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# Decoding Securities Class Actions: Determinants of Outcomes in the USA

Sahil CHOPRA

sahil.chopra@emle.eu

CEPN - Université Sorbonne Paris Nord

**Abstract.** Securities class actions are considered to be a prominent tool to create a deterrence impact on companies whose wrongdoing has affected their stock prices. Inspired from fraud-market theory, securities class actions do protect small and large investors. It becomes critically important to understand the factors that could impact the outcomes in these lawsuits. This research aims to examine the determinants of settlements specially in securities class actions. The study utilizes a hand-collected data set of 1,241 cases, to analyses the impact of variables that are related to case merit, defendant strength and judicial proceedings. The findings reveal that meritorious lawsuits have higher chances of resulting in a settlement outcome. On the other hand, the market valuation of the defending firm reduces these chances. Judicial experience has a positive influence on facilitating settlements. These conclusions contribute to a better understanding of the factors influencing the settlement outcome and can help in promoting informed policy decisions to stimulate settlement outcomes in such class actions.

**Keywords :** Event Study, Settlement, Class actions, Securities fraud, Logistic Regression

**JEL codes :** D53, G14, K22, K41

# Decoding Securities Class Actions: Determinants of Outcomes in the USA

Sahil Chopra\*

## Abstract

Securities class actions are considered to be a prominent tool to create a deterrence impact on the companies, whose wrongdoing has affected its stock prices. Inspired from fraud-market theory, securities class actions do protect small and large investors. It becomes critically important to understand the factors that could impact the outcomes in these lawsuits. This research aims to examine the determinants of settlements specially in securities class actions. The study utilizes a hand-collected data set of 1,241 cases, to analyse the impact of variables that are related to case merit, defendant strength and judicial proceedings. The findings reveal that the meritorious lawsuits have higher chances of resulting in a settlement outcome. On the other hand, the market valuation of the defending firm reduces these chances. Judicial experience has a positive influence on facilitating settlements. These conclusions contribute to a better understanding of the factors influencing the settlement outcome and can help in promoting informed policy decisions to stimulate settlement outcomes in such class actions.

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\*Ph.D candidate (Université Sorbonne Paris Nord), Centre d'Economie de l'Université Paris Nord (CEPN), Paris, France. Email id: sahil.chopra@emle.eu Mobile: +33 (0)7 54 50 0304

# 1 Introduction

Class actions, which were introduced into the U.S. legal system nearly a century ago, have become a cornerstone of federal civil procedure over the past six decades. These collective lawsuits consolidate claims arising from similar harm caused by a single or multiple wrongdoers. The primary objectives of class action within the judicial system is to enhance access to justice and deter future wrongdoing (see: [Cameron and Murphy \(2006\)](#), [Cassone and Ramello \(2011\)](#), [Mullenix \(2014\)](#)). However, scholars have criticized class action for increasing in litigation costs and potentially coercing settlements from defendants (see: [Ulen \(2011\)](#), [Calabresi and Schwartz \(2011\)](#), [Warren III \(2011\)](#)). In 2021, the European Commission issued a directive focusing on collective redress mechanism to empower injured consumers or investors to demand compensation for widespread harm<sup>1</sup>. This initiative has prompted many European countries to reevaluate their legal framework to facilitate collective redress. For instance, Germany and the Netherlands have enacted laws expanding the scope of collective actions and simplifying the filing process, particularly for investors [[KapMuG \(2021\)](#); [Wet collectieve afhandeling massaschade \(2020\)](#), respectively].

The increasing facilitation of collective action in Europe, especially for investors, has renewed interest in the U.S. experience with securities class actions. These lawsuits often result in settlement rather than trial<sup>2</sup>. Settlements are generally preferred over trials as they save time for litigants and the legal system, provide timely compensation to injured plaintiffs, and punish the wrongdoers (see: [Shavell \(1995\)](#), [Galanter \(2004\)](#), [Langbein \(2012\)](#), [Berlemann and Christmann \(2019\)](#)). Class members often favor settlement as it is quicker than trial proceedings, reduce waiting time, and eliminate the uncertainty associated with trial. Therefore, in today's legal landscape, countries aiming to facilitate class action settlements are keen to understand the determinants of these settlements. Understanding the factors that influence settlement decisions is crucial for designing a legal system that can effectively facilitate negotiations leading to mutual agreements between litigants. Hence, to inform policy decisions and promote efficient in-court settlement in collective redress actions, it is essential to understand the determinants of settlement in securities class action.

While some researchers in law and economics have explored the factors determining the duration of a lawsuit settlement in civil lawsuits (see: [Grajzl and Zajc \(2017\)](#), [Bielen et al. \(2017\)](#)) and some stimulated the factors influencing settlement in individual civil lawsuits (see: [Berlemann and Christmann \(2019\)](#), [Holas et al. \(2023\)](#)), however a comprehensive analysis of securities class action settlements is still lacking. Most of

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<sup>1</sup>Directive of the European Parliament and of the council on Representative actions for the protection of the collective interests of consumers

<sup>2</sup>2019 report from cornerstone research

the prior research analyzing the settlement outcome has been primarily focused on the Private Securities Litigation Reform Act (PSLRA) (see: [Cox et al. \(2006\)](#), [Johnson et al. \(2007\)](#), [Cox et al. \(2008\)](#), [McShane et al. \(2012\)](#) and [Donelson et al. \(2015\)](#)). As such, there remains a significant gap in research addressing the comprehensive factors affecting settlement in securities class actions.

Additionally, the presence of insufficient empirical research on the aspects of determining settlement outcome in securities class actions deters the implementation and enactment of substantiated policy reforms to encourage early settlements. The prevalence of such a gap in the literature persists because of limited availability of readily assessable data. Although various datasets are available focusing on individual lawsuit judgments, they usually require substantial efforts to consolidate numerous necessary variables to conduct a meaningful analysis. In the current scenario to conduct an unbiased analysis of factors affecting settlement decisions, the sample data should include factors pertaining to court judgments, the strength of the parties, and procedural elements, whereas, such comprehensive repository is rarely available.

This research aspires to fill a gap in the existing body of literature on securities class actions, by using a meticulously collected dataset consisting of 1,241 case records from Stanford law school and corresponding courts websites. Focusing on the class actions filed in USA, the paper addresses the following questions: What factors predict a settlement outcome? To what extent the characteristics that are case-specific, defendant specific, and judge specific matters? Does the venue of the lawsuit influence the outcome? The determinants of settlement outcome in securities class actions has been the area of interest for law and economics scholar on either side of Atlantic. The research employs the logistic regression modeling and conducts a focused analysis of selected variables to address key research questions and hypotheses concerning the likelihood of securities class action settlement.

The exclusivity of data allow us to concentrate on three principal categories of variables. First, we examine various factors related to the lawsuit, such as case merit or complexity of the lawsuit. Second, we try to examine the impact of defendant's strength in facilitating settlements by analyzing proxies for the strength of defendant. Third, we shed light on the characteristic of judicial procedures that can play an essential role for formulating policies to stimulate settlement. This includes judge-specific factor such as experience and gender, as well as the control for the circuit, which account for the procedural aspects affecting settlements. This comprehensive approach advances our understanding of the intricate dynamics inherent in securities class action settlements and allow us to determine the factors leading to a settlement outcome.

The results indicate that settlement is positively associated with factors representing case merit, while the defending firm valuation is statistically negatively related to

the likelihood of settlement, contrary to [Donelson et al. \(2015\)](#), which established a positive impact of firm size on settlement magnitude. Furthermore, judicial experience positively influences settlement outcome, a finding consistent with [Berlemann and Christmann \(2019\)](#) and [Choi et al. \(2013\)](#). Additionally, no gender bias was found among judges, opposing the findings of [Croson and Gneezy \(2009\)](#), demonstrating that no differential decision-making is observed among different genders.

The chances for a lawsuit to be settled, *ceteris paribus*, statistically significantly lower for the cases that involve multiple exchanges between the disputing parties and take much time to conclude. To the extent that this increases the difference in expectations of the disputing parties, making them more optimistic about their likely claims. This finding shows the consistency of the securities class action outcome with the theory of divergent expectations (see: [Landes \(1971\)](#), [Gould \(1973\)](#), [Shavell \(1982\)](#), [Priest and Klein \(1984\)](#), [Bebchuk \(1984\)](#), [Spier \(1992\)](#), [Daughety et al. \(1994\)](#)).

In contrast to various scholars who argue that securities class action may lead to an increase in frivolous lawsuits (e.g., [Ulen \(2011\)](#)), the findings suggests that the threshold for bringing such actions is so stringent that even some meritorious lawsuits are not being filed.

The subsequent parts of the paper are structured as follows: Section 2 explains the process of securities class actions in the U.S., Section 3 provides a comprehensive review of the related literature, and Section 4 introduces the dataset and elaborates on the adopted methodology. In Section 5, empirical results for the factors determining the likelihood of settlement are presented, along with robustness checks for the model. Finally, Section 6 summarizes the main findings and draws conclusions.

## 2 Procedure of Securities Class Actions

### 2.1 Background

Securities class action are among the most prevalent types of class action lawsuits in the U.S., where a group of shareholder claimants seeks compensation for damages incurred due to misleading reports or dishonest statements that influenced the purchase or sale of a company's securities. These class actions are typically filed, when the fraudulent information provided results in a drop of at least 10 percent in company's stock price ([Cox, 1997](#)). Such violations can stem from the mandatory disclosure requirements imposed on publicly traded companies, like those listed on NYSE or NASDAQ etc, established in securities law act of 1934 ([Mahoney, 2009](#)). According to which listed companies have to disclose the information that can affect the stock price to maintain

transparency between the investors and the listed companies. The U.S. Congress enacted the Private Securities Litigation Reform Act (PSLRA) in 1995, which introduced significant changes to securities class action law aimed at discouraging frivolous filings (Cox et al., 2008).

## 2.2 Procedural Process

In securities class actions, complaints are typically filed against corporation, their directors and chief executive, who are then designated as defendants. These complaints must specify the “class period”, which refers to the time-frame during which securities were allegedly affected by fraudulent misstatements made by the entity or its representatives and the event date on which the announcement is made. The class period can range from a day to several months or even years.

Such complaints are filed under U.S. federal securities laws, exclusively in federal district courts, and are reinforced by the Private Securities Litigation Reform Act (PSLRA). These claims often stem from alleged violations of Section 10(b) and Section 20(b) of the Securities Exchange Act of 1934. Notably, complaints under section 10(b) must demonstrate the impact of misstatement on the stock prices, often using event studies to establish the presence of loss causation or scienter on defendant’s part. Plaintiffs are required to provide a *preponderance of evidence* to support their claims. The presence of statistically significant abnormal returns strengthens the case for loss causation and price distortion, a statistically significant p-value is critical for establishing causality. A statistical significance p-value (informal threshold of below 5%) indicates that abnormal returns are likely due to the company’s misstatement. However, following the enactment of the PSLRA, plaintiff’s counsel increasingly filed class actions in state courts to circumvent the limitations posed by the PSLRA. This prompted Congress to pass the Securities Litigation Uniform Standards Act (SLUSA), which aimed to discourage abusive filings in state courts and mandate that securities class actions be filed exclusively in federal district courts (Cox et al., 2008).

The U.S. judicial system comprises 94 federal district courts organized into 11 judicial circuits. When multiple plaintiffs with similar claims against the same defendant for the same violation file class actions, the PSLRA permits federal courts to consolidate these cases into a single court. After filing a complaint, as presented in figure 1, plaintiffs must notify potential class members about the lawsuit and file motions to consolidate the cases and appoint a lead plaintiff. A 60-day deadline is typically set for submitting requests to become the lead plaintiff. It can take 60 to 110 days to file the motions in

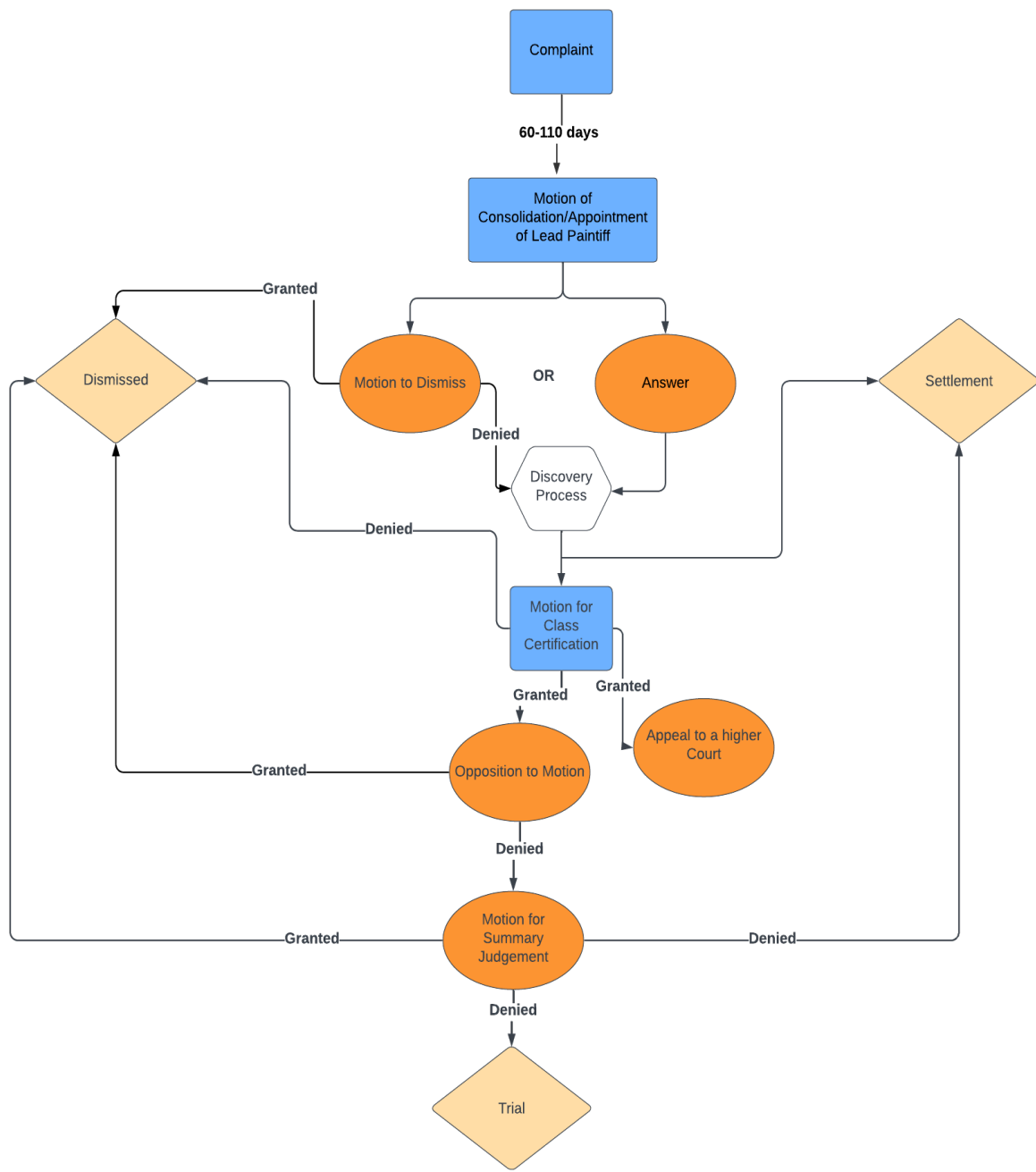


Figure 1: Class Action Procedure

Source: Author

court that consolidate multiple class actions and select a lead plaintiff and their counsel. After the appointment of the lead plaintiff(s) and their lead counsel(s), the defending party has a choice of filing a motion either to dismiss the lawsuit or to respond to the complaint.

In many securities class actions, defendants often file motion to dismiss. According to the PSLRA, such motions can prevent lead plaintiff's counsel from conducting discovery, investigation, and other proceedings related to the lawsuit (Cox, 1997). These motion allows the court to re-examine the complaint and the submitted documents. Grounds for filing such a motion can vary, including a lack of credibility in the claims, or concerns about the appointed lead plaintiff. If the court finds the case lacks merit, it may dismiss the lawsuit. Alternatively, the court may suggest that the consolidated complaint is to be amended or completely deny the defendant's motion to dismiss altogether.

If the motion to dismiss is denied, the discovery process begins. During discovery, plaintiffs' counsel can request various documents such as financial reports, balance sheets, earnings releases, interim reports, expert testimony, admissions requests for breaches, and subpoenas for parties and non-parties. The lead plaintiff, along with the lead counsel, and with the agreement of class members, may choose to settle the lawsuit either during the discovery process or near the completion of the discovery process. Additionally, after completing or during the discovery, the lead plaintiff can file a motion for class certification. However, settlement amount tend to be larger when negotiations begin after the class certification. Defendant(s) may oppose this motion based on potential conflicts of interest between the lead plaintiff and class members or the absence of loss causation. They may also appeal the court's decision to certify the class to a higher court, such as the supreme court.

At this stage, establishing the presence of abnormal return remains crucial. Failure to prove loss causation can result in the rejection of class certification, as seen in *Dura Pharmaceuticals, Inc. v. Broudo*. If the defendant successfully oppose class certification, the court may dismiss the lawsuit or defendant negotiate a smaller settlement.

If the class certification is granted, the parties typically negotiate a settlement. However, defendants often file motion for summary judgment. A successful motion for summary judgment results in a dismissal with prejudice as an outcome. Otherwise, the case proceeds to further discovery and potentially trial. It is important to note that class action lawsuits rarely go to trial, and the magnitude of the settlement usually increases at this stage.

For a certified class, a stipulation of settlement must be prepared and notified to all the class members. The stipulation should include necessary details such as the total settlement amount, the names of the lead plaintiff(s) and their counsel(s), and the

agreed-upon attorney's fee and legal expenses. The PSLRA mandates that the court approve the awarded attorneys' fees and legal expenses. Class members have the opportunity to file objections to the settlement amount or contingency fees for counsel or opt-out of the class action. If the members neither object nor opt-out, they are typically compensated pro-rata from the settlement amount and are barred from filing subsequent lawsuits against the same defendant for similar claim.

The PSLRA of 1945 provides defendant(s) with multiple opportunities to challenge the merit of lawsuit and seek dismissal, as shown in figure 1. At the same time, the PSLRA imposes challenges for plaintiff(s) in advancing their claims, reflecting its primary aim to discourage frivolous securities class action. Furthermore, the PSLRA significantly expanded judicial authority in class action proceedings. While judges are randomly assigned on these cases, they now have have the power to actively oversee various stages of litigation, including the appointment of lead plaintiff and lead counsel, the certification of the class, and the determination of reasonable attorneys' fees. Notably, judges have the discretion to reduce attorneys' fees, even if agreed upon by the class members and lead plaintiff, if they deems the fees unreasonable or excessive.

### 3 Literature review

In the spheres of law and economics, the debate related to the resolution of a lawsuit has been raised multiple times, whether the lawsuit will be settled or proceed to trial. Early scholarly articles such as Landes (1971), Gould (1973), Shavell (1982), Priest and Klein (1984) delve into the theoretical solution for the litigation game, contributing towards the theory of *divergent expectations* among litigating parties. The decision whether the plaintiff chooses to file the lawsuit and subsequently whether to settle or proceed to trial depends on the disputing parties expected outcome from the trial. These models based on the assumption of risk-neutrality of the players, focus on finding the amicable range of settlement, that can be mutually accepted by both the players. In addition, establishing that the dispute will be settled if the parties' expectations are similarly aligned. In contrast, persistent divergence in expectations among parties ends in the outcome of the trial. However, these models do not elaborate on the existence of divergent belief among litigant parties. More recent scholarly articles such as Bebchuk (1984), Spier (1992), Daughety et al. (1994) argue that the presence of information asymmetries between disputing parties causes the prevalence of divergent beliefs. This theoretical literature, focusing on players' expectation in litigation, provides us with a comprehensive understanding of strategical behavior of players in opting between settlement or trial. It lacks, however, precision in identifying key factors that influence

settlement outcome, mainly because expectations are difficult to measure. Additionally, these models may not be seamlessly applied in the scenarios of class action, hence this article adopts certain hypotheses linked to the litigation model of divergent expectations.

Moreover, the existing empirical literature in the domain of Securities class action primarily discusses the impact of Private Security Litigation Reform Act (PSLRA) introduced by the US congress in 1995 to reduce the filing of the frivolous case in securities class action. In late 2000s, after the completion of ten years of PSLRA scholars wanted to establish the casual impact of this act on the settlement outcome in class action. Scholars, including [Cox et al. \(2006\)](#), [Johnson et al. \(2007\)](#), [Cox et al. \(2008\)](#), [McShane et al. \(2012\)](#) and [Donelson et al. \(2015\)](#), investigate different aspects of the PSLRA to analyse its impact on settlement outcome.

[Cox et al. \(2006\)](#) and [Cox et al. \(2008\)](#) examine the impact of named lead institutional plaintiff, since PSLRA favour that court should consider an institutional investor as the lead plaintiff, on settlement. Thus, finding a statistically significant positive influence of the institutional lead plaintiff on the settlement amount. Further, [Johnson et al. \(2007\)](#) pick the aspect of the PSLRA that explores the role of re-statements, earning forecasts and insider trading on the likelihood of settlement. Their paper use the matching technique to analyse the likelihood of attaining settlement pre-PSLRA and post-PSLRA concentrating on the technology sector. The impact of PSLRA is significant on the likelihood of attaining settlement if the complaint indicate a restatement of the earnings by the defending company.

Furthermore, [McShane et al. \(2012\)](#) and [Donelson et al. \(2015\)](#) focus on the period post-PSLRA. Where, [Donelson et al. \(2015\)](#) establishes the relation between the settlement amount and the insurance bought by the directors. They conceptualized the model suggesting defendants aiming for settlement amount which is close to the insurance limit, in which case the defense cost and the settlement amount is borne by the insurance company. Importantly, all these papers emphasize the importance of meritness of the case justified by the presence of any strong violation on the part of defendant such as the presence of SEC investigation or any re-statement issued. [McShane et al. \(2012\)](#) and [Donelson et al. \(2015\)](#) also consider the market valuation of the defendant firm to accommodate the strength of the defendant.

More recently, scholars are increasingly interested in the crucial role played by event study methodology in securities class action. As per the judicial statutory to bring a securities class action, event study analysis is necessary to establish the presence of a

causal link between the disclosure of information and its price-impact on stocks (([Brav and Heaton, 2015](#)) and ([Fisch and Gelbach, 2021](#))). The causation of loss signifies that the prominent cause of plaintiff's injury is due to the misstatement made by the defendant. According to the *fraud on the market* theory, the stock price of a listed company in a stock market efficiently incorporates all the publicly available information. Therefore, the stock price of the companies represents the total valuation and the true status of the company. Investors invest in the company's stock price trusting the efficiency of the market. If an incorrect or fraudulent information penetrates the public domain, the stock price does not accurately represent the firm's true valuation. The investors (victims) invest in a company's stocks relying on the virtue of the stock market, whereas the stock prices are not correctly represented. The prices are either inflated or deflated. To compensate such misinformed investors, who are punished for trusting the rectitude of the stock market, they can file a securities class action lawsuit. The filing of the lawsuit requires an appropriate estimation of claim/damages. Such estimations are mainly executed by financial economists using event studies. The prevalent literature such as [Brav and Heaton \(2015\)](#), [Fisch and Gelbach \(2021\)](#) argue that the currently used event study model is not very efficient for judicial reliance. [Brav and Heaton \(2015\)](#) identify difficulties such as, low statistical power, confounding effects, and bias in using this method. Thus, concluded that the level of significance adopted by the courts are 5%. This is accepted to keep the probability of committing type 1 error low. Consequence of this is the low test power which leads in higher probability of committing type 2 error. Moreover, it is argued that due the presence of confounding effects in the price-impact, the overall price-impact is inflated. Confounding effect are difficult to distinguish from the actual price effect because of announcement. These inflated price-impact become statistically significant, resulting in the rejection of null hypothesis. On the contrary, the null hypothesis was not to be rejected, this leads in committing type 1 error. Also, the inflated price-impact leads to over-estimation of damages which may result in larger settlement compensations.

[Baker \(2016\)](#) and [Fisch and Gelbach \(2021\)](#), points in a similar direction. They argue that the level of statistical significance and the power of the test shall not be fixed for all securities lawsuit at 95% (as per current standard procedure). Rather, the level of significance and power of test should be decided depending upon the volatility of the stocks. In line with this, [Baker \(2016\)](#) focused on a high volatile period of 2007-08. And [Fisch and Gelbach \(2021\)](#), document the trade-off between power of test and confidence level. They identify the choice that courts must make. The courts can choose either non-rejection of a false null hypothesis or rejection of a true null hypothesis. Whereas

the non-rejection may result in lack of deterrence, the rejection of the same, on the other hand, leads to punishment of an innocent defendant. Generally, courts ask the experts of the respective parties to testify. In testimony, they have to submit a report that justifies the casual link between the price and the announcement. Experts confirm such justification with 95% confidence standard. It is argued that this threshold of significance level should be based on the trade-off between type 1 and type 2 errors. It is observed that for a more volatile stock, a higher magnitude of price fall must be observed to qualify it as a price-impact due to disclosure of information. Therefore, for a volatile stock price, a wider range is required. It is suggested to increase the significance level from 5% so that the smaller fluctuations due to information disclosure can be captured and this will reduce the possibility of committing type 2 error. And a lower confidence level should be used for volatile stock price and vice-versa. Thus, to assess the impact of statistical significance on the resolution of securities class actions, it is essential to include the corresponding p-value for each lawsuit as a control variable specific to this type of litigation.

Another factor which is considered to be very important in any judicial proceedings is the role of the judge which is crucial as per PSLRA. [Choi et al. \(2013\)](#) study on judicial ability in deciding on the outcome of securities class action. [Choi et al. \(2013\)](#) hypothesis that a superior judicial outcome is linked with the ability of the judges. Contrary to their believes, their analysis reported that the judges with more judicial experience (measuring the experiential ability) tend to give decision in support of approving the settlements in class action. In a civil law context, [Berlemann and Christmann \(2019\)](#) also find a positive impact of the judge's experience on the likelihood of settlement.

## 4 Data and Methodology

The empirical analysis is based on securities class action proceedings within the district courts of the USA. The comprehensive dataset comprising 1,159 lawsuits initiated between 2015 to 2018. This time frame was specifically chosen to ensure that the results are not influence by the volatility in securities litigation following the 2008 crisis ([Baker, 2016](#)). Initially, 1,241 lawsuits were identified, but 82 cases were excluded due to insufficient data availability. This final sample represents approximately 24% of the 5,187 securities lawsuits filed between 1996 and 2018. Data for these cases were sourced from the Stanford Securities Class Action Clearinghouse for certain variables, while additional variables were hand-collected from various federal court websites and Eikon(Datastream).

This exhaustive data was compiled by analyzing documents such as complaints for violations, amended complaints for violations, and U.S. district court civil docket provided on the clearinghouse website for each lawsuit. From these documents, information was extracted regarding the specific violations cited in the complaints, the number of named defendant(s), and the total exchanges between the disputing parties during the litigation period. Data on the judges presiding over these cases was gathered from the respective state or federal district courts where the lawsuits were filed. Finally, information related to the market valuation of each defendant firms was assembled from the Datasream website.

The judicial outcomes of the 1159 lawsuit culminate as either settlement, dismissal with prejudice, remands or voluntarily dismissed. Among these, a notable subset of 318 cases arrives at a resolution in which the disputing parties eventually agreed for an in-court settlement with the judge approval, hence effectively resolving the dispute. In contrast, 370 cases reach an outcome in a dismissal with prejudice ruling. This legal ruling signifies that the court has dismissed the case, accompanied by a restriction on the plaintiff's ability to bring any future claim on the same grounds. This outcome signals that the plaintiff claim lacks the necessary merit to continue the dispute against the defendant<sup>3</sup>. Further, 463 lawsuits resulted in voluntarily dismissals. This judgment is typically chosen when plaintiff and their legal representative discern insufficient evidence coupled with a high likelihood of an outcome as dismissal with prejudice. Lastly, only eight lawsuits were remanded by the court and one lawsuit went for trial.

The analytical framework relies on a logistic regression (logit) model instead of the Heckman two-step method adopted by [Grajzl et al. \(2016\)](#). [Heckman \(1979\)](#) introduced the two-step method to address the selections bias that can arises by endogenous choice of lawsuits which either proceed to trial or result in settlement. In this study, however, the entire sample of lawsuits filed during the specified range is considered, thus the sample is assumed to be free from endogenous selection. Therefore, the logit model is centered on 1159 observations of class action proceedings commenced by lead plaintiff(s) and their representatives.

The successful outcome of a lawsuit is determined by whether it results in a settlement. Settlement is an only outcome that enables plaintiff to obtain any recovery for their injuries. Conversely, if the outcome is culminated in a dismissed with prejudice or voluntary dismissal, it is deemed unsuccessful. The logit model is capable to capture the likelihood of a judgment leading to a settlement by estimating the coefficients of each explanatory variables, representing the partial effect of the variables. This is

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<sup>3</sup>see section 2

achieved by estimating the log-odds of the settlement outcome as a linear function of various control variables. This can be expressed in equation 1:

$$\begin{aligned} \log(\text{odds of OutcomeSettlement}) = & \beta_0 + \beta_1 pvalue + \beta_2 DocketEntries \\ & + \beta_3 \log Dur + \beta_4 10b + \beta_5 \log val \\ & + \beta_6 Defendants + \beta_7 Tenure + \beta_8 Female \\ & + \text{Circuit Factors} \end{aligned} \quad (1)$$

Here, the binary dependent variable *OutcomeSettlement* captures the respective judicial outcome: “1” implies a successful lawsuit resulting in settlement and “0” otherwise. Descriptive statistics of all the employed variables are provided in table 1. The model incorporates three clusters of explanatory variables to facilitate its estimation.

The first cluster examines into the meritoriousness of each case. To evaluate case quality, four case-specific control variables are employed. Within the context of securities class action, these variables include *pvalue*, *DocketEntries*, *Duration* and *10b*. The assumption is that a higher-quality lawsuit, as determined by these metrics, is more likely to result in a settlement.

The first variable from this cluster is *pvalue*. The p-value suggests the likelihood of not rejecting a false null hypothesis. In our analysis, the null hypothesis is related to the absence of abnormal return in securities class action. Abnormal return are not the normal fluctuations in the stock prices but an unexpected change that is linked to specific events, like merger announcement, restatement. Now, p-value is a measure of how likely it is that we would mistakenly conclude that there are abnormal returns when, in fact, there aren't.

In simpler terms, a smaller p-value indicate that the low chances of finding a null hypothesis to be true from the sample, meaning the event had a real impact on stock prices. This is significant because a smaller p-value implies that the likelihood of committing wrong conclusion is low. This translates in a higher level of confidence and a low chance of committing type 1 error, minimizing the probability of unjustly penalizing the innocent. Further, it proves that the event truly influences the prices and wasn't just normal fluctuations. Notably, in securities class action, the presence of abnormal return hoist preminent importance, crediting to relevance for loss causation, market efficiency and price distortion (Baker, 2016). So, when the abnormal returns are statistically significant, it plays a colossal role in establishing case's credibility and its potential for class certification.

Abnormal returns are analysed using the “event study” methodology. The event study

approach hinged on the efficient market hypothesis, wherein stock returns instantaneously mirror available public information, translating event impact immediately in stock prices (Baker, 2016). The event study unravelling the event’s impact on securities return through a juxtaposition of actual and counterfactual returns. Counterfactual returns represent the returns that would have occurred if the event had never taken place. This counterfactual return can be estimated using three models: the constant mean return model, the market-adjusted return model and market model (MacKinlay, 1997). The constant mean return model assumes a static counterfactual return equal to the pre-event period’s average, calculating abnormal returns as the difference between actual and mean returns (MacKinlay, 1997). The market-adjusted return model subtracts the market index’s average return from the stock’s return, isolating the abnormality in price arise due to the event (MacKinlay, 1997). The market model, a widely adopted approach, posits a linear relationship between a stock’s return and the market return. The baseline behavior of the stocks returns is dependent on historical price patterns and the general market movements (MacKinlay, 1997). The linear relationship is presented in equation 2.

$$R_{it1} = \alpha_i + \beta_i R_{mt1} + \epsilon_{it1} \quad (2)$$

where  $R_{it1}$  and  $R_{mt1}$  are the actual returns on the firm’s security  $i$  and market return for the period of  $t1$ .  $\epsilon_{it1}$  is the term accounts for random fluctuations, it is assumed to be normally distributed with zero mean and constant variance. The  $\alpha$  and  $\beta$  of the equation 2 is the OLS estimator of the market model when firm returns are regressed over the market return for the period of “estimation window” ( $t1$ ). The estimation window is a time frame which is used to establish the behaviour of the return (MacKinlay, 1997). Crucially, estimation window is the period before the beginning of the class period in securities class action<sup>4</sup>. Estimation period helps us establish the baseline for the company’s return behaviour. Our analysis stipulates an estimation window encompassing a minimum of 200 trading days for each defendant firm’s returns. The analysis utilizes the Nasdaq consolidated and NYSE consolidated indices as representatives of the broader market portfolio. The necessary data for these indices, as well as the daily traded prices of individual firms, are sourced from datastreaming website.

In equation 2, the coefficient  $\alpha$  which is the intercept of the equation represents the change in the stock returns of the firm independent from the market index, which implies the expected returns when the stock returns are not influence by the market,

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<sup>4</sup>Class period is a range of dates between the alleged misstatement or misrepresentation of fraud is disclosed and investor which have bought the stocks/securities during the class period are eligible to file for the class action and for recovery

whereas  $\beta$  coefficient measure the change in the firm’s stock returns which are influenced by the market in which stocks are traded.

Further, this linear baseline regression model is used to make prediction during the event window( $t_2$ ), thereby estimating the counterfactual returns. This event window comprises of event day itself; our model embraces a 20–23-day event window, comprising of 10 days pre-event and post-event, spotlighting anticipation and persistence of the impact of the event on stock returns. The last date of the class period is considered as the event date for all 1,159 lawsuits. Essentially, the estimation window and event window shall not overlap, so that the estimated parameters are not influenced by the event (MacKinlay, 1997).

Figure 2 visualizes the predicted and the actual returns of the two defendant firms during the event window. It can be seen that after the event day the fall in the actual return was much more sharp compared to the predicted return. The post-event decline in actual returns is notably steeper than the predicted trajectory, indicating a significant deviation from the expected pattern. Abnormal returns are calculated as the difference between actual and predicted returns during the “event window” (MacKinlay, 1997). Thus, the abnormal returns are presented by equation 3:

$$AR_{it_2} = R_{it_2} - \hat{\alpha}_i - \hat{\beta}_i R_{mt_2} \quad (3)$$

Next comes the cumulative abnormal return (CAR), which is the aggregation of individual abnormal returns. CAR gives a comprehensive assessment of the market reaction, hence considered as a more robust technique for analysing the market’s reaction to the event. CAR captures the cumulative effect, enhancing its power to detect significant market reactions. To access the statistical significance of CAR, we calculate p-values for each case. It is important because stock prices have a fluctuating tendency, hence it is important to calculate the level on confidence for the presence of abnormal return. However, for this purpose the normality of the daily stock returns is assumed. If it is proved that the event does not result in any impact on the returns, since it is not statistically significance in that scenario the court will not provide the class certification. The statistical significance of the abnormal return is a one of the requirements as per the rule 10b-5. Since, it can be argued that the observed change in actual stock price is just due to the daily normal fluctuation and not related to the event.

Market model has been adopted to estimate the p-value to further establish the statistical significance of abnormal returns concerning each of the 1,159 cases present in the

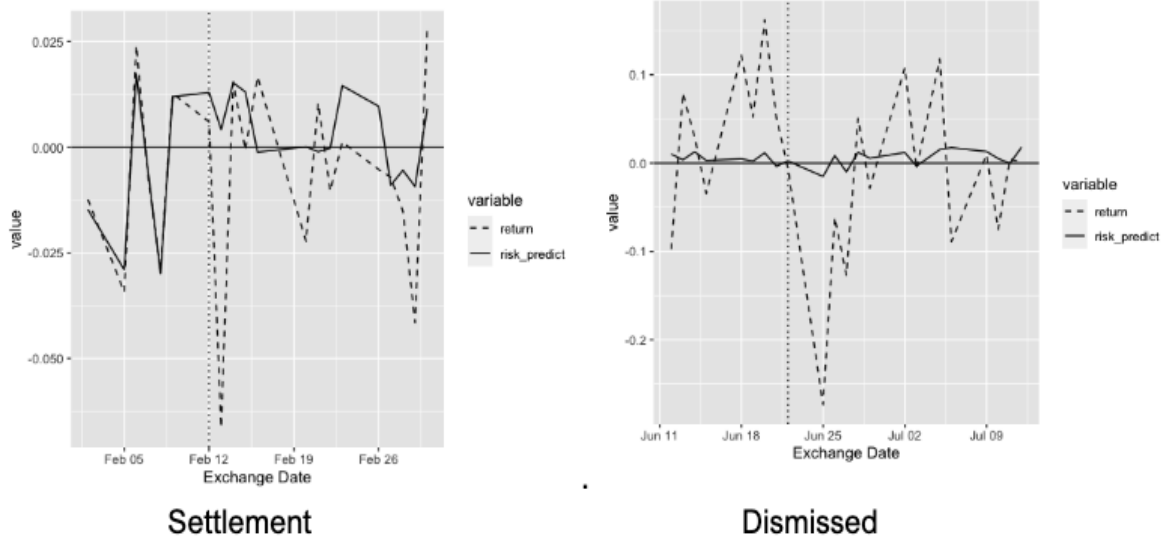


Figure 2: Predicted vs Actual

Source: Author

dataset. Smaller the estimated p-value, stronger the likelihood that the fluctuations in stock prices are influenced by the event. The average p-value equals to 0.05, although for 149 cases the estimated p-values exceed the conventional threshold of 0.05. The estimation error in these cases could arise from an imprecise event dating or due to the quality of the retrieved data. However, these 149 lawsuits demonstrate a lack of statistical evidence that an event has impacted the stock price, and thus these data points have been excluded from the regression analysis. Table 1 summarizes the p-value of the remaining 1,010 cases, with an average of 0.001, and a maximum of 0.04.

The second variable in this group is number of docket filings, denoted as *DocketEntries*. This variable serves as the proxy for the intensity of the cases, reflecting the commitment and determination of the parties involved in the legal claim. In the U.S. common law jurisdiction, the discovery process is liberal, allowing for the production of various documents and testimony, as requested by both the plaintiff’s lead counsel and the defendant’s counsel. These documents and testimonies, which may include balance sheets, financial reports, and statements from parties and non-parties, are central to the lawsuit. The discovery process, which also involves multiple hearings, results in the disclosure of information based upon requests and responses from each litigating parties (Warren III, 2011). Thus, the discovery process allows the litigating parties to reduce the information gap during the litigation procedure. This further helps the parties to

reduce the gap of divergent expectations among parties, thus encourage parties to settle the disputes (see: [Landes \(1971\)](#), [Gould \(1973\)](#), [Shavell \(1982\)](#), [Priest and Klein \(1984\)](#), [Bebchuk \(1984\)](#), [Spier \(1992\)](#), [Daughety et al. \(1994\)](#)).

Consequently, the number of docket filings indicates the frequency of exchanges between litigants. A higher count of docket filings reflects an increased interaction between the parties and more information revelation leading to convergence of beliefs entrenched from divergent expectation theories. Therefore, hypothesize that more number of docket filings increase the likelihood of settlement. The mean of this variable is around 82, indicating the average number of exchanges between the litigating parties. However, the median of 56, suggesting that the average value has been inflated by outliers. The maximum number of docket entries recorded is 1069 (Table 1). This indicates a high-intensity lawsuit that requires multiple hearings and a demand for extensive evidence and other documentation, as exemplified by *CHEN v. VALEANT PHARMACEUTICALS INTERNATIONAL, INC.*

The third variable is *Duration* which measures the number of days from the filing of the lawsuit until a judicial outcome is achieved. As discussed in section 2, securities class action are considered complex and often require the appointment of financial and other experts by the court to provide testimony. These experts appointments can prolong the duration of the lawsuit, as the preparation and the submission of expert reports often extend the litigation process ([Grajzl and Zajc, 2017](#)). However, this time consuming expert testimony, reduces the intensity of the divergence in expectations between the litigation parties, thereby increasing the likelihood of settlement(see, [Landes \(1971\)](#), [Gould \(1973\)](#), [Shavell \(1982\)](#), [Priest and Klein \(1984\)](#)).

It is hypothesized that longer lawsuit durations increase the possibility of settlement, indicating a positive effect. Further, a longer duration typically suggests that the parties have taken more time refining their strategic arguments, particularly in complex cases, reflecting a desire to secure a favorable resolution. However, lawsuit with weak merits are more likely to be dismissed at any stage of the litigation process, indicating that cases with stronger merits tend to have longer durations.

As illustrated in table 1, the median length of 498 days, which is exceeding one year, suggesting that securities class action lawsuits tend to be lengthy. The average duration for lawsuits that result in a settlement is approximately 1414 days, whereas dismissed cases and voluntary dismissals average around 705 days and 153 days respectively. The longest lawsuit lasted 4806 days, suggesting the confidence of both plaintiff and defendant in the quality of the case. The mean for this variable is 694.5 days which is greater than the median value, thus suggesting that the distribution is positively skewed. This represents that majority of the cases in the dataset have duration below the median number of days but has a tail towards longer cases.

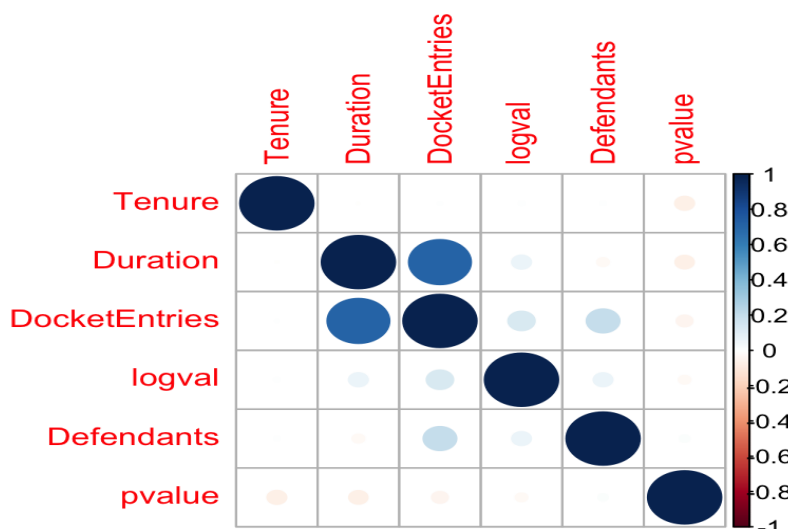


Figure 3: Correlation Matrix

Source: Author

Further, the descriptive statistics of duration indicate the presence of outliers. Additionally, figure 3 reveals high correlation between duration and the number of docket entries, suggesting potential multicollinearity. This correlation likely arises from the fact that complex and meritorious cases tends to have both a greater number of docket entries and longer duration. To reduce the impact of extreme value on the analysis, logarithmic values of the duration is considered. This adjustment reduces the influence of outliers while also resolving the problem of multicollinearity.

Lastly, *10b* variable capture if the complaint filed by the plaintiff considers a breach of section\_10b of the 1934 act. According to the existing literature, when measuring the case merit, scholar have included dummies for SEC investigations or restatements. However, this dummy captures if the defendant violated the section\_10b and this violation may increase the chance of a SEC investigation on the defending firm. Further, pleading under section 10(b) is difficult since plaintiff has to prove that defendant acted with *scienter*. McShane et al. (2012) considers the violation of rule 10-5 which comes under section 10(b), to forecast the outcome of securities class action. Thus, it can be hypothesized that the presence of pleading under section 10b increases the likelihood of reaching a settlement outcome. Table 1 indicates that the almost 53 percent of the analysed case are pleaded under the violation of section 10(b).

The second cluster of variable assesses the strength of the defendant, incorporating *logval* and *Defendants*. The variable *logval* is the logarithmic transformation of market valuation and/or total assets of defendant company. This variable measures the resources

available to the defendant, which can effect the outcome of the lawsuit (Galanter, 1974). A company with higher market valuation typically has greater financial resources to pay the compensation demanded by the plaintiffs against the injury, resulting in increasing the possibility of settlement. Thus, a higher market valuation are expected to elevates the chance of settlement. However, it can be argued that companies with higher market valuations have more resources to employ in strategic negotiations and bargaining, potentially making it harder to reach a settlement. Such firms may recruit skilled and expensive lawyer to push the case towards dismissal(Lu et al., 2012), thereby influencing the settlement decision.

The logarithm value of market capitalization is adopted to normalize the values. A brief analysis showed that this variable is positively skewed, as the mean market capitalization is \$16,491 million. Whereas, the median is \$988 million, implying a much higher mean than median. Additionally, the maximum value is \$1,729,250 million, highlight the influence of outliers. The logarithmic transformation helps in reducing such disparities to have a more balance analysis.

The second variable in this cluster, *Defendants*, represents the number of named defendants in the lawsuit. The presence of multiple defendants facilitate a higher chance of attaining settlement, as the possibility of holding at least one defendant accountable is higher compared to cases with fewer defendants. This is particularly common in securities class actions, where complaints often target not only the company but also its directors and managers. On the contrary, the multiple defendants can also increase the negotiation costs, as the settlement must be agreed upon by multiple parties(Grajzl and Zajc, 2017). Therefore, it is hypothesized that the number of defendants may either positively or negatively influence the likelihood of settlement. As observed in table 1, the average number of named defendants in the given dataset is approximately eight, with a median is seven, suggesting a moderately positively skewed distribution. The variable *Defendants* quantifies the effect of number of defendants on the settlement outcome.

The third cluster of variables delves into the characteristics of the judicial procedure. This cluster include control variables to capture the nature of the circuit-specific effect and characteristics of judges. To incorporate the characteristics of the judge overseeing the case, we have considered broadly two variable such as experience of the judge *tenure* and their gender *Female*.

The former *tenure* measures the number of years a judge has been part of the respective court. To calculate this, we begin from the year the judge was appointed at a magistrate level in the district court, tracking their journey until the year prior to filing year.

Table 1: Descriptive Statistics

Variable	Description	Prediction	Mean	Median	Min	Max
OutcomeSettlement	Settlement achieved		0.28			
<i>meritoriousness of case</i>						
pvalue	p-values using event-study	+	0.001	0.00	0.00	0.04
DocketEntries	Number of Docket Entries	+	82.17	56	2	1069
Duration	Total length of lawsuit(days)	+	694.5	498	0	4806
logDur	log values of Duration	+	5.86	6.21	0	8.47
10b	Pleading under section 10b	+	0.53			
<i>strength of defendant</i>						
logval	log values of market valuation	±	6.77	6.89	0	14.363
Defendants	Number of Defendants	+	7.99	7	2	64
<i>characteristics of judicial procedure</i>						
Tenure	Judges' experience(years)	±	14.05	13	0	51
Female	Gender of the judge(Female)	±	0.32			
Circuit 2	lawsuit filed in 2nd Circuit	±	0.23			
Circuit 3	lawsuit filed in 3rd Circuit	±	0.17			
Circuit 4	lawsuit filed in 4th Circuit	±	0.05			
Circuit 5	lawsuit filed in 5th Circuit	±	0.06			
Circuit 6	lawsuit filed in 6th Circuit	±	0.03			
Circuit 7	lawsuit filed in 7th Circuit	±	0.03			
Circuit 8	lawsuit filed in 8th Circuit	±	0.03			
Circuit 9	lawsuit filed in 9th Circuit	±	0.27			
Circuit 10	lawsuit filed in 10th Circuit	±	0.04			
Circuit 11	lawsuit filed in 11th Circuit	±	0.04			
DC	lawsuit filed in D. District Columbia	±	0.001			

A longer tenure is indicative of substantial experience with a nuanced understanding of the complex securities class action. Consequently, a judge with a considerable experience signals the ability to understand the legal conditions more accurately. This perspective, further aligns with the theory that judges consider parties' expected benefit and litigation cost when deciding the outcome(see, [Galanter \(2004\)](#), [Langbein \(2012\)](#)). For instance, a seasoned judge may be more likely to facilitate negotiations between the plaintiff and the defendant, fostering a potential path towards settlement ([Berlemann and Christmann, 2019](#)). Contrarily, it can be argued that an experienced judge may opt for a fair outcome for the investor from the judicial proceeding. Thus, a judge with such a competence will not rush to sanction the judgment with a low settlement amount and opt for a difficult path for themselves ([Choi et al., 2013](#)). Therefore, it is pertinent and valuable to inquire about the potential impact of a judge's tenure of the settlement decision. In our dataset, the average tenure of a judge is little more than 14 years, with a maximum of 51 years. The median is 13 years which is slightly lower than the mean, indicating a moderately positively skewed distribution.

This model also includes the gender of judge as a variable to investigate the impact of the gender on arranging the possibilities for settlement. Notably, our dataset comprises a total of 152 female judges and approximately 32 percent of the total lawsuits were

presided over by female judges. The variable detects if any indication of gender-related bias exists in the decision-making process of the judges belonging to different genders. This variable is considered because of the prior research finding concluding the possibility of divergent interpretations and analysis of law among different gender of judges [Croson and Gneezy \(2009\)](#). This introduces the notion that different mindset depending on the gender, have potential impact on the decision-making process. If the judge is a Female, then the variable *Female* will consider the value 1 and 0 otherwise. Additionally, for the purpose of this analysis, it has been assumed that judges are randomly assigned to cases.

Moreover, to comprehend the circuit-specific effect, dummy variables for each US circuit (including D. District Columbia) is created. The first circuit is considered as the baseline circuit for analysis. This approach enables to examine the impact of circuit-level districts courts on the possibility of achieving a settlement in class action. These dummy variables control for the different legal procedure prevalent in different circuits, regulations and interpretations pertaining to class action in various jurisdictions. We can observe that, in [table 1](#), second circuit and ninth circuit receive the most number of securities class action, with mean percentage of 23% and 27% respectively. The court level dummy for 65 courts are not considered to avoid the problem of multicollinearity and maintain the degree of freedom in analysis.

The aforementioned variables can enable the model to stimulate the log-odds for a judgment leading to a settlement outcome. These variables help the model to assess the influence of meritoriousness of the case, judicial and procedural characteristics, and defendant strength, on the chances of having a settlement outcome.

## 5 Empirical Results

### 5.1 Main Specification

The dependent variable *OutcomeSettlement* is a binary variable, hence to determine the possibility of achieving a settlement in a class action, logistic regression is utilized. This statistical method allow us to establish the factors that may influence the probability of settlement. The three aforementioned groups of variables are employed to stimulate the logit regression model.

As depicted in [Table 2](#), McFadden’s pseudo R-square reveals that approximately 50

percent of the variation in the dependent variable can be accounted by the control variables included in this model. The table display the estimated coefficients of two models: the independent variables are listed in column 2, while column 3 includes an interaction term introduced to analyze the relationship between *DocketEntries* and *logDur*. Across both the models, the qualitative consistency of most independent variables is maintained. Additionally, the interaction term variable is statistically significant at the 0.1% level but has a negative impact on the dependent variable.

For the opted model *M1* and *M2*, 4 case-specific variables and 6 case-specific variables, respectively, show a statistically significant relationship with the possibility of a settlement outcome. These significant variables span all three groups of control variables- namely meritoriousness of case, defendant strength and judicial characteristics- indicating their important role in influencing class action settlements.

The intercept term of the logistic model 1 (M1) and model 2 (M2), in table 2, represents the baseline scenario where a male judge presides over a class action lawsuit within the jurisdiction of first-circuit. The negative sign of the intercept term signals that, when all other control variables are held constant, the chance of attaining a settlement in a securities class action is quite low when a male judge overseeing the lawsuit in the first-circuit.

Among the variables categorized under meritoriousness of the case group, *DocketEntries* and *logDur* have been detected to exert statistically significant effects on the probability of achieving a successful settlement. Notably, both these variables have a positive impact of the likelihood of settlement: as the number of docket entries or the duration pertaining to a case rises, the chances of reaching a settlement also increase. This suggest that a higher number of docket entries signal that the litigants have exchanged a substantial number of documentation during the discovery process to support their respective claims. Additionally, more in-court hearings have taken place. These circumstances create a scenario where each party has a better opportunity to thoroughly understand and assess the evidence and claims presented by the opposite party. This, in essence, provide valuable information for more effective negotiations, ultimately increasing the chance to opt for settlement.

Given the specific nature of the litigation procedures in the securities class action, the discovery process and the duration of the lawsuit play a crucial role in the submission of evidence and the establishment of claims, ultimately influencing the likelihood of a settlement outcome. This aligns with the rational-choice theory of divergent expectations (see: Landes (1971), Gould (1973), Shavell (1982), Priest and Klein (1984)): the discovery process enables parties to gather more information about the claims, while

Table 2: Logistic Regression Models

	<i>Dependent variable:</i>	
	Settlement	
	(1)	(2)
pvalue	11.476 (17.334)	11.591 (18.141)
DocketEntries	0.008*** (0.002)	0.083*** (0.023)
logDur	2.107*** (0.230)	2.903*** (0.348)
Interaction		-0.010*** (0.003)
10b	0.319 (0.266)	0.229 (0.266)
logval	-0.106*** (0.036)	-0.104*** (0.035)
Defendants	0.001 (0.020)	-0.004 (0.019)
Tenure	0.023** (0.010)	0.022** (0.010)
Female	-0.358 (0.222)	-0.366* (0.222)
Circuit2	-0.378 (0.558)	-0.376 (0.575)
Circuit3	0.014 (0.597)	0.131 (0.616)
Circuit4	0.824 (0.740)	0.861 (0.772)
Circuit5	-0.379 (0.681)	-0.405 (0.705)
Circuit6	0.612 (0.777)	0.636 (0.794)
Circuit7	0.317 (0.746)	0.323 (0.760)
Circuit8	-1.820 (1.282)	-1.697 (1.221)
Circuit9	-0.346 (0.558)	-0.386 (0.575)
Circuit10	-0.375 (0.821)	-0.328 (0.842)
Circuit11	-0.049 (0.741)	-0.095 (0.760)
DC	-9.709 (620.989)	-8.321 (620.804)
Constant	-15.120*** (1.538)	-20.774*** (2.457)
Observations	1,010	1,010
McFadden-R <sup>2</sup>	0.501	0.509

*Note:*

\*p&lt;0.1; \*\*p&lt;0.05; \*\*\*p&lt;0.01

the expert reports provide additional clarity, thereby facilitating the settlement process. Further, the marginal effect of  $\log Dur$  is 20 percent, indicating that a one percent increase in the logarithmic duration of the case corresponds to a 20 percent increase in the likelihood of the lawsuit being settled, assuming other variables held constant. This suggests a positive relationship between lawsuit duration and settlement probability. However, it's important, to note that the marginal effect of  $DocketEntries$  is negligible. The *Interaction* term in model (M2) in table 2, is obtained by multiplying  $DocketEntries$  and  $\log Dur$ . Thus, it captures the combine effect of  $DocketEntries$  and  $\log Dur$  on the likelihood of a settlement outcome. The coefficient of this variable is negative, hence suggesting a negative influence on the likelihood of settlement. Intuitively, it can be said that when either of the variables, the number of docket entries or the duration of a particular case, continue to increase beyond a certain threshold, the possibility of settlement reduces.

To further deduce the marginal effect, a one percent increase in the duration of a lawsuit leads to a 27 percent increase in the chance for a settlement outcome, considering rest of the variables constant. However, this positive influence is slightly reduced by 0.1 percent under the presence of interaction term, resulting in a net impact of 26.9 percent.

A plausible explanation for this finding is that prolonged cases and numerous exchanges between parties, may lead to over-optimism about their respective claims, thereby reducing the likelihood of settlement. This aligns with the theory of divergent expectations, which suggests that increase optimism among disputing results diminishes the chances of a settlement (for e.g., [Landes \(1971\)](#), [Gould \(1973\)](#), [Shavell \(1982\)](#), [Priest and Klein \(1984\)](#)). However, the analysis reveals that the negative impact of the interaction term becomes more pronounced when the number of docket entries is particularly high, as illustrated in figure 4. Specifically, for lawsuits with more than 298 docket entries, the negative effect of the interaction term significantly reduces the likelihood of settlement beyond a certain threshold level.

That said, only 32 lawsuits in the dataset exceed 298 docket entries, meaning the overall marginal effect of this interaction term is likely to be negligible for the majority of cases, where this effect remains relatively weak. Additionally,  $M2$  confirms the robustness of the results presented in  $M1$ , as the introduction of interaction term does not substantially alter the findings.

As per the expectation,  $10b$  demonstrates a positive impact on the likelihood of attaining a settlement. This implies that a stronger case brought by the plaintiff which has multiple challenges in pleading (such as proof of loss causation, scienter, material misrepresentation or omission) is more likely to result in a settlement outcome rather than dismissal. However, the findings do not provide strong evidence favoring this hy-

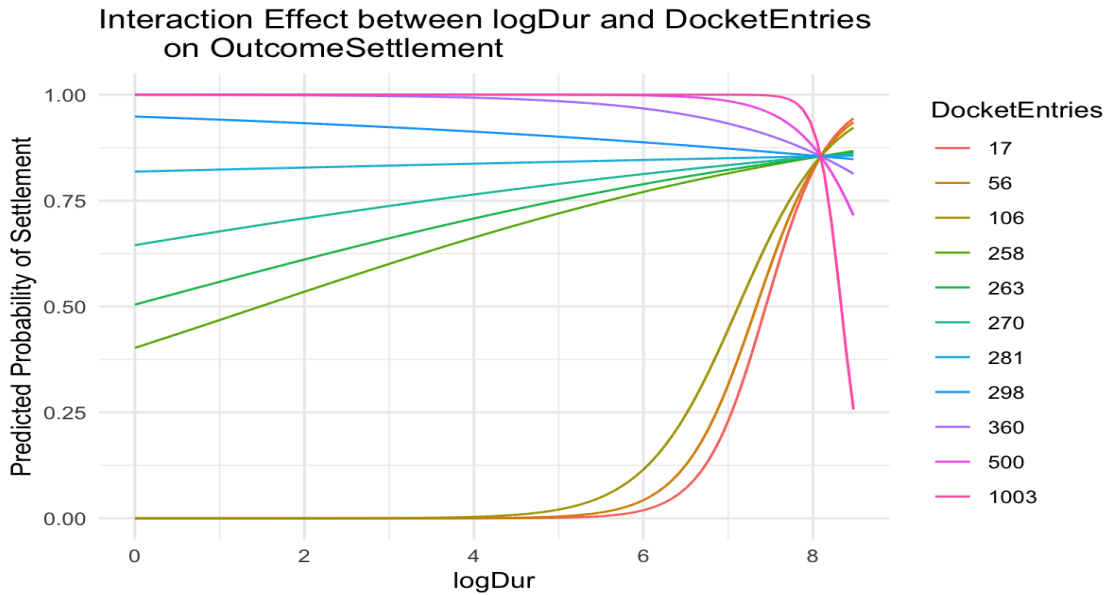


Figure 4: Interaction Effect

Source: Author

pothesis.

The fourth variable in this cluster is *pvalue*, which measure the magnitude of the statistical significance when estimating the presence of abnormal return in securities class action. The coefficient's positive sign indicates that the lower p-value is associated with an increased likelihood of settling the lawsuit. However, it's worth noting that the estimated coefficient for *pvalue* is not statistically significant. Thus, we can argue that when aiming to achieve a settlement in a securities class action, the use of p-value as a measure of meritoriousness of the lawsuit may not have a significant impact. This observation suggests that the threshold level of p-value for initiating a lawsuit to attain class certification could be lowered, potentially reducing the risk of committing a type 2 error.

Moving to the second cluster of variables which reflect the strength of the defendant, namely *logval* and *Defendant*. The coefficient of variable *logval* has been found to be statistically significant and negative, however, the coefficient of variable *Defendant* is statistically insignificant and positive. The coefficient of *logval* suggests that the settlement outcome is less likely whenever the lawsuit is filed against a firm having a higher market valuation.

To put it in perspective, a one percent change in the logarithmic market valuation of the firm corresponds to a 1 percent decrease in the likelihood of lawsuit being settled. This indicate that firms with higher market valuations may have more resources at their disposal to navigate a legal battles compared to a smaller firm, by employing

expensive and competitive lawyers(see, [Lu et al. \(2012\)](#)). Furthermore, the presence of multiple defendant in the lawsuit has an ambiguous effect on the probability of settling the lawsuit.

The third cluster of variables which pertains to characteristics of the judicial procedure, plays a crucial role in determining the outcome of the lawsuit. This cluster captures the influence of factors related to rules and regulation governing the legal process in each circuit, as well as the characteristics of the presiding judge. However, it is worth noting that the variable associated with the court’s procedure, the dummy for each circuit, do not exhibit statistical significant coefficients.

Among these variables, the *tenure* of the judge is observed to have a positive effect, suggesting the impact on the probability of settlement is positive. Indicating that an experienced judge comprehend the nuances of the legal dispute, hence facilitating the negotiations between the defendants and the plaintiffs(see, [Galanter \(2004\)](#), [Langbein \(2012\)](#)), this finding is contrary to the findings of [Choi et al. \(2013\)](#). Furthermore, this variable shows a positive impact on the likelihood of settlement. *Tenure* is statistically significant at 5% significance level.

Furthermore, the estimated coefficient for the dummy variable representing *Female* judges is also statistically significant at 10% significance level in M2. The negative sign of this variable, when combined with the baseline intercept coefficient, indicates that the presence of a female judge further reduces the likelihood of a settlement outcome. This implies that the judgments rendered by female judges do not significantly differ from those of male judges. The marginal effect for this dummy variable indicate that if the judge’s gender is female then the likelihood of reaching a settlement decreases by 3.4 percent.

## 5.2 Robustness Test

### 5.2.1 Robustness Checks

To assess the robustness of the results, a sensitivity analysis is performed using different models. Table 3 depicts the results of models estimated using only one cluster of variables (see column 2 to 4), Model 6 (*M6*) includes only variables that were statistically significant in previous model (*M1*).

We can suggest, the estimated coefficients in model *M3*, *M5* and *M6*, align with the statistically significant and direction observed in *M1* and *M2* for the controlled variables. However, the McFadden-R2 for *M4* and *M5*, is extremely low, suggesting limited explanatory variations for these models at 0.1% and 2.4% respectively.

Notably, in *M5*, the coefficients for circuit dummy variables are statistically significant.

This indicate a circuit-specific impact on the outcome of the lawsuit. The positive coefficients for circuit second, sixth, seventh and ninth are statistically significant at 10% level, signifying a positive likelihood on settlement outcome for securities class actions in these circuits.

Table 4 displays logistic models (*M7-M9*, column 2-4), which are estimated by employing two of the three clusters of variables. Column 5 and 6 estimate the coefficients using probit model. It is important to note that the direction of impact of the controlled variables is consistent between logit and probit model, the precise impact of the coefficients on the dependent variable is less illustratable in probit models.

We can observe that the effect of p-values on the likelihood of attaining settlement across all the model (1 - 9) indicate a lack of statistically significant, hence it can be established that p-values do not impact the outcome of the securities class action.

Across all the four models, the coefficients of variables *DocketEntries* and *logDur* have consistently maintained a positive impact on the dependent variable which is statistical significance. This suggests that an increased number of exchanges between both the parties and a longer duration of the lawsuit have a positive effect on the likelihood of the outcome to be settlement. The interaction term between these two variables shows highly statistically significant and a negative coefficient. Additionally, the variable presenting the strength of the defendants, *logval* consistently demonstrates a significant relation in all models where it is controlled for.

Moving on to the last cluster, minimal changes are observed in estimated coefficient of *Tenure* across model 6 and 7 while comparing with Model 1 and 2. However, remarkable variations arose in estimated model such as model M5 and M9, where the circuit-level dummy variables demonstrate statistical significant on the outcome variable. Notably, in these two models, variables related to the case merit such as *logDur* and *DocketEntries*, are excluded.

*logDur* gauge at the lawsuit's length and *DocketEntries* at the official entries made by the court clerk, encompassing major events such as all documents filed during the lawsuit, number of hearings, and other relevant actions. If we consider circuits of district and federal courts as a treatment variable, it can be argued that *logDur* and *DocketEntries* act as the confounders for the circuit-level factors ((Epstein and Martin, 2014); (Chopra, 2022)). In essence, the introduction of these variables influencing the impact of circuit factor on the outcome. It is witnessed that with the exclusion of *logDur* and *DocketEntries* alters the estimated coefficients of the circuits rendering them statistically significant.

The theoretical reason for this confounding can be explained as, each circuit has its

Table 3: Robustness Checks 1

	<i>Dependent variable:</i>			
	Settlement			
	(3)	(4)	(5)	(6)
pvalue	15.323 (16.019)			
DocketEntries	0.007*** (0.002)			0.008*** (0.002)
logDur	2.063*** (0.217)			2.080*** (0.218)
10b	0.209 (0.241)			
logval		-0.012 (0.026)		-0.104*** (0.035)
Defendants		-0.0001 (0.012)		
Tenure			0.012* (0.007)	0.021** (0.010)
Female			0.034 (0.153)	
Circuit2			0.740* (0.382)	
Circuit3			0.311 (0.400)	
Circuit4			0.093 (0.483)	
Circuit5			-0.099 (0.480)	
Circuit6			0.962* (0.503)	
Circuit7			0.955* (0.504)	
Circuit8			-0.659 (0.709)	
Circuit9			0.683* (0.380)	
Circuit10			-0.199 (0.572)	
Circuit11			0.122 (0.535)	
DC			-12.169 (376.941)	
Constant	-15.294*** (1.398)	-0.850*** (0.209)	-1.591*** (0.381)	-14.940*** (1.423)
Observations	1,010	1,010	1,010	1,010
McFadden-R <sup>2</sup>	0.478	0.001	0.024	0.489

Note:

\*p<0.1; \*\*p<0.05; \*\*\*p<0.01

Table 4: Robustness Checks 2

	<i>Dependent variable:</i>				
	Settlement			<i>probit</i>	
	(7)	<i>logistic</i> (8)	(9)	(10)	(11)
pvalue	14.055 (17.177)	12.785 (16.255)		7.164 (9.632)	6.597 (10.070)
DocketEntries	0.008*** (0.002)	0.008*** (0.002)		0.004*** (0.001)	0.046*** (0.012)
logDur	2.105*** (0.227)	2.066*** (0.220)		1.218*** (0.126)	1.653*** (0.184)
Interaction					-0.006*** (0.002)
10b	0.299 (0.251)	0.243 (0.256)		0.205 (0.150)	0.141 (0.152)
logval		-0.103*** (0.035)	-0.015 (0.027)	-0.063*** (0.020)	-0.061*** (0.020)
Defendants		0.004 (0.020)	0.008 (0.013)	0.003 (0.011)	0.003 (0.011)
Tenure	0.022** (0.010)		0.012* (0.007)	0.012** (0.006)	0.012** (0.006)
Female	-0.347 (0.220)		0.042 (0.154)	-0.177 (0.013)	-0.198 (0.127)
Circuit2	-0.484 (0.557)		0.770** (0.384)	-0.227 (0.305)	-0.245 (0.316)
Circuit3	0.003 (0.594)		0.321 (0.400)	-0.002 (0.326)	0.058 (0.339)
Circuit4	0.734 (0.731)		0.103 (0.484)	0.447 (0.408)	0.484 (0.429)
Circuit5	-0.469 (0.676)		-0.078 (0.481)	-0.229 (0.377)	-0.265 (0.392)
Circuit6	0.361 (0.773)		0.994** (0.506)	0.430 (0.433)	0.439 (0.446)
Circuit7	0.143 (0.737)		0.975* (0.505)	0.199 (0.412)	0.184 (0.423)
Circuit8	-1.949 (1.263)		-0.657 (0.711)	-0.906 (0.704)	-0.945 (0.670)
Circuit9	-0.426 (0.556)		0.709* (0.381)	-0.174 (0.305)	-0.222 (0.316)
Circuit10	-0.483 (0.817)		-0.180 (0.573)	-0.225 (0.455)	-0.208 (0.469)
Circuit11	-0.220 (0.738)		0.159 (0.538)	-0.036 (0.414)	-0.095 (0.427)
DC	-10.065 (620.217)		-12.154 (377.417)	-2.101 (103.153)	-1.348 (103.081)
Constant	-15.645*** (1.496)	-14.732*** (1.439)	-1.575*** (0.424)	-8.674*** (0.841)	-11.773*** (1.294)
Observations	1,010	1,010	1,010	1,010	1,010
McFadden-R <sup>2</sup>	0.493	0.486	0.024	0.498	0.507

*Note:*

\*p&lt;0.1; \*\*p&lt;0.05; \*\*\*p&lt;0.01

own unique procedural rules and regulations. Consequently, the duration of a lawsuit may also be influenced by the circuit in which a lawsuit has been filed. For instance, if a lawsuit has been filed in a circuit which is known for taking longer time on average in announcing the judgment, this can potentially impact the true effect of the circuit on the outcome of the lawsuit. The positive coefficients for the second, sixth, seventh and ninth circuits imply that cases filed in these circuits have a higher chance of settlement compared to the baseline first-circuit.

From, table 1 is can be deduced that almost 50 percent of the total cases were filed in circuits second and ninth between 2015-2018. According to a 2019 report by cornerstone research, between 1997 and 2018, an average of 53% of securities class action cases were filed in the second and ninth circuits between 1997-2018. Thus, it can be argued that judges in these two circuits, irrespective of there tenure and gender, are more competent in facilitating settlement outcome. Moreover, there are multiple precedents in these circuits enhances the possibility of reaching settlement. Notably, circuits second and ninth demand for pre-trial discovery, this may create a nudge for the defendant to demand for early settlement. The circuit second, covering New York, a financial hub, sees a high volume of cases because most of the securities lawsuits are filled in the jurisdictions of the defendant company, while the ninth-circuit is considered to be plaintiff-friendly circuit after the 2007 Tellabs ruling, this contributes to increase in fillings (Chen et al., 2023).

### 5.2.2 Bootstrapping Analysis

In the model, the variable *pvalue* is an estimated parameter, and to ensure the robustness of this variable, a bootstrapping procedure has been conducted. Bootstrapping involves creating multiple datasets of same size as the original dataset through random sampling with replacements. Since the original dataset is considered to be the representation of the entire population of lawsuits, the bootstrapped samples, which are random selections from the original accumulated data, also serve as reasonable representations of the entire population (Efron, 1992).

After generating bootstrap samples, the model is re-estimated using each of the newly created resampled datasets. This allow us to observe the variations in the estimated co-efficient for the *pvalue* across different samples. The distribution of the estimated co-efficient for variable *pvalue* obtained from 1000 and 10,000 bootstrap resampling is presented in Figure 5. The 95% confidence intervals for these distributions are (-17.11, 46.36) for the 1000 resampling and (-17.89, 44.76) for the 10000 resampling, respectively. The estimated co-efficient of the original model falls within the confidence intervals and

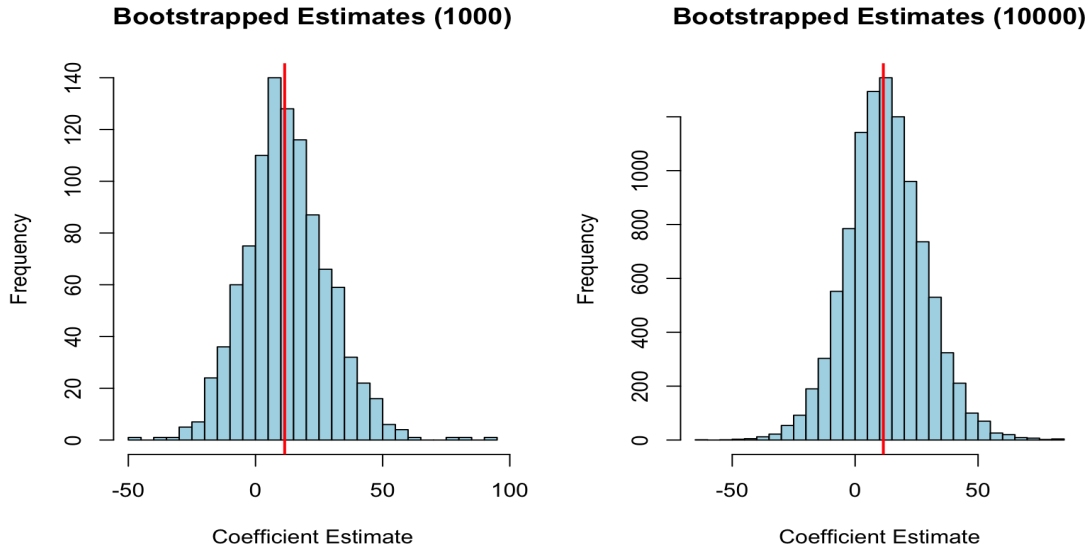


Figure 5: Bootstrapping pvalue

Source: Author

is close to the most frequently occurring estimated co-efficient in the bootstrap distributions. This indicated that the co-efficient is stable.

## 6 Summary and Conclusion

To obtain the comprehensive understanding of whole flux encompassing settlement outcome in class actions, it is crucial to know the key factors influencing these decisions. This knowledge is immensely important for all the stakeholders involved such as lead plaintiff, defendants, lead counsels and class member. In this paper, our objective is to shed light on the vital determinants that influence the likelihood of settlement by scrutinizing variables related to case merit, strength of defendants and the characteristics of judicial procedure.

In our analysis, we identified that some variable are consistent with the theory of divergent expectation, thus emphasis the significance of this theory is securities class actions. Further, the two variables related to case merit that have a significant impact on settlement probability: the number of docket entries and the total length of the lawsuit. Our research reveals a positive influence of these variables on the possibility of attaining a settlement. For instance, an increase in either the number of docket entries or length of the lawsuit corresponds to an augmentation in the chance of settlement outcome. This

signals that a more liberal discovery process may enhance the likelihood of settlement. In contrast to Ulen (2011), the findings suggest that the prolonged discovery process can result in reducing the chances of recovery in the meritorious claims.

Similarly, complaints filed under the breach of section 10(b) also show an increase in chance of settlement. This finding could be particularly relevant for policymakers, as it suggests that cases which are difficult to plead, such as those under section 10(b) of 1934 act, may be more likely to encourage settlement outcome. This is because successfully pleading a breach under this section is difficult, which could deter plaintiff from bringing frivolous lawsuit while simultaneously enhancing the chance of settlement for legitimate claims. However, a balance is required between deterring frivolous cases and ensuring access to justice when creating legal frameworks.

Despite these insights, it is important to note that the co-efficient of this dummy variable is not statistically significant. In our sample, 53 percent of lawsuits plead under section 10b, yet only 233 of these lawsuits resulted in settlement. This relatively low number of settled cases under section 10(b) reduces both the magnitude and the statistical significance of its co-efficient. Further, while the coefficient of variable *pvalue* in the model positively influence the settlement likelihood, although the corresponding co-efficient is not statistically significant. Contrary to Ulen (2011) the finding suggests that courts have sophisticated filtration process against the frivolous cases. Thus, the policy recommendation could be to reduce the unofficial threshold level of establishing the presence of abnormal returns. As the findings indicate that while courts may consider cases with higher *pvalue* values, lower statistical significance on the presence of abnormal returns, other factors are likely more influential in determining case outcome. Overall, the variables in this category show that lawsuits with strong merits are more likely to facilitate a settlement than those with weaker claims.

Further, contrary to the initial hypothesis, the market capitalization symbolizes the financial strength of the defendant, shows a negative impact on possibility of attaining settlement. This implies that affluent or large firms may be more inclined to allocate substantial resources to their defence rather than acceding to plaintiffs' demand.

The third aspect focuses on the characteristics of judicial procedure, analysing the factors that may influence the outcome of the lawsuits that are related to the the courts in which lawsuits are filed. Our empirical evidence has favored the hypotheses that the judges with more experience in the court exhibit a better ability to arrange for settle-

ments in class action compared to judge with relatively less experience. Additionally, the empirical analysis highlights that no difference persists on the bases of the gender in deciding the case outcome, indicating that both male or female judges tend to make almost similar decision when it comes to class action litigation.

These findings rest on the fact that the judges are randomly assigned to cases. However, one could argue that more experienced female judges are more likely to be assigned cases with higher case-merit, which are more likely to result in settlements. Therefore, further research could explore whether securities class actions are assigned based on judges' experience, and this line of inquiry could be extended to examine potential gender biases in case assignments. Coming to other judicial characteristic, circuits - specifically second, sixth, seventh and ninth - showed a higher likelihood of settlements that compared to baseline of the First circuit. The coefficients of these circuits are positive and significant when the confounding factors were not included in the model. Thus, one the significant challenge is to isolate the circuit specific effect from local precedents and case filing patterns unique to each circuit. Another limitation emerge due to the resource-intensive data collection process. The data collected suffers from the problem of selections bias. Thus, future research should focus on enlarging the data to mitigate such bias. Additionally, the research could look into the factors that can influence the duration in such lawsuits, scholars have frequently adopted a method of competing risk regression to assess the determinants of duration.

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