

Cluster Analysis of Financial Institution Fraud: The Role of Civil Money Penalties

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Abstract

This paper explores risk mitigation strategy in the supervision and regulation of financial institutions. As a result of the depth and breadth of financial fraud that characterized the financial crisis, and in terms of both institutions and individuals involved, this research assesses what supervisors-regulators have learned and what their response has been to this massive disruption in both the financial and real economies.

Using a dataset compiled from the Federal Reserve's enforcement actions, we examine supervisory-regulatory typology, but focus on civil money penalties, in particular. Civil money penalties entail more than the transactions costs of additional audits; they also affect banks income statements *and* balance sheets, as well as financial market prices, which in turn, affect us all. We attempt to discover patterns in enforcement based on hierarchical clustering of financial institutions by type of fraudulent behavior. The resulting classification reveals two main, stable clusters: Institutions with long histories of fraud and criminal violations and large, global financial institutions across a wide range of financial activities that have high incidences of losses.

Key Words: financial fraud, financial crisis, Federal Reserve, cluster analysis, enforcement actions, risk assessment

1. Introduction

In 1996, the Board of Governors of the Federal Reserve, for the first time in its history, took note of the “subprime” market in its annual report, which it defined as “lending either to higher-risk customers or on terms entailing *unusually* high loan-to-value ratios, or both”¹. The theoretical significance of this notice presaged a change in outlook toward risk, the return for which could be limitless given sufficiently high risk of the borrower. In the aggregate, however, the “vigorous marketing” of home equity loans offset both the fall in consumer credit and the tighter lending standards for subprime borrowers, thus increasing the overall amount of credit in the economy (*ibid*).

This issue would lie dormant until the turn of the millennium when the supervisor-regulator would use expressions like “abusive practices”² and “predatory lending”, as well as extend its industry coverage beyond housing to automobile lending and other sectors in which “fraud and deception” played an increasingly large role.

¹ See page 16 of the 83rd *Annual Report 1996*; italics, mine.

² See page 92 of the 87th *Annual Report 2000. Board of Governors of the Federal Reserve*.

What follows is the history of the episode and the waning of scholarly and public interest thereafter. This research therefore attempts to revive and contribute to a more robust *post mortem*, given that predatory lending observed by the Federal Reserve in ca. 2000 has metastasized into a “fringe economy”³, which remains connected to the financial institutions that were the source of the crisis. In addition, absent any punitive measures or even legislation in the aftermath of the crisis, activities that once raised supervisor-regulator brows—such as continued subprime mortgage lending, violations of the Bank Secrecy Act, and financial market manipulation—have resumed.

The starting point for this analysis is an examination of the differential impact on financial institutions of penalties, from moral suasion to financial penalties. Common to all in the Federal Reserve’s enforcement actions database are (1) the commission of some fraudulent financial activity and (2) the acceptance of the supervisor’s-regulator’s finding that fraud has been committed. In this way. These enforcement actions are legal actions by the Board of Governors or by the Federal Reserve District Banks under delegated authority. We employ cluster analysis to segment financial institutions and thus to derive signals about risk profiles.

1.1 The “Transparency v. Opacity” Dilemma

In its supervision of individual institutions and the financial system as a whole, the supervisor-regulator faces a trade-off between the democratic ideal of transparency, on the one hand, and the allowing the details of the quality of financial institution’s balance sheets to remain sufficiently opaque, on the other, so as not to incite bank runs (Gorton, 2013). One Federal Reserve nod to transparency was its decision, beginning in 1989, to make notice of enforcement actions available publicly.

Given that fraud, insider abuse, and criminal violations have material consequences, financial institution activity threatens the supervisors’ mandate. Official recognition of such behavior, an expansion in the number and type of institutions and individuals that can be charged with fraud challenge the practice of regulatory capture (Stigler, 1971), of which the Federal Reserve had been accused, primarily during the tenure of Chair Alan Greenspan from 1987 to 2006. Moreover, the Federal Reserve confessed its light touch in revealing its reluctance to assess civil money penalties except in “egregious or repetitive violations of law and for instances where other informal and formal enforcement tools...failed to yield correction”⁴. Lessons learned from the savings and loan crisis of the mid-1980s and early 1990s thus resulted in enforcement actions being taken against both institutions and individuals, including:

- State member banks
- Savings and loan (S&L) holding companies
- Nonbank subsidiaries of bank and S&L holding companies
- Edge Act and agreement corporations
- Foreign banks operating in the United States and their parent banks

³ The designation used by Sociologist Howard Karger in *Shortchanged: Life and debt in the fringe economy* (Berrett-Koehler Publishers, 2005).

⁴ A “supervision and regulation letter” dated June 3, 1991, directed to officer in charge of supervision at all Federal Reserve Banks.

- Institution-affiliated parties, among them institution officers, directors, employees, shareholders.

In addition, the Federal Reserve, unlike other members of the interagency FFIEC⁵, the Federal Financial Institutions Examination Council, can also assess fines against

- Bank holding companies (BHC), and
- BHC institution-affiliated parties, or "IAP", defined as institution officers, directors, employees, shareholders, and certain other categories of individuals associated with the above banks, companies, and organizations.

In order of severity, formal enforcement actions begin with cease and desist orders, followed by written agreements, prompt corrective action directives, removal of staff and prohibition orders, and the ultimate sanction is an order assessing civil money penalties.

The publication of the enforcement actions make progress in informing the public of the extent of financial institution risk-taking, deterring it, and compensating defrauded parties. What remains obscure, however, is the extent to which fraud and insider abuse are detected, the frequency with which enforcement orders are issued, and the extent to which enforcement orders become enforcement *actions*. The episodic nature and news of penalties therefore isolates financial institutions' criminal activity, thus perpetuating the belief that the financial system is, on the whole, safe and sound.

1.2 The Civil Money Penalty (CMP) Matrix

Through FFIEC interagency agreement, the Civil Money Penalty Matrix is closely aligned with that of other organizations, inclusive of a "suggested" penalty structure, whereby the number of points, determined by the level of severity, 0 to 4, times the weight, results in the final figure in the CMP. Civil money penalty points and their corresponding penalty assessments are:

Points	Amount of Penalty
10 - 39	\$1,000,000 to \$5,000,000
40 - 59	\$5,000,000 to \$10,000,000
60 - 79	\$10,000,000 to \$25,000,000
80 - 99	\$25,000,000 to \$75,000,000
100 - 119	\$75,000,000 to \$125,000,000
120 +	greater than \$125,000,000

⁵ The FFIEC was established in 1979 and today consists of the consists of the Federal Deposit Insurance Corporation (FDIC), the National Credit Union Administration (NCUA), the Office of the Comptroller of the Currency (OCC), and the Consumer Financial Protection Bureau (CFPB).

CMP MATRIX

Note: Boxes on the Matrix (including the empty boxes) should be used to reflect progressive levels of severity.

	0	1	2	3	4	Weight Factor	Final Figure
Intent	No		Should Have Known		Clear Intent	5	
Pecuniary gain or other benefit to IAP or Related Interest	No			Indirect Benefit to IAP or Related Interest	Direct Benefit to IAP or Related Interest	4	
Prev. Admin. Action or Criticism	None	Prev. Criticism for Similar Violation	Violation or Criticism on Point Cited in Report	Prior Letter or MOU on Point	C&D, Agreement, or Condition in Writing on Point	3	
History	None	Unrelated Prior Violations	At Least One Similar Violation	Several Similar Violations	Frequent Similar Violations	2	
Loss or Risk of Loss	No Loss and No Risk of Loss	No Loss or Minimal Risk	Minimal Loss or Moderate Risk		Substantial Actual or Potential Loss	6	
Number of Violations at Issue					Numerous Violations	2	
Duration of Violation Prior to Notification					Violation Outstanding for Long Period	2	
Continuation after Notification	Violation Ceased Prior to Notification	Violation Ceased Immed. Upon Notification		Violation Continued for Period of Time After Notification	Violation still Continuing	3	

Note: Boxes on the Matrix (including the empty boxes) should be used to reflect progressive levels of severity.

	0	1	2	3	4	Weight Factor	Final Figure
Concealment	None			Purposely Complicated Transaction to Make It Difficult to Uncover	Active Concealment	5	
Impact	No Impact on Institution or Banking Industry		Substantial Impact on Institution; No Impact on Banking Industry	Moderate Impact on Banking Industry or on Public Perception of Banking Industry	Substantial Impact on Banking Industry or on Public Perception of Banking Industry	6	
Loss or Harm to Consumers (where applicable)	No Loss and No Harm	No Loss or Minimal Harm	Minimal Loss or Moderate Harm		Substantial Loss or Harm	5	
Subtotal 1							
Restitution	No Restitution	Complete Restitution Under Compulsion (e.g. Threat of Losing Job)	Partial Restitution	Complete Restitute Immed. After Loss or Violation Brought to Attention	Complete Restitution Voluntarily. Before Institution or Examiner Uncovered Loss	2	
Good Faith	None				Unintentional Violation	3	
Full Cooperation	None				Forthcoming in Interviews	2	
Subtotal 2							
Total (Subtract 2 From 1)							

Figure 1: The Civil Money Penalty (CMP) Matrix used by the Federal Reserve
Source: Board of Governors of the Federal Reserve System

Note the subtotals. Subtotal 1 is the sum of the final penalty points, whereas Subtotal 2, reduces the number of penalty points, taking into account whether or not the institution or individual has provided any restitution to victims, whether or not they have acted in good faith during the course of business activity, and whether they have cooperated with financial institution supervisors.

Two caveats are in order here. Namely, the Federal Reserve is careful to note that “facts”, “circumstances”, “legal considerations”, and judgment play a determining role in the final amount of the penalty and that the above amounts are based on “tier 1” violations. If the financial resources of the individual or institution are sufficient or the dollar amount of personal gain received by the individual or institution is sufficiently large, then the assessment may increase by \$25,000 per day, or five times a tier 1 violation. Extending this arithmetic logic to tier 3 violations, the \$1,000,000 per day fine reflects a vastly more serious instance of fraud by a factor of 40. The amounts in Table 1 should therefore be considered indicative baseline penalties.

2. Using Cluster Analysis for Fraud Classification and Risk Assessment

2.1 The CMP Dataset and Data Description

The dataset used for this research was constructed through a search of all Federal Reserve enforcement actions that were listed as “civil money penalty” available via the webpage “Enforcement Actions” under the “Banking Information and Regulation” tab of the Board of Governors’ website.

From 1989 to May 2016, 45 enforcement actions (EAs) amounting to at least \$1,000,000 in nominal terms were assessed against 31 financial institutions. The data is therefore an enumeration, and not a subset or sample of all data made publicly available since 1989. Of the 31 financial institutions, the number of foreign institutions was 17, slightly higher than the 14 domestic institutions that were penalized. Most of the foreign institutions conduct activities in the US, and are therefore subject to US jurisdiction via the International Banking Act of 1978, even though their criminal violation may have taken place elsewhere.

Predictably, mortgage-related criminal violations figure prominently in the dataset. While only 7 of 31 institutions are involved, having been issued 12 of 45 civil money penalties, total penalties amount to 62% of all such penalties. Of the total amount of \$7.76 billion, which has been adjusted for inflation (2016=100), approximately \$2.4 billion can be attributed to mortgage-related financial crimes during the financial crisis and an additional \$2.4 billion for mortgage-related financial crimes after the financial crisis.

As shown in the left column of Figure 1, “The Civil Money Penalty (CMP) Matrix used by the Federal Reserve”, 11 factors enter the determination of a penalty, starting with an institution’s intent to defraud and ending with the loss to consumers—though this should not be considered an ordinal scale. Data available from press releases that detail the nature of the charges do not allow computation of the “final figure” of the full matrix. Linked press releases do, however, provide proxies for data that is not directly available or accessible for each of the 31 civil money penalties:

- Number of prior enforcement actions (available),
- History associated with a given violation (available); here, “full history” also refers to fraud committed by and penalty assessed on individuals and IAPs (institution-affiliated parties)

- Losses—measured as “events”, as opposed to dollar amounts. If available, they are tallied. The potential for loss is neither estimated nor proxied.
- Type of violation for the purposes of this study (in alphabetical order):

Abbreviation	Violation Category
ACCOUNTING	Fraud involving misreporting, underreporting expenses and over-reporting revenues
BSAAML	Bank Secrecy Act; Anti-Money Laundering violations
CCARDS	Credit card violations such as deceptive marketing and debt collection
FINCRISIS	Misrepresentation of collateral during the Federal Reserve’s credit and liquidity programs to stabilize financial markets in the midst of the financial crisis
FX	Foreign exchange market manipulation
MTG	Mortgage-related violations, at any time before, during or after the financial crisis
ORG	Violations of bank holding companies regulations; irregular intercompany transfers; undisclosed purchases and sales of banks or BHCs; poorly trained staff
REPORTING	False statements; obstructing bank supervision
SANCTIONS	Government-imposed sanctions violations
STUDENT	Student loan violations—deceptive marketing, hidden fees
TAX	Tax law violations

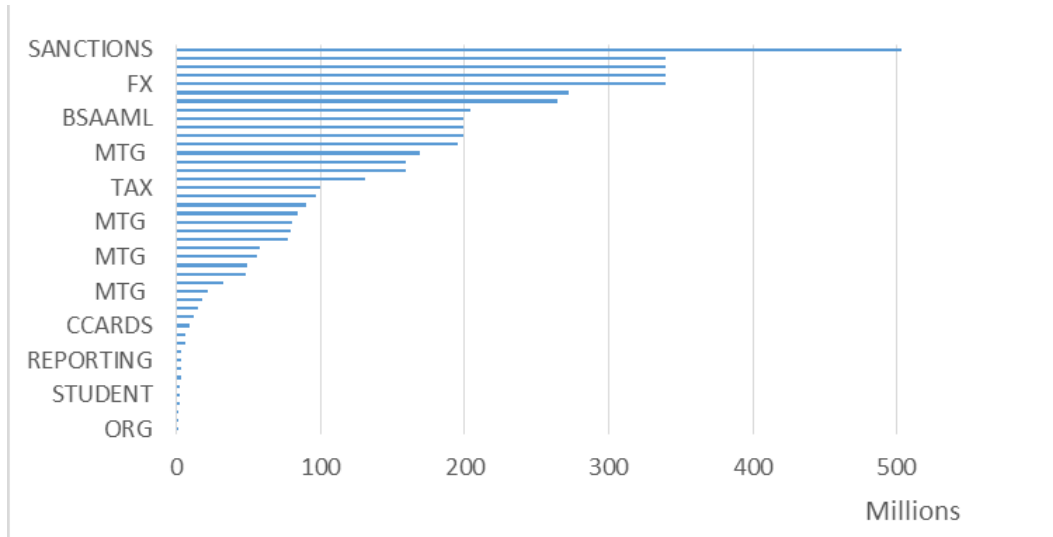


Figure 2. Civil money penalties by type of violation

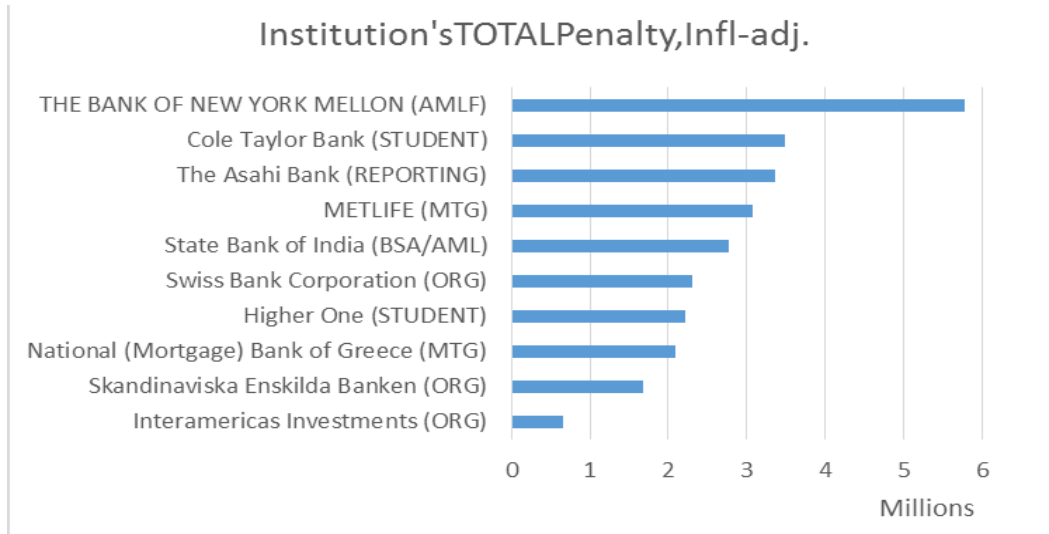


Figure 3. Low civil money penalties (inflation-adjusted) by financial institution (violation category)

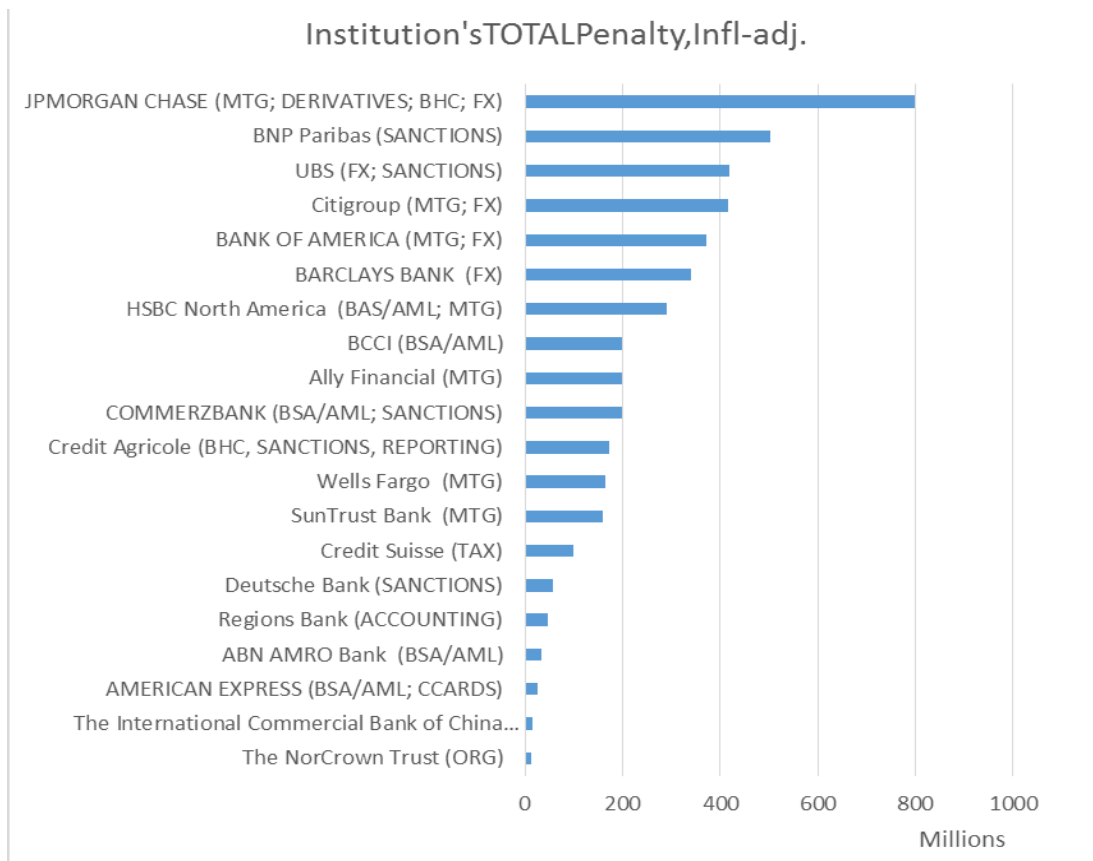


Figure 4. The highest civil money penalties (inflation-adjusted) by financial institution (violation category)

2.2 Hierarchical Clustering

The use of cluster analysis for this research is motivated by the goal of finding patterns in the data before proceeding with the second phase of modeling relationships. If financial institutions can be grouped based on a hierarchy of their violations, then k-means clustering can be used to identify “k” groups based on *n* observations, such that the distance to the *k*th mean is minimized. This algorithm extends Euclidean distance measurement, which is the difference between ratio-level data vector pairs **x** and **y**, such that

$$\sum_i (\mathbf{x}_i - \mathbf{y}_i)^2,$$

Or, the difference between two vectors, one of which is the mean of the cluster. More specifically, this process,

$$E(k) = \sum_i \sum_j (\mathbf{x}_{ij} - \boldsymbol{\mu}_{jk})^2$$

takes place iteratively, until the sum of the squared “errors” (hence, “E”) quantity in parentheses is minimized for all vectors (*n*-valued observations) and for all *j* = 1 to *k* means of all clusters (Everitt et al., 2011). This formula further requires scaling the 6- to 10-digit penalties to a mean of 0 and standard deviation 1, so that they are comparable in size to the counts used for other variables in each vector.

The analysis is conducted in R using the “hclust” package, which is an agglomerative approach to grouping, in which each observation (financial institution) starts out in its own cluster. Institutions are subsequently and iteratively merged into clusters until the sum of squares of the error, *E(k)*, within each cluster is at its lowest possible value (Murtagh, 1992; Zumel, 2014). The algorithm presents six clusters, and subsequent bootstrap analysis reveals that clusters 3, 4 and 6 are the most stable.

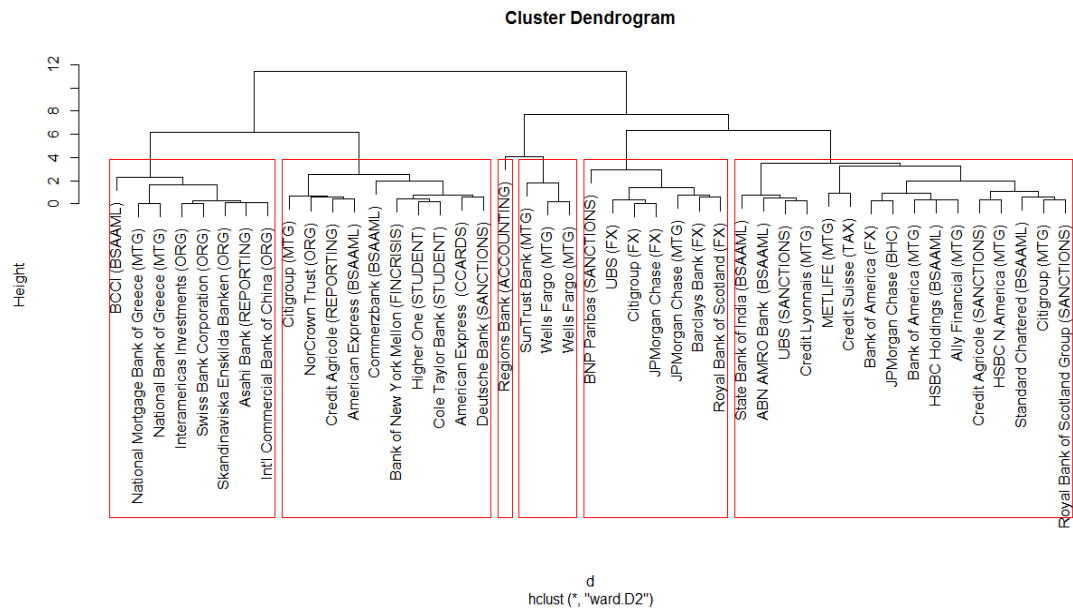


Figure 5. Dendrogram of financial institution clusters

2.3 Results and Interpretation

As Figure 5 indicates, violation type alone does not suffice in explaining financial institution clusters. Based on the results obtained from this exercise, we can make further observations about the level of financial institution risk suggested by our model, with clusters that can be identified as follows:

Table 1. Clustering based on non-US ownership with supervision and regulation shared by government counterparts in the financial institution's country of origin

Cluster 1: "(Now) Dated Cases, Shared Losses"				
EffectiveYear	Institution	TotalPenalty	TotalLoss	FullHistory
1996	Interamericas Investments (ORG)	663,570	1	1
1989	National Mortgage Bank of Greece (MTG)	1,044,570	1	0
1989	National Bank of Greece (MTG)	1,038,000	1	0
1997	Skandinaviska Enskilda Banken (ORG)	1,680,000	1	1
1997	Asahi Bank (REPORTING)	3,360,000	1	0
1996	Swiss Bank Corporation (ORG)	2,299,500	1	1
1997	Int'l Commercial Bank of China (ORG)	14,999,040	1	0
1992	BCCI (BSAAML)	199,332,000	1	6
	Sum	224,416,680	8	9
	Mean	28,052,085	1	1
	Standard deviation	69,369,477	0	2

Table 2. Financial institutions whose repeated history of offenses place them in the category of the highest risk of fraud, or the "intransigent" group

Cluster 2: "The Intransigent"				
EffectiveYear	Institution	TotalPenalty	TotalLoss	FullHistory
2015	Higher One (STUDENT)	2,215,631	1	1
2014	Cole Taylor Bank (STUDENT)	3,478,410	1	2
2012	American Express (CCARDS)	8,658,000	1	6
2012	Bank of New York Mellon (FINCRISIS)	5,772,000	1	0
2004	Credit Agricole (REPORTING)	6,328,000	1	4
2007	American Express (BSAAML)	17,360,000	1	3
2012	Citigroup (MTG)	21,164,000	2	3
2005	NorCrown Trust (ORG)	12,270,000	1	8
2015	Deutsche Bank (SANCTIONS)	57,594,000	1	4
2015	Commerzbank (BSAAML)	198,600,000	1	4
	Sum	333,440,041	11	35
	Mean	33,344,004	1	4
	Standard deviation	60,282,639	0.3	2.3

Table 3. Regions Bank: An institution with the highest number of penalties**Cluster 3: "The Outlier (singular)"**

EffectiveYear	Institution	TotalPenalty	TotalLoss	FullHistory
2014	Regions Bank (ACCOUNTING)	47,964,400	2	54

Regions Bank is unique in this dataset for the \$2.3 million-plus in penalties assessed against individual officers and employees. This amount is close to the \$2.4 million the institution was fined.

Table 4. History-based evidence of a continuation of the subprime mortgage-led financial crisis

Cluster 4: "Eye of the Storm"				
EffectiveYear	Institution	TotalPenalty	TotalLoss	FullHistory
2012	Wells Fargo (MTG)	83,694,000	2	19
2011	Wells Fargo (MTG)	80,070,000	2	18
2014	SunTrust Bank (MTG)	158,560,000	2	32
	Sum	322,324,000	6	69
	Mean	161,162,000	2	23
	Standard deviation	44,307,132	0	8

Note the high level of historical events associated with mortgage-related fraud and violations of the law. Of all institutions assessed civil money penalties, this cluster has the longest violation-related history.

Table 5. Market manipulators threaten the structure of financial markets.**Cluster 5: "Market Manipulators"**

EffectiveYear	Institution	TotalPenalty	TotalLoss	FullHistory
2015	Bank of America (FX)	203,565,000	2	7
2012	JPMorgan Chase (MTG)	264,550,000	2	0
2015	Royal Bank of Scotland (FX)	272,082,000	2	4
2015	UBS (FX)	339,606,000	2	11
2015	Barclays Bank (FX)	339,606,000	2	4
2015	Citigroup (FX)	339,606,000	2	8
2015	JPMorgan Chase (FX)	339,606,000	2	8
2014	BNP Paribas (SANCTIONS)	503,428,000	3	3
	Sum	2,602,049,000	17	45
	Mean	325,256,125	2	6
	Standard deviation	87,741,783	0	4

Market manipulators exploit their size advantage, the global networks, and specialized expertise.

Table 6. The largest fines for the institutions with the greatest financial capacity and largest number of loss events

Cluster 6: "Too Big to (Not) Jail"

EffectiveYear	Institution	TotalPenalty	TotalLoss	FullHistory
2001	State Bank of India (BSAAML)	2,778,750	2	1
2012	METLIFE (MTG)	3,078,400	3	1
2005	ABN AMRO Bank (BSAAML)	32,720,000	2	2
2013	Royal Bank of Scotland Group (SANCTIONS)	48,800,000	2	1
2004	Citigroup (MTG)	55,370,000	1	1
2003	Credit Lyonnais (MTG)	77,385,000	2	2
2004	UBS (SANCTIONS)	79,100,000	2	0
2015	Credit Agricole (SANCTIONS)	89,667,900	2	6
2012	Standard Chartered (BSAAML)	96,200,000	2	3
2014	Credit Suisse (TAX)	99,100,000	3	5
2016	HSBC N.America (MTG)	131,000,000	2	5
2012	HSBC Holdings (BSAAML)	158,730,000	2	1
2012	Bank of America (MTG)	168,831,000	2	4
2013	JPMorgan Chase (BHC)	195,200,000	2	6
2012	Ally Financial (MTG)	199,134,000	2	1
2015	Bank of America (FX)	203,565,000	2	7
	Sum	1,640,660,050	33	46
	Mean	102,541,253	2	3
	Standard deviation	67,189,674	0	2

Institutions in this cluster substantially undermine the safety and soundness of global finance across a range of financial activity and therefore violation types.

3. Conclusion

Insights from this exercise in assessment the supervisor-regulator's penalties for large scale, systemic financial fraud and criminal violations suggest that financial institution size and type of violation affect penalties.

Returning to the civil penalty matrix, we can see that, if the highest final figure possible is 172 points, which is well above 120, then we expect to see institutions being fined more than \$125,000,000, and this penalty, combined with enforcement details suggest a model for assessing risk. If bootstrap analysis indicates that clusters 3, 4, and 6 are stable, then this suggests a prioritizing more frequent supervision, more detailed audits, and more stress testing. Although this enumeration of fewer than 50 civil money penalties is not large, relative to the breadth and depth of financial markets institutions, evidence points toward making institutions like Wells Fargo and SunTrust, which have continued to defraud consumers about mortgages, the target of more intensive oversight by both government officials and civil society. The same applies to institutions with higher than average incidences of losses regardless of the markets or activities in which these losses occur.

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