. *Co-Lead Counsel respond to, and issue, a significant volume of written discovery*

24. The volume of written discovery in this case was also significant. Both sides issued and responded to numerous written discovery requests.

25. Defendants issued dozens of interrogatories to the Class Representatives. Our responses and objections span 163 pages in length, including a 77-page extended narrative description of Defendants' conspiracy, replete with record cites to documents and depositions. Defendants also issued 57 requests for admission to all Plaintiffs, along with an additional 30 to IPERS, 44 to LACERA, 44 to OCERS, and 36 to SCERA, for a total of 211 unique requests for admission. Collectively, the Class Representatives' responses and objections to these requests for admission span 125 pages.

26. Co-Lead Counsel also issued numerous interrogatories, in December 2018 (to the Prime Broker Defendants), August 2020 (to all Defendants), and January 2022 (to JPMorgan). Co-Lead Counsel also issued 322 requests for admission to Defendants; Defendants' responses and objections span 240 pages.

3. *Co-Lead Counsel negotiate for the production of voluminous and complicated transactional data*

27. To support the motion for class certification, Co-Lead Counsel negotiated and analyzed an unusually significant amount of transactional data, which was essential to our expert reports. Each Defendant produced detailed data reflecting its stock loan transactions. Equilend similarly produced extensive data about the transactions it facilitated, along with legacy data from AQS. Along the way, Co-Lead Counsel navigated numerous challenges, including complications associated with negotiation and production and protective order issues.

28. Co-Lead Counsel initially requested transactional data from the Defendants in December 2018. Between late 2018 and May 2019, the parties engaged in dozens of meet and confers regarding these requests and exchanged dozens of detailed letters. *See* ECF No. 176. Defendants first produced exemplar data to confirm that the data specifications were correct. *Id*. The exemplar data reflected that Defendants maintained data in distinct, unique databases with hundreds of unique fields. *Id*. The initial data exemplars often lacked critical fields and explanations for the fields provided. *Id*. Accordingly, Co-Lead Counsel recognized early that these complications would necessitate an extension of the deadline for data production, and promptly raised the issue with the Court. *Id*. Meanwhile, Co-Lead Counsel continued to engage with Defendants to obtain complete data sets and interpretive material. Of note, Co-Lead Counsel were able to work cooperatively with most Defendants' counsel on interpreting Defendants' data sets and obtaining efficient, early answers to data-related questions.

29. Because the data was housed in different databases, obtaining a timeline for actual production proved difficult. Even after a March 17, 2019 Court-ordered status conference, Defendants still could not commit to a deadline for the production of full data sets. ECF No. 185. Accordingly, after letter updates to the Court, *see* ECF Nos. 183-84, the Court ordered that the parties resolve disputes regarding the production of transactional data by June 24, 2019, that Defendants produce data dictionaries by the same date, and that Defendants advise Plaintiffs and the Court of the date by which Defendants could complete their production by July 1, 2019. ECF No. 185.

30. Data productions became substantially more complicated when—on the eve of production—Defendants provided notice to their clients of the impending production. ECF No. 192. Those clients expressed concerns regarding the sufficiency of the parties' protective

order. *Id*. Co-Lead Counsel worked swiftly to resolve those concerns, meeting with putative class members and weighing options to ameliorate any issues. ECF No. 193.

31. Co-Lead Counsel took numerous steps to assure putative class members that their data would be secure. *First*, Co-Lead Counsel explained that their experts employed state-of-the-art security measures. ECF No. 196. *Second*, Co-Lead Counsel offered to discuss changes and amendments to the parties' protective order. *Id*. *Third*, Co-Lead Counsel offered to anonymize the data, to further protect putative class members' interests. *Id*. Ultimately, Co-Lead Counsel's persistence paid off—the parties agreed to a supplemental protective order, ECF No. 228. That supplemental protective order provided still further protections for putative class members, including additional notice requirements. *See e.g.*, ECF No. 246. In January 2020, Co-Lead Counsel reached agreement with the Defendants and putative class members on the format of the data production. In addition to the supplemental protective order, the parties agreed to anonymize all borrow-side data. ECF No. 264.

32. The data productions Defendants ultimately made are massive in scope, even for a complex antitrust class action. Goldman Sachs produced a total of 31 sets of data files, representing more than 815 gigabytes of information; Morgan Stanley produced 16 sets of data files, representing more than 2,217 gigabytes of information; JPMorgan produced 10 sets of data files, representing more than 399 gigabytes of information; Bank of American produced 28 sets of data files, representing more than 706 gigabytes of information; Credit Suisse produced 25 sets of data files, representing more than 64 gigabytes of information; UBS produced 22 sets of data files, representing more than 814 gigabytes of information; and Equilend produced 26 sets of data files, representing more than 7,907 gigabytes of information. *See* ECF no. 414-10, Appendix C.

33. All told, Defendants produced more than 12.9 terabytes of data. It is hard to overstate how much information that figure represents—usually, data measured in terabytes describes libraries of big multimedia files, such as hundreds of hours of 4K video, or hundreds of thousands of high quality photos. The data collected in Defendants' productions are lines of comma-separated text representing tens of millions of stock loan transactions—roughly 26 *billion* printed pages of information.

34. Equilend also produced legacy data from AQS, one of the boycotted platforms that the Prime Broker Defendants acquired through Equilend as part of the conspiracy. ECF No. 414-10, Appendix D. The data reflect more than 13,000,000 unique stock loan billing observations. *Id.* Even after filtering for sufficiently robust data and limiting the data to the class period, the total number of observations still exceeded 5,000,000. *Id.*

35. Data of this volume is not easy to work with. It cannot be stored in familiar formats such as Microsoft Excel spreadsheets. Performing operations often requires writing new computer code, and takes hours of processing by high-powered computers not available in consumer markets. Manipulating and otherwise "cleaning" this data took months; the process was sufficiently arduous that, despite millions of dollars in expert fees, Plaintiffs' damages experts were unable to complete the process for all banks by the date of their opening class certification report. ECF No. 414-10 ¶ 521. And the damages experts' opening report data appendix alone spans 37 pages just on Defendants' data. *Id*. at Appendix C.

36. Apart from sheer volume, Defendants' data is also extremely complex. Just understanding the data required Co-Lead Counsel repeatedly to seek clarification in follow-up questions to Defendants. This process occurred for more than a year. By way of example, Co-Lead Counsel and counsel for JPMorgan exchanged over twenty formal letters, alongside

many more emails, between April of 2019 to January 2021 concerning JPMorgan's data production. Those letters concern a huge array of topics, including field definitions (*e.g.*, what does a particular field mean or represent), field-value definitions (*e.g.*, what does a particular value in a given field represent), missing data (*e.g.*, why is there no data for a particular date range), anomalous entries (*e.g.*, why is a given field value, expected to be positive, negative sometimes), and units of observation (*e.g.*, what triggers or events are necessary for a particular dataset to record an observation). Co-Lead Counsel had similar exchanges with each Defendant.

37. Equilend's data was particularly complex and voluminous. In January 2020, Co-Lead Counsel served a notice of a 30(b)(6) deposition on Equilend driven largely by the need for additional information about Equilend's data. After extensive negotiation, in August 2020, Co-Lead Counsel took a 30(b)(6) deposition of an Equilend designee. That deposition transcript spans 224 pages and almost exclusively concerns Equilend's data production.

4. Co-Lead Counsel take and defend nearly 100 depositions

38. Fact depositions in this case spanned the better part of a year, from late 2019 until the end of 2020. Many depositions occurred during the midst of the COVID-19 pandemic, which necessitated that Co-Lead Counsel develop remote deposition protocols as well as learn to take and defend depositions on Zoom.

39. Co-Lead Counsel took 56 depositions of Defendants' witnesses. This included eight from Bank of America, eight from Credit Suisse, five from Equilend—including a 30(b)(6) deposition and a two day deposition of Equilend's CEO—nine from Goldman Sachs, eight from JPMorgan, nine from Morgan Stanley, and nine from UBS. These depositions were critical to the overall success of the case.

40. Given the nature of the conspiracy in this case—a group boycott of trading platforms and data transparency providers—third-party discovery was also critical. Co-Lead

Counsel also took 33 third-party depositions. This included seven AQS depositions, one Barclays deposition, one Blue Ridge Capital deposition, one BNY Mellon deposition, one Citi deposition, one D.E. Shaw deposition, two DTCC depositions, one FIS deposition, four Markit (purchaser of Data Explorers) depositions, three Northern Trust depositions, four Options Clearing Corporation depositions, six SL-x depositions, and one State Street deposition.

41. Co-Lead Counsel also defended seven depositions of witnesses from the Class Representatives. This included one 30(b)(6) deposition for each of the four pension fund plaintiffs—IPERS, LACERA, OCERS, and SCERA—as well as three depositions of Torus Capital representatives. Defense of these depositions was important, given that Defendants ultimately argued (unsuccessfully) that both Torus and SCERA were inadequate and atypical Class Representatives. *See* ECF No. 441 at 46-47.

42. In total, Co-Lead Counsel took and defended nearly 100 fact depositions during the span of just over one year, in the middle of a global pandemic.

5. <u>Co-Lead Counsel litigate numerous discovery motions</u>

43. This case was zealously fought, with Co-Lead Counsel litigating against many of the world's top firms, including Cravath Swaine & Moore (Morgan Stanley); Shearman & Sterling (Bank of America); Covington & Burling LLP (JPMorgan); Cahill Gordon & Reindel LLP (Credit Suisse); Clearly Gottlieb Steen & Hamilton LLP (Equilend); Katten Munchin Rosenman LLP (UBS); and Winston & Strawn LLP, Sullivan & Cromwell LLP, and, later, Paul Weiss Rifkind Wharton & Garrison (Goldman Sachs). The parties litigated numerous discovery disputes. Some examples are set forth below.

44. In March 2019, Co-Lead Counsel submitted a letter-motion relating to a search-term dispute with JPMorgan. ECF No. 165. JPMorgan refused to apply reasonable search terms, instead demanding that Co-Lead Counsel accept much narrower, and unhelpful,

terms. *Id*. JPMorgan then requested an extension to respond, ECF No. 166, which the Court subsequently granted, ECF No. 167. Co-Lead Counsel then met and conferred with counsel for JPMorgan, who ultimately capitulated, at which point Co-Lead Counsel withdrew their motion. ECF No. 168. Co-Lead Counsel's request for Court intervention was critical to JPMorgan capitulating on search terms, which was essential to obtaining the needed documents.

45. In May 2019, Co-Lead Counsel wrote to inform the Court of delays associated with Defendants' production of transactional data. ECF No. 175. One day later, the Court ordered a status conference on this issue. ECF No. 176. Ahead of that conference, Co-Lead Counsel updated the Court on the progress of negotiations. ECF No. 177. At that conference, Co-Lead Counsel discussed a number of outstanding issues with Defendants' transactional data and apprised the Court of the parties' timelines. ECF No. 178.

46. In June 2019, Co-Lead Counsel again updated the Court on the progress of data negotiations, and asked for relief in the form of a deadline to resolve disputes and an order compelling the production of data dictionaries. ECF No. 183. The Court ultimately granted that relief. ECF No. 185. On July 1, 2019, Defendants provided the required update. ECF No. 186. On July 29, 2019, given the extensive delays in data production, Co-Lead Counsel moved to extend the deadlines for class certification. ECF No. 189. The Court granted that relief, too. ECF No. 190.

47. In the fall of 2019, as discussed above, the ultimate production of Defendants' transactional data was further complicated by some putative class members raising concerns about the confidentiality of their transactional data. ECF No. 193. Co-Lead Counsel, Defendants, and 22 putative class members spent the better part of several months negotiating protections for putative class members' data. *See* ECF Nos. 192, 193, 195, 196, 198, 199, 207.

48. In October 2019, Defendants moved to compel information they viewed as responsive to their first interrogatory, aimed at uncovering our work product and confidential sources of information. ECF No. 233. Co-Lead Counsel opposed, explaining that Defendants' request was designed not for proper purposes, but instead to pierce Plaintiffs' and Co-Lead Counsel's privileges. ECF No. 238. Co-Lead Counsel also explained that Defendants' request implicated significant privacy and anti-retaliation concerns. *Id*. The Court ultimately granted Defendants' motion, but critically limited the relief to only the names of individuals quoted in the amended complaint. ECF No. 240.

49. In December 2019, after months of failed negotiations, Co-Lead Counsel moved to compel Bank of America to produce its profit and loss data. ECF No. 254. Bank of America vigorously opposed. ECF No. 256. Later that month, after recognizing Co-Lead Counsel's efforts to resolve this dispute, the Court ordered Bank of America to produce the requested data. ECF No. 260.

50. In February 2020, Defendants moved *again* to compel additional answers in response to its first interrogatory. ECF No. 271. As Co-Lead Counsel carefully explained in their opposition, we had promptly complied with the Court's prior order. ECF No. 276. We explained that Defendants' latest request was an attempt to *expand* that order rather than seek compliance with it. *Id*. The Court agreed, denying Defendants' request. ECF No. 280.

51. In April 2020, Defendants issued subpoenas to a non-testifying industry consultant and his attorney. ECF Nos. 297-1, 297-2. Those subpoenas sought information relating to the non-testifying industry consultant's communications with Co-Lead Counsel. ECF No. 297. Co-Lead Counsel also argued that Defendants' subpoenas were designed to harass and intimidate the industry consultant, a former executive of one of the boycotted platforms who had

spoken out against the Defendants' illegal conduct. *Id*. The Court held a conference in June 2020, wherein Co-Lead Counsel argued that Defendants' subpoenas were improper. ECF Nos. ECF No. 307, 311. The Court ultimately agreed, asking Defendants to re-issue the subpoenas with a narrower scope, and ordering further briefing on the topic of the industry consultant's retention.

52. Later that month, in June 2020, Co-Lead Counsel and Equilend submitted 10-page letters regarding the non-testifying industry consultant. Co-Lead Counsel explained that their relationship with the non-testifying industry consultant was nothing out of the ordinary. ECF No. 319. As Co-Lead Counsel argued, courts regularly permit parties to hire industry consultants with knowledge about the underlying facts of the lawsuit. *Id*. Co-Lead Counsel explained that their communications with the non-testifying industry consultant were work product, clearly protected from Equilend's attempt to seek discovery into Co-Lead Counsel's litigation strategy. *Id*. This marked the *third* time that Defendants had attempted to pierce Co-Lead Counsel's work product protections.

53. In July 2020 the Court ordered the parties to appear for another teleconference. ECF No. 328. Ahead of that conference, Equilend submitted a "supplemental" letter, again aimed at smearing Co-Lead Counsel's retention of industry consultants. ECF No. 330. This letter necessitated a further response from Co-Lead Counsel. ECF No. 333. At the resulting teleconference, the parties again argued about the propriety of retaining the non-testifying industry consultant, and about his dual role as industry consultant and fact witness. ECF No. 342. The Court granted Co-Lead Counsel's motion to quash, finding that the sought-after documents were protected work product. *Id*. The Court also discussed Co-Lead Counsel's acquisition of documents, and Equilend indicated its view that it would move for sanctions. *Id*.

The Court indicated that it would consider those issues after the non-testifying industry consultant's forthcoming deposition. *Id*.

54. In November 2020, after that deposition, Equilend informed the Court that it intended to seek sanctions against Co-Lead Counsel. ECF No. 373. Co-Lead Counsel responded, explaining that the non-testifying industry consultant's deposition had fully vindicated Plaintiffs' position. ECF No. 376. The Court ordered a teleconference. ECF Nos. 381, 384. The Court explained that Equilend had a "tough row to hoe" on its anticipated motion, but nevetheless said it would allow Equilend the opportunity to file its motion. *Id*.

55. Equilend brought its motion later that month, in November 2020. ECF No. 388. Equilend's 25-page motion requested: (1) disqualification of any attorney who handled the documents at issue from working on the case, (2) a "clean team" to review plaintiffs' work product for information purportedly privileged to Equilend, (3) prohibiting Co-Lead Counsel from using the industry consultant's testimony in the case, (4) ordering Co-Lead Counsel to pay a monetary sanction, (5) prohibiting Co-Lead Counsel from using any documents produced by the non-testifying industry consultant, and (6) reimbursing Equilend for its costs. *Id*.

56. In December 2020, Co-Lead Counsel responded. ECF No. 399. Co-Lead Counsel's opposition explained that Equilend failed to adduce any evidence that Co-Lead Counsel engaged in sanctionable conduct. *Id*. Equilend identified no evidence of bad faith, no prejudice it suffered, and its proposed "remedies" would merely punish Co-Lead Counsel for bringing and prosecuting this antitrust case. *Id*. Co-Lead Counsel prepared our opposition over the course of the holidays, while simultaneously preparing to file Plaintiffs' class certification motion.

57. The Court denied Equilend's sanction motion on July 8, 2021. ECF No. 436.

58. During the pendency of the industry-consultant dispute, Co-Lead Counsel briefed several other discovery disputes. For instance, in December 2020, Co-Lead Counsel moved to compel the production of data concerning certain potential "opt-out" Class members. ECF No. 392. The motion was necessitated because Defendants initially stated they would provide the information, but later reneged on their promise. *Id*. Defendants responded, but effectively conceded by agreeing to produce the information by January 15, 2021. ECF No. 397. Accordingly, the Court noted that the dispute was mooted. *Id*.

C. Co-Lead Counsel's Expert Discovery Efforts And Efforts To Certify The Litigation Class

59. Co-Lead Counsel filed Plaintiffs' motion for class certification and appointment of class counsel in February 2021. ECF No. 411. The motion was accompanied by a 50-page memorandum of law and two attorney declarations attaching a combined 162 exhibits. ECF Nos. 419-2. Those included two expert reports: the report of Plaintiffs' lead impact expert, Dr. Haoxiang Zhu, and the report of Plaintiffs' damages and impact experts, Profs. Paul Asquith and Parag Pathak. ECF No. 420-11, 12.

60. After filing our opening motion for class certification, Co-Lead Counsel spent many hours preparing our three testifying experts for their depositions. Co-Lead Counsel prepared the three testifying experts with mock questioning, anticipating many of the lines of questioning that Defendants' counsel pursued in depositions.

61. Defendants filed their 50-page opposition to Plaintiffs' motion for class certification in June 2021. ECF Nos. 441, 442. Defendants included 68 exhibits with their opposition, including reports from four experts: Professor Terrence Hendershott from the Berkeley Haas School of Business; Professor Justin McCrary from Columbia Law School;

William Pridmore, a purported industry expert; and Fabio Savoldelli, another purported industry expert. ECF Nos. 442-1-4.

62. Utilizing these experts, Defendants made numerous lengthy and complex arguments in support of their opposition to Plaintiff's class certification motion. Co-Lead Counsel immediately got to work in preparing responses. Co-Lead Counsel conducted extensive research into the law, the evidentiary record, and economic literature.

63. Co-Lead Counsel deposed Defendants' testifying experts following extensive preparation. Co-Lead Counsel wrote to the court requesting to file a 35-page reply brief in support of our motion for class certification, which the Court granted. ECF Nos. 466-67.

64. Co-Lead Counsel ultimately filed our reply memorandum in support of our motion for class certification in October 2021. ECF No. 491. The reply brief was accompanied with 16 new exhibits, including expert reply reports by Dr. Zhu and Professors Asquith and Pathak. ECF No. 492.

65. The Court scheduled oral argument on the motion for class certification for April 28, 2022. ECF No. 535. Co-Lead Counsel spent many hours preparing. This included preparing PowerPoint decks that we used during the hearing consisting of 114 affirmative slides and 55 potential rebuttal slides. ECF No. 556-1, 556-2. All of this work was essential to putting on a strong showing at the hearing, which was a full day of argument before Magistrate Judge Sarah Cave.

66. Before the hearing, Co-Lead Counsel also submitted two notices of supplemental authority to alert the Court to new cases that supported Plaintiffs' arguments. Magistrate Judge Cave later cited both of these submissions in the Report and Recommendation. ECF No. 563 at 45, 59.

67. Magistrate Judge Cave issued a Report and Recommendation recommending that the Court certify the class in June 2022. ECF No. 563. Magistrate Judge Cave agreed with nearly all of Co-Lead Counsel's arguments, vindicating the thousands of hours Co-Lead Counsel had invested in discovery, preparing our class certification papers (including the supporting expert reports), and preparing for the class certification hearing. Magistrate Judge Cave's 70-page recommendation analyzed both sides' arguments and contentions in depth and determined that Plaintiffs satisfy each of Rule 23's certification requirements.

68. Defendants filed objections to Magistrate Judge Cave's recommendation in August 2022. ECF No. 587. Co-Lead Counsel prepared and filed an opposition brief in October 2022. ECF No. 609. Defendants filed their reply brief in November 2022. ECF No. 630. Co-Lead Counsel filed a limited objection to Magistrate Judge Cave's recommendation—regarding the applicable class period—on the same timetable. ECF Nos. 573, 604, 627.

II. THE SETTLEMENTS AND CO-LEAD COUNSEL'S EFFORTS TO GET THEM APPROVED

69. The Credit Suisse Agreement was reached after extensive arm's-length negotiations with Credit Suisse and its counsel, concluding in late January 2022. In February 2022, Co-Lead Counsel prepared and filed a motion to approve the Credit Suisse Agreement, including a 25-page brief and supporting documentation. ECF No. 520. Later that same month, the Court granted the motion to preliminarily approve the Credit Suisse Agreement. ECF No. 529.

70. The New Settlement Agreement was reached after extensive arm's-length negotiations with the assistance of a leading mediator, the Honorable Layn Phillips. Negotiation began in early 2023 and concluded in June 2023. The parties met in person in March for a

two-day mediation. While some progress was made, the parties were still far apart after the end of the second day.

71. The parties continued to negotiate for three months more, finally agreeing to a term sheet in June 2023. The negotiations concluded only after both sides accepted a mediator's proposal put forward by Judge Phillips.

72. Turning the agreement into a long-form document (the New Settlement Agreement) was itself the subject of intense additional negotiations, which concluded in August 2023. Very shortly thereafter, also in August 2023, Co-Lead Counsel prepared and filed a motion to approve the New Settlement Agreement, including a 25-page brief and supporting documentation. ECF No. 651.

73. Co-Lead Counsel's work continued even after the Settlements were preliminarily approved.

74. For instance, Co-Lead Counsel spent the next few months preparing to give notice to members of the Settlement Classes. This included working with both the Settling Defendants and the non-settling Bank of America Defendants to provide the reasonably available contact information for potential members of the Settlement Classes. This also included retaining and then working with the settlement administrator to devise the notice program and all of the notice materials.

75. Co-Lead Counsel also continued to work for the benefit of the Settlement Classes by way of devising the Plans of Allocation. While built off of our extensive work during the class-certification stage, translating the lessons learned and the conclusions reached during litigation into an easy-to-understand, easy-to-administer, universal plan covering the entire class of lenders and borrowers required additional effort and consultation with the settlement

administrator. The Plans of Allocation assign different damages and risk multipliers based on (i) whether the claimant was a borrower or lender; (ii) the "temperature" of the transaction, determined by the loan cost; and (iii) the date of the transaction. Co-Lead Counsel believe the methodology achieves an equitable distribution of settlement funds among members of the Settlement Classes, while ensuring that both the preparation of claims by class members and the administration of claims by the settlement administrator is as seamless and efficient as possible.

76. In February 2024, Co-Lead Counsel filed a motion to preliminarily approve the notice and allocation plans, including a 16-page brief and extensive supporting documentation, including the proposed notice materials, claim form, and allocation plans. ECF No. 661.

77. Attached as Exhibit A is a report from Dr. Rosa Abrantes-Metz, a Ph.D. economist with deep experience in the study, detection, and prevention of collusion, including compliance. Dr. Abrantes-Metz's report seeks to estimate the value of the industry reforms secured by the New Settlement Agreement.

III. CO-LEAD COUNSEL'S APPLICATION FOR AN AWARD OF ATTORNEYS' FEES, LITIGATION EXPENSES, AND SERVICE AWARDS

78. Class members were advised that Co-Lead Counsel would submit an application for an award of attorneys' fees in an amount not to exceed $105,000,000; litigation expenses in an amount not to exceed $23,000,000; Class Representative service awards in an amount not to exceed $500,000; and interest accrued on these amounts in the Settlement Fund accounts. Our fee, expense, and award application is fully consistent with the notice materials.

A. Co-Lead Counsel's Fee Request as Compared to Our Significant Time Invested In This Action

79. Co-Lead Counsel seek a fee award of $102,200,000, plus interest.

80. As detailed in our concurrently filed individual declarations, Co-Lead Counsel have invested more than 180,000 hours in this Action over the course of seven years, through February 29, 2024 (Quinn Emanuel) and May 3, 2024 (Cohen Milstein).

81. Our individual declarations also identify the attorneys and support staff who worked on the Action, their hourly rates and number of hours billed, and the lodestar value of their time. Using the "historic rate" method described therein, this amounts to an investment of more than $97,000,000 in the time of Co-Lead Counsel's attorneys and professional support staff. Using the "current rate" method described therein, this amounts to an investment of more than $146,000,000 in the time of Co-Lead Counsel's attorneys and professional support staff. Valuable work on behalf of the class by other firms, such as Safirstein LLC, is not included in these figures for simplicity's sake.

82. Co-Lead Counsel took this case on a fully contingent basis.

B. Co-Lead Counsel's Request for Litigation Expenses

83. Co-Lead Counsel seek expenses in the amount of $18,845,997.91, plus interest accrued in the Settlement Fund accounts thereon.

84. The total request above includes 1) $3,615,045.17 incurred directly by Quinn Emanuel, as seen in the Brockett Declaration, 2) $15,222,005.24 incurred by Cohen Milstein, as seen in the Eisenkraft Declaration (a figure that includes expenditures from the common litigation fund managed by Cohen Milstein, to which both firms contributed), and 3) $8,947.50 incurred by Safirstein Law LLC, as seen in the Safirstein Declaration. To avoid double counting, individual firms' contributions to the common litigation fund are not included in these figures.

85. The categorization of all expenses incurred by Co-Lead Counsel and explanations as to how they were arrived at, as well as other details, are provided in our respective concurrently filed individual declarations.

86. Almost all of these expenses represent payments to testifying and non-testifying experts and Plaintiffs' discovery management platform. As more fully discussed above, these expenses reflect the extraordinary work required from experts to develop usable transactional data from which Plaintiffs' testifying experts could create the damages models that supported Plaintiffs' motion for class certification, which was ultimately approved by Magistrate Judge Cave and drove the settlement. Document storage fees were also extraordinary, because of the enormous volume of documents provided by Defendants, which greatly exceeded case productions even in other complex antitrust cases.

87. As noted in our motion for attorneys' fees, litigation expenses, and named Plaintiff service awards, in our reply brief to that motion we may update this request with additional expenses incurred during the pendency of the motion, such as ongoing document hosting fees or vendor corrections. Even with such updates, Co-Lead Counsel's expense request is and will be significantly below the $23 million in litigation expenses proposed in notices to the Settlement Classes.

C. <u>Co-Lead Counsel's Request for Service Awards</u>

88. As reflected in the attached Exhibits B through F, each Class Representative devoted extensive time and effort to supervising Co-Lead Counsel's prosecution of the case and participating in discovery as named Plaintiffs. Without the Class Representatives' participation, this case would not have been brought, leaving the hundreds of millions of dollars achieved in these Settlements in the hands of the banks.

89. As Co-Lead Counsel, we endorse their request for incentive awards of $100,000 each, for a total of $500,000, plus interest accrued thereon. Co-Lead Counsel believe these awards, which reflect the disproportionate responsibility the Class Representatives undertook to

prosecute this case, are a key element of an equitable distribution of the Settlement Funds to members of the Settlement Classes under Rule 23(e)(2)(D).

* * *

We declare, under penalty of perjury, that the foregoing is true and correct.

Executed May 8, 2024
New York, New York

Daniel L. Brockett

Executed May 8, 2024
New York, New York

Michael B. Eisenkraft

EXHIBIT A

IN THE UNITED STATES DISTRICT COURT

FOR THE

SOUTHERN DISTRICT OF NEW YORK

IOWA PUBLIC EMPLOYES' RETIREMENT SYSTEM, *et al.*, **Plaintiffs** **v.** BANK OF AMERICA CORPORATION, *et al.*, **Defendants**	**No. 17-cv-6221 (KPF)**

EXPERT REPORT OF

ROSA M. ABRANTES-METZ, PHD

MAY 1, 2024

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I. INTRODUCTION

A. SUMMARY OF QUALIFICATIONS

1. My name is Rosa M. Abrantes-Metz, and I am a Ph.D. economist specializing in industrial organization, finance and econometrics, with a focus on matters involving conspiracies, market manipulation, and fraud. I am a Managing Director at Berkeley Research Group, a global consulting firm providing economic, financial, and analytical advice for a range of disciplines. I have over twenty years of experience in economics consulting.

2. I was an Adjunct Associate Professor at Leonard N. Stern School of Business at New York University ("Stern School of Business") from 2009 to 2020, where I taught industrial organization and competitive analyses, monetary and financial economics, as well as statistics and econometrics.

3. Prior to my career as an economic consultant and as adjunct faculty at the Stern School of Business, I was an economist at the United States Federal Trade Commission ("FTC"). I was also a lecturer for advanced econometrics and macroeconomics for the Department of Economics at the University of Chicago, as well as a lecturer for economics at the Universidade Católica Portuguesa in Lisbon, Portugal.

4. I received my Ph.D. in Economics from the University of Chicago, where I also received my second MA in Economics. I obtained my first MA in Economics from Universität Pompeu Fabra in Barcelona, Spain, and my Licenciatura (a five-year BA degree) in Economics from Universidade Católica Portuguesa in Lisbon, Portugal.

5. I have directed many consulting projects in my areas of expertise during the last two decades. I have also authored or co-authored research in the areas of financial and industrial economics, as well as econometrics, both in peer-review journals and in trade publications. I have contributed to books in both antitrust and finance, including on antitrust compliance. A significant portion of my work as a consultant and my publications focus on collusion, market manipulation, and fraud, and much of that, in turn, is dedicated to the development of empirical methods, including what I refer to as "screens," to identify potentially anticompetitive or otherwise illegal conduct.

As described more fully below, a "screen" is a statistical tool that uses commonly available data such as prices, bids, quotes, spreads, market shares, and volumes to determine whether manipulation or other illegal behavior may exist in a particular market.

6. I have authored several publications, including in the International Journal of Industrial Organization, the Journal of Banking and Finance, the Harvard Business Law Review, Applied Economic Letters, the University of Pennsylvania Journal of Business Law, and the Journal of International Arbitration. I have co-authored book chapters on collusion, manipulation, screens, antitrust compliance, and event studies, including in the Oxford Handbook of International Antitrust Economics, as well as in the American Bar Association's "The Role of the Economic Expert in Proving a Conspiracy," a chapter on the role of screens in antitrust compliance in a book edited by Concurrences, and other upcoming book chapters on antitrust compliance. Most recently, one of the articles I co-authored on antitrust compliance and AI won a prize by Les Concurrences.

7. I first began my work on alleged conspiracies and manipulations as an FTC economist. While at the FTC, I worked on multiple investigations related to possible conspiracies and manipulations in the oil industry. I also worked to improve the FTC's gasoline monitoring program, which screens weekly retail gasoline prices in approximately 360 U.S. cities and approximately 20 wholesale terminals, to identify illegal conduct.[1] I developed new statistical tools and "screens" to detect illegal behavior, such as collusion, manipulation, and fraud, and began publishing in peer-review journals on this topic. The use and development of empirical tools and screens to flag illegal behavior has since become a key focus of my work.

8. Over the years, and through many discussions and engagements with various governmental agencies around the world, I have contributed to the adoption of tools to detect collusion and other anticompetitive conduct. In several instances, I assisted individual agencies in the development and implementation of screens to launch then-current and future cartel investigations. Government agencies have applied these screens to many industries. These agencies include the FTC as well as the competition authorities for Canada, Mexico, Brazil,

[1] "FTC Chairman Opens Public Conference Citing New Model to Identify and Track Gasoline Price Spikes," Federal Trade Commission press release, May 8, 2002, available at: http://www.ftc.gov/news-events/press-releases/2002/05/ftc-chairman-opens-public-conference-citing-new-model-identify.

Austria, Germany, France, Portugal, Spain, England, Poland, Turkey, Romania, Hong Kong, and Peru, and the European Commission, among others. I have advised the Federal Energy Regulatory Commission and the Securities and Exchange Commission in the development of screening programs for manipulation, collusion, and various types of fraud, and I served as a senior competition advisor at the World Bank, where I conducted training for dozens of competition authorities worldwide on competition matters, with a particular focus on cartels.

9. I have worked on behalf of defendants, plaintiffs, and governmental agencies in multiple matters. My published research has also led to significant government investigations culminating in settlements around the world of many billions of dollars. For example, my research helped launch some of the largest recent investigations, including the U.S. dollar LIBOR conspiracy and manipulation, which I and co-authors flagged in 2008, and the Gold and Silver Fixings conspiracy and manipulation, which I also flagged and assisted in the launch of investigations worldwide in late 2013 and early 2014.[2] Similar work has also involved foreign exchange markets, where I started by assisting and verifying Bloomberg's reports on the collusion and manipulation of the WM/Reuters benchmark, culminating with Bloomberg articles which lead to worldwide investigations in this matter.[3] I also worked on this matter on behalf of several plaintiffs. I have assisted in the uncovering of collusion conduct in swap markets, bond markets, including U.S. Treasuries, mortgage-linked derivatives markets, and others. In these matters, I have consulted on topics related to both liability and the overall market impact and damages of the alleged conduct, and I have also testified on some of these matters. In addition, I have worked on matters involving collusion in catering, payment systems, lithium-ion batteries, and a variety of commodities.

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[2] *See*, e.g., "How to Use Statistics to Seek Out Criminals," *Bloomberg*, February 26, 2013, available at: http://www.bloomberg.com/news/2013-02-26/how-to-use-statistics-to-seek-out-criminals html; Rosa M. Abrantes-Metz., "How to Keep Banks from Rigging Gold Prices," *Bloomberg*, December 19, 2013, available at: https://www.bloomberg.com/opinion/articles/2013-12-19/how-to-keep-banks-from-rigging-gold-prices#xj4y7vzkg; and Liam Vaughan, "Gold Fix Study Shows Signs of Decade of Bank Manipulation," *Bloomberg*, February 28, 2014, available at: https://www.bloomberg.com/news/articles/2014-02-28/gold-fix-study-shows-signs-of-decade-of-bank-manipulation#xj4y7vzkg.

[3] Liam Vaughan and Gavin Finch, "Currency Spikes at 4 P.M. in London Provide Rigging Clues," *Bloomberg*, August 27, 2013, available at: https://www.bloomberg.com/news/articles/2013-08-27/currency-spikes-at-4-p-m-in-london-provide-rigging-clues#xj4y7vzkg.

10. At the invitation of the World Bank, I authored the "Guidelines on Exchanges of Information and Collaborations among Competitors for Central and South American Countries" in 2013. I advised antitrust and securities authorities around the world on specific types of collaborations among competitors, in addition to the implementation of screens that I developed. At the invitation of then Commodity Futures Trading Commission Chairman, Gary Gensler, I advised various agencies on financial and commodities benchmarks replacements and reforms, and market abuse in the wake of the LIBOR rigging.[4] These also focused on financial regulation and actual benchmark restructuring to enhance robustness of these structures with respect to collusion and other market abuse, as well as on guidelines for best practices of benchmarks. These authorities include the U.S. Commodity Futures Trading Commission, the United Kingdom's Financial Conduct Authority, the European Commission, and the International Organization of Securities Commissions.

11. I have provided testimony on damages, liability, class certification, and plans of allocation for classes in a wide variety of matters, including platforms in industries such as payments systems, airline booking, health care, and app stores. These include alleged bid-rigging, price-fixing, and market allocation in various markets, hub and spoke conspiracies, monopolization in generic pharmaceutical markets, pharmaceutical mergers involving horizontal and vertical restraints, breaches of contract due to changes in financial and commodity benchmarks, and others. In addition, I have testified on valuation issues including the valuation of an energy services provider company, the valuation of expropriated oil services assets, the valuation of stock options and various types of swaps, and the valuation of utilities.

12. I have testified on behalf of several foreign and domestic organizations in enforcement matters as well as on behalf of private institutions. For example, I have served as an expert witness for Enforcement Staff at the Federal Energy Regulatory Commission in the natural gas market manipulation proceeding involving BP America Inc., in which the Commission ultimately concluded that BP engaged in manipulation, a conclusion affirmed by the United States Fifth

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[4] *See*, *e.g.,* the panel (and my participation) at "Financial Benchmarks Reform," IOSCO, FSA, CFTC and other International Regulators Meeting, London & Washington, DC, February 2013. Video of the Washington, DC roundtable is available at https://www.youtube.com/watch?v=duUODyMdnsE. I was also invited by Chairman Gensler to moderate a panel on financial benchmarks reform titled "Benchmarks: Maintaining Integrity and Reliability," Panel discussion with David Lawton, Jim Rosenthal, Nick Collier and David Eichhorn, CFTC International Regulators Meeting, Florida, March 2013.

Circuit Court of Appeals. I am also the expert economist testifying on another market manipulation matter involving multiple abuse of price benchmarks by Total Energies and on behalf of FERC. In addition, I testified on behalf of Fannie Mae through the Department of Justice on an alleged fraud matter in the market for mortgage foreclosures and evictions, and on behalf of the Federal Trade Commission as an expert witness in a matter involving two multisided platforms owned by Surescripts. In addition, I am testifying on behalf of the Department of Justice against Google in an ongoing matter. I have also been retained by various state Attorneys General offices and the Department of Justice. Furthermore, I have testified in international arbitration, contractual disputes settings, antitrust and valuation in the U.S., Europe, Brazil, and Canada, including at jury trials.

13. I recently testified on behalf of American Airlines in *US Airways v. Sabre,* involving a multisided platform and the question of monopolization in two-sided markets, the first monopolization case of two-sided platforms won by plaintiff (US Airways). I was honored by the American Antitrust Institute for "Outstanding Antitrust Litigation Achievement in Economics" for this matter. In addition, the same matter was also selected by GCR as one of five Matters of the Year, among matters worldwide in 2023, for "creative, strategic, and innovative work by teams of in-house and external lawyers and economists." In 2019, I was recognized among "40 in their 40's" Notable Women Competition Professionals in the Americas, for which thirty-six distinguished lawyers and four distinguished economists were selected among North, Central and South American professional women. I have been selected as a Who's Who of Competition Lawyers & Economists every year since 2009. In addition, I have testified on behalf of consumers against the Apple App store, providing a but-for estimate of the commission rate paid by app developers to Apple. And I have testified on an alleged conspiracy by the major credit card companies to harm merchants and competition when switching to EMV technology in the United States.[5]

[5] EMV stands for Europay, Visa, and Mastercard, the credit card companies that spearheaded the development and adoption of this chip technology. EMV is a payment technology that uses a tiny, chip embedded in credit and debit cards to make card transactions more secure. It was developed in the mid-1990s and has since become the standard for secure card payments. It is overseen by an organization called EMVCo, which includes among its members major credit card companies such as Mastercard, Visa, American Express, Discover, JCB, and UnionPay.

14. My qualifications are further detailed in my curriculum vitae included as Exhibit 1. This includes my publications and itemizes my testimony during the past four years. BRG is being compensated for my time in this matter at a rate of $1,250 an hour. The documents and data that I relied upon in forming my opinions are listed in Exhibit 2.

B. ASSIGNMENT AND SUMMARY OPINIONS

15. Counsel for Plaintiffs have asked me to assist in developing antitrust compliance reforms for EquiLend, the third-party organization through which Plaintiffs allege the conspiracy was effectuated. These EquiLend Reforms, which I assisted in authoring, are attached to this report as Exhibit 3.[6] I understand that the EquiLend Reforms will be in effect for five years from the date of the final settlement approval. In Section III of this report I describe the EquiLend Reforms and discuss how they align with best practices for antitrust compliance programs as outlined by the United States Department of Justice ("DOJ"), as well as guidelines from the DOJ and United States Federal Trade Commission ("FTC") regarding collaborations among competitors. I also rely on other literature from government sources and academia.

16. Counsel have also asked me to evaluate—from the perspective of the wider market and the class in this case—the approximate monetary value of the EquiLend Reforms. Reforms that reduce recidivism can have substantial monetary value, because they reduce the likelihood of future anticompetitive conduct. In this case, I apply standard valuation techniques to determine the approximate monetary value of the EquiLend reforms. I find that the EquiLend Reforms will conservatively create nearly $320 million in value. I explain the methodology underlying this calculation in Section IV below.

17. This report offers no opinion on liability, damages, or class certification and my reliance on briefings or expert reports (from Plaintiffs or Defendants) should not be construed as such.

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[6] Stipulation and Agreement of Settlement, Compromise, and Release with the Goldman Sachs, Morgan Stanley, JPMorgan, UBS, and EquiLend Defendants, August 22, 2023, Exhibit A.

II. CASE BACKGROUND

18. In this section I provide a brief background of the allegations in this matter in order to place the proposed reforms in their proper context.[7]

19. This case centers around the stock lending market. Stock lending transactions are a precursor to short selling. A short sale involves a bet that the price of a stock will fall.[8] To make this bet, short sellers borrow stock and sell it on the open market.[9] Investors hope to buy back the stock to return to the lender at a lower price, pocketing the difference.[10] Thus, demand for short selling largely drives demand for stock borrowing. Short sellers pay a fee, typically expressed as a percentage of the transaction value, to borrow stock. Short sellers also often post collateral, either in the form of cash or securities, to borrow stock.

20. Lenders—often public pension funds such as the named plaintiffs in this case—are willing to lend stock in exchange for both cash collateral and a lending fee. Cash collateral is valuable to lenders because they can reinvest it into other financial instruments. But, particularly for "hot" or "hard to borrow" stocks, lenders are primarily compensated in the form of a percentage fee. Both borrowers (i.e., the short sellers) and lenders (i.e., stockholders) are members of the proposed class, divided into two subclasses.[11]

21. The Prime Broker Defendants in this case are broker-dealers. These broker-dealers borrow stock from lenders and lend stock to borrowers.[12] Accordingly, the Prime Broker Defendants are a financial intermediary (i.e., a middleman). The Prime Broker Defendants earn a "spread" for their role; the spread is the difference between the price at which the Prime Broker Defendant borrowed the stock and the price at which the Prime Broker Defendant lent the stock.

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7 Unless otherwise noted, the information in this section comes from the Report and Recommendation of Sarah L. Cave, June 30, 2022, § II ("Cave Report and Recommendation").

8 Securities and Exchange Commission, "Key Points About Regulation SHO," § I, available at: https://www.sec.gov/investor/pubs/regsho htm ("Key Points About Regulation SHO").

9 Key Points About Regulation SHO, § I.

10 Key Points About Regulation SHO, § I.

11 The "End-User Subclass" refers to borrowers of stock while the "Beneficial Owner Subclass" refers to lenders of stock. (Cave Report and Recommendation, p. 20).

12 The Prime Broker Defendants include Bank of America, Merrill Lynch, Goldman Sachs, Morgan Stanley, Credit Suisse, JPMorgan, and UBS. I note that Bank of America, Merrill Lynch has not settled with the proposed Settlement Class, and the case against that Defendant is ongoing.

Particularly for low supply or high demand "hard to borrow" stocks, this spread is large. Like fees, spreads are typically expressed as a percentage.

22. The market structure of the stock lending market is over-the-counter ("OTC"). In OTC markets, there is no centralized place where buyers and sellers can transact; rather, customers must search for the best prices by negotiating bilaterally, and sequentially, with many dealers. Plaintiffs allege that this market structure benefits intermediaries at the expense of customers. Plaintiffs allege that the OTC market structure imposes search costs on both lenders and borrowers, which the Prime Broker Defendants use to extort higher spreads. For this reason, Plaintiffs allege that Defendants coordinated to stop the introduction of electronic platforms. Those platforms would have dramatically reduced or eliminated the need for intermediaries. In doing so, those platforms would have reduced search costs, eliminating the ability for the Defendants to extract supracompetitive spreads.

23. Plaintiffs allege that Defendants effectuated their conspiracy through EquiLend, an organization formed in 2001 and partially owned by the Prime Broker Defendants.[13] In addition, Prime Broker Defendants' employees served on EquiLend's Board of Directors. Prime Broker Defendants argue that EquiLend is a procompetitive joint venture,[14] while Plaintiffs argue that Prime Broker Defendants used EquiLend as a means to conspire to boycott the introduction of new centralized platforms.[15]

III. THE EQUILEND REFORMS ARE CONSISTENT WITH BEST PRACTICES FOR ANTITRUST COMPLIANCE PROGRAMS AND COLLABORATIONS AMONG COMPETITORS

24. In this section I discuss how the EquiLend Reforms are consistent with best practices for antitrust compliance programs and competitor collaborations. I first briefly discuss general principles for antitrust compliance programs (Section III.A). I then address how the federal antitrust agencies evaluate collaborations among competitors (Section III.B). Finally, I apply the

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13 EquiLend is also a Defendant in this matter.

14 Defendants' Memorandum of Law in Opposition to Plaintiffs' Motion for Class Certification, August 3, 2021, p. 10.

15 Cave Report and Recommendation, § II.A.2.

principles of both antitrust compliance programs and collaborations among competitors to the EquiLend Reforms in order to demonstrate how the reforms are consistent with best practices (Section III.C).

A. GENERAL PRINCIPLES FOR ANTITRUST COMPLIANCE PROGRAMS

25. The United States Sentencing Commission 2021 Guidelines Manual ("Sentencing Guidelines") states that an organization's diligence in preventing and detecting criminal conduct has a "direct bearing on the appropriate penalties" if that organization is convicted and sentenced for a criminal offense.[16] In that context, the Sentencing Guidelines provide clear requirements for an effective compliance and ethics program.[17] The Sentencing Guidelines state that such a program "shall be reasonably designed, implemented, and enforced so that the program is generally effective in preventing and detecting criminal conduct."[18] The program need not prevent or detect every offense in order to be considered effective.[19] Although the Sentencing Guidelines concern compliance programs generally—and not antitrust compliance programs specifically—several key themes from the Sentencing Guidelines have bearing here.

26. The overarching requirement for an effective program is that the organization "exercise due diligence to prevent and detect criminal conduct" and "otherwise promote an organizational culture that encourages ethical conduct and a commitment to compliance with the law."[20] Specifically, the Sentencing Guidelines emphasize the following requirements: (1) a specific individual with day-to-day operational responsibility for the program, (2) development of effective compliance training programs, (3) monitoring and auditing of those programs, (4) periodic evaluation of those programs' effectiveness, (5) a system for anonymously reporting violations, and (6) development of appropriate incentives and punishment to encourage

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[16] United States Sentencing Commission, "Guidelines Manual 2021," p. 530, available at: https://www.ussc.gov/sites/default/files/pdf/guidelines-manual/2021/GLMFull.pdf.

[17] Sentencing Guidelines, § 8.B2.1.

[18] Sentencing Guidelines, p. 517.

[19] Sentencing Guidelines, p. 517 ("The failure to prevent or detect the instant offense does not necessarily mean that the program is not generally effective in preventing and detecting criminal conduct.").

[20] Sentencing Guidelines, p. 517.

compliance with those programs.[21] The Sentencing Guidelines also stress the importance of the involvement of high-level personnel.[22]

27. The U.S. Justice Manual states that, when evaluating a corporate compliance program for charging and sentencing purposes, "[t]he fundamental questions a prosecutor should ask are: (1) Is the corporation's compliance program well designed? (2) Is the program being applied earnestly and in good faith? In other words, is the program adequately resourced and empowered to function effectively? And (3) Does the corporation's compliance program work in practice?"[23] The DOJ also developed guidelines for evaluating compliance programs specifically within the context of criminal antitrust investigations.[24] The purpose of these guidelines is "to assist [DOJ] prosecutors in their evaluation of antitrust compliance programs at the charging and sentencing phases of an investigation."[25] In order to answer the three "fundamental" questions noted above, the DOJ has identified elements of an effective antitrust compliance program. These elements are the following: (1) the design and comprehensiveness of the program; (2) the culture of compliance within the company; (3) responsibility for, and resources dedicated to, antitrust compliance; (4) antitrust risk assessment techniques; (5) compliance training and communication to employees; (6) monitoring and auditing techniques, including continued review, evaluation, and revision of the antitrust compliance program; (7) reporting mechanisms; (8) compliance incentives and discipline; and (9) remediation methods.[26]

28. Other jurisdictions around the world also provide similar guidance. For example, the Canadian Competition Bureau outlines similar principles for successful antitrust compliance programs, including senior management involvement, establishment of clear compliance policies, risk-based compliance assessment, training and education, monitoring and reporting

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21 Sentencing Guidelines, § 8.B2.1.

22 Sentencing Guidelines, pp. 517-518.

23 Justice Manual, § 9-28.800, available at: https://www.justice.gov/jm/jm-9-28000-principles-federal-prosecution-business-organizations#9-28.800.

24 United States Department of Justice, July 2019, "Evaluation of Corporate Compliance Programs in Criminal Antitrust Investigations," available at: https://www.justice.gov/atr/page/file/1182001/download ("DOJ Antitrust Compliance Program Guidelines").

25 DOJ Antitrust Compliance Program Guidelines, p. 1.

26 DOJ Antitrust Compliance Program Guidelines, pp. 3-4.

mechanisms, and consistent disciplinary procedures and incentives.[27] The International Chamber of Commerce has an antitrust compliance toolkit that gives similar guidance as well.[28]

29. Joseph Murphy and William Kolasky, recognized antitrust compliance counsel, published an article in *Antitrust* magazine that distills the key elements of successful antitrust compliance programs into 20 fundamental points. While I will not review them all in detail here, I note that these elements echo the guidance from the agencies cited above. Important elements include clearly articulated standards, senior management support and designation of a chief ethics and compliance officer (CECO), training and communication, auditing and monitoring mechanisms, and reporting systems that prevent retaliation.[29]

B. GENERAL PRINCIPLES FOR COLLABORATIONS AMONG COMPETITORS

30. The literature discussed in the prior section generally focuses on internal company programs; in this case, however, the proposed reforms apply not to the Prime Broker Defendants, but rather to EquiLend, which is an organization partially owned by the Prime Broker Defendants and on whose Board of Directors the Prime Broker Defendants' employees served.[30] Collaborations among competitors—such as EquiLend—can be procompetitive, but such collaborations must take care to ensure they do not veer into anticompetitive conduct, thus raising prices and reducing output for consumers. In fact, the DOJ and FTC (the "Agencies") issued joint guidelines in 2000 ("Competitor Collaboration Guidelines") that provide "an analytical framework to assist businesses in assessing the likelihood of an antitrust challenge to a collaboration with one or more competitors."[31] It is instructive to review these guidelines, as

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27 Competition Bureau Canada, "Corporate Compliance Programs," available at: https://ised-isde.canada.ca/site/competition-bureau-canada/sites/default/files/attachments/2022/cb-bulletin-corp-compliance-e.pdf.

28 International Chamber of Commerce Commission on Competition, "The ICC Antitrust Compliance Toolkit," available at: https://compliance.concurrences.com/en/page/pdfjs/?id_document=64530.

29 Joseph Murphy and William Kolasky, Spring 2012, "The Role of Anti-Cartel Compliance Programs in Preventing Cartel Behavior," *Antitrust*, Volume 26(2): 61-64.

30 Cave Report and Recommendation, footnote 3.

31 Federal Trade Commission and U.S. Department of Justice, April 2000, "Antitrust Guidelines for Collaborations Among Competitors," available at: https://www.ftc.gov/sites/default/files/documents/public_events/joint-venture-hearings-antitrust-guidelines-collaboration-among-competitors/ftcdojguidelines-2.pdf.

they describe the types of behavior that tend to lead to anticompetitive outcomes, and which the EquiLend Reforms are designed to prevent.

31. The Competitor Collaboration Guidelines note that competitor collaborations "may provide an opportunity for participants to discuss and agree on anticompetitive terms, or otherwise to collude, as well as a greater ability to detect and punish deviations that would undermine the collusion."[32] One factor the Agencies consider when evaluating the anticompetitive risk of a collaboration among competitors is the "the extent to which the collaboration's governance structure enables the collaboration to act as an independent decision maker."[33] The Competitor Collaboration Guidelines note that "the collaboration is less likely to compete independently as participants gain greater control over the collaboration's price, output, and other competitively significant decisions" and thus the Agencies consider—for example—whether the participants in a collaboration are able to appoint members to the board of directors or otherwise "exercise significant control over the operations of the collaboration."[34]

32. Another potential harm is that competitor collaborations "may facilitate explicit or tacit collusion through facilitating practices such as the exchange or disclosure of competitively sensitive information or through increased market concentration."[35] While some sharing of information may be procompetitive and necessary to the functioning of the collaboration, information sharing "may increase the likelihood of collusion on matters such as price, output, or other competitively sensitive variables."[36] The Competitor Collaboration Guidelines note that sharing information related to price, output, costs, or strategic planning is more likely to lead to anticompetitive outcomes than less competitively sensitive information.[37] Furthermore, sharing current information is more likely to raise competitive concerns rather than historical data, and sharing granular, firm-level data is more likely to raise concerns than sharing aggregated data.[38] I note

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32 Competitor Collaboration Guidelines, p. 15.
33 Competitor Collaboration Guidelines, p. 20.
34 Competitor Collaboration Guidelines, p. 20.
35 Competitor Collaboration Guidelines, p. 6.
36 Competitor Collaboration Guidelines, p. 15.
37 Competitor Collaboration Guidelines, p. 15.
38 Competitor Collaboration Guidelines, pp. 15-16.

that the horizontal guidelines that I authored in 2013 for Central and South American Countries provides similar guidance.[39]

33. The American Bar Association ("ABA"), in its publication *Joint Ventures*, notes that antitrust risks from information sharing can be minimized by using information firewalls and other safeguards.[40] Such safeguards include memorializing restrictions on information sharing in antitrust guidelines, limiting the number of employees with access to competitively sensitive information, use of confidentiality agreements, heightening antitrust compliance training, monitoring compliance periodically, and specifying the meetings follow a pre-agreed agenda.[41]

C. DISCUSSION OF EQUILEND REFORMS

34. The EquiLend Reforms incorporate recommendations from both the guidelines for evaluating corporate antitrust compliance programs and the guidelines for evaluating competitor collaborations, as exemplified below.

- Clear standards: Murphy and Kolasky (2012) note that a successful antitrust compliance program has "[c]learly articulate[d] standards and policies designed to prevent and detect cartels."[42] In fitting with this standard, the EquiLend Reforms call for the creation of an Antitrust Code of Conduct designed to prevent collusion and inappropriate information sharing.
- Monitoring and auditing: DOJ's guidelines for evaluating corporate antitrust compliance programs notes that "[a]n effective compliance program includes monitoring and auditing functions to ensure that employees follow the compliance program."[43] Similarly, Murphy and Kolasky (2012) state that an effective program should "[i]mplement ongoing efforts to

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39 Rosa M. Abrantes-Metz, December 2013, "Regional Competition Center for Latin America: Antitrust Guidelines for Exchanges of Information Among Competitors," available at: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3291659.

40 American Bar Association, "Chapter 8: Practical Considerations for Joint Ventures," *Joint Ventures*, ABA Book Publishing, October 2020, p. 145.

41 American Bar Association, "Chapter 8: Practical Considerations for Joint Ventures," *Joint Ventures*, ABA Book Publishing, October 2020, p. 146.

42 Murphy and Kolasky (2012), p. 62.

43 DOJ Antitrust Compliance Program Guidelines, p. 10.

keep the program diligent and at least as good as industry practice."[44] They also state that an effective compliance program should "[i]mplement systems to regularly measure the compliance program's performance and effectiveness."[45] In fitting with this standard, the EquiLend Reforms require all Board Members and Alternate Board Members to certify on an annual basis that he or she will comply with the Antitrust Code of Conduct. In addition, the EquiLend Reforms state that EquiLend's Chief Compliance Officer will provide annual reports of compliance to the EquiLend Board and the Designated Antitrust Liaison Counsel at each of the owner firms.

- High-level involvement: Murphy and Kolasky (2012) emphasize both an empowered chief compliance office and senior management support.[46] Similarly, DOJ notes that "those with operational responsibility for the program must have sufficient autonomy, authority, and seniority within the company's governance structure, as well as adequate resources for training, monitoring, auditing and periodic evaluation of the program."[47] The sources cited in Section III.A above also emphasize fostering a culture of compliance. In fitting with this standard, the EquiLend Reforms require the annual certifications of the Antitrust Code of Conduct to be transmitted to the Chief Compliance Officer of EquiLend. If the Chief Compliance Officer believes a Board Member or Alternate Board Member has violated the Antitrust Code of Conduct, he or she is required to inform the Designated Antitrust Liaison Counsel of the owner firm that employs the Board Member or Alternate Board Member. In addition, the Antitrust Code of Conduct must explicitly state that owner firms may take further steps to investigate any suspect communications or situations.

- Reporting: DOJ states that "[a]n effective compliance program includes reporting mechanisms that employees can use to report potential antitrust violations anonymously or confidentially and without fear of retaliation."[48] In fitting with this standard, EquiLend Board Members and Alternate Board Members—if they become aware of them—are

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[44] Murphy and Kolasky (2012), p. 62.

[45] Murphy and Kolasky (2012), p. 62.

[46] Murphy and Kolasky (2012), p. 62.

[47] DOJ Antitrust Compliance Program Guidelines, p. 6.

[48] DOJ Antitrust Compliance Program Guidelines, p. 11.

required to report potential breaches of the Antitrust Code of Conduct to the Chief Compliance Officer of EquiLend.

- Training: DOJ states that "[a]n effective antitrust compliance program will include adequate training and communication so that employees understand their antitrust compliance obligations."[49] Murphy and Kolasky (2012) also emphasize training and communication.[50] In fitting with this standard, the EquiLend Reforms state that EquiLend will provide every EquiLend Board Member and Alternate Board Member with antitrust training every two years.
- Information sharing: DOJ and FTC's Competitor Collaboration Guidelines make clear that sharing competitively sensitive information is a particularly important risk. A number of the EquiLend Reforms are in place to limit the potential for anticompetitive harm from information sharing, consistent with the best practices as summarized by the ABA in its *Joint Ventures* handbook. These safeguards include the following:
  - Limitations on who can have access to confidential information and a requirement to report breaches of these confidentiality restrictions to EquiLend's Chief Compliance Officer.
  - These restrictions on information sharing must be incorporated into the Antitrust Code of Conduct.
  - Outside antitrust counsel must attend all Board Meetings, Working Group Meetings, and Audit Committee Meetings.
  - All Board Meetings must follow a pre-specified agenda that is to be reviewed by counsel in advance. Any agenda items added at a later date must be included in the meeting minutes, which must be approved by all Board Members who attended the meeting and sent to EquiLend's Chief Compliance Officer. Such reforms serve to limit the dissemination of competitively sensitive information and safeguard against potentially collusive conduct occurring at EquiLend meetings. These types of reforms are commonly present safeguards in competitor collaborations. For example, a committee of

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[49] DOJ Antitrust Compliance Program Guidelines, p. 8.

[50] Murphy and Kolasky (2012), p. 62.

auto shippers formed to improve efficiency in railroad car construction was reviewed by the DOJ who considered as part of its decision not to the challenge the collaboration the fact that the proposed committee's bylaws contained "provisions limiting meeting topics to those contained in a pre-published agenda; requiring minutes of the meeting to be published and circulated to members; and requiring that legal counsel be present at each meeting."[51]

- Conflicts of interest: the EquiLend Reforms also include other, commonsense rules designed to limit conflicts of interest. These conflicts can arise when the parties designated as independent auditors or inspectors are captured by the organization they are meant to regulate. Perhaps the most well-known example of this type of conflict of interest is the case of Enron, whose external auditing firm (Arthur Andersen) was also employed by Enron as a consultant, which compromised its independence as an external auditor.[52] Governance reforms to EquiLend are thus paramount to prevent conflicts of interest that could undermine internal and external controls. The proposed governance reforms for EquiLend include limitations on the terms of EquiLend Board Members (five years), hiring of new antitrust counsel and limitations on the terms of outside antitrust counsel (three years), and requiring the names of all individuals who attend Board Meetings or Working Group Meetings to be included in the minutes for those meetings. I note that limitations on the terms of outside antitrust counsel is particularly important because it removes the financial incentive to get re-hired, which may result in a lack of independence.

35. It is my opinion that the EquiLend Reforms are strong and consistent with the best practices of antitrust compliance programs, as described in the sources in Section III.A and III.B above. In the next section, I describe the methodology I used to place a monetary value on the EquiLend Reforms.

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[51] United States Department of Justice, "Response To Auto Shippers' Efficiency Committee's Request For Business Review," January 14, 1993, available at: https://www.justice.gov/atr/response-auto-shippers-efficiency-committees-request-business-review.

[52] Stuart L. Gillan & John D. Martin, December 2007, "Corporate governance post-Enron: Effective reforms, or closing the stable door?" *Journal of Corporate Finance*, Volume 13, Issue 5, pp. 929-958 at 949.

IV. VALUE OF EQUILEND REFORMS

36. I have been asked by counsel for Plaintiffs to estimate the dollar value of the EquiLend Reforms. Accordingly, I estimate that the EquiLend Reforms will create nearly $320 million in value for stock lenders and borrowers. I describe the valuation approach and calculations in detail below.

37. For purposes of valuing the EquiLend Reforms, I have been asked by counsel to assume that a cartel would impose harm consistent with preventing the development of all-to-all trading in the stock lending market. My estimate of the harm from a cartel is thus primarily derived from the value of reduced trading costs that would likely accompany all-to-all trading. The total value of the EquiLend Reforms is a function of the harm resulting from a cartel times the reduction in the probability of a cartel reemerging, as given by Equation 1 below.

$$(1)\ \text{Value of EL reforms} = (\text{Cartel harm}) \text{ x } (\text{Reduction in recidivism probability})$$

38. In essence, Equation (1) calculates the expected value of the EquiLend Reforms, in the future, with its expected value depending on both payoff and probability. The cartel harm—and the mitigation thereof—is the payoff. The reduction in recidivism probability is the probability that this payoff will (or will not) occur.

39. It bears noting that, for the purposes of this exercise, I assume that the Defendants' cartel concluded at or by the time of settlement. I understand, however, that at least one Defendant (Bank of America) continues to litigate this case and that Plaintiffs have alleged a continuing conspiracy and continuing violation of law. My assumption is not based on or related to any analysis, facts, or the real world at all and may or my not be true—it is simply an assumption that makes the valuation exercise tractable. A qualitatively similar valuation exercise could be performed to show that the EquiLend Reforms have value in facilitating the *end* of the cartel as well. More generally, in a group boycott case where all prospective entrants have gone out of business, the difference between the cartel having concluded, continuing, or the harm continuing is academic. Regardless, the EquiLend Reforms reduce the chances that a cartel exists in the future, thereby increasing the chances that a new entrant might arise and gain traction in the marketplace.

40. In the remainder of this Section, I discuss, analyze, and provide inputs for Equation 1. Section IV.A discusses my estimate of cartel harm. Section IV.B discusses my estimate of the reduction in recidivism probability. Section IV.C concludes and offers sensitivity analyses.

A. CARTEL HARM ESTIMATE

41. Like most cartels, the cartel alleged in this case harmed consumers in the form of higher prices. Accordingly, I express my estimate of cartel harm as a dollar figure. I estimate that the cartel harm is $1.828 billion annually. Because any harm associated with the cartel reemerging occurs in the future, I also discount this annual harm estimate to present value.

42. The higher price at issue in this case is a higher "spread." Plaintiffs allege that Defendants conspired to boycott the entry of multilateral trading platforms. Without competition from those platforms, Defendants were able to collect supracompetitive spreads. From the perspective of borrowers and lenders, these higher spreads increase the cost of trading. Thus, my estimate of cartel harm is an estimate of cost savings that short sellers and stock lenders *did not* receive, due to the cartel.

43. The mechanism by which Defendants' conspiracy harmed competition is discussed more fully in Plaintiffs' class certification briefing and reports. I briefly summarize here.

44. Financial markets can either involve bilateral trading or multilateral trading. As noted in Section II above, the current structure of the stock lending market is bilateral, or OTC.[53] OTC markets "are characterized by off-exchange, bilateral negotiations with dealers."[54] In contrast, multilateral trading allows traders to view multiple bids or offers simultaneously; an exchange is an example of a multilateral trading platform, but multilateral trading may also encompass—for example—the ability of an investor to view quotes from multiple dealers simultaneously.[55]

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[53] Cave Report and Recommendation, p. 6.

[54] Terrence Hendershott and Ananth Madhavan, February 2015, "Click or Call? Auction versus Search in the Over-the-Counter Market," *Journal of Finance*, Volume 70(1): 419-447, p. 419.

[55] Hendershott and Madhavan (2015), pp. 445-446 ("By contrast, auction mechanisms permit competition among dealers while limiting adverse selection costs. This is shifting the evolution of the OTC market structure and fixed income markets by allowing traders to more easily engage in multilateral trading.").

All-to-all trading refers to the ability of anyone on the platform (both end users and intermediaries) to trade with anyone else on the platform.[56]

45. Multilateral trading is more efficient than OTC trading because search costs are lower when lenders and borrowers can see all bids and offers simultaneously rather than having to contact dealers individually. High search costs mean dealers face less competition, because it is costly for either lenders or borrowers to compare prices offered by multiple dealers, which in turn allows the dealer to raise its price above the competitive level. The association between search costs and prices is a well-known result in the academic literature.[57] In the context of OTC financial markets, economic theory has demonstrated that lower search costs result in smaller bid-ask spreads.[58]

46. In the context of the stock lending market specifically, the spread is the difference in the price lenders receive and borrowers pay; narrower spreads mean that lenders receive more for loaning their stocks and borrowers pay less to borrow them. Multiple empirical studies—discussed further below—have shown that the introduction of lower search costs through multilateral trading reduced spreads in those markets. Defendants' conspiracy harmed competition by boycotting—and thus eliminating—the competitive threat from multilateral trading. As a result, spread compression, which should have occurred in the actual world, did not occur in the actual world.

47. In my calculations below, I provide a range of reasonable values for the reduction in spreads (and thus the benefit to lenders and borrowers) that would occur absent a cartel. I calibrate the annual reduction in trading costs in the stock lending market that would occur based on Equation (2) below.

(2) Reduction in trading costs = (U.S. equity market cap) x (Short interest / shares outstanding) x (Spread reduction)

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[56] Bank for International Settlements Markets Committee, January 2016, "Electronic trading in fixed income markets," p. 42, available at https://www.bis.org/publ/mktc07.pdf.

[57] Peter Diamond, June 1971, "A Model of Price Adjustment," *Journal of Economic Theory*, Volume 3(2): 156-168; Darrell Duffie, Nicolae Garleanu, and Lasse Pedersen, November 2005, "Over-the-Counter Markets," *Econometrica*, Volume 73(6): 1815-1847; Haoxiang Zhu, April 2012, "Finding a Good Price in Opaque Over-the-Counter Markets," *Review of Financial Studies*, Volume 25(4): 1255-1285.

[58] Duffie, Garleanu, and Pedersen, p. 1815 ("Bid-ask spreads are lower if investors can more easily find other investors or have easier access to multiple marketmakers.").

48. Equation (2) has two primary components: an estimate for the total value of borrowed stock in the United States and an estimate for the value (spread reduction) of all-to-all trading. The former is best thought of as the total amount of commerce impacted by Defendants' alleged conspiracy. The latter is best thought of as the measure of impact. When multiplied, the value represents the cartel harm.

49. I discuss both the total value of borrowed stock (Section IV.A.1) and the spread reduction (Section IV.A.2) below. Because the cartel harm occurs in the future, I also discuss the process of translating this harm into present value (Section IV.A.3).

1. Total Value of Borrowed Stock

50. As shown in Equation (2), the total value of borrowed stock depends on two components: (1) the U.S. equity market capitalization and (2) the ratio of short interest to shares outstanding. Both variables are "static" variables, meaning they are measured as a snapshot at a given point in time.

51. The total market capitalization of U.S. equity markets was $49 trillion as of Q4-2023.[59] This figure represents the total dollar value of outstanding stock in the U.S. equities market, for all stock. I use this figure as a proxy for the future U.S. equity market cap as well but note for completeness that I expect this number to rise. This makes my valuation conservative, because I am effectively undercounting the amount of commerce affected by the conduct at issue.

52. The second part of the equation is the share of outstanding stock that is held short. Academic literature reports that the median ratio of shorted shares to shares outstanding from 1980-2018 is 1.7 percent.[60]

53. Multiplying the market capitalization of U.S. equity markets (i.e., dollar value of shares outstanding) by the ratio of shorted shares to shares outstanding yields an estimated value of shorted stocks, at any point in time moving forward, of $833 billion. Because it is necessary to

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[59] SIFMA Research, January 2024, "Quarterly Report: US Equity & Related, 4Q2023," available at: https://www.sifma.org/wp-content/uploads/2023/10/Research-Quarterly-Equity-and-Related-4Q23.pdf.

[60] Matthias X. Hanauer, Pavel Lesnevski, and Esad Smajlbegovic, May 2023, "Surprise in Short Interest," *Journal of Financial Markets*, In Press, Table 1. The authors consider all stocks traded on the NYSE, NYSE MKT, and Nasdaq.

borrow a stock in order to short it, this serves as my estimate of the total value of borrowed stocks.[61] This estimate is similar in magnitude to the total value of shorted stocks reported by government sources and in the trade press.[62] This $833 billion figure supplies the first component of Equation (2), above.

2. Spread Reduction

54. As shown in Equation (2), the second input necessary for calculating cartel harm is spread reduction. Specifically, and as discussed above, fees for borrowing stocks are paid as a percentage of the value being borrowed.[63] For example, if one borrows 1,000 shares of a stock worth $36/share and the cost of borrowing is 200 bps (2 percent), then one would pay $2 for every day that the stock is borrowed.[64] The reduction in spreads as a result of multilateral trading would accrue directly to lenders in the form of higher fees and borrowers in the form of lower fees (i.e., both parties would be made better off). For example, if the spread (the difference between the price borrowers pay and the price lenders receive) went from 100 bps to 40 bps as a result of cartel cessation, lenders and borrowers would benefit by 60 bps. My analysis is agnostic as to how lenders and borrowers "split" this spread reduction. For my purposes, what matters is the value to the market as a whole; accordingly, who benefits (*e.g.* how the spread reduction is apportioned) is immaterial.

55. I assume that with the introduction of multilateral trading, spreads would drop by 22 basis points. I base that assumption on two inputs: (1) actual world spreads in the securities lending market and (2) a spread reduction percentage.

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[61] Selling stock short without having located stock for delivery at settlement is a violation of the SEC's Regulation SHO with the exception of "short sales by market makers engaged in bona fide market making activities." (Key Points About Regulation SHO, § IV.1).

[62] Financial Stability Oversight Council, "2021 Annual Report," available at: https://home.treasury.gov/system/files/261/FSOC2021AnnualReport.pdf (estimating the value of U.S. equities on loan as $646 billion in 2021); Carmen Reinicke, June 21, 2023, "Short Bets on US Stocks Hit $1 Trillion, Most Since April 2022," *Bloomberg*, available at: https://www.bloomberg.com/news/articles/2023-06-21/short-bets-on-us-stocks-hit-1-trillion-most-since-april-2022#xj4y7vzkg.

[63] Cave Report and Recommendation, pp. 3-4.

[64] $2 = ($1,000 x $36 x 0.02) / 360

56. Actual spreads in the stock loan market are 41.4 bps. I derive this number from Plaintiffs' damages experts, Drs. Paul Asquith and Parag Pathak, who calculated it based on data produced in this case.

57. I apply a spread reduction percentage of 53 percent, based on my review of the relevant academic literature. The empirical studies that I reviewed and discuss below analyze the impact that the introduction of multilateral trading has on prices (spreads) in traditionally OTC markets. The average percentage spread reduction across these five studies is 53 percent. The studies are the following (also summarized in Table 1 below):

- Barclay, Christie, Harris, Kandel, and Schultz (1999) study SEC rules introduced in 1997 that allowed for the public to disintermediate dealers in the Nasdaq market.[65] The authors write that, "[t]raditionally, the Nasdaq Stock Market has operated as a pure dealer market, with the public unable to compete directly with marketmakers through the submission of their limit orders."[66] The new rules "would permit the public to compete directly with Nasdaq dealers by submitting binding limit orders…[a]dditionally, superior quotes placed by Nasdaq dealers in private trading venues began to be displayed in the Nasdaq market."[67] The authors find that these rules reduced spreads by approximately 30 percent.[68]
- Hendershott and Madhavan (2015) study the introduction of an electronic auction market to the traditionally OTC corporate bond trading market. The authors note that OTC markets—like the corporate bond market—are "characterized by off-exchange, bilateral negotiations with dealers."[69] MarketAxess, an electronic auction venue, "allows an investor to query multiple dealers electronically, providing considerable time savings relative to the alternative of a sequence of bilateral negotiations with this same set of dealers."[70] The authors find that trading costs on MarketAxess were between 20 percent and 75 percent lower than trades negotiated bilaterally, depending on the size of the trade and the type of bond (i.e.,

[65] Michael J. Barclay, William G. Christie, Jeffrey H. Harris, Eugene Kandel, and Paul H. Schultz, February 1999, "Effects of Market Reform on the Trading Costs and Depths of Nasdaq Stocks," *Journal of Finance*, Volume 54(1): 1-34.

[66] Barclay et al. (1999), p. 1.

[67] Barclay et al. (1999), p. 1.

[68] Barclay et al. (1999), p. 32.

[69] Hendershott and Madhavan (2015), p. 419.

[70] Hendershott and Madhavan (2015), p. 421.

investment grade or high-yield).[71] The simple average reduction in trading costs across all bond sizes and types was 50 percent.

- Mizrach and Neely (2006) study the interdealer market for U.S. Treasury bonds, which transitioned from voice brokers to electronic communication networks ("ECNs").[72] The authors write that, "[f]or more than a decade, bond trading screens have displayed quotes from dealers that helped to initiate voice transactions…ECNs permit dealers to post transactable prices and quantities and execute trades electronically."[73] The authors find that bid-asks spreads for U.S. Treasury bonds were between 75 percent and 82 percent lower on the ECN (eSpeed) compared with voice-brokered trades, depending on maturity length.[74] The average decline in the bid-ask spread was 78 percent across all maturity lengths.
- Raman, Robe, and Yadav (2020) study "the world's largest commodity market—the New York Mercantile Exchange's (NYMEX) West Texas Intermediate (WTI) light sweet crude oil futures market. This market underwent a major structural change on September 5th, 2006, when the NYMEX first allowed electronic trading on the Globex platform alongside face-to-face trading in the NYMEX pits."[75] Open outcry trading (i.e., pit trading) is not the same as OTC because traders can see multiple quotes at the same time, but the introduction of Globex enabled additional competition from traders without access to the pits.[76] The authors find that the mean bid-ask spread dropped from 37 basis points in the pits to 3 basis points on Globex (a 92 percent decline).[77]
- Aitken, Frino, Hill, and Jarnecic (2004) also study the transition from open outcry trading to electronic trading in three international markets (London, Sydney, and Hong Kong).[78] The

[71] Hendershott and Madhavan (2015), Table II.

[72] Bruce Mizrach and Christopher J. Neely, Nov/ Dec 2006, "The Transition to Electronic Communications Networks in the Secondary Treasury Market," *Federal Reserve Bank of St. Louis Review*, Volume 88(6): 527-541.

[73] Mizrach and Neely (2006), p. 530.

[74] Mizrach and Neely (2006), Table 1.

[75] Vikas Raman, Michel A. Robe, and Pradeep K. Yadav, January 2020, "The Third Dimension of Financialization: Electronification, Intraday Institutional Trading, and Commodity Market Quality," p.3, available at: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3068248.

[76] Raman, Robe, and Yadav (2020), p. 3.

[77] Raman, Robe, and Yadav (2020), Table 1.

[78] Michael J. Aitken, Alex Frino, Amelia M. Hill, and Elvis Jarnecic, July 2004, "The Impact of Electronic Trading on Bid-Ask Spreads: Evidence from Futures Markets in Hong Kong, London, and Sydney," *The Journal of Futures Markets*, Volume 24(7): 675-696.

authors find that trades in the electronic markets had lower spreads than open outcry trades in all three markets; the average decline in spreads across all three markets was 16 percent.[79]

TABLE 1: SUMMARY OF ACADEMIC STUDIES (MULTILATERAL TRADING)

Study	Spread Reduction
Barclay et al. (1999)	30%
Hendershott and Madhavan (2015)	50%
Mizrach and Neely (2006)	78%
Raman, Robe, and Yadav (2020)	92%
Aitken et al. (2004)	16%
Average	***53%***

58. I use the average value across the five studies rather than choosing a single value because combining multiple studies can make the results more generalizable, since any one study may be subject to idiosyncratic factors. Similarly, the Law of Large Numbers states that, as more observations are included in a sample, the average converges to the "true" value. For example, the true probability of a coin coming up heads is 50 percent, but one may easily see deviations in small sample sizes (i.e., if the coin is flipped only a few times). As the number of coin flips increases, the average converges to the true value. Meta-analysis, which involves combining and analyzing data from multiple studies, is common in economics as well as other disciplines. As one academic article on the subject notes: "If a number of independent studies have been conducted on a particular subject, using different data sets and methods, then combining their results can furnish more insight and greater explanatory power than the mere listing of the individual results."[80] I also present the results from sensitivity analyses where I consider a bigger spread reduction than the average and a smaller spread reduction than the average.

3. Present Value Of Cartel Harm

59. Based on Equation 2, I multiply the estimated total value of borrower stock (Section IV.A.1) and estimated spread reduction (Section IV.A.2) to arrive at annual cartel harms of $1.828 billion.

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79 Aitken et al. (2004), Table I and Table II. For this calculation, I compare the coefficient on the dummy variable for electronic trades in Table II (D_A) with the mean spreads reported in Table I.

80 T.D. Stanley, Summer 2001, "Wheat From Chaff: Meta-Analysis as Quantitative Literature Review," *Journal of Economic Perspectives*, Volume 15, Number 3, pp. 131-150 at 131.

Conversely, this figure can be thought of as the annual savings to consumers if the cartel does not reemerge, assuming effective entry of multilateral trading platforms. The inputs and outputs to this analysis are shown below, in Table 2.

TABLE 2: ANNUAL SAVINGS FROM MULTILATERAL TRADING ($MM)

U.S. Equity Market Cap ($MM)	[A]	$49,000,000
Aggregate Short Interest	[B]	1.7%
Total Borrowed Value ($MM)	[C] = [A]*[B]	$833,000
Calculated Spread	[D]	0.414%
Percentage Reduction in Spread	[E]	53%
Annual Savings ($MM)	[F] = [C]*[D]*[E]	$1,828

[A] SIFMA Research, January 2024, "Quarterly Report: US Equity & Related, 4Q2023," available at: https://www.sifma.org/wp-content/uploads/2023/10/Research-Quarterly-Equity-and-Related-4Q23.pdf.

[B] Matthias X. Hanauer, Pavel Lesnevski, and Esad Smajlbegovic, 2023, "Surprise in Short Interest," *Journal of Financial Markets*, In Press, Table 1.

[D] Expert Report of Paul Asquith and Parag Pathak, February 22, 2021, Table XI.8.

[E] Estimated based on various studies (see report text).

60. The total harm generated by the cartel will depend on how long the cartel lasts. That is, each year that the cartel lives results in another $1.828 billion in harm to consumers. I assume that, were the cartel to reemerge, it would do so for six years, which is an estimate for the average cartel duration found in the academic literature.[81] This is a reasonable estimate, based on a paper I co-authored, which relied on a database of cartels uncovered between 1990 and July 2004.

61. Because the EquiLend Reforms will be in place for five years, I calculate the present value of harm in five different scenarios: assuming the cartel reemerges in Year 1, Year 2, Year 3, Year 4, and Year 5. These calculations are presented in Table 3 below. To calculate the present value of the harm, I use a discount rate equal to the risk-free rate. I assume the discount rate is equal to the risk-free rate because it is not clear that the risk of cartel formation is correlated with the market, and thus would not be priced. I assume a risk-free rate of 4.33 percent, which is based on the current yield on 5-year Treasury bonds.[82] I use the 5-year rate because it is approximately equal to cartel duration.

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[81] Rosa M. Abrantes-Metz, John M. Connor, and Albert D. Metz, May 2013, "The Determinants of Cartel Duration," Table 1, available at: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2263782.

[82] Board of Governors of the Federal Reserve System (US), Market Yield on U.S. Treasury Securities at 5-Year Constant Maturity, Quoted on an Investment Basis [DGS5], retrieved from FRED, Federal Reserve Bank of St.

62. To illustrate: assume the cartel reemerges in Year 2. The cartel would cause $1.679 billion in harm in Year 2 (in present value terms), $1.610 billion in harm in Year 3 (in present value terms), $1.543 billion in harm in Year 4 (in present value terms), and so on for six years.

TABLE 3: PRESENT VALUE OF CARTEL HARM ($MM)

Year	Cartel Forms Year 1	Cartel Forms Year 2	Cartel Forms Year 3	Cartel Forms Year 4	Cartel Forms Year 5
1	$1,752	$0	$0	$0	$0
2	$1,679	$1,679	$0	$0	$0
3	$1,610	$1,610	$1,610	$0	$0
4	$1,543	$1,543	$1,543	$1,543	$0
5	$1,479	$1,479	$1,479	$1,479	$1,479
6	$1,417	$1,417	$1,417	$1,417	$1,417
7	$0	$1,358	$1,358	$1,358	$1,358
8	$0	$0	$1,302	$1,302	$1,302
9	$0	$0	$0	$1,248	$1,248
10	$0	$0	$0	$0	$1,196
Total	***$9,479***	***$9,086***	***$8,709***	***$8,347***	***$8,001***

Note: assumes 4.33 percent discount rate.

63. As Table 3 shows, cartel harm depends in part on when the cartel reemerges. When the cartel reemerges, in turn, depends on the timing and probability of recidivism. I turn to this question next.

B. REDUCTION IN RECIDIVISM PROBABILITY

64. I reproduce Equation (1), below, for readability.

(1) Value of EL reforms = (Cartel harm) x (Reduction in recidivism probability)

65. Having calculated cartel harm, I next turn to the reduction in recidivism possibility. Here, I assign probabilities to whether and when the cartel will reemerge, with and without the EquiLend Reforms. Then, I calculate the expected cartel harm with and without the EquiLend

Louis; https://fred.stlouisfed.org/series/DGS5, March 15, 2024. Currently the yield curve is nearly flat between five years (4.33 percent) and ten years (4.31 percent).

Reforms. The difference between the harm with and without the EquiLend Reforms represents the expected value of those reforms.

66. My analysis begins from the premise that the Defendants' cartel could reemerge; if cartel reemergence were impossible, all measures taken to prevent reemergence would be valueless. In practice, cartels can and do reemerge.[83] If this particular cartel reemerges, I reasonably estimate it will cause harm on the order of $1.828 billion annually as noted above.

67. The purpose of the EquiLend Reforms is to significantly reduce or eliminate that possibility. I assume the annual probability that the cartel reemerges without the EquiLend Reforms is one percent, which is a low and reasonable likelihood. This is also consistent with some (limited) empirical evidence.[84] For instance, John Connor, professor of industrial economics at Purdue University, finds that 18 percent of the firms in his sample were repeat offenders, which represents an estimate for the annual probability of recidivism of roughly one percent.[85]

68. Thus, the probability that the cartel reemerges in Year 1 is one percent. The probability the cartel reemerges in Year 2 is equal to the probability that the cartel does not reemerge in Year 1 (99 percent) times the probability the cartel does reemerge in Year 2 (one percent). The probability the cartel reemerges in Year 3 is equal to the probability the cartel does not reemerge in Years 1 or 2 times the probability that it reemerges in Year 3, and so on.

69. I further assume that the EquiLend Reforms reduce the probability of recidivism by 75 percent. In my opinion, this is a reasonable assumption given the strengths of the proposed reforms discussed above. Nonetheless, due to the inherent uncertainty in the probability of recidivism with the EquiLend Reforms in place, I also consider a sensitivity in which the EquiLend Reforms reduce the probability of recidivism by 50 percent rather than 75 percent.

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83 John M. Connor, Autumn 2010, "Recidivism Revealed: Private International Cartels 1990-2009," *Competition Policy International*, Volume 6(2): 101-127.

84 Connor (2010), p. 102 ("There is virtually no literature on the dimensions, determinants, or effects of cartel recidivism.").

85 John M. Connor, Autumn 2010, "Recidivism Revealed: Private International Cartels 1990-2009," *Competition Policy International*, Volume 6(2): 101-127. I solve for the constant annual hazard rate, h, which would produce a probability of recidivism of 18% over 20 years per the following: $h = 1 - (1 - 0.18)^{\frac{1}{20}} = 0.0099 \approx 0.01$.

70. The proposed reforms are similar in nature to reforms undertaken in the wake of the LIBOR rigging scandal which are recognized as having lessened the reemergence of collusion. LIBOR stands for London Interbank Offering Rate and was a major interest rate benchmark often referred to as "the world's most important number."[86] The LIBOR scandal first gained public attention in 2011 and 2012, as public reports revealed that U.S. and international regulators were investigating major banks that contributed to LIBOR. The claim was that these banks had deliberately colluded to manipulate the benchmark by, for instance, intentionally submitting inaccurate data as part of their submissions.[87] In June 2012, it was reported that Barclays settled these allegations with U.S. and U.K. authorities for $453 million.[88] These allegations spurred multi-district antitrust litigation in the Southern District of New York against the banks beginning in 2011.[89]

71. In the wake of the LIBOR collusion scandal, which I helped to uncover using empirical methods known as "screens," I also participated in discussions and commented on proposals aimed at reforming LIBOR and other financial benchmarks prone to collusion,[90] some of them involving panels of experts at the invitation of then-Chairman of the CFTC, Mr. Gary Gensler. One major reform to LIBOR was transitioning its administration from the British Bankers' Association (BBA), which was comprised of the banks themselves, to a new administrator "responsible for compiling and distributing the rate, as well as providing credible internal governance and oversight."[91] Intercontinental Exchange Group (ICE) took over the administration of LIBOR in

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86 Moneyweek, October 10, 2008, "LIBOR: the world's most important number," available at: https://moneyweek.com/32651/libor-the-worlds-most-important-number-13816.

87 David Enrich, *et al.*, "U.S. Libor Probe Includes BofA, Citi, UBS," *The Wall Street Journal*, March 18, 2011, available at: https://www.wsj.com/articles/SB10001424052748703818204576205991698548286.

88 Alexandra Alper and Kirstin Ridley, "Barclays Paying $453 Million to Settle Libor Probe," *Reuters*, June 27, 2012, available at: https://www reuters.com/article/us-barclays-libor/barclays-paying-453-million-to-settle-libor-probe-idUSBRE85Q0J720120627.

89 *Libor-Based Financial Instruments Antitrust Litigation*, 11-md-2262 (S.D.N.Y.).

90 Rosa M. Abrantes-Metz, "Principles for Financial Benchmarks: Comments on the OICU-IOSCO Consultation Report on Financial Benchmarks," May 15, 2013, available at http://www.iosco.org/library/pubdocs/409/pdf/Rosa%20M.%20Abrantes%20Metz.pdf; Rosa M. Abrantes-Metz & David S. Evans, "Will The Wheatley Recommendations Fix LIBOR?" *Competition Policy International,* Antitrust Chronicle, November 2012 (2). *See also*, footnote 4.

91 "The Wheatley Review of LIBOR: Final Report," September 2012, p. 8, available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/191762/wheatley_review_libor_finalreport_280912.pdf.

February 2014.[92] As a result, banks (as members of BBA) would no longer be regulating themselves, which had been a clear conflict of interest that allowed anticompetitive behavior to emerge. The new independent administrator (ICE) instituted a number of safeguards to prevent banks from colluding to manipulate the benchmark, including "[g]overnance and control mechanisms established within the panel banks" and "[e]xternal auditing of the administrator and submitters."[93] ICE stated that, as a result of these and other safeguards, "LIBOR is now harder to manipulate, making it more likely that any attempt to manipulate it will be discovered, and there are appropriate legal punishments associated with any attempts at manipulation."[94]

72. I note that other financial benchmark abuses were also uncovered during the last 15 years or so, leading to major reforms across several of them, including the LBMA Gold and Silver Fixings, the WM/Reuters for foreign exchange, ISDAfix and various others. In 2013, IOSCO put forward the final report on "Principles for Financial Benchmarks" which, among others, details reforms on governance structures of financial benchmarks similar to those relevant in this matter.[95]

73. Based on a 1 percent annual reemergence risk without the EquiLend Reforms, and a 0.25 percent annual reemergence risk with the EquiLend Reforms, I calculate the probability that the cartel reemerges in each year in Table 4 below.

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[92] https://ir.theice.com/press/news-details/2014/ICE-Benchmark-Administration-to-Become-New-Administrator-of-LIBOR-on-February-1-2014/default.aspx.

[93] ICE Benchmark Administration Limited, "Second Position Paper on the Evolution of ICE LIBOR," July 31, 2015, pp. 3-4, available at: https://www.ice.com/publicdocs/ICE_LIBOR_Second_Position_Paper.pdf.

[94] ICE Benchmark Administration Limited, "Second Position Paper on the Evolution of ICE LIBOR," July 31, 2015, pp. 3-4, available at: https://www.ice.com/publicdocs/ICE_LIBOR_Second_Position_Paper.pdf.

[95] OICU-IOSCO, July 2013, "Principles for Financial Benchmarks – Final Report, available at: https://www.iosco.org/library/pubdocs/pdf/IOSCOPD415.pdf.

TABLE 4: PROBABILITY OF RECIDIVISM BY YEAR

Program	Forms Year 1	Forms Year 2	Forms Year 3	Forms Year 4	Forms Year 5
EquiLend Reforms	0.250%	0.249%	0.249%	0.248%	0.248%
No Reforms	1.000%	0.990%	0.980%	0.970%	0.961%

C. VALUE OF THE EQUILEND REFORMS AND SENSITIVITY ANALYSES

74. With both the annual, aggregate cartel harm and reduction in recidivism probability calculated, I may now calculate the present value of the EquiLend Reforms.

75. In Table 5, I apply the probabilities calculated in Table 4 to the annual cartel harm calculated in Table 3. The result is the expected value (or loss of value) to the market if the cartel reemerges, both with and without the EquiLend Reforms. The expected value of cartel harm without the reforms is $428 million; the expected value of the cartel harm with the reforms is $109 million. Accordingly, the present expected value of the EquiLend Reforms is the difference, $319 million.

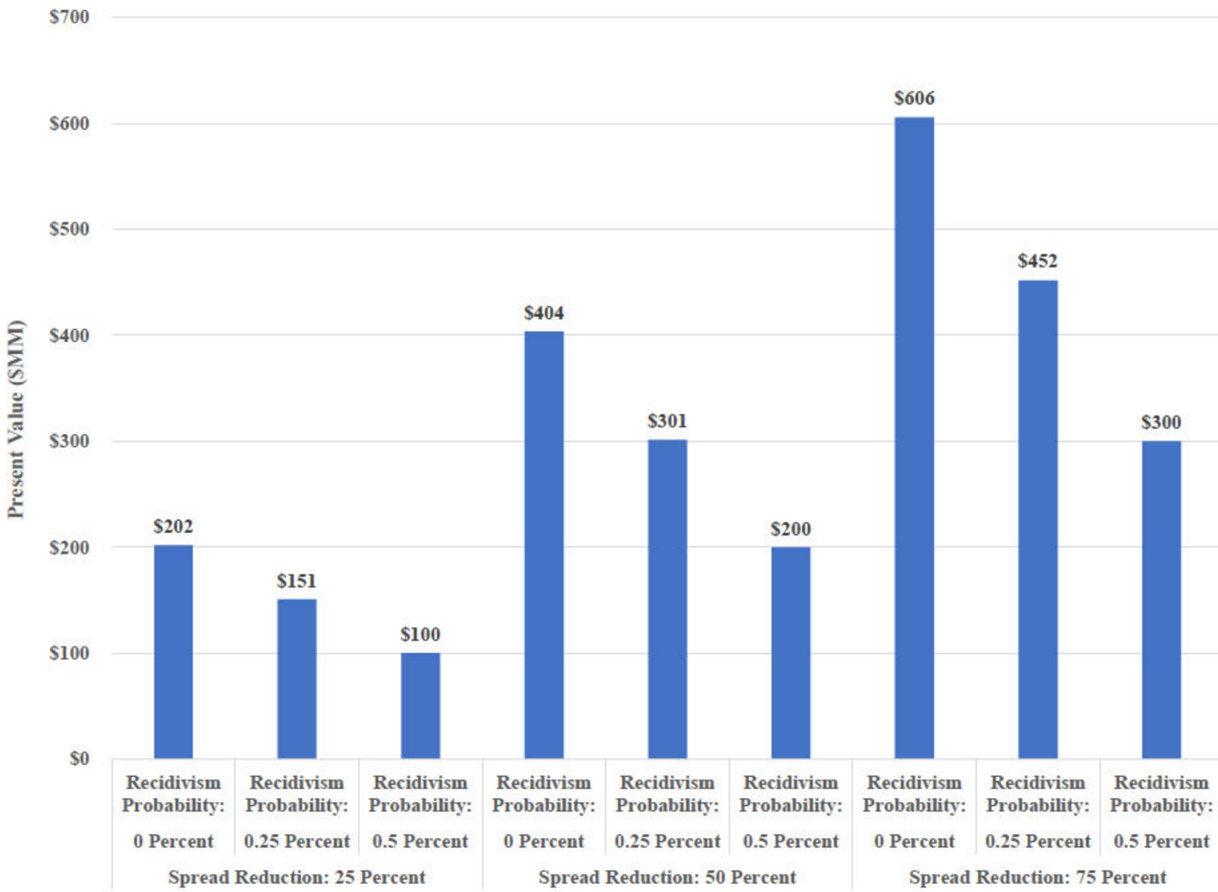
TABLE 5: EXPECTED VALUE OF CARTEL HARM WITH AND WITHOUT EQUILEND REFORMS ($MM)

Program	Year 1	Year 2	Year 3	Year 4	Year 5	Total
EquiLend Reforms	$24	$23	$22	$21	$20	$109
No Reforms	$95	$90	$85	$81	$77	$428
Difference	***$71***	***$67***	***$64***	***$60***	***$57***	***$319***

76. I also test the sensitivity of these findings to alternative assumptions. One such assumption is the percentage reduction in spreads that would occur as a result of multilateral trading, which I assume is 53 percent based on the empirical studies cited above. For my sensitivity analysis, I instead assume that spreads would be only 25 percent lower, which is towards the lower end of the range of studies cited in Table 1 above. I also assume the spread reduction would be 75 percent, which is the upper end of the range found in the academic literature cited above.

77. In another sensitivity, I assume that the EquiLend Reforms reduce the probability of cartel recidivism by half (50 percent) rather than by 75 percent. I also assume the EquiLend Reforms would reduce the probability of cartelization to zero. These scenarios are all presented in Figure 1 below.

FIGURE 1: VALUE OF EQUILEND REFORMS SENSITIVITY ANALYSIS ($MM)



Note: Recidivism probability shown on x-axis is the annual probability with the EquiLend Reforms in place. Annual probability of recidivism without the EquiLend Reforms in place assumed to be one percent, which is common to all bars. Other assumptions common to all bars: equity market cap ($49 trillion), ratio of shorted volume to outstanding volume (1.7 percent), calculated spread (41.4 bps), cartel length (six years), and discount rate (4.33 percent).

78. As Figure 1 reflects, the value of the EquiLend Reforms varies based on the inputs, ranging from $100 million to $606 million. But, all sensitivities tested are at least $100 million in value.

79. Finally, I note that the value of the EquiLend Reforms is most likely understated for two main reasons. First, my analysis does not incorporate the increased trading activity that would likely accompany a reduction in transaction costs. Thus, my analysis does not capture benefits to consumers (i.e., short sellers or stock lenders) who would have traded more in the but-for world as a result of lower spreads, nor does it capture benefits to consumer who would have entered the market as a result of lower spreads. Second, it is reasonable to assume that the introduction of

all-to-all trading in the stock lending market would require a central clearing counterparty (CCP), which would potentially reduce systemic risk by reducing the probability that a default from one counterparty causes other counterparties to default on their obligations.[96] My analysis does not incorporate the value of this reduction in systemic risk.

Respectfully submitted,

Rosa M. Abrantes-Metz, PhD

May 1, 2024

[96] Committee on Payment and Settlement Systems and Technical Committee of the International Organization of Securities Commissions, April 2012, "Principles for Financial Market Infrastructures," p. 9, available at: www.bis.org/publ/cpss101a.pdf ("A central counterparty interposes itself between counterparties to contracts traded in one or more financial markets, becoming the buyer to every seller and the seller to every buyer and thereby ensuring the performance of open contracts…CCPs have the potential to reduce significantly risks to participants through the multilateral netting of trades and by imposing more-effective risk controls on all participants. For example, CCPs typically require participants to provide collateral (in the form of initial margin and other financial resources) to cover current and potential future exposures. CCPs may also mutualise certain risks through devices such as default funds. As a result of their potential to reduce risks to participants, CCPs also can reduce systemic risk in the markets they serve. The effectiveness of a CCP's risk controls and the adequacy of its financial resources are critical to achieving these risk reduction benefits.").

EXHIBIT 1

CV AND TESTIMONY LIST

Berkeley Research Group

ROSA M. ABRANTES-METZ, PHD

MANAGING DIRECTOR

New York, NY & Miami, FL

Email: RAbrantes-Metz@thinkBRG.com
Cell: +1.917.499.4944

Dr. Rosa M. Abrantes-Metz is a Managing Director at the Berkeley Research Group, based in New York City and Miami. She has over two decades of experience specializing in antitrust, securities, and financial regulation, including work in consulting and banking, as well as in government. Her main areas of specialization are industrial organization, monetary and financial economics, and statistics and econometrics. Dr. Abrantes-Metz has a particular expertise involving the intersection between alleged market manipulations and competition issues, including alleged coordinated conduct. She is also an experienced expert on the economics of multisided platforms.

Dr. Abrantes Metz is a former adjunct associate professor at Leonard N. Stern School of Business, New York University, where she taught money and banking, financial institutions and the financial crisis, industrial economics, and econometrics for MBAs. She is a former Lecturer for honors econometrics at the department of economics at the University of Chicago, and various other fields of economics at Universidade Católica Portuguesa, in Lisbon, Portugal.

Dr. Abrantes-Metz's work is regularly featured in the media such as *The Wall Street Journal*, *Financial Times, The Economist, CNNMoney, CNBC, Forbes, Bloomberg, Fox Business, BusinessWeek, Washington Post, Huffington Post, Reuters, Crain's, Risk Magazine, Investor's Business Daily, L'Agefi Hebdo, Les Temps, Le Monde, Bloomberg TV, Sky News TV*, *BNN-Bloomberg TV, BBC Radio*, and *BBC TV*. She also contributes with Opinion Articles to several of these outlets. In 2019, she was recognized among "40 in their 40's" Notable Women Competition Professionals in the Americas, for which thirty six distinguished lawyers and four distinguished economists were selected among North, Central and South American professional women. She has also been honored by the American Antitrust Institute for "Outstanding Antitrust Litigation Achievement in Economics." In addition, she was a testifying expert in *Sabre v. US Airways*, selected by GCR as Matter of the Year among matters worldwide in 2023, for "creative, strategic and innovative work by teams of in-house and external lawyers and economists." Most recently in 2024, one of her articles on antitrust compliance and AI received an award from Les Concurrences in the Business digital category.

After working as a staff economist at the Federal Trade Commission, Dr. Abrantes-Metz continued to serve as a consultant for special projects with the Commission's Bureau of Economics. She was also a senior competition policy advisor for the World Bank. Dr. Abrantes-Metz is the author of several articles on econometric methods and screens for conspiracies, manipulations and fraud, multisided platforms, gasoline, pharmaceuticals and health care, telecommunications, event studies and valuation, structured finance, payments systems, credit default swaps, credit ratings agencies and regulation, financial benchmarks reform, new statistical tests, and diversity in assets management. Dr. Abrantes-Metz has published in peer-reviewed journals such as the *International Journal of Industrial Organization*, the *Journal of Pharmaceutical Finance, Economics and Policy*, *Applied Economics Letters*, the *Journal of International Arbitration*, the *Journal of Banking and Finance*, *Harvard Business Law Review*, and University of Pennsylvania *Journal of Business Law*. Her work has also appeared in trade publications including the *ABA Antitrust Section's Economics Committee Newsletter*, *The Antitrust Source*, *The Antitrust Magazine*, *The Antitrust Counselor*, Competition Policy International's *Journal* and *Antitrust Chronicle*; *Derivatives Litigation Reporter*; and *Securities Litigation Report*.

Dr. Abrantes-Metz is a co-author of a chapter on the role of the economic experts in addressing conspiracy allegations under federal antitrust laws in a book published by the American Bar Association. In addition, she has contributed to other books on international arbitration with a focus on event studies, and is a co-author of the chapter on antitrust corporate governance and compliance in the *Oxford Handbook of International Antitrust Economics*. She has addressed the economics of alleged cartels and information exchanges from various perspectives, and is the author of the 2013 guidelines on exchanges of information among competitors for the Latin America Regional Center for Competition. Most recently, she co-authored a chapter on screens in antitrust compliance for a book published by Les Concurrences.

Dr. Abrantes-Metz has developed numerous empirical screens for assessing potential conspiracies, manipulations, fraud, and price gouging, and is a pioneer in the field, contributing to the further development and increased adoption of these methods worldwide. Screens are used by both plaintiffs and defendants in assessing antitrust risk. Her work covers both liability and damages, in the intersection between market manipulation and cartel activity. In 2008, she flagged the possibility of collusion in LIBOR prior to the launch of large-scale investigations. She has also flagged the possibility of manipulation and collusion in gold markets as well as in other markets, and more recently the possibility of bid rigging in US Treasuries auctions, among other financial products. She has developed and applied screens not only to assist governmental agencies and plaintiffs, but also on the defense side when companies and individuals are faced with allegations of this type of conduct.

Dr. Abrantes-Metz has extended her experience in LIBOR to the analyses of other financial benchmarks and potential illegal behavior worldwide, including in assessing alleged manipulations of spot markets. She is regularly retained to address issues of price artificiality and price impact between price indices and prices in related markets as well as various types of contracts. Some of her work included analyses of transportation of commodities as an alleged accessory or vehicle to market manipulation. Her experience in alleged market abuse also extends to a variety of financial and commodities markets on alleged of spoofing and high frequency trading, for oil and gasoline, natural gas, electricity, silver, gold, platinum, palladium, aluminum, zinc, copper and other metals including scrap metals, as well as stock prices, futures prices and NYMEX settlement prices, various swaps and options, credit default swaps, foreign exchange markets, ISDAfix, US Treasuries, sovereign and supranational bonds, agency municipal bonds, variable rate demand obligations, mortgages, cryptocurrencies, payments systems, mortgage backed-securities, catering, lithium-ion batteries, airlines and other transportation and travel, professional sports, insurance, pharmaceuticals, mortgage foreclosure and evictions, defaults, among others. In addition to her work in this area, Dr. Abrantes-Metz has been invited by regulatory bodies to participate in roundtables on how to reform financial benchmarks worldwide and has formally advised American and European authorities on this topic. She has also advised public and private institutions on the development and implementation of new financial benchmarks. Dr. Abrantes-Metz has advised competition and other regulatory and securities agencies around the world on the use of empirical screens to detect the possibility of market rigging and fraud in general, on the use of pricing algorithms, and has formally been engaged as an economic expert in related matters by several governmental agencies.

In pharmaceuticals, she co-developed a model to estimate the likelihood of drugs failing and succeeding each of the clinical stages of the Food and Drug Administration, and their expected durations in each of these phases. This model has become one of the most used by industry analysts to assist in valuing pharmaceutical and biotechnology pipelines. More recently, she studied the possibility of collusion in pharmaceutical markets. Her research on pharmaceuticals and on rigging of markets has been discussed in books on how to value pharmaceutical and biotechnology companies, and in publications pertaining to healthcare, intellectual property and cartels.

Dr. Abrantes-Metz has provided testimony on damages, liability, class certification and plans of allocation for classes, related to alleged bid-rigging, price-fixing and market allocation in various markets, information exchanges, monopolization, mergers involving horizontal and vertical restraints, market definition, conduct involving multisided platforms in various industries including payments systems, healthcare, and airline bookings, the valuation of an energy services provider company, the valuation of expropriated oil services assets, the valuation of stock options and various types of swaps, the valuation of utilities, and breach of contracts due to changes in financial and commodity benchmarks, among others. Her clients include companies as American Airlines and Fannie Mae. Dr. Abrantes-Metz has also provided written and oral testimony as an economic expert for the U.S. Government – The U.S. Federal Energy Regulatory Commission – on BP's manipulation of natural gas markets, leading to a conviction by FERC and upheld by the Fifth Circuit Court of Appeals. She is engaged as an expert witness in other energy markets manipulation matters on behalf of FERC on *FERC v Total*. Dr. Abrantes-Metz has testified on behalf of Fannie Mae through the Department of Justice on an alleged fraud matter in the market for mortgages foreclosures and evictions and has also been engaged by the U.S. Federal Trade Commission and the U.S. Department of Justice as an expert witness in matters involving multisided platforms. She has been retained by various Attorneys General offices. In addition, she consults with numerous other competition authorities around the world. Dr. Abrantes-Metz's work has been cited in decisions by U.S. Federal Courts and by other Courts and Administrative Proceedings. She has testified before such courts and in jury trials, as well as in international arbitration and contractual disputes settings, in Europe, Brazil, Canada and the United States, both in English and in Portuguese. Dr. Abrantes-Metz has been a signatory to Amicus Briefs submitted to the U.S. Supreme Court. In addition, she has undertaken pro bono consulting work assisting counsel on behalf of children with special needs, when estimating damages and settlement amounts in various matters in the state of New York.

Rosa Abrantes-Metz holds a Ph.D. and a masters in economics from the University of Chicago. She also holds a Masters in Economics from the Universitat Pompeu Fabra in Barcelona, Spain, and a *Licenciatura* in Economics from Universidade Católica Portuguesa. She is has been selected as a *Who's Who* of Competition Lawyers & Economists every year since 2009.

PROFESSIONAL EXPERIENCE

2023– Berkeley Research Group
Managing Director

2020–2023 The Brattle Group
Principal & Co-Chair Global Antitrust and Competition (2021-2023)
Co-Chair Technology Practice (2021)

2011–2020 Global Economics Group & Market Platform Dynamics
Managing Director & Principal

2007–2011 LECG
Principal

2004–2007 **NERA Economic Consulting**
Senior Consultant

2002–2004 **Federal Trade Commission, Bureau of Economics**
Economist

2001 **RCF Economic and Financial Consulting, Inc.**
Part-time Consultant (June–October)

2001 **Board of Governors of the Federal Reserve System**
Spring Associate (February–June)

1998 **Banco Bozano Simonsen - Rio de Janeiro, Brazil**
Summer Associate (June–October)

Teaching & Research Positions

2009–2020 **New York University, Leonard N. Stern School of Business**
Adjunct Associate Professor – Department of Economics
Visiting Scholar

1998–2001 **University of Chicago, Department of Economics**
Lecturer for Honors Econometrics
Teaching Assistant for Graduate Econometrics and Macroeconomics

1992–1995 **Universidade Católica Portuguesa, Lisbon, Portugal**
Research Assistant
Instructor and Teaching Assistant, Lecturer

OTHER ACADEMIC AND AGENCY AFFILIATIONS

2011–2018 **World Bank**
Senior Competition Policy Affiliated Expert
Consultant for Special Projects

2004–2008 **Federal Trade Commission, Bureau of Economics**
Consultant for Special Projects

2007–2009 **Suffolk University, Sawyer Business School**
Board of Advisors – Department of Accounting

EDUCATION

University of Chicago
PhD & MA in Economics

Universitat Pompeu Fabra, Barcelona, Spain
MA in Economics (with High Honors)

Universidade Nova de Lisboa, Lisbon, Portugal
Completed First Year Ph.D. Program Course Work in Economics

Universidade Católica Portuguesa, Lisbon, Portugal
Licenciatura in Economics (Magna Cum Laude)
Second highest average among all graduating students

REPRESENTATIVE MATTERS

Multisided Platforms, Antitrust and Regulation

- **Liability and Damages Involving Multisided Platforms.** Conducted analyses and testimony related monopolization, collusion, market definition, predatory pricing, damages, causation and liability, in industries such as financial and derivatives markets, payments systems, app stores, advertising, hotel bookings, air travel services and transportation, and health care markets. This work included deposition and trial testimony on behalf of US Airways (American Airlines) in *US Airways v. Sabre,* testimony on behalf of the US Federal Trade Commission in *FTC v Surescripts*, testimony on behalf of a class of consumers in *Re Apple iPhone Antitrust Litigation*, testimony on behalf of SIBS payment system in *Portuguese Competition Authority v. SIBS*, testimony on behalf of the US Department of Justice in *United States of America, et al. v Google LLC*, among other public non-public multisided platform matters.

- **The Economics and Regulation of the Portuguese Retail Payments System.** Co-authored 2013 report analyzing how the Portuguese payment system operates and how regulatory interventions, especially those involving controls, would likely affect the interest of the various stakeholders in the system including consumers, merchants, banks, schemes, and infrastructure providers. Filed another report on addressing allegations of monopolization by SIBS in various markets. In 2022, testified on behalf of SIBS addressing anticompetitive conduct, awaiting trial in 2024.

- **Network Effects in Payment Systems.** Co-authored report on the evolution of a Portuguese payment system and the strength of its network effects.

- **Alleged Conspiracy in Multisided Platforms Markets.** Provided expert testimony on behalf of merchants, on market definition and collusion on an alleged cartel by the four credit card companies on the transition to EMV technology.

Other Non-Financial Markets Conspiracies, Monopolization, Competition, Oil & Gasoline, Pharmaceuticals and Health Care, and Other General Antitrust Matters

- **Amicus Brief.** Brief of Amici Curiae Economists in Support of Appellees, *Susan Giordano, Angelene Hayes, Ying-Liang Wang, Anja Beachum v Saks & Company LLC, Saks Incorporated, Louis Vuitton USA Inc, Loro Piana & C. Inc, Gucci America, Inc., Prada USA Corp., Brunello Cucinelli USA, Inc.,* Eastern District of New York, 2023, co-signer.

- **Amicus Brief.** Brief of Amici Curiae Economists in Support of Petitioners, *National Collegiate Athletic Association v Shawne Alston*, U.S. Supreme Court, 2020, co-signer.

- **Amicus Brief.** Brief of Amici Curiae Economists in Support of Petitioners, *National Football League v Ninth Inning*, U.S. Supreme Court, 2020, co-signer.

- **Alleged Conspiracy in Catering.** Provided expert testimony on an alleged cartel case involving price-fixing, bid-rigging and market allocation in catering. Developed numerous empirical approaches to address materiality and likelihood of such behaviors, and to address the alleged exchange of information among competitors. Estimated alleged overcharges. Trial testimony, company found not guilty.

- **Alleged Monopolization and Collusion in Food Markets Services.** Providing expert testimony for defendant on alleged monopolization and collusion of corporations in the provision of tech services for some food products.

- **Alleged Collusion in the Master Data Management in Life Sciences.** Providing expert testimony on behalf of IQVIA against allegations by Veeva that IQVIA and Reltio colluded to monopolize the market for Master Data Management.

- **Alleged Collusion in the Broiler Chicken Industry.** Providing expert testimony on behalf of the Washington State against various broiler chicken producers related to the Agri Stats information exchange.

- **Class Certification in Lithium Ion Batteries.** Provided expert testimony on class certification in the LIB market, and on the likelihood of collusion and likely market price effect.

- **Class Actions Certification and Price-Fixing.** Addressed class certification using various empirical methods to determine similarity of effects across consumers allegedly belonging to classes in price-fixing conspiracies in various financial and commodities markets.

- **Alleged Collusion and Analysis of Information Exchanges in Food Markets.** Developed economic analyses to assess the relevance of information exchanges among competitors and their impact on food markets overall.

- **Monopolization in Generic Pharmaceuticals.** Testimony submitted to the International Trade Commission on monopolization, damages and welfare loss related to market exclusion of competing generic products.

- **Alleged Conspiracy among Business Partners.** Developed an innovative approach to detect collusion based on survey data. Studied whether the patterns of responses to a survey by business partners of a major financial institution were indicative of collusion and identified suspects, later confirmed by internal records.

- **Guidelines on Exchanges of Information among Competitors.** Authored the guidelines on best practices for exchanges of information among competitors for Central and South American countries.

- **Collusion Detection in Oil and Gasoline Markets.** Developed empirical screens to detect conspiracies in gasoline. Applied screens to the US retail and wholesale data. Contributed to the FTC's gasoline monitoring program. Work performed as an FTC economist.

- **Analyses of Potential Collusion in Liquefied Natural Gas Markets.** Developed empirical and structural screens to address whether collusion in regional liquefied natural gas markets around the world may have happened, on behalf of investigated company.

- **Mergers and Acquisitions in Oil and Gasoline Markets.** Developed empirical analyses to access market behavior post mergers as an FTC economist. Developed and implemented empirical analyses to assist in merger evaluation both as an FTC economist and on behalf of the merging parties.

- **Training of Competition Authorities on Cartel Detection.** Trained Competition Authorities around the world on how to detect collusion through screening and advised on how to enhance anti-cartel antitrust policies. Training also involved the development of but-for models for prices and the estimation of overcharges.

- **International Bid-Rigging.** Developed economic and empirical analyses to flag likely ongoing bid-rigging in multiple international markets on behalf of competition authorities around the world.

- **Estimation of Exposed Population and Brand Name Drug Sales.** Built models to estimate exposed population to a disease of interest and relevant drug sales on behalf of an insurance company in order to access validity of claims submitted due to adverse effects allegedly caused by the drug.

- **Analysis of Pharmaceutical Merger involving Horizontal and Vertical Restraints.** Expert report on vertical restraints related to an acquisition of major wholesalers by the national association of pharmacies in Europe. Report focused on tying, bundling and exchanges of information.

- **Mergers and Acquisitions in Pharmaceuticals.** Worked on numerous mergers in the pharmaceutical and biotech industries and addressed potential anticompetitive effects. Also valued biotech and pharmaceutical pipelines. Work performed both as an FTC economist and as an economic consultant on behalf of merging or acquired parties.

- **Competitive Dynamics in Consumer Products.** Empirical analyses of competition in brick-and-mortar and online for various consumer products.

- **Brand Name vs. Generic Pharmaceutical Drugs.** Estimated the effect of generic entry on price, volume and market shares of branded drugs in specific therapeutic areas. Used findings to estimate the but-for scenario absent generic entry. Estimated alleged damages.

- **Material Adverse Change in Connection with Acquisitions.** Determined the materiality of a disclosure on the existence of a price-fixing conspiracy sometime in the past in the aspartame market, prior to the relevant acquisition, and which could have affected the later decision to acquire the company.

- **Merger in the Poultry Industry in Brazil.** Co-authored and submitted an expert report on the estimation of the elasticities of demand across products in the same relevant market in an acquisition in the Brazilian poultry industry. Estimated efficiency gains and price changes due to the acquisition.

- **Mergers and Acquisitions in the Waste Management Industry in Portugal.** Report on likely pro and anticompetitive effects of a specific acquisition raising both horizontal and vertical concerns.

- **Daily Gasoline Pricing Forecast.** Developed an econometric model on behalf of a major oil company to predict daily gasoline prices for all of its competitors at the terminal level, and across all of its terminals in the United States. The model significantly improved analysts' forecasts and assisted daily pricing decisions.

- **Trends and Cycles in Gasoline Prices.** Decomposed movements in gasoline prices between long-run and short-run components, across 365 cities in the United States, in order to study interconnections across various regional markets. Work performed as an

FTC economist.

- **Spectral Test for Mergers and Acquisitions.** Developed a new statistical test in the frequency domain and applied it to antitrust market definition in gasoline markets. This test was later used for other applications including in financial markets. Work performed as an FTC economist.

- **Prediction of Hart-Scott-Rodino Filings.** Developed econometric models to predict HSR filings as a function of major economic indicators. Work performed as an FTC economist.

- **Estimation of the Likelihood of Success and Duration of Drugs in Clinical Stages.** Co-developed a duration model to estimate the likelihood of success and failure of drugs in each of the clinical stages of the Food and Drug Administration, as a function of various drugs characteristics. The model also estimates the expected duration for each of the drugs based on the same characteristics. Model informs mergers and acquisitions, intellectual property and valuation. Used as supporting evidence in FTC decisions such as in the Genzyme Corporation / Novazyme Pharmaceuticals, Inc., 2003 merger. Work performed as an FTC economist and as an economic consultant.

- **Mergers and Acquisitions in Other Areas.** Worked on mergers and acquisitions in various other industries such as cable television, boats, railroads, and appliances.

- **Health Care Costs and Innovation.** Developed a new econometric approach to estimate the contribution of technological progress to the increase in health care expenditures in the United States over the last four decades.

- **Benefits of Health Care Spending.** Developed simple econometric models to assist in determining if countries spending more on health care also experience greater health benefits from such spending.

Securities, Valuation, Risk Assessment, Financial Regulation, Other Conspiracies and Antitrust involving Financial Markets, and Manipulations and Fraud in Financial and Commodities Markets

- **Class Certification and Liability on an Alleged Collusion in Variable Rate Demand Obligation Bonds.** Provided expert testimony on class certification related to collusion among major financial institutions to raise VRDO interest rates. Class was certified.

- **Alleged Hub and Spoke Conspiracy in Customized One Hundred Percent Placement Bonds.** Provided expert testimony on an alleged hub and spoke conspiracy organized by Nuveen to exclude Preston Hollow from doing business with major financial institutions. Settlement reached.

- **Alleged WTI Futures Manipulation on April 20, 2020.** Conducted numerous economic analyses to address transportation and storage capacity, algorithmic mal-function and market manipulation of the NYMEX WTI crude oil futures settlement price on April 20, 2020, which took a negative value.

- **USD LIBOR Conspiracy and Manipulation.** Research assisted in the launching of investigations around the world. Subsequently analyzed liability and estimated damages for various securities benchmarked against USD LIBOR on behalf of large institutional investors and governmental agencies in the United States and abroad.

- **Alleged Manipulation and Collusion in Gasoline Spot Markets in Specific U.S. Regions.** Expert testimony on collusion and manipulation in a regional US market involving a benchmark price and other collusive conduct. Estimation of price artificiality.

- **Alleged Conspiracies and Manipulations of Oil Prices Platts Indices.** Developed empirical approaches to determine whether there was evidence of a material impact of an alleged conspiracy and manipulation of the Platts WTI Index and Brent crude oil prices, for both spot and futures markets. Studied trading data across all market players to address price materiality, causation, market power and possible motive. Studied other related commodities and markets. Calculated illegal profits and damages.

- **Natural Gas Manipulation by Total.** Expert testimony on behalf of the Federal Energy Regulatory Commission. Developed various empirical approaches to assist in addressing liability, causation, and artificiality, consistent with Total's traders' manipulation in natural gas markets in several regions in the United States.

- **Natural Gas Manipulation by BP.** Expert testimony on behalf of the Federal Energy Regulatory Commission. Developed various empirical approaches to assist in addressing intent, causation, and artificiality, consistent with BP's manipulation in natural gas markets in 2008. BP was found guilty of such conduct. Written and oral testimony, deposition and testimony at hearing. Commissions' decisions refer to Abrantes-Metz' testimony approximately 150 times all together. Opinions upheld in several appeals by the Commission and in Federal Court and by the Fifth Circuit Court of Appeals.

- **Fraud in Services Provided on Mortgages Foreclosures and Evictions.** Written testimony on behalf of Fannie Mae and the U.S. Department of Justice. Developed various empirical approaches to address liability and damages due to alleged overpricing of service providers in the market for mortgages foreclosures and evictions for a decade.

- **Manipulation of Cryptocurrencies.** Analyses of alleged collusion, manipulation and fraud potentially involving various cryptocurrencies.

- **Reform of LIBOR and Other Financial Benchmarks.** Advised regulatory agencies around the world on methodology, governance, regulation, transition and implementation of reforms of key financial benchmarks worldwide.

- **Design and Implementation of New Financial Benchmarks.** Advised private companies interested in developing and implementing new financial benchmarks.

- **Manipulations and Conspiracies of other (besides USD LIBOR) Financial Benchmarks including Euribor, Yen LIBOR, TIBOR, ISDAfix, Foreign Exchange WM/Reuters Fixing and FX Futures, Platts Brent and WTI Oil Benchmarks, and US Treasuries Futures.** Worked on manipulations and conspiracies of most major financial benchmarks, auction settings, bond issuance, and secondary markets for various bond types currently under investigation around the world.

- **Manipulations and Conspiracies in Precious and Non-Precious Metals Benchmarks for Sport Prices.** Developed numerous empirical and structural analyses to address collusion and manipulation for precious and non-precious metals benchmarks including LBMA gold and silver, platinum and palladium, aluminum, zinc and copper, assisting in the launching of investigations worldwide.

- **Metals Prices Artificiality due to Unwarranted Increased Warehousing**. Worked on manipulations and conspiracies in various metals markets involving alleged squeezes in metals markets due to unwarranted increased warehousing inventories. These included London Metal Exchange warehousing disruptions on Aluminum, Zinc, Copper, among others. Developed empirical approaches to assist in addressing causation, artificiality, intent, and likelihood of collusion and damages.

- **Collusion and Manipulation of U.S. Treasuries Auctions and other Bonds.** Developed empirical and economic analyses to detect possible bid rigging in U.S. Treasuries auctions and its effect on the secondary, when issued and futures markets.

- **Collusion, Manipulation and Fraud in Specific Bond Markets including SSA bonds, Agencies bonds, and others.** Developed empirical and other economic analyses to detect possible rigging in bonds markets around the world as the expert economist for competition authorities.

- **Collusion and Manipulation involving Spoofing in Spot and Futures Markets for Various Commodities.** Developed empirical analyses to assist in the detection and identification of spoofing in commodities markets and estimate damages.

- **Analyses and Testimony of Liability and Damages Assessment in Alleged Breach of Contract Due to Change in Commodities Benchmark for Scrap Metal.** Developed empirical and economic analyses to address the impact on transactions due to a change in scrap metal index underlying contracts. Testified on behalf of defendant in arbitration.

- **Collusion and Manipulation of Volatility Indices (VIX).** Developed empirical analyses consistent with collusion, manipulation and artificiality in the VIX Settlement Procedure.

- **Manipulations of Stock Prices.** Developed empirical approaches to determine whether an alleged revenue management episode in the computer industry materially affected the stock price of the company.

- **Alleged Manipulations of Hedge Funds Accounts.** Developed empirical approaches to estimate the likelihood that the observed patterns in trading and in profits by a specific trader were the result of a manipulation to maximize profits of specific accounts to the detriment of others.

- **Alleged Conspiracy and Manipulation Among Brokers and Dealers of Major Financial Institutions.** Estimated but-for transaction prices in an alleged conspiracy between brokers and dealers of a major financial institution. Evaluated execution quality when compared to unsuspected benchmarks. Estimated allegedly illegal profits and consumers' disadvantage. Developed analyses of liability. Presented at the SEC assisting in closing of investigation.

- **Commodities Futures Contracts Alleged Manipulations.** Developed empirical approaches to determine whether commodities futures prices of various precious metals were manipulated. Defined relevant markets, estimated price artificiality, addressed causation and market power. Studied floor and electronic trading, and where price discovery took place. Linked analyses to cash markets and related commodities. Estimated but-for trading, allegedly illegal profits, and potential damages.

- **Profitability Analyses of Special Purpose Vehicles.** Developed empirical analysis to estimate the profitability of various Special Purpose Vehicles after extracting the effects of taxes and other benefits, in comparison with foreign investments.

- **Alleged Fraud Related to Delivery Delay of Shorted Securities.** Conducted empirical analyses to assist in determining whether defendant's conduct was consistent with SEC's allegations of purposed delay in delivering shorted securities to profit from illicit additional interest earned.

- **Credit Ratings and Risk.** Analyzed the evolution of structured finance ratings during the eruption of the recent financial crisis in the United States. Timed these changes with various measures of increased risk in the market and disclosures of exposures to this risk by major financial institutions.

- **Valuation of Structured Finance Securities during the 2007-2009 Financial Crisis.** Analyzed econometric models and assumptions used to value structured finance securities, namely RMBS and CDOs, during the eruption of the financial crisis. Evaluated models' sensitivities to stress scenarios and calibrations. Developed models for RMBS expected cumulative losses based on corporate default models, and tested model implications on mortgages correlations, crossed-pool correlations, and volatility of house price growth and of cumulative losses against actual and forecasted data.

- **Risk Assessment in the Financial Crisis.** Developed and implemented a sophisticated Markov Regime Switching Model to identify the evolution of risk in ABX indices from 2007 through 2009, which allowed for five different states of variable intensity and volatility. Applied various measures of relative risk in the literature to the financial crisis to assist in determine how early was subprime risk identifiable by the market.

- **Analysis of Disclosures during the Subprime Mortgages Crisis.** Matched companies' disclosures of information related to the exposure of particular assets to the evolution of risk in the market place to assist in determining whether public disclosures were timely made.

- **Valuation of Expropriated Assets in the Oil Industry.** Provided expert testimony on an international arbitration matter on the value of expropriated assets belonging to a publicly traded oil services company with headquarters in Texas, whose assets were expropriated by Venezuela.

- **Valuation of Utilities Assets.** Provided expert testimony on the valuation of a utilities company, containing a fairness opinion and addressing robustness and appropriateness of various valuation methods employed during a merger and acquisition process. Addressed issues related to material adverse change with respect to the acquisition.

- **Valuation in the Pharmaceutical and Biotechonology Industries.** Opined on the price offered by a major pharmaceutical company in the acquisition of a leading biotechnology company. Used discounted cash flow models, multiple models and event studies. Assisted in the estimation of the value of the biotechnology R&D pipeline.

- **Damages Suffered by Beyond Meat.** Expert testimony on damages suffered by Beyond Meat due to alleged misinformation spread by main competitor. Analyses included an event study, the pricing of a convertible bond and debt pricing in the context to the Merton model.

- **Stock Options and Swaps Valuation.** Opined on the valuation of stock and indices options by a financial institution in Europe.

- **Section 10b-5 Securities Litigation.** Used event studies to estimate the effect of alleged fraud on companies' stock prices and the economic value of the effect. Estimated alleged damages.

- **Insider Trading.** Analyzed the materiality of the gain allegedly obtained through insider trading. Evaluated stock and bond prices reactions to the allegedly private and illegally obtained information. Determined the extent to which such information had previously been known and assimilated by the market.

- **Testing for Market Efficiency.** Implemented a variety of statistical tests for market efficiency of particular securities during the financial crisis and compared results with those prior to the crisis. Assessed and explained changes and the appropriateness of the assumption of market efficiency.

- **Analysis of Credit Default Swaps.** Analyzed the information content of credit default swaps and to assist in determining the material impact of having only quote data available rather than final transaction prices for market participants in general.

- **Stock Options Backdating and Spring Loading.** Developed various empirical screens to determine whether patterns observed in stock price excess returns related to alleged stock options backdating and spring loading were statistically anomalous. Studied the materiality of these events.

- **Trading in Major Stock Exchanges.** Assisted in determined whether brokers and dealers in a major stock exchange illegally profited from not crossing buying and selling orders. Estimated allegedly illegal profits and consumers' disadvantage.

- **Materiality of Disclosures Related to Conspiracies.** Investigated whether the disclosure of an alleged conspiracy between members of the same industry materially affected stock prices of the companies in the same industry and the transaction price of a merger.

- **Material Adverse Change in Connection with Merger Agreements.** Determined materiality of the stock price response to information not disclosed prior to an acquisition, information which may have affected the acquisition decision itself had it previously been known.

Other

- **Diversity of Asset Managers.** Co-authored a study to assess the representation of women and racial or ethnic minorities among asset managers used by the top 50 charitable endowments in the United States.

- **Drug Recalls.** Estimated damages associated with the recall of major blockbuster drugs.

- **Asbestos.** Estimated damages associated with construction workers' exposure to asbestos.

- **Macroeconomic Effects of Airport Expansion**. Assisted in the estimation of the macroeconomic and sectorial specific impacts of the expansion of the Lisbon airport into the Portuguese economy.

- **Postal Services Modeling.** Developed a new econometric model to predict demand for the United States Postal Service. Model results assisted management on decisions related to pricing and product innovations.

- **Patent infringement in Medical Devices.** Estimated lost profits due to alleged patent infringement in the medical device industry.

- **Patent infringement in Pharmaceuticals.** Estimated lost profits due to alleged patent infringement in the pharmaceutical industry.

RECENT ORAL TESTIMONY

United States of America v Google LLC
United States District Court for the Eastern District of Virginia
Alexandria Division
Index No.: 1:23-cv-00108

State of Washington v Tyson Foods, Inc., et al
State of Washington King County Superior Court
Index No.: 21-2-14174-5 (SEA)

Veeva Systems, Inc. v IQVIA Inc. and IMS Software Services, Ltd.
United States District Court for the District of New Jersey
Index No.: 2:19-cv-15517 (CCC-MF)

Preston Hollow Capital LLC v Nuveen Asset Management LLC, and John V. Miller
United States District Court, Southern District of New York
Index No.: 20-cv-5597 (PKC-JLC)

The City of Philadelphia, et al. v. Bank of America Corporation, et al.
United States District Court, Southern District of New York
No. 19-cv-1608 (JMF)

Portuguese Competition Authority: Autoridade da Concorrência v SIBS
Portugal
No. PRC/2020/05

In Re: Apple iPhone Antitrust Litigation
United States District Court, Northern District of California Oakland Division
Case No. 4:11-cv-06714-YGR

FERC v. Total
Federal Energy Regulatory Commission Office of Enforcement
Total Gas & Power North America, Inc. et al.
No. IN12-17-000

Don Lee Farms v. Beyond Meat, Inc., et al.
Superior Court of the State of California, County of Los Angeles
No. BC662838

B&R Supermarket, et al. v. Visa, Inc., et al.
United States District Court for the District of Columbia
No. 1:17-cv-02738-MKB-JO

Federal Trade Commission v. Surescripts, LLC
United States District Court for the District of Columbia
No. 19-cv-1080 (JDB)

US Airways, Inc. v. Sabre Holdings Corporation et al.
United States District Court, Southern District of New York
No. 1:11-cv-02725 (LGS)

In Re: Lithium Ion Batteries Antitrust Litigation
United States District Court, Northern District of California, Oakland Division
No. 13-MD-02420 YGR (DMR)

FERC v. BP
Federal Energy Regulatory Commission
BP America Inc., et al.
No. IN13-15-000

PUBLICATIONS AND MANUSCRIPTS

Direct and Indirect Network Effects, Multisided Platforms, Dynamic Competition, Antitrust and Regulation

"Network Effects and the Neutrality of Transaction Fees," with Albert D. Metz, *Working Paper.*

"Bundled Benefits of Retail Memberships," with Mame Maloney and Jeff Brazell, available at CCIA (https://research.ccianet.org/reports/bundled-benefits-retail-memberships/), December 2023; shorter version titled "Unravelling the Bundled Benefits of Retail Memberships," *Law360*, January 2024.

"How to Approach the Calculation of Overcharge by Multisided Platforms," with Albert D. Metz, *Competition Policy International, Antitrust Chronicle,* January 2023.

"Competitive Dynamics of Online and Brick-and-Mortar Retail Prices," with Mame Maloney, available at CCIA (https://research.ccianet.org/wp-content/uploads/2022/08/CCIA_Competitive-Dynamics-Handout.pdf), and a shorter version at *Competition Policy International, Antitrust Chronicle,* July 2022.

"Understanding the Economics of Platforms," with Michael Cragg, Albert Metz and Minjae Song, American Bar Association, Antitrust Law Section's *The Antitrust Magazine*, December 2021.

"Competition and Payment Card Interchange Fees: A Brief Note to the OECD Latin American and Caribbean Competition Forum," prepared for Forum presentation, September 2021.

"Collusion and Network Effects: Modeling the Dynamics of Single- and Multisided Platforms," with Albert D. Metz, *Working Paper,* June 2021.

"Modeling the Dynamics of Network Entry and Competition Under Single- and Multi-Homing," with Albert D. Metz, *Working Paper,* June 2021.

"The Dynamics of Single- and Multisided Platform Monopolies," with Albert D. Metz, *Working Paper,* September 2020.

"Regulating Multisided Platforms? The Case Against Treating Platforms as Utilities" *Competition Policy International, Antitrust Chronicle,* August 2020.

"The Economics and Regulation of the Portuguese Retail Payments System," with David S. Evans, SIBS, November 2013.

Conspiracies, Manipulations, Information Exchanges, Empirical Screens, Pricing Algorithms, Antitrust and Financial Regulation

"Can Exchanges of Anonymized Disaggregated Data Facilitate Collusion?" with Pedro Ergei-Gonzaga, Albert D. Metz, Ben Wagner, *Working Paper,* March 2024.

"The Increased Role of Economics in Cartel Cases," with Pedro Ergei-Gonzaga, Albert D. Metz, Ben Wagner, *Competition Policy International, Antitrust Chronicle,* April 2024.

"Information Exchanges Between Competitors in the Age of AI: A Note," with Pedro Ergei-Gonzaga, February 2024.

"Antitrust & Regulatory Compliance in the 21st Century: New Challenges, New Opportunities and the Role of AI," with Albert D. Metz, *Competition Policy International, Antitrust Chronicle,* September 2023.

"A Note on Screens' Worldwide Adoption and Successes," *OECD Regional Centre for Latin America*, January 2021.

"Pricing Algorithms and Collusion: Is There Clarity on What Corporations may be on the Hook For?" with Albert D. Metz, *Competition Policy International, Antitrust Chronicle,* November 2020.

"Why Screening is a 'Must Have' Tool for Effective Antitrust Compliance Programs," with Albert D. Metz, *Competition Policy International, Antitrust Chronicle,* November 2019.

"Pricing Algorithms and Implications for Competition," *Competition Policy International, Cartel Column,* May 2019.

"The Future of Cartel Deterrence and Detection," with Albert D. Metz, *Competition Policy International, Antitrust Chronicle,* January 2019.

"Can Machine Learning Aid in Cartel Detection?" with Albert D. Metz, *Competition Policy International, Antitrust Chronicle,* July 2018.

"Recent Financial Sector Conspiracies and Manipulations: How to Prevent Future Similar Conduct?" *Competition Policy International, Antitrust Chronicle,* June 2016 (1).

"Antitrust Compliance 2.0: The Use of Structural Analysis and Empirical Screens to Detect Collusion and Corruption in Bidding Procurement Processes," with Elizabeth Prewitt, *Competition Policy International, Antitrust Chronicle,* June 2015 (2).

"Comments on ICE Benchmark Administration's Position Paper of 20 October 2014: LIBOR Reform," with Albert D. Metz, December 18, 2014.

"Recent Successes of Screens for Conspiracies and Manipulations: Why Are There Still Skeptics?" *Competition Policy International, Antitrust Chronicle,* October 2014 (2).

"Roundtable on *Ex Officio* Cartel Investigations and the Use of Screens to Detect Cartels, A Paper by Rosa M. Abrantes-Metz," prepared for the Directorate for Financial and Enterprise Affairs, Competition Committee, Organization for Economic Cooperation and Development, for discussion at its meeting held on October 31, 2013, OECD, Paris.

"Aluminum Market Dislocation: Evidence, Incentives and Reform," September 18, 2013, Working Paper, available at http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2328902.

"Proactive *vs.* Reactive Anti-Cartel Policy: The Role of Empirical Screens," Working Paper, June 2013, available at http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2284740.

"Principles for Financial Benchmarks: Comments on the OICU-IOSCO Consultation Report on Financial Benchmarks," May 15, 2013, available at http://www.iosco.org/library/pubdocs/409/pdf/Rosa%20M.%20Abrantes%20Metz.pdf.

"The Determinants of Cartel Duration," with John M. Connor and Albert D. Metz, Working Paper, April 2013, available at http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2263782.

"Enhancing Financial Benchmarks: Comments on the OICU-IOSCO Consultation Report on Financial Benchmarks," with David S. Evans, Working Paper, February 10, 2013, available at http://www.iosco.org/library/pubdocs/399/pdf/Prof.%20Rosa%20Abrantes%20-%20Metz%20NYU.pdf.

"Revolution in Manipulation Law: The New CFTC Rules and the Urgent Need for Economic and Empirical Analyses," with Gabriel Rauterberg and Andrew Verstein, *University of Pennsylvania Journal of Business Law,* 15(2), 357-418, 2013, also available at https://www.law.upenn.edu/live/files/1806-verstein15upajbusl3572013pdf.

"Regional Competition Center for Latin America Presents: Guidelines on Exchanges of Information Among Competitors," *Competition Policy International Latin America Column*, January 17, 2013.

"Will The Wheatley Recommendations Fix LIBOR?" with David S. Evans, *Competition Policy International, Antitrust Chronicle,* November 2012 (2), refer also to http://blogs.law.harvard.edu/corpgov/2013/01/04/replacing-the-libor-with-a-transparent-and-reliable-index/#comments.

"Antitrust Guidelines for Horizontal Exchanges of Information among Competitors for the Regional Competition Center for Latin America," October 2013.

"Replacing LIBOR with a Transparent and Reliable Index of Interbank Lending: Comments on the Wheatley Review of LIBOR Initial Discussion Paper," with David S. Evans, Working Paper, September 6, 2012, available at http://cdn.hm-treasury.gov.uk/condoc_wheatley_review_responses_1.pdf.

"Lessons from LIBOR for Detection and Deterrence of Cartel Wrongdoing," with Daniel D. Sokol, *Harvard Business Law Review Online*, vol 3, pp 10-16, available at http://www.hblr.org/2012/10/the-lessons-from-libor-for-detection-and-deterrence-of-cartel-wrongdoing/.

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"Interview: Update on 'Screens for Conspiracies and Their Multiple Applications,'" *Competition Policy International, Antitrust Journal*, June 8(1), 2012.

"A Short Note on Manipulation, Speculation and Crude Oil Prices," Mimeo, April 2012.

"How Far Can Screens Go in Detecting Explicit Collusion? New Evidence From the LIBOR Setting," with Albert D. Metz, *Competition Policy International Antitrust Chronicle*, March (1) 2012.

"Why and How to Use Empirical Screens in Antitrust Compliance?" *Competition Policy International Antitrust Chronicle*, February (1) 2012.

"Defending Against Allegations of Fraud and Manipulation: The Role of the Economist under the New CFTC Rules," Working Paper, December 2011.

"Design and Implementation of Screens and Their Use by Defendants," *Competition Policy International Antitrust Chronicle*, September (2) 2011.

"LIBOR Litigation and the Role of Screening: The Need for Enhanced Compliance Programs," *Competition Policy International Antitrust Chronicle*, July (2), 2011.

"LIBOR Manipulation?" with Michael Kraten, Albert D. Metz and Gim Seow, *Journal of Banking and Finance,* 36, 136-150, 2012, *List of Most Download Journal of Banking and Finance Articles,* 2012, first draft dated August 4, 2008 and available at http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1201389.

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"Screens for Conspiracies and Their Multiple Applications - Extended," with Patrick Bajari, *Competition Policy International Journal,* 6(2), Autumn 2010.

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"Enhancing Compliance Programs through Antitrust Screening," with Patrick Bajari and Joseph E. Murphy, *The Antitrust Counselor*, 4(5), September 2010.

"Antitrust Screening: Making Compliance Programs Robust," with Patrick Bajari and Joseph E. Murphy, Working Paper, July 2010.

"Economic Expert Testimony in Conspiracy Cases Under Federal Antitrust Laws," with Dina O. Aguilar, Mark Frankena, Kostis Hatzitaskos and David Scheffman, Working Paper, February 2010 (in "Proof of Conspiracy Under Federal Antitrust Laws,: ABA editions, 2010).

"Screens for Conspiracies and their Multiple Applications," with Patrick Bajari, American Bar Association, Antitrust Section's *The Antitrust Magazine*, 24(1), Fall 2009.

"Screening for Conspiracies: Applications for Litigation, Pre-Litigation, Regulation and Internal Monitoring," with Patrick Bajari, March 2009, available at http://papers.ssrn.com/sol3/cf_dev/AbsByAuth.cfm?per_id=339863.

"Is the Market Being Fooled? An Error-Based Test for Manipulation," with Sumanth Addanki, available at http://papers.ssrn.com/sol3/cf_dev/AbsByAuth.cfm?per_id=339863, 2007, revise and resubmit.

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Pharmaceuticals and Health Care

"The Determinants of Pharmaceutical Review, Success and Duration," with Chris P. Adams and Albert D. Metz, Working Paper, November 2014.

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"Why a Reduction of Health Care Costs *per se* May be a Misleading Policy Objective," *Competition Policy International, Antitrust Chronicle*, July (2), 2012.

"Benefits to Society from Health Care Spending: Do We Get More for Higher Spending?" Working Paper, May 2012.

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"Pharmaceutical Development Phases: A Duration Analysis," with Chris P. Adams and Albert D. Metz, *Journal of Pharmaceutical Finance, Economics & Policy*, 14, 19–42, 2006.

Monetary and Financial Economics, Theoretical Econometrics, Other Applied Econometrics, Other Antitrust and Regulation of Financial Markets

"Is Financial Regulation Appropriately Dealing With Systemic Risk? Are We Really Fixing Existing Problems or Creating New Ones?" January 2014, available at http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2381180.

"Did Credit Rating Agencies Cause the European Sovereign Debt Crisis?" *Competition Policy International, Antitrust Chronicle,* January 2014 (2).

"Misdiagnosing and Mistreating the Market for Credit Ratings?" *Competition Policy International, Antitrust Chronicle,* November 2013 (2).

"What's to be done with Rating Agencies? Understanding the Problem to Find a Solution," with Kristiyana T. Teodosieva, *The Exchange*, *American Bar Association*, September 2013, also available at http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2288195.

"Testing Equalities of Variances for Paired Time Series at Selected Frequencies: An application to Sovereign Credit Default Swaps," with Albert D. Metz, August 2011.

"The Use of the Event Study Methodology in International Arbitration Damages Assessments," with Santiago Dellepiane, *Journal of International Arbitration*, 28(4), 327-342, 2011.

"The Information Content of Credit Default Swap Prices," with Cathy Niden, *Derivatives*

Litigation Reporter, 14(18), July 2008.

“The Effect of Entry on Prices and Costs in Mobile Telephony,” with Pedro Pereira, http://papers.ssrn.com/sol3/cf_dev/AbsByAuth.cfm?per_id=339863, Working Paper 2008, revise and resubmit.

“Before and After the EMU: Financial Integration, Monetary Policy and Welfare Changes,” PhD Dissertation in Economics, University of Chicago, June 2002.

“The European Monetary Union–Could there be any ‘Winners’ and ‘Losers’?” Manuscript, University of Chicago, July 2001.

“An Evaluation of the Macroeconomic Stability of the European Monetary Union, and an Original Decomposition of its Business Cycles into Real and Monetary Components,” Manuscript, University of Chicago, June 1999.

Book Contributions

"Antitrust and Regulatory Compliance: New Challenges and Opportunities, and the Use of AI” with Albert Metz. book chapter included in *Research Handbook on Competition and Corporate Law,* edited by Florence Thepot, forthcoming.

“The Role of Screening in Antitrust Compliance,” book chapter included in *A Guide to Antitrust Compliance*, with Albert D. Metz, published by *Les Concurrences*, Antitrust Publications and Events, 2021.

“Antitrust Governance and Compliance,” with Daniel Sokol, *The Oxford Handbook of International Antitrust Economics*, Chapter 23, 2015, 586-618.

Co-author of a chapter on the “Role of Event Studies in International Arbitration Cases”, forthcoming in the second book of the *Foro de Arbitraje en Materia de Inversión*, Sonia Rodríguez Jiménez and Herfried Wöss (eds.), *Instituto de Investigaciones Jurídicas, Universidad Nacional Autónoma de México*, México, September 2013, http://biblio.juridicas.unam.mx/libros/libro.htm?l=3386.

Co-drafter of the chapter on “Restraints of Trade,” Volume on “2010 Annual Review of Antitrust Law Developments,” *American Bar Association Editions*, March 2011.

Co-drafter of the chapter on “The Role of the Economic Expert in Conspiracy Cases,” included in the Volume on “Proof of Conspiracy under Antitrust Federal Laws,” *American Bar Association Editions*, April 2010.

Ongoing Research

“Antitrust Compliance: Its History, Art and Science,” with Don Klawiter.

“Competitive Entry Deterrence in Multisided Platforms,” with Albert D. Metz.

“The Multiple Applications of Screens in Finance: Manipulations, Conspiracies, Insider Trading, FCPA Violations, and Other Fraud.”

“Detecting Collusion in Survey Data,” with Albert D. Metz.

Selected Opinion Articles

“Time to rethink deficient market structures,” *Financial Times*, April 11, 2016, available at https://www.ft.com/content/f95648f8-d499-11e5-829b-8564e7528e54.

“Stress Tests Won’t Prevent the Next Financial Crisis: Expected losses under invented scenarios tell us little about risk and reality,” *The Wall Street Journal*, March 18 2014, available at http://online.wsj.com/news/articles/SB10001424052702303704304579380961631198726.

“Time is nigh to rethink the role of benchmarks: New indices should reflect lessons learnt from recent scandals,” *Financial Times*, January 10, 2013, available athttp://www.ft.com/intl/cms/s/0/222f4230-79ec-11e3-8211-00144feabdc0.html#axzz2rTDaZS6s.

“How to Keep Banks from Rigging Gold Prices,” *Bloomberg*, December 19, 2013, available at http://www.bloomberg.com/news/2013-12-19/how-to-keep-banks-from-rigging-gold-prices.html.

“Banks’ Role in Metal Trade Deserves Scrutiny,” *Bloomberg*, July 31, 2013, available at http://www.bloomberg.com/news/2013-07-31/banks-role-in-metal-trade-deserves-scrutiny.html.

“How to Use Statistics to Seek Out Criminals,” *Bloomberg*, February 26, 2013, available at http://www.bloomberg.com/news/2013-02-26/how-to-use-statistics-to-seek-out-criminals.html.

“Should New Financial Products be Regulated by an FDA-like Agency? 8 Reasons Why Not,” May 16, 2012, available at http://www.globaleconomicsgroup.com/financial-regulation/should-new-financial-products-be-regulated-by-an-fda-like-agency-8-reasons-why-not/.

“Credit Rating Agencies, the Financial Crisis, and Regulation,” April 18, 2012, available at http://www.globaleconomicsgroup.com/financial-regulation/credit-rating-agencies-the-financial-crisis-and-regulation/.

"The Complexity and Challenges of Proposed Swap Regulations," April 4, 2012, available at http://www.globaleconomicsgroup.com/financial-regulation/the-complexity-and-challenges-of-proposed-swaps-regulations/.

"Screens and the Alleged LIBOR Conspiracy and Manipulation," March 21, 2012, available at http://www.globaleconomicsgroup.com/financial-regulation/screens-and-the-alleged-libor-conspiracy-and-manipulation/.

"Has the LIBOR-Alleged Conspiracy and Manipulation Inspired the New CFTC Regulations?" March 7, 2012, available at http://www.globaleconomicsgroup.com/financial-regulation/has-the-libor-alleged-conspiracy-and-manipulation-inspired-the-new-cftc-regulations/.

SELECTED PRESENTATIONS

Multisided Platforms, Big Data & Technology, Labor and Dynamic Competition

"Competition Law and Digital Ecosystems," Panel discussion, GCR Law Leaders Global, Miami, February 2024.

"Latest Antitrust Developments," Invited Dinner Speaker, Willkie Farr, Antitrust Spring Meetings, Washington DC, March 2023.

"Do Not Pass Go – Steering and Monopolies," Panel discussion at the Antitrust Spring Meetings, American Bar Association," Washington DC, March 2023.

"Competition in Labor Markets: What Antitrust Has To Do With That?" Panel discussion, hosted by New York University, New York, December 2022.

"Labor Markets: Where are the Antitrust Concerns?" Panel discussion, 10th Bill Kovacic Antitrust Salon, hosted by Les Concurrences, Washington DC, September 2022.

"The Role of Economics and Economists in Judicial Review of Antitrust Enforcement," Panel discussion, co-hosted by OECD Regional Centre for Competition (RCC) in Latin America, July 2022.

"Dynamic Competition and Public Policy," Panel discussion, co-hosted by the George Washington University Regulatory Studies Center and Information Technology and Innovation Foundation, Washington D.C., April 2022.

Expert Witness at Mock Trial, ABA Spring Meetings, Washington D.C., April 2022, on Merger-to-Monopoly matter in multisided platforms.

“Antitrust and the Future of Multisided Platforms,” Panel discussion, ABA Webinar, December 2021.

“Digital Transformation Investment,” Panel discussion, C-Vision Internal Council, November 2021.

“Competition and Payment Card Interchange Fees,” Presentation, OECD Latin American and Caribbean Competition Forum, November 2021.

“What does big data mean for antitrust?” Panel discussion, University of Iowa, September 2021.

“The Future of Competition Policy in China,” Panel discussion, Fordham Competition Law Institute Webinar, June 2021.

“Financial Sector Consortia & Collaborations: A Brief Economic Perspective,” Panel discussion, Les Concurrences, April 2021.

“Economic Issues Involving Platforms, Privacy and the Digital Economy,” Panel discussion, The Canadian Bar Association Competition Law Section, February 2021.

“Understanding Network Effects in the Platform Context,” Panel discussion with Mike Cragg, Evan Chesler, Lars Kjolbye, Kai-Uwe Kuhn, and Christopher Yates, at the *Fordham Competition Law Institute*, October 2020.

“Antitrust Analysis of Platform Markets: Beyond American Express,” panel discussion with Joseph E. Stiglitz, David S. Evans, Evan Chesler and Michael Cragg, Competition Policy International, March 2020.

Conspiracies, Manipulations, Fraud, Price Gauging, Screens, Pricing Algorithms and Regulation and Financial Markets

"Mind Your Exchanges: Talk Isn’t Always Cheap,” Panel discussion at the Antitrust Spring Meetings, American Bar Association,” Washington DC, April 2024.

“Pricing Algorithms and Antitrust,” Invited Lunch Speaker, Antitrust Group at Willkie Farr, Washington DC, March 2024.

"Leveraging Data to Enhance Antitrust Compliance,” Panel discussion, American Bar Association, February 2024.

"Pricing Algorithms: What to be Concerned About?” Panel discussion, Berkeley Research

Group, Washington DC, February 2024.

"Cartels Screening and Pricing Algorithms" Invited Guest Presentation to ICC-Mexico Diploma in Competition Policy Academic Program," February 2024.

"Antitrust Compliance and AI," Panel discussion at Morgan Lewis' 2023 Antitrust in the Financial Sector Summit," Morgan Lewis NY office, September 2023.

"Antitrust Compliance History, Art and Science," Workshop on Research Handbook on Competition and Corporate Law," ZEW, Mannheim, Germany, March 2023.

"International Cartels, Screening, and Algorithmic Collusion," Invited Guest Presentation to ICC-Mexico Diploma in Competition Policy Academic Program," January 2023.

"Outsourcing Competition Law Enforcement," Panel discussion, GCR Law Leaders Global, Miami, February 2023.

"Adoption of Screens in Antitrust Compliance Programs and Antitrust Compliance in General," Panel discussion for *Les Concurrences*, launch of new Antitrust Compliance book, May 2022.

"International cartels and how to detect them," Presentation, ICC-Mexico Diploma in Competition Policy Academic Program, November 2021.

"Algorithms and Competition Policy," Panel discussion, CRESSE Conference, July 2021.

"Screening for Conspiracies: What's New? What's Best?" Presentation for the OECD Virtual Workshop on Screening for Ukrenergo, June 2021.

"Working with Economic Experts from Selection Through Trial: Women's Insights," Panel discussion, The American Bar Association, series Bar None II: Women Leading in the Courtroom, April 2021.

"Using Econometrics and Big Data to Guide Antitrust Enforcement and Compliance," panel discussion, ABA Antitrust Law Section, Economics Committee, March 2021.

"#88 What's in a Screen? Using Data as Evidence of Collusion and Manipulation (or lack thereof)," Guest speaker at *Our Curious Amalgam podcast*, American Bar Association, Antitrust Section, November 2020.

"Screens: A Must for Cartel Detection and Deterrence," presentation for the OECD Regional Centre for Competition in Latin America, section on "Proactive Tools for Cartel Detection."

Panel discussion with heads of cartel enforcement for competition authorities of Argentina, Brazil, Mexico and Peru, September 2020.

"The Economics of Price Gouging," Panel presentation and discussion on "COVID-19 Price Gouging Roundtable," Fideres, September 2020.

"2020 Next Generation of Antitrust, Data Privacy and Data Protection Scholars Conference," Invited Panel Moderator on Collusion and Pricing Algorithms, New York University Law School and American Bar Association, New York, January 2020.

"Estimating Price Impact Due to Manipulation," Federal Energy Regulatory Commission, Washington, DC, April 2019.

"Pricing Algorithms and Collusion," Panel Discussion, Federal Trade Commission's Hearings on Competition, Washington DC, November 2018.

"Beyond Leniency: What else can be done to detect and deter collusion?" Presentation to the NYSBA Executive Committee, New York, May 16, 2018.

"Negotiating Cartel Fines and Civil Settlements," American Bar Association, Antitrust Section Spring Meetings, Panel discussion with Adam Hemlock, Rachel Adcox, Jeff Martino and Hollis Salzman, Washington D.C, April 11, 2018.

"The Role of Market Power in the Digital Economy," NYSBA Annual Meetings, Panel discussion with Eric Hochstadt, Kellie Lerner, Nicholas Gaglio, and Pat DeGraba, New York, January 25, 2018.

"Comments on "Collusion on Markets with Syndication" by Hatfield, Kominers, Lowery and Barry," 2018 Next Generation of Antitrust Scholars Conference, New York University Law School and American Bar Association, New York, January 26, 2018.

"Embracing Change: Innovation in the Practice and Enforcement of Competition Law," Panel discussion at the Canadian Bar Association Fall Meetings, Antitrust Section, Ottawa, October 2017.

"Collusion and Manipulation in Gold Markets: Additional Developments," Invited Speaker to Gold and Mines Conference, New York, May 5, 2017.

"Screens for Conspiracies and Manipulations: My Most Recent Ongoing Research," Competition Law & Policy Seminar Series, U.S Department of Justice Seminar Series, Washington, DC, April 2017.

"How to Develop and Implement Screens for Conspiracies," Philippines Competition

Authority, February 2017.

“Screens for Cartels and Antitrust Compliance Training,” Macmillan Publishers, Required Antitrust training for Senior Management and Staff, New York, January 2017.

“Screens for Conspiracies and Their Recent Successes,” Canadian Bar Association, scheduled for December 2016.

“Collusion and Manipulation in Gold Markets: Latest Developments,” Invited Speaker to Gold and Mines Conference, London, scheduled for November 2016.

“Using Screenings to Detect Conspiracies in Commodities Markets,” Federal Energy Regulatory Commission, Washington, DC, November 2015.

“Using Screens to Detect Conspiracies and Manipulations,” Invited Speaker at the University of British Columbia Summer Conference on Industrial Organization, Vancouver, Canada, July 2016.

“Screens for Conspiracies and Bid-Rigging Detection,” Guest Speaker at OECD Conference, Mexico City, Mexico, April 2016.

“Evolution of Market Reference Rates: Libor, Euribor, IBR,” Guest Speaker at The Colombian Banking Association (Asobancaria), 18th Treasury Management Congress, Colombia, scheduled for January 29, 2016.

“The Use of Screens in Cartel Detection,” Guest Speaker at the Hong-Kong Competition Authority, October 26, 2015, Hong-Kong.

“Screens for Conspiracies and Manipulations,” Conference Keynote Speaker, Hong-Kong Economic Association Annual Meeting, October 24, 2015, Hong-Kong.

“Using Screens to Complement Leniency Programs,” Panel discussion at the Portuguese Competition Authority Annual Meeting on Competition Economics, Lisbon, Portugal, October 22, 2015.

“Screens for Conspiracies and Manipulations: Recent Successes,” Seminar at the US Department of Justice, Antitrust Division, New York, October 15, 2015.

“London Gold Fixing Conspiracy and Manipulation,” Invited Keynote Speaker at the Mines and Money upcoming conference in Hong-Kong, scheduled for March 2015.

“Exchange Rates, Manipulation and Reform,” Invited Keynote Speaker at the Fourth Annual Workshop on “Financial Determinants of Exchange Rates,” organized by the European

Central Bank, the Dutch Central Bank and the Bank of Italy, Amsterdam, The Netherlands, scheduled for December 2014.

"Screens: Multiple Uses and Successes," Presentation at the Competition Markets Authority, United Kingdom, September 11, 2014.

"Problem Markets: Collusion and Manipulation in Financial Benchmarks," Presentation at the CCP Annual Conference, University of East Anglia, United Kingdom, June 12-13 2014.

"Financial Benchmarks: Collusion, Manipulation, Screening and Reform," Financial Conduct Authority, London, United Kingdom, June 11 and September 10, 2014.

"Financial Benchmarks, Collusion and Reform," Dutch Competition Law Conference, New York (through video conference), April 24, 2014.

"Empirical Screening of Markets: Detection, Deterrence and Defense," American Bar Association, Business Section Spring Meetings, Panel Discussion with David Rosenfield, Vincent Briganti, D. Loren Washburn, and Harvey Westbrook, Los Angeles, April 12, 2014.

"Looming Temptation: Antitrust and Benchmark Pricing," American Bar Association, Antitrust Section Spring Meetings, Panel discussion with Henry McFarland, William Rooney and Elizabeth Prewitt, Washington D.C, March 26, 2014.

"Manipulating Benchmarks: Antitrust Concerns about Coordination vs. Oversight of Unilateral Conduct," at CRA Annual Brussels Conference, Economic Developments in European Competition Law. Panel discussion with Christopher Woolard, FCA, Miguel de-la-Mano, EC, and Cristina Caffarra, CRA, Brussels, Belgium, December 11, 2013.

"Commodities Manipulations and Conspiracies: Empirical Evidence," Chief Economist Team, European Commission, Brussels, December 10, 2013.

"Screens for Conspiracies and Dawn Raids," Competition Authority for Peru, Lima, Peru, November 19, 2013.

"Screens for Conspiracies and their Role in Effective Anti-Cartel Policy," Organization for Economic Cooperation and Development (OECD) Roundtable Discussion on "Ex-Officio Cartel Investigations and the Use of Screens to Detect Cartels," Paris, France, October 30, 2013; Supporting materials available at http://www.oecd.org/competition/exofficio-cartel-investigations.htm.

"Screens for Conspiracies and Antitrust Enforcement: Detection without Leniency" Annual National Association of Attorneys General Antitrust Section, Hartford, Connecticut, September 26, 2013.

"LIBOR, Screens for Conspiracies, Manipulations and Fraud: Lessons for an Effective Anti-Fraud Program," Presentation to the Securities and Exchange Commission, Washington D.C., August 6, 2013.

"Proactive versus Reactive Cartel Detection Policy: The Role of Screening," 8th European Summer School and Conference in Competition and Regulation, Corfu, Greece, July 6, 2013.

"LIBOR, Euribor, TIBOR and Other Financial Benchmarks: Detection, Antitrust and Reform," Portuguese Competition Authority, Lisbon, Portugal, June 20, 2013.

"Briefing Room on Screens for Conspiracies," Panel discussions with David Evans, Antonio Capobianco, Carlos Mena Labarthe, Carlos Ragazzo, Danny Sokol, Donald Klawiter and Kai Hueschelrath, Competition Policy International, May 2013.

"The Economics of Collusion and Damages," Romanian Competition Authority, Bucharest, Romania, April 23, 2013.

"Benchmarks: Maintaining Integrity and Reliability," Panel discussion with David Lawton, Jim Rosenthal, Nick Collier and David Eichhorn, CFTC International Regulators Meeting, Florida, March 2013.

"LIBOR, Screening and Reform," Public Lecture, University College London, February 2013.

"Financial Benchmarks Reform," IOSCO, FSA, CFTC and other International Regulators Meeting, London & Washington, DC, February 2013. Summary of Washington, D.C. Roundtable available at http://www.sifma.org/members/hearings.aspx?id=8589942209, and video available at http://www.youtube.com/watch?v=duUODyMdnsE&feature=youtu.be.

"LIBOR, Screening and Reform," European Commission, Brussels, December 6, 2012, available
http://ec.europa.eu/internal_market/economic_analysis/docs/presentations/121206_libor-screening-reform_en.pdf.

"Screens in the Detection of Illegal Behavior," Romanian Competition Authority, Bucharest, Romania, December 5, 2012.

"The LIBOR Conspiracy & Manipulation: Screening as a Tool to Detect Illegal Behavior," World Bank Seminar, Washington, D.C., November 29, 2012.

"The Effective Use of Economics in Competition Enforcement," Panel Presentation with Pierluigi Sabbatini, Fiorenzo Bovenzi, Arvid Fredenberg and Kai Hüschelrath, Polish Competition Authority, Warsaw, Poland, November 22, 2012, available at http://www.uokik.gov.pl/news.php?news_id=10116.

"Recent Benchmarks Manipulation Scandals and Need for Deterrent Sanction Regimes," IOSCO, EMC Annual Meeting, November 19, 2012, Santiago, Chile.

"Economic Tools & Cartel Detection: Screens & Applications," Mexican Antitrust Bar Association, November 15, 2012, Mexico City, Mexico.

"Empirical Screens to Detect and Defend Conspiracies and Manipulations," Panel discussion, CIDE, November 15, 2012, Mexico City, Mexico.

"What To Do About LIBOR: A Special Webinar Series," Panel Discussion with David S. Evans, Miguel de-la-Mano and Michael Barr, Competition Policy International, November 8, 2012, available at https://www.competitionpolicyinternational.com/what-to-do-about-libor-a-special-cpi-webinar/.

"Making markets work for sustainable economic growth and economic recovery: The role of competition policy," Panel discussion, World Bank, Washington, D.C., November 5, 2012.

"The Determinants of Cartel Duration," Seminar in Economics, Michigan University, October 12, 2012.

"Finance, Regulation, and Ethics: Lessons from the LIBOR Scandal", with Margaret Levenstein, Michael Barr and David Mayer, Ross School of Business, Michigan University, October 11, 2012.

"Antitrust Guidelines for Horizontal Collaborations among Competitors for Central and South American Countries," Regional Center for Competition in Latin America, First Conference, Santo Domingo, Dominican Republic, September 20, 2012.

"Credit Ratings Agencies, Antitrust and Regulation," Joint with Lawrence White, Competition Policy International, June 2012.

"21st Century Antitrust Compliance: Beyond the Basics," panel discussion, joint with Alicia Downey, Theodore Banks, Joseph Murphy and Eric Morehead, American Bar Association, Antitrust Section Spring Meetings, Washington D.C., March 2012.

"Beyond Leniency: Empirical Methods of Cartel Detection," with Donald Klawiter, D. Daniel Sokol, Carlos Mena and Carlos Ragazzo, American Bar Association Brown Bag Series, December 15, 2011.

"The Use of Economic Screens in Antitrust Litigation: The Case of the London Interbank Offered Rate," Afternoon Speaker Series, New York University Law School. New York, November 2011.

"Alleged Libor Conspiracy and Manipulation: The Role of Screens," Executive Committee of the New York State Bar's Antitrust Law Section, New York, October 2011.

"Screens for Conspiracies and Manipulations and Their Multiple Applications," Portuguese Competition Authority, Lisbon, Portugal, June 2011.

"Competition Compliance: Up Your Game, Add to the Bottom Line, and Be a Corporate Star," Joint with Theodore Banks, Brian Henry and Joseph Murphy, Corporate Counsel Committee, Canadian Bar Association, June 2011.

"Empirical Methods for Conspiracies and Manipulations," Executive Committee of the New York State Bar's Antitrust Law Section, New York, December 2010.

"Screening for Conspiracies," French Competition Authority, Paris, France; German Competition Authority, Bonn, Germany, October 2010.

"Screening Devices for Detecting Collusion," Presentation and Panel Discussion with Christina Hummer and Maarten Janssen, Austrian Federal Competition Authority, Vienna, Austria, October 2010.

"Conspiracies Detection and Empirical Screens," ZEW Conference on Quantitative Analysis in Competition Assessments, Mannheim, Germany, October 2010.

"Screening for a Libor Conspiracy and Manipulation," Microeconomics Lunch Seminar, Department of Economics, Leonard N. Stern School of Business, New York University, May 2010.

"Cartel Detection, Leniency Programs and the Latin America Experience," Joint with Carlos Mena-Labarthe, November 2009.

"Econometrics and Antitrust," Joint with David S. Evans, Competition Policy International, November 2009.

"Legal and Economic Analysis of Collusion," Joint with Patrick Bajari, Competition Policy International, June 2009.

"The Determinants of Cartel Duration," International Industrial Organization Conference, Boston, April 2009.

"On Detecting Agents' Influence in Market Data Outcomes," International Industrial Organization Conference, Boston, April 2009.

"The Empirical Detection of Conspiracies and Manipulations," Bureau of Economics, Federal Trade Commission, Washington D.C., September 2008.

"Globalization, Cartel Formation and Detection," Knowledge Globalization Annual Conference, Boston, April 2008.

"Detecting Conspiracies and Manipulations," Sawyer Business School, Suffolk University, Boston, December 2007.

"How to Spot Cheaters? Empirical Methods to Detect Conspiracies and Manipulations," Instituto Superior de Economia e Gestão, Lisbon, Portugal, July 2007.

"Is the Market being Fooled? An Error-Based Screen for Manipulation," First Meeting of the Portuguese Economic Journal, Ponta Delgada, Portugal, July 2007.

"A Variance Screen for Collusion," Portuguese Competition Authority, Lisbon, Portugal, June 2005.

Pharmaceuticals and Health Care

"Is there too much Innovation? Benefits to Society from Technological Progress and its Contribution to Health Care Costs," International Industrial Organization Conference, Vancouver, Canada, May 2010.

"The Determinants of Pharmaceutical Review, Success and Duration," International Industrial Organization Conference, Virginia, May 2008.

"Assessing the Prospects of Drugs in the Pipeline," A Medical Affairs Leadership Conference: The Good, the Bad, and the Emerging, sponsored by Scientific Advantage, New Jersey, May 2008.

"Bringing Drugs to Market: Which Ones? How Fast? What Value?" The Center for Business Intelligence, January 2008.

"Pharmaceutical Development Phases: A Duration Analysis," Portuguese Authority for Competition, Lisbon, Portugal, November 2005; Federal Trade Commission, Washington D.C., March 2003; Congressional Budget Office, Washington, D.C., March 2003; International Industrial Organization Conference, Boston, April 2003; North American Summer Meetings of the Econometric Society, Chicago, June 2003.

Other Monetary and Financial Economics

"Before and After the EMU: Financial Integration, Monetary Policy and Welfare Changes," The University of Chicago, Chicago, May 2002; Board of Governors of the Federal Reserve System, Washington, D.C., February 2002; European Central Bank, Frankfurt am Main, Germany, February 2002; Federal Reserve Bank of St. Louis, St. Louis, February 2002; Bank of England, London, England, January 2002.

"The European Monetary Union – Could there be any 'Winners' and 'Losers'?" The University of Western Australia, Perth, Australia, November 2001; Board of Governors of the Federal Reserve System, Washington, D.C., May 2001; The University of Chicago, Chicago, November 2000.

"The European Monetary Union and its Consequences for Financial Markets," Banco Bozano Simonsen, Rio-de-Janeiro, Brazil, September 1998.

HONORS AND AWARDS, FELLOWSHIPS AND SCHOLARSHIPS

Economic Expert in *Sabre v. US Airways*, Selected by GCR as Matter of the Year among matters worldwide in 2023, for "Creative, strategic and innovative work by teams of in-house and external lawyers and economists."

Honoree for the American Antitrust Institute 2022 Antitrust Enforcement Awards: Outstanding Antitrust Litigation Achievement in Economics.

Nominated as a Distinguished Professional Woman in Competition in "40s in their 40s" for North, Central and South America, January 2019.

Member, The International *Who's Who* of Competition Lawyers & Economists every year since 2009.

Award winner article on AI and antitrust compliance, Les Concurrences, April 2024.

Nominated Author for Best Antitrust and Process Article in Economics, Les Concurrences, for multiple years.

Fellowships from Fundação Calouste Gulbenkian, Portugal, 1999-2002.

Scholarship from Portuguese Government – PRAXIS XXI, 1995-1999.

Scholarship from Luso-American Foundation for Development, Portugal, 1995-1999.

Scholarship from Universitat Pompeu Fabra, PhD Program, Spain, 1995-1996.

OTHER

Referee, *Journal of Political Economy*, *RAND Journal*, *The Review of Industrial Organization*, the *International Journal of Industrial Organization, Southern Economic Journal* and the *Journal of Law, Economics and Organization, Journal of Banking and Finance*, *Journal of Economics and Management Strategy*, among others.

Member, Editorial Advisory Board, *The Antitrust Chronicle*, *Competition Policy International,* 2011-2020.

Co-Editor of the Monthly Cartel Column "From Collusion to Competition," *Competition Policy International*, 2013-2021.

EXHIBIT 2

MATERIALS RELIED UPON

Case Documents

Iowa Public Employees' Retirement System et al. vs Bank of America Corporation et al., *United States District Court for the Southern District of New York*, No. 17-cv-6221, "Defendants' Memorandum of Law in Opposition to Plaintiffs' Motion for Class Certification," August 3, 2021.

Iowa Public Employees' Retirement System et al. vs Bank of America Corporation et al., United States District Court for the Southern District of New York, No. 17-cv-6221, "Expert Report of Haoxiang Zhu," February 22, 2021.

Iowa Public Employees' Retirement System et al. vs Bank of America Corporation et al., *United States District Court for the Southern District of New York*, No. 17-cv-6221, "Expert Report of Paul Asquith and Parag Pathak," February 22, 2021.

Iowa Public Employees' Retirement System et al. vs Bank of America Corporation et al., *United States District Court for the Southern District of New York*, No. 17-cv-6221, "Report and Recommendation of Sarah L. Cove," June 30, 2022.

Iowa Public Employees' Retirement System et al. vs Bank of America Corporation et al., *United States District Court for the Southern District of New York*, No. 17-cv-6221, "Stipulation and Agreement of Settlement, Compromise, and Release with the Goldman Sachs, Morgan Stanley, JPMorgan, UBS, and EquiLend Defendants," August 22, 2023, Exhibit A.

Academic Literature

American Bar Association, "Chapter 8: Practical Considerations for Joint Ventures," *Joint Ventures*, ABA Book Publishing, October 2020.

Bank for International Settlements Markets Committee, January 2016, "Electronic trading in fixed income markets," available at https://www.bis.org/publ/mktc07.pdf

Bruce Mizrach and Christopher J. Neely, Nov/Dec 2006, "The Transition to Electronic Communications Networks in the Secondary Treasury Market," *Federal Reserve Bank of St. Louis Review*, Volume 88(6): 527-541.

Darrell Duffie, Nicolae Garleanu, and Lasse Pedersen, November 2005, "Over-the-Counter Markets," *Econometrica*, Volume 73(6): 1815-1847.

Haoxiang Zhu, April 2012, "Finding a Good Price in Opaque Over-the-Counter Markets," *Review of Financial Studies*, Volume 25(4): 1255-1285.

John M. Connor, Autumn 2010, "Recidivism Revealed: Private International Cartels 1990-2009," *Competition Policy International*, Volume 6(2): 101-127.

Joseph Murphy and William Kolasky, Spring 2012, "The Role of Anti-Cartel Compliance Programs in Preventing Cartel Behavior," *Antitrust*, Volume 26(2): 61-64.

Matthias X. Hanauer, Pavel Lesnevski, and Esad Smajlbegovic, May 2023, "Surprise in Short Interest," *Journal of Financial Markets*, In Press.

Michael J. Aitken, Alex Frino, Amelia M. Hill, and Elvis Jarnecic, July 2004, "The Impact of Electronic Trading on Bid-Ask Spreads: Evidence from Futures Markets in Hong Kong, London, and Sydney," *The Journal of Futures Markets*, Volume 24(7): 675-696.

Michael J. Barclay, William G. Christie, Jeffrey H. Harris, Eugene Kandel, and Paul H. Schultz, February 1999, "Effects of Market Reform on the Trading Costs and Depths of Nasdaq Stocks," *Journal of Finance*, Volume 54(1): 1-34.

Peter Diamond, June 1971, "A Model of Price Adjustment," *Journal of Economic Theory*, Volume 3(2): 156-168.

Rosa M. Abrantes-Metz & David S. Evans, "Will The Wheatley Recommendations Fix LIBOR?" *Competition Policy International,* Antitrust Chronicle, November 2012 (2).

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EXHIBIT 3

EQUILEND REFORMS

EXHIBIT A

EquiLend Reforms

- **Duration:** All EquiLend reforms shall remain in place for five years from the date of final approval of the settlement.

1. EquiLend Board and Committee Meetings:

- Each EquiLend owner firm[1] shall be entitled to a maximum of three EquiLend Board Members at any given time (one regular Board Member and two Alternates).[2]
- Terms for EquiLend Board Members and alternate Board Members will be five years (on a staggered basis), with a break of two years required before an individual can be reappointed.
- Outside antitrust counsel will be retained for a term of three years and then rotated. EquiLend must obtain new outside antitrust counsel within six months of final approval of the settlement.
- The names of the individuals who attend EquiLend Board or Working Group[3] Meetings shall be identified in the minutes of such meetings.
- All Board and Working Group Meetings must follow a pre-determined agenda that counsel for EquiLend review in advance.
  - Any items added to the agenda at a later date require inclusion in the minutes to ensure that there is a record of what transpired.
  - Meeting minutes must be preserved and sent to the Chief Compliance Officer at EquiLend.
  - The minutes must be approved by all Board Members who attended each Board Meeting.

2. Information Shared at EquiLend Meetings:

  - Apart from EquiLend employees, only Board Members, Alternate Board Members, and personnel to whom disclosure has a business justification and who agree to protect such

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[1] EquiLend owner firms, Board Members and Alternate Board Members shall be defined to include prime broker and agent lender firms and their employees only.

[2] This limitation shall not affect the ability of any entity to appoint a Board Member that it would otherwise obtain after acquiring another entity's equity interest in EquiLend.

[3] Working Group references shall refer only to exclusive owner working groups formed and approved by EquiLend.

  information can have access to confidential information discussed at EquiLend Board, Committee, or Working Group meetings.

  - If any EquiLend Board Member, Alternate Board Member, or employee becomes aware of a potential breach of the above confidentiality restrictions, they shall report the potential breach to EquiLend's Chief Compliance Officer, who shall report the potential breach to a Designated Antitrust Liaison Counsel[4] of the relevant EquiLend owner firm.

  - The above restrictions on information sharing should be specified in EquiLend's Antitrust Code of Conduct, to be created by EquiLend as detailed below, and signed by each Board and Alternate Board representative.

- Outside antitrust counsel must attend every (1) EquiLend Board Meeting; (2) Audit Committee Meeting; and (3) meetings of Working Groups.

- Training:

  - EquiLend will provide every EquiLend Board and Alternate Board Member antitrust training every two years.

- Other monitoring of compliance periodically and reporting:

  - Each Board Member and Alternate Board Member must certify each year that he or she will comply with EquiLend's Antitrust Code of Conduct.

- If any EquiLend Board Member, Alternate Board Member, or employee becomes aware of a potential breach of EquiLend's Antitrust Code of Conduct, they shall report the potential breach to EquiLend's Chief Compliance Officer. In the event that EquiLend's Chief Compliance Officer believes that there may have been a breach of the Antitrust Code of Conduct by a Board Member or Alternate Board Member, EquiLend's Chief Compliance Officer shall alert the Board and the Designated Antitrust Liaison Counsel at each of the owner firms whose Board and/or Alternate Board Member were involved in the matter at issue.

- EquiLend's Chief Compliance Officer will provide annual reports of compliance to the EquiLend Board and the Designated Antitrust Liaison Counsel at each of the owner firms.

3. <u>EquiLend's Antitrust Code of Conduct:</u>

- EquiLend shall create an Antitrust Code of Conduct designed to prevent collusion and inappropriate sharing of information. The Antitrust Code of Conduct shall contain:

  - Ethical conduct:

[4] Designated Antitrust Liaison Counsel shall be an in-house lawyer with some antitrust training.

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- A statement that individuals should strive for the highest ethical standards of honesty, fairness, and integrity.

- Information sharing:

  - The Antitrust Code of Conduct should spell out the restrictions on inappropriate sharing of information identified above.

  - Each EquiLend Board Member and Alternate Board Member must certify on an annual basis that he or she will comply with EquiLend's Antitrust Code of Conduct.

  - The Antitrust Code of Conduct and annual certifications shall be transmitted to the Chief Compliance Officer of EquiLend.

  - The Antitrust Code of Conduct will specify that EquiLend Board and Alternate Board Members will use reasonable efforts to ensure that communications between and among them—especially those outside the presence of antitrust counsel—are consistent with antitrust laws.

  - The Antitrust Code of Conduct will explicitly state that owner firms may take further steps to investigate any suspect communications or situations, as appropriate.

EXHIBIT B

UNITED STATES DISTRICT COURT SOUTHERN DISTRICT OF NEW YORK

IOWA PUBLIC EMPLOYEES' RETIREMENT SYSTEM, *et al.*, Plaintiffs, v. BANK OF AMERICA CORPORATION, *et al.*, Defendants.	Case No. 17-cv-6221 (KPF) (SLC) Hon. Katherine Polk Failla

DECLARATION OF ELIZABETH HENNESSEY, GENERAL COUNSEL OF THE IOWA PUBLIC EMPLOYEES' RETIREMENT SYSTEM, IN SUPPORT OF PLAINTIFFS' MOTION FOR FINAL APPROVAL OF SETTLEMENTS, ATTORNEYS' FEES, EXPENSE REIMBURSEMENTS, AND INCENTIVE AWARDS

I, Elizabeth Hennessey, am General Counsel at Iowa Public Employees' Retirement System ("IPERS"), a named plaintiff in this action and a class representative of both Settlement Classes. I submit this declaration pursuant to 28 U.S.C. § 1746, and declare under penalty of perjury as follows:

1. I respectfully submit this declaration in support of Plaintiffs' Motions for Final Approval of Settlements, Attorneys' Fees, and Plaintiffs' Incentive Awards.

2. As General Counsel for IPERS, my responsibilities include monitoring and supervising counsel in class action litigation. I have been actively involved in supervising this litigation on behalf IPERS, am familiar with the proceedings, and have knowledge of the matters stated herein.

3. IPERS is a public pension fund that operates for the benefit of the employees of the state of Iowa, has approximately $41 billion in assets under management, and invests on behalf of over 404,000 members.

4. IPERS has served as a lead plaintiff and class representative in several other class actions and thus, has experience, in supervising counsel in class action litigation. Throughout the course of this litigation, I have taken the duties and responsibilities of acting as a class representative seriously and executed them to the best of my ability.

5. For nearly seven years, IPERS has participated in this litigation as a named plaintiff, proposed class representative, and, more recently, class representative to both Settlement Classes. Throughout the litigation, we have expended substantial time and effort to supervise the work of our attorneys in the litigation and to cooperate with discovery and the other obligations of litigating on behalf of a proposed class.

6. The work we undertook on behalf of the classes in support of this litigation has required a significant amount of time and effort from myself as well as other members of IPERS staff and leadership. On behalf of IPERS, I and other IPERS personnel have, among other things: (a) received and reviewed regular reports from counsel regarding developments in the Action as well as various drafts of the pleadings filed in the action; (b) participated in numerous conference calls with Counsel as well as other Class Representatives; (b) reviewed Defendants' document requests and searched for and produced relevant documents responsive to Defendants' document requests; (c) prepared and sat for a 30(b)(6) deposition; and (d) provided direction to Lead Counsel regarding case strategy and developments – including settlement strategy.

7. Based upon the foregoing, I endorse the proposed Settlement before the Court for final approval. In light of the risks of ongoing litigation, I believe that the Settlement represents an excellent recovery for the proposed Settlement Classes.

8. I also support Lead Counsel's Motion for an Award of Attorneys' Fees and Reimbursement of Litigation Expenses. Prior to this action, I understood that antitrust class action claims brought without a parallel government action are particularly risky. I also understood that bringing antitrust claims against some of the largest investment banks in the world would be a difficult, expensive, and time-consuming endeavor. IPERS is pleased with the quality of representation provided by Class Counsel. Throughout this litigation, Class Counsel has advocated zealously on behalf of the Class. I understand that Class Counsel litigated this Action on a contingency basis, foregoing any payment unless and until settlement or judgment was obtained. Thus, IPERS believes that Lead Counsel's fee request and request for reimbursement of expenses is fair and reasonable.

9. IPERS also supports an incentive award of $100,000 for it and the other Class Representatives. IPERS and the other Class Representatives spent a significant amount of time over the past seven years supervising Class Counsel and participating in the litigation. While IPERS does not record its time in the ordinary course of business, we have expended time and resources to help advance this litigation through time spent by myself as well as other members of IPERS legal division, IPERS Chief Executive, and various staff members. An incentive award of $100,000 would be approximately $15,000 for each year IPERS and its staff has spent supervising counsel and participating in this litigation. We believe this would be fair compensation given the time and effort expended.

10. For the foregoing reasons, IPERS respectfully requests that the Court approve in full: (a) Plaintiffs' motion for approval of the proposed Settlements and the proposed Plans of Allocation and (b) Class Counsel's motion for attorneys' fees, reimbursement of expenses, and incentive payments.

I declare, under penalty of perjury, that the foregoing is true and correct.

Executed: April 18, 2024
Des Moines, Iowa

Elizabeth A. Hennessey

Elizabeth Hennessey
General Counsel
Iowa Public Employees' Retirement System

EXHIBIT C

UNITED STATES DISTRICT COURT SOUTHERN DISTRICT OF NEW YORK

IOWA PUBLIC EMPLOYEES' RETIREMENT SYSTEM, *et al.*, Plaintiffs, v. BANK OF AMERICA CORPORATION, *et al.*, Defendants.	Case No. 17-cv-6221 (KPF) (SLC) Hon. Katherine Polk Failla

DECLARATION OF MICHAEL D. HERRERA, SENIOR STAFF COUNSEL OF THE LOS ANGELES COUNTY EMPLOYEES RETIREMENT ASSOCIATION, IN SUPPORT OF PLAINTIFFS' MOTION FOR FINAL APPROVAL OF SETTLEMENTS, ATTORNEYS' FEES, EXPENSE REIMBURSEMENTS, AND INCENTIVE AWARDS

I, Michael D. Herrera, am a Senior Staff Counsel of the Los Angeles County Employees Retirement Association ("LACERA"), a named plaintiff in this action and a class representative of both Settlement Classes. I submit this declaration pursuant to 28 U.S.C. § 1746, and declare under penalty of perjury as follows:

1. I respectfully submit this declaration in support of Plaintiffs' Motions for Final Approval of Settlements, Attorneys' Fees, and Plaintiffs' Incentive Awards.

2. As a Senior Staff Counsel for LACERA, my responsibilities include assisting the Chief Counsel in monitoring and supervising counsel in class action litigation. I have been actively involved in supervising this litigation on behalf LACERA, am familiar with the proceedings, and have knowledge of the matters stated herein.

3. LACERA is a public pension fund and the largest county retirement system in the United States. LACERA provides pension benefits for 190,000 retirees and their beneficiaries. LACERA has approximately $73.9 billion in assets under management.

4. LACERA has served as a class representative in several other class actions and thus, has experience, in supervising counsel in class action litigation. Throughout the course of this litigation, I have taken the duties and responsibilities of acting as a class representative seriously and executed them to the best of my ability.

5. For nearly seven years, LACERA has participated in this litigation as a named plaintiff, proposed class representative, and, more recently, class representative to both Settlement Classes. Throughout the litigation, we have expended substantial time and effort to supervise the work of our attorneys in the litigation and to cooperate with discovery and the other obligations of litigating on behalf of a proposed class.

6. The work we undertook on behalf of the classes in support of this litigation has required a significant amount of time and effort from myself as well as other members of LACERA staff and leadership. On behalf of LACERA, I and other LACERA personnel have, among other things: (a) received and reviewed regular reports from counsel regarding developments in the Action as well as various drafts of the pleadings filed in the action; (b) participated in numerous conference calls with Counsel as well as other Class Representatives; (b) reviewed Defendants' document requests and searched for and produced relevant documents responsive to Defendants' document requests; (c) prepared and sat for 30(b)(6) depositions; and (d) provided direction to Lead Counsel regarding case strategy and developments – including settlement strategy.

7. Based upon the foregoing, LACERA endorses the proposed Settlement before the Court for final approval. In light of the risks of ongoing litigation, I believe that the Settlement represents an excellent recovery for the proposed Settlement Classes.

8. LACERA also supports Lead Counsel's Motion for an Award of Attorneys' Fees and Reimbursement of Litigation Expenses. Prior to this action, I understood that antitrust class action claims brought without a parallel government action are particularly risky. I also understood that bringing antitrust claims against some of the largest investment banks in the world would be a difficult, expensive, and time-consuming endeavor. LACERA is pleased with the quality of representation provided by Class Counsel. Throughout this litigation, Class Counsel has advocated zealously on behalf of the Class. I understand that Class Counsel litigated this Action on a contingency basis, foregoing any payment unless and until settlement or judgment was obtained. Thus, LACERA believes that Lead Counsel's fee request and request for reimbursement of expenses is fair and reasonable.

9. LACERA also supports an incentive award of $100,000 for it and the other Class Representatives. I spent a significant amount of time over the past seven years supervising Class Counsel and participating in the litigation. While LACERA does not record its time in the ordinary course of business, we have expended time and resources to help advance this litigation through time spent by myself as well as other members of LACERA staff. An incentive award of $100,000 would be approximately $15,000 for each year LACERA and its staff has spent supervising counsel and participating in this litigation. We believe this would be fair compensation given the time and effort expended.

10. For the foregoing reasons, LACERA respectfully requests that the Court approve in full: (a) Plaintiffs' motion for approval of the proposed Settlements and the proposed Plans of

Allocation and (b) Class Counsel's motion for attorneys' fees, reimbursement of expenses, and incentive payments.

I declare, under penalty of perjury, that the foregoing is true and correct.

Executed: May 6, 2024
Pasadena, California

Michael D. Herrera
Senior Staff Counsel
Los Angeles County Employees Retirement Association

EXHIBIT D

UNITED STATES DISTRICT COURT SOUTHERN DISTRICT OF NEW YORK

IOWA PUBLIC EMPLOYEES' RETIREMENT SYSTEM, *et al.*, Plaintiffs, v. BANK OF AMERICA CORPORATION, *et al.*, Defendants.	Case No. 17-cv-6221 (KPF) (SLC) Hon. Katherine Polk Failla

DECLARATION OF MANUEL SERPA, GENERAL COUNSEL OF THE ORANGE COUNTY EMPLOYEES RETIREMENT SYSTEM, IN SUPPORT OF PLAINTIFFS' MOTION FOR FINAL APPROVAL OF SETTLEMENTS, ATTORNEYS' FEES, EXPENSE REIMBURSEMENTS, AND INCENTIVE AWARDS

I, Manuel Serpa, am General Counsel at Orange County Employees Retirement System ("OCERS"), a named plaintiff in this action and a class representative of both Settlement Classes. I submit this declaration pursuant to 28 U.S.C. § 1746, and declare under penalty of perjury as follows:

1. I respectfully submit this declaration in support of Plaintiffs' Motions for Final Approval of Settlements, Attorneys' Fees, and Plaintiffs' Incentive Awards.

2. As General Counsel for OCERS, my responsibilities include monitoring and supervising counsel in class action litigation. I have been actively involved in supervising this litigation on behalf OCERS, am familiar with the proceedings, and have knowledge of the matters stated herein.

3. OCERS is a public pension fund that operates for the benefit of 13 active participating employers to provide pension benefits for retirees and their beneficiaries. OCERS' members include deputy sheriffs, firefighters, probation officers, physicians, secretaries, and bus drivers, among others. OCERS has approximately $22.3 billion in assets under management, and invests on behalf of nearly 30,000 members.

4. OCERS has served as a class representative in several other class actions and thus, has experience, in supervising counsel in class action litigation. Throughout the course of this litigation, I have taken the duties and responsibilities of acting as a class representative seriously and executed them to the best of my ability.

5. For nearly seven years, OCERS has participated in this litigation as a named plaintiff, proposed class representative, and, more recently, class representative to both Settlement Classes. Throughout the litigation, we have expended substantial time and effort to supervise the work of our attorneys in the litigation and to cooperate with discovery and the other obligations of litigating on behalf of a proposed class.

6. The work we undertook on behalf of the classes in support of this litigation has required a significant amount of time and effort from myself as well as other members of OCERS staff and leadership. On behalf of OCERS, I and other OCERS personnel have, among other things: (a) received and reviewed regular reports from counsel regarding developments in the Action as well as various drafts of the pleadings filed in the action; (b) participated in numerous conference calls with Counsel as well as other Class Representatives; (b) reviewed Defendants' document requests and searched for and produced relevant documents responsive to Defendants' document requests; (c) prepared and sat for a 30(b)(6) deposition; and (d) provided

direction to Lead Counsel regarding case strategy and developments – including settlement strategy.

7. Based upon the foregoing, I endorse the proposed Settlement before the Court for final approval. In light of the risks of ongoing litigation, I believe that the Settlement represents an excellent recovery for the proposed Settlement Classes.

8. I also support Lead Counsel's Motion for an Award of Attorneys' Fees and Reimbursement of Litigation Expenses. Prior to this action, I understood that antitrust class action claims brought without a parallel government action are particularly risky. I also understood that bringing antitrust claims against some of the largest investment banks in the world would be a difficult, expensive, and time-consuming endeavor. OCERS is pleased with the quality of representation provided by Class Counsel. Throughout this litigation, Class Counsel has advocated zealously on behalf of the Class. I understand that Class Counsel litigated this Action on a contingency basis, foregoing any payment unless and until settlement or judgment was obtained. Thus, OCERS believes that Lead Counsel's fee request and request for reimbursement of expenses is fair and reasonable.

9. OCERS also supports an incentive award of $100,000 for it and the other Class Representatives. OCERS and the other Class Representatives spent a significant amount of time over the past seven years supervising Class Counsel and participating in the litigation. While OCERS does not record its time in the ordinary course of business, we have expended time and resources to help advance this litigation through time spent by myself as well as other members of OCERS staff. An incentive award of $100,000 would be approximately $15,000 for each year OCERS and its staff has spent supervising counsel and participating in this litigation. We believe this would be fair compensation given the time and effort expended.

10. For the foregoing reasons, OCERS respectfully requests that the Court approve in full: (a) Plaintiffs' motion for approval of the proposed Settlements and the proposed Plans of Allocation and (b) Class Counsel's motion for attorneys' fees, reimbursement of expenses, and incentive payments.

I declare, under penalty of perjury, that the foregoing is true and correct.

Executed: April 23 2024
Santa Ana, California

Manuel Serpa
General Counsel
Orange County Employees Retirement System

EXHIBIT E

UNITED STATES DISTRICT COURT SOUTHERN DISTRICT OF NEW YORK

IOWA PUBLIC EMPLOYEES' RETIREMENT SYSTEM, *et al.*, Plaintiffs, v. BANK OF AMERICA CORPORATION, *et al.*, Defendants.	Case No. 17-cv-6221 (KPF) (SLC) Hon. Katherine Polk Failla

DECLARATION OF JULIE WYNE, CHIEF EXECUTIVE OFFICER OF THE SONOMA COUNTY EMPLOYEES' RETIREMENT ASSOCIATION, IN SUPPORT OF PLAINTIFFS' MOTION FOR FINAL APPROVAL OF SETTLEMENTS, ATTORNEYS' FEES, EXPENSE REIMBURSEMENTS, AND INCENTIVE AWARDS

I, Julie Wyne, am the Chief Executive Officer of the Sonoma County Employees' Retirement Association ("SCERA"), a named plaintiff in this action and a class representative of both Settlement Classes. I submit this declaration pursuant to 28 U.S.C. § 1746, and declare under penalty of perjury as follows:

1. I respectfully submit this declaration in support of Plaintiffs' Motions for Final Approval of Settlements, Attorneys' Fees, and Plaintiffs' Incentive Awards.

2. As Chief Executive Officer for SCERA, my responsibilities include monitoring and supervising counsel in class action litigation. I have been actively involved in supervising this litigation on behalf SCERA, am familiar with the proceedings, and have knowledge of the matters stated herein.

3. SCERA is a public pension fund that operates for the benefit of 3 participating employers to provide pension benefits for retirees and their beneficiaries. SCERA has approximately $3.5 billion in assets under management.

4. SCERA has served as a class representative in several other class actions and thus, has experience, in supervising counsel in class action litigation. Throughout the course of this litigation, I have taken the duties and responsibilities of acting as a class representative seriously and executed them to the best of my ability.

5. For nearly seven years, SCERA has participated in this litigation as a named plaintiff, proposed class representative, and, more recently, class representative to both Settlement Classes. Throughout the litigation, we have expended substantial time and effort to supervise the work of our attorneys in the litigation and to cooperate with discovery and the other obligations of litigating on behalf of a proposed class.

6. The work we undertook on behalf of the classes in support of this litigation has required a significant amount of time and effort from myself as well as other members of SCERA staff and leadership. On behalf of SCERA, I and other SCERA personnel have, among other things: (a) received and reviewed regular reports from counsel regarding developments in the Action as well as various drafts of the pleadings filed in the action; (b) participated in numerous conference calls with Counsel as well as other Class Representatives; (b) reviewed Defendants' document requests and searched for and produced relevant documents responsive to Defendants' document requests; (c) prepared and sat for a 30(b)(6) deposition; and (d) provided direction to Lead Counsel regarding case strategy and developments – including settlement strategy.

7. Based upon the foregoing, I endorse the proposed Settlement before the Court for final approval. In light of the risks of ongoing litigation, I believe that the Settlement represents an excellent recovery for the proposed Settlement Classes.

8. I also support Lead Counsel's Motion for an Award of Attorneys' Fees and Reimbursement of Litigation Expenses. Prior to this action, I understood that antitrust class action claims brought without a parallel government action are particularly risky. I also understood that bringing antitrust claims against some of the largest investment banks in the world would be a difficult, expensive, and time-consuming endeavor. SCERA is pleased with the quality of representation provided by Class Counsel. Throughout this litigation, Class Counsel has advocated zealously on behalf of the Class. I understand that Class Counsel litigated this Action on a contingency basis, foregoing any payment unless and until settlement or judgment was obtained. Thus, SCERA believes that Lead Counsel's fee request and request for reimbursement of expenses is fair and reasonable.

9. SCERA also supports an incentive award of $100,000 for it and the other Class Representatives. SCERA and the other Class Representatives spent a significant amount of time over the past seven years supervising Class Counsel and participating in the litigation. While SCERA does not record its time in the ordinary course of business, we have expended time and resources to help advance this litigation through time spent by myself as well as other members of SCERA staff. An incentive award of $100,000 would be approximately $15,000 for each year SCERA and its staff has spent supervising counsel and participating in this litigation. We believe this would be fair compensation given the time and effort expended.

10. For the foregoing reasons, SCERA respectfully requests that the Court approve in full: (a) Plaintiffs' motion for approval of the proposed Settlements and the proposed Plans of

Allocation and (b) Class Counsel's motion for attorneys' fees, reimbursement of expenses, and incentive payments.

I declare, under penalty of perjury, that the foregoing is true and correct.

Executed: April 24, 2024
Santa Rosa, California

Julie Wyne

Julie Wyne
Chief Executive Officer
Sonoma County Employees' Retirement Association

EXHIBIT F

UNITED STATES DISTRICT COURT
SOUTHERN DISTRICT OF NEW YORK

IOWA PUBLIC EMPLOYEES' RETIREMENT SYSTEM, *et al.*, Plaintiffs, v. BANK OF AMERICA CORPORATION, *et al.*, Defendants.	Case No. 17-cv-6221 (KPF) (SLC) Hon. Katherine Polk Failla

DECLARATION OF NICHOLAS SIMEONE, MANAGER OF TORUS CAPITAL LLC, IN SUPPORT OF PLAINTIFFS' MOTION FOR FINAL APPROVAL OF SETTLEMENTS, ATTORNEYS' FEES, EXPENSE <u>REIMBURSEMENTS, AND INCENTIVE AWARDS</u>

I, Nicholas Simeone, am the Manager of Torus Capital LLC ("Torus"), a named plaintiff in this action and a class representative of both Settlement Classes. I submit this declaration pursuant to 28 U.S.C. § 1746, and declare under penalty of perjury as follows:

1. I respectfully submit this declaration in support of Plaintiffs' Motions for Final Approval of Settlements, Attorneys' Fees, and Plaintiffs' Incentive Awards.

2. As Manager for Torus, my responsibilities include monitoring and supervising counsel in class action litigation. I have been actively involved in supervising this litigation on behalf of Torus, am familiar with the proceedings, and have knowledge of the matters stated herein.

3. Torus is a proprietary trading firm that has, over the years, traded substantial amounts of money.

4. Torus has served as a named plaintiff and class representative in other class actions and, thus, has experience in supervising counsel in class action litigation. Throughout the course of this litigation, I have taken the duties and responsibilities of acting as a class representative seriously and executed them to the best of my ability.

5. For nearly seven years, Torus has participated in this litigation as a named plaintiff, proposed class representative, and, more recently, class representative to both Settlement Classes. Throughout the litigation, we have expended substantial time and effort to supervise the work of our attorneys in the litigation and to cooperate with discovery and the other obligations of litigating on behalf of a proposed class.

6. The work we undertook on behalf of the classes in support of this litigation has required a significant amount of time and effort from myself as well as the partners of Torus (past and present). On behalf of Torus, I and other Torus personnel have, among other things: (a) received and reviewed regular reports from counsel regarding developments in the Action as well as various drafts of the pleadings filed in the action; (b) participated in numerous conference calls with Counsel; (c) reviewed Defendants' document requests and searched for and produced relevant documents responsive to Defendants' document requests; (d) prepared for 4 depositions and sat for 3 depositions; and (d) provided direction to Lead Counsel and co-counsel regarding case strategy and developments—including settlement strategy.

7. Based upon the foregoing, I endorse the proposed Settlements before the Court for final approval. In light of the risks of ongoing litigation, I believe that the Settlements represent an excellent recovery for the proposed Settlement Classes.

8. I also support Lead Counsel's Motion for an Award of Attorneys' Fees and Reimbursement of Litigation Expenses. Prior to this action, I understood that antitrust class

action claims brought without a parallel government action are particularly risky. I also understood that bringing antitrust claims against some of the largest investment banks in the world would be a difficult, expensive, and time-consuming endeavor. Torus is pleased with the quality of representation provided by Co-Lead Counsel. Throughout this litigation, Co-Lead Counsel have advocated zealously on behalf of the Class. I understand that Co-Lead Counsel litigated this Action on a contingency basis, foregoing any payment unless and until settlement or judgment was obtained. Thus, Torus believes that Co-Lead Counsel's fee request and request for reimbursement of expenses is fair and reasonable.

9. Torus also supports an incentive award of $100,000 for it and the other Class Representatives. Torus and the other Class Representatives spent a significant amount of time over the past seven years supervising Class Counsel and participating in the litigation. While Torus does not record its time in the ordinary course of business, we have expended time and resources to help advance this litigation through time spent by myself as well as partners of Torus (past and present). An incentive award of $100,000 would be approximately $15,000 for each year Torus has spent supervising counsel and participating in this litigation. We believe this would be fair compensation given the time and effort expended.

10. For the foregoing reasons, Torus respectfully requests that the Court approve in full: (a) Plaintiffs' motion for approval of the proposed Settlements and the proposed Plans of Allocation and (b) Co-Lead Counsel's motion for attorneys' fees, reimbursement of expenses, and incentive payments.

I declare, under penalty of perjury, that the foregoing is true and correct.

Executed: May 7, 2024
Long Beach, New York

Nicholas Simeone
Manager
Torus Capital LLC