

1 Richard M. Heimann (063607)
 1 *rheimann@lchb.com*
 2 Katherine Lubin Benson (259826)
 2 *kbenson@lchb.com*
 3 Michael K. Sheen (288284)
 3 *msheen@lchb.com*
 4 Nicholas R. Hartmann (301049)
 4 *nhartmann@lchb.com*
 5 LIEFF CABRASER HEIMANN & BERNSTEIN, LLP
 5 275 Battery Street, 29th Floor
 6 San Francisco, CA 94111-3339
 6 Telephone: (415) 956-1000
 7 Facsimile: (415) 956-1008

8 Daniel P. Chiplock (*pro hac vice*)
 8 *dchiplock@lchb.com*
 9 Michael J. Miarmi (*pro hac vice*)
 9 *mmiarmi@lchb.com*
 10 Gabriel Panek (*pro hac vice*)
 10 *gpanek@lchb.com*
 11 LIEFF CABRASER HEIMANN & BERNSTEIN, LLP
 11 250 Hudson Street, 8th Floor
 12 New York, NY 10013-1413
 12 Telephone: (212) 355-9500
 13 Facsimile: (212) 355-9592

14 *Counsel for Lead Plaintiff Houston Municipal Employees Pension
 14 System and the Class*

15 UNITED STATES DISTRICT COURT
 16 SOUTHERN DISTRICT OF CALIFORNIA

18 IN RE:
 19 BofI HOLDING, INC. SECURITIES
 20 LITIGATION.

Case No. 3:15-cv-02324-GPC-KSC

**DECLARATION OF STEVEN P.
 FEINSTEIN, PH.D., CFA**

1 I, Steven P. Feinstein, declare as follows:

2 1. I submit this declaration based on my personal knowledge, my formal
3 education and training, and my review and assessment of information provided by
4 Class Counsel in the above-captioned action. I make this declaration in support of
5 Lead Plaintiff Houston Municipal Employees Pension System’s Motion for
6 Preliminary Approval of Settlement.

7 **I. Background and Qualifications**

8 2. I am an Associate Professor of Finance at Babson College, and the
9 founder and president of Crowninshield Financial Research, Inc., a financial
10 economics consulting firm. I have extensive experience as an expert witness on
11 matters related to securities, investments, derivatives, valuation, and complex
12 business litigation. During my many years as an academic and finance expert, I have
13 successfully applied my award-winning teaching skills to deposition and courtroom
14 testimony.

15 3. I hold a Ph.D. in Economics from Yale University, a Master of
16 Philosophy degree in Economics from Yale University, a Master of Arts in
17 Economics from Yale University, and a Bachelor of Arts degree in Economics from
18 Pomona College. I also hold the Chartered Financial Analyst (“CFA”) designation,
19 granted by the CFA Institute.

20 **II. Background and Scope of Declaration**

21 4. I understand that in August 2021, the Court certified a Class consisting
22 of all persons and entities that, during the period from September 4, 2013 through
23 October 13, 2015, inclusive, purchased or otherwise acquired shares of the publicly
24 traded common stock of BofI Holding, Inc. (“BofI” or the “Company”), as well as
25 purchasers of BofI call options and sellers of BofI put options, and were damaged
26 thereby. I was retained by Class Counsel to provide a description of the two-trader
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1 proportional trading model (the “two-trader model”) and how it was used to estimate
2 the aggregate damages for Class Members who purchased BofI common during the
3 Class Period. In addition, I was also asked to provide an estimate of damages for call
4 option contracts purchased or put option contracts written during the Class Period.

5 5. This declaration is organized below as follows: First, I provide a
6 description of the two-trader model that is commonly used to estimate aggregate
7 damages in class action securities cases. I describe its use in securities litigation and
8 treatment in academia. Second, I explain the computation of damages for Class
9 Members with 10(b) Claims and the use of two-trader model in estimating the
10 aggregate damages for all Class Members who purchased BofI common stock.

11 **III. The Two-Trader Model**

12 6. The two-trader model estimates the requisite purchase and sale dates
13 for all shares of common stock traded during a period of time, and is commonly used
14 to provide estimates of aggregate damages in securities cases.

15 7. The two-trader model recognizes that most stock trading volume is
16 attributable to a relatively small subset of traders, while the remaining investors tend
17 to have longer holding periods. Accordingly, market participants are divided into
18 two groups – “traders,” who trade frequently, and “holders,” who trade less
19 frequently.

20 8. The model employs parameter estimates for the percentages of
21 outstanding shares held by each of the two groups, and the greater frequency of
22 “trader” trades relative to “holder” trades.

23 9. The model then uses reported trading volume to estimate when shares
24 purchased were subsequently sold. Essentially, the model estimates the probability
25 of any particular share being traded on a particular day. It applies this probability to
26 estimate the number of shares purchased on each prior day that are re-traded on each
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1 respective subsequent day. The model’s construction and operation are further
2 explained below.

3 **A. Published Literature and Wide Use of Two-Trader Model**

4 10. A proportional trading model, such as the two-trader model I used, is a
5 “representative agent” model, which is a generally accepted model in finance and
6 economic research. There are a multitude of seminal articles based on representative
7 agent models. The groundbreaking article by Nobel Prize winner Robert E. Lucas,
8 “Asset Prices in an Exchange Economy,” published in the leading journal
9 *Econometrica* [November 1978],¹ is but one such example that demonstrates the
10 profession’s acceptance of such models.

11 11. The basic one-trader and two-trader proportional trading models are
12 presented in the *Litigation Services Handbook*, 6th edition.²

13 12. In my experience I have observed that the two-trader model and its
14 variants are widely used both by plaintiff and defense experts for calculating
15 aggregate damages in the course of litigation, in settlement discussions, and for
16 drafting plans of allocation subsequent to settlement.

17 13. Published peer-reviewed research, including my co-authored article,
18 Feinstein, Hu, Marcus and Ali [2013],³ shows that the two-trader model provides a
19 conservative estimate of damages in securities litigation cases.

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23 ¹ “Asset Prices in an Exchange Economy,” by Robert E. Lucas, Jr., *Econometrica*,
November 1978.

24 ² “Federal Securities Acts and Areas of Expert Analysis,” by Nicholas Crew, et al.,
25 Chapter 27 of the *Litigation Services Handbook: The Role of the Financial Expert*,
6th ed., edited by Roman Weil, et al., John Wiley & Sons, Inc., 2017.

26 ³ “Underestimation of Securities Fraud Aggregate Damages Due to Inter-Fund
27 Trades,” by Steven Feinstein, Gang Hu, Mark Marcus, and Zann Ali, *Journal of*
28 *Forensic Economics*, Vol. 24, No. 2, Sept. 2013, p.161-173.

1 14. Other published studies, such as Cone and Laurence [1994]⁴ and
2 Furbush and Smith [1994],⁵ have examined the model's use in securities litigation
3 and have shown that two-trader models are more conservative and more accurate in
4 estimating damages than are one- or single-trader proportional trading models.

5 15. Finnerty and Pushner [2003]⁶ and Barclay and Torchio [2001]⁷ are two
6 more examples of published research on the model and its variants.

7 16. Bassin [2000]⁸ and Beaver, Malernee, and Keeley [1997]⁹ empirically
8 tested two-trader models. Bassin and Beaver, et al., used actual trading records to
9 calibrate the parameters of two-trader models. I utilized the modeling and parameter
10 estimates presented in the Beaver, et al. model, which is widely used both by plaintiff
11 and defense experts to estimate aggregate damages.

12 **IV. Estimate of Aggregate Damages for Class Members Who** 13 **Purchased BofI Common Stock**

14 17. To quantify per share damages for Class Members, I ran a regression
15 on daily returns covering the full Class Period, September 4, 2013 through October
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17 ⁴ "How Accurate Are Estimates of Aggregate Damages in Securities Fraud Cases?,"
18 by Kenneth R. Cone and James E. Laurence, *Business Law*, 1994.

19 ⁵ "Estimating the Number of Damaged Shares in Securities Fraud Litigation: An
20 Introduction to Stock Trading Models," by Dean Furbush and Jeffrey W. Smith,
Business Law, 1994.

21 ⁶ "An Improved Two-Trader Model for Measuring Damages in Securities Fraud
22 Class Actions," by John Finnerty and George Pushner, *Stanford Journal of Law,
Business and Finance*, 2003.

23 ⁷ "A Comparison of Trading Models Used for Calculating Aggregate Damages in
24 Securities Litigation," by Michael Barclay and Frank C. Torchio, *Law &
Contemporary Problems*, 2001.

25 ⁸ "A Two Trader Population Share Retention Model for Estimating Damages in
26 Shareholder Class Action Litigations," by William M. Bassin, *Stanford Journal of
Business and Finance*, 2000.

27 ⁹ *Stock Trading Behavior and Damage Estimation in Securities Cases*, by William
28 H. Beaver, James K. Malernee, and Michael C. Keeley, Cornerstone Research, 1997.

1 13, 2015,¹⁰ to determine how the price of BofI stock typically behaved in relation to
2 the overall market¹¹ and its industry sector.¹² I then used the regression model to
3 determine how much of the actual return on October 14, 2015 was explained by
4 market and sector effects.

5 18. For the October 14, 2015 event date, I computed the explained portion
6 of BofI's stock return by adding i) the estimated regression intercept term, ii) the
7 event day's Market Index return multiplied by the Market Index coefficient
8 estimated by the respective regression, and iii) the event day's Sector Index return
9 multiplied by the Sector Index coefficient estimated by the respective regression. I
10 then computed the residual return on October 14, 2015 by subtracting the explained
11 return from the actual return.

12 19. On October 14, 2015, the price of BofI stock fell 35.94% (on a
13 logarithmic return basis). The Market Index return that day was -0.43%, and the
14 Sector Index return was -2.89%. Based on the regression model, the explained return
15 of the stock was -2.49%. The difference between the actual return of -35.94% and
16 the explained return of -2.49% is a statistically significant residual decline
17 of -33.45%, equivalent to a residual loss of \$40.37 per share. This residual return is
18 associated with a *t*-statistic of -17.99, which is statistically significant at the 99%
19 confidence level. The statistical significance of the residual return indicates that the
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22 ¹⁰ I used dummy variables to control for potentially abnormal returns on earnings
announcement event dates during the Class Period.

23 ¹¹ I used the CRSP NYSE/AMEX/NASDAQ/ARCA Market Index (the "Market
24 Index"), which is a generally accepted and widely used measure of the overall stock
25 market performance. The Market Index appropriately incorporates payment of
dividends by the constituent companies.

26 ¹² For the sector factor, I used the same index that BofI identified as representative
27 of its sector. In its proxy statements filed during the Class Period, BofI compared the
28 performance of its stock to the ABAQ NASDAQ Community Bank Index (the
"Sector Index").

1 large stock price decline that day was not caused by random volatility. The
2 regression excluded market-wide and sector effects.

3 20. For the Plan of Allocation, I used the two-trader model to estimate how
4 many shares of BofI common stock were bought on each day of the Class Period,
5 and to estimate if and when those same shares were subsequently sold. These
6 estimated trade quantities were then multiplied by the per share damages
7 corresponding to the respective buy and sell dates to determine aggregate damages.

8 21. Utilizing the modeling and parameter estimates presented in the
9 Beaver, et al., model, I assumed that 15.3% of outstanding shares were held by
10 “traders” (that is, investors with high trading frequency) and the remaining 84.7%
11 were held by “holders” (that is, investors with low trading frequency). Also based
12 on their study, I assumed that a trader’s share is 29 times more likely to be traded
13 than is a holder’s share.

14 22. BofI common stock was listed and traded on the NASDAQ under the
15 symbol BOFI. I used the daily trading volume data for BofI common stock and daily
16 closing prices obtained from the Center for Research in Security Prices (“CRSP”).

17 23. I removed from the published trading volume data the trades that
18 constituted only facilitation by market makers of trading among investors, which
19 therefore were not ultimate trades between investors.

20 24. Tradable float for the Company was calculated by adding short interest
21 to total shares outstanding and then reducing this amount by insider holdings and by
22 the shares that the institutional holdings data indicated were held by institutions
23 throughout the Class Period and were therefore not traded.¹³

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¹³ I also ran the two-trader model without adjusting for shares held by institutions. That is, there was no reduction to tradable float for shares reportedly held by institutions.

1 25. The tradable float for BofI was divided into shares owned by traders
2 and shares owned by holders using the Beaver, et al., model parameters. As shares
3 outstanding changed, the number of shares owned by each group was adjusted using
4 the same percentages.

5 26. For each date during the Class Period and 90-day lookback period, the
6 number of shares traded by each group is estimated using daily volume, the portion
7 of float held by holders, the portion of float held by traders, and the probabilities that
8 traders and holders will trade, or re-trade, shares.

9 27. For each trading day, the probability of any particular holder's share
10 being traded, or re-traded, is estimated by dividing volume by shares held in float,
11 adjusting the portion of tradeable float held by traders by the greater likelihood of
12 traders to trade their shares relative to holders. The probability of any particular
13 trader's share being traded, or re-traded, is estimated as the probability of a holder's
14 share being traded multiplied by the likelihood of traders to trade their shares relative
15 to holders.

16 28. Using these estimated probabilities for each day in the Class Period, the
17 model indicates when previously purchased shares were likely later sold. The model
18 also indicates the quantities of shares still held at the end of the 90-day look-back
19 period.

20 29. Estimated using the two-trader model, total damages suffered by BofI
21 common stock investors ranged between \$116.6 million and \$139.8 million, and
22 damaged shares ranged between 4.7 million and 5.9 million. These damage figures
23 are exclusive of prejudgment interest.

24 **V. Estimating the Potential Damages For Option Investors**

25 30. Counsel also asked me to provide an estimate of options aggregate
26 damages to assess the approximate level of options damages relative to common
27 stock aggregate damages. While the option damage estimate methodology is
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1 comparable to the Recognized Loss calculation outlined in the Plan of Allocation,
2 due to data limitations it is not exactly equivalent.

3 31. Counsel provided me with historical end of day option data from
4 IVolatility. Damages were estimated for each call and put option contract that had
5 open interest on October 13, 2015, the date preceding the corrective disclosure. For
6 each call (put) option with open interest on October 13, 2015, it was assumed that
7 this option was bought (sold) on October 13, 2015, and subsequently sold
8 (repurchased) on October 14, 2015. Damages for each contract were computed equal
9 to the estimate of what would have been the change in value of the contract on the
10 initial purchase (sale) date for call (put) options, had there been full disclosure.

11 32. For each option with open interest, that option was revalued using the
12 Black-Scholes option pricing formula, where the BofI stock price of \$142.00 on
13 October 13, 2015 was replaced with the but-for stock price of \$101.63 (equal to the
14 \$142.00 closing price on October 13, 2015, less the \$40.37 in artificial inflation in
15 BofI common stock that day). This computation returned the but-for option price.
16 Damages for call options, on a per share basis, were computed as the difference
17 between the price paid for the option and the but-for option price. Damages for put
18 options, on a per share basis, were computed as the difference between the price
19 received for the option and the but-for option price. Each of the per share damage
20 numbers were multiplied by 100 (the number of shares represented by one contract),
21 to compute the per-contract damage estimate.

22 33. At the close of trading on October 13, 2015, BofI call option contracts
23 had total open interest of 5,661 and BofI put option contracts had total open interest
24 of 20,316. Using this methodology, damages for BofI call option investors is \$10.9
25 million and total damages for BofI put option investors is \$7.8 million. In sum,
26 damages to BofI option holders is estimated to be \$18.7 million.

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1 34. This \$18.7 million damage estimate for BofI options investors is likely
2 to exceed the sum of all Class Members' Recognized Claims related to their
3 investments in BofI options under the Plan of Allocation, due to the "Market Gain"
4 and "Market Loss" constraint on each Class Members' Recognized Claim. Some
5 BofI options investors losses on these contracts will be mitigated or offset by short
6 call or long put positions.

7 35. Options are often used as hedges, or in combination strategies with
8 other option contracts, stocks, and notes. Hedging strategies generally involve some
9 combination of purchases and sales of the underlying security, call options, and put
10 options. Investors who engage in option combination strategies may have losses in
11 one component of their portfolio offset by profits earned on another component.
12 Because options are often used as hedging instruments, it is reasonable that
13 Recognized Loss for some options are already compensated by offsetting gains
14 earned on other positions.

15 I declare under penalty of perjury under the laws of the United States of America
16 that the foregoing is true and correct. Executed this 14th day of April 2022, in
17 Brookline, Massachusetts.

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19 By: 
20 STEVEN P. FEINSTEIN, PH.D., CFA