# The effects of IPO firms’ characteristics on SEC reviews of IPO registration statements

# Abstract

# This study investigates how a host of IPO firm characteristics affect the extensiveness of SEC reviews of S-1 filings, as indicated by the duration of the IPO process, the number of comment letters issued by the SEC on each S-1 filing, the number of comments within comment letters and the number of themes commented upon the initial S-1 filings issued by the SEC. This study identifies that the SEC spend more time reviewing S-1 filings, issue more comment letters, more comments and wider range of themes for initial S-1 filings prepared by bigger IPO firms. Older IPO firms experience longer SEC review duration and receive more comment letters. Regarding the impact of IPO firms’ business complexity, the results reveal that SEC reviews are likely to be more extensive when reviewing IPO firms who have greater complexity in their business. In terms of financial health, IPO firms having a higher probability of bankruptcy are identified to have longer SEC reviews, receive more comment letters, more comments and more themes in the comment letters. More profitable IPO firms are also observed to experience longer SEC reviews. The results also reveal that shorter review times are experienced by IPO firms using more external financing. With regard to auditor quality, this study observes shorter reviewing time and fewer comments are experienced by IPO firms audited by Big4 auditors. Overall, the findings suggest that SEC reviews are likely to be more extensive when IPO firms display characteristics that indicate potential deficiencies in the informational quality of their IPO registration statements. In addition, the results suggest that IPO firms incur higher cost of remediation when receiving comments on core accounting issues, non-core accounting issues, business issues, and disclosure issues, as compared with other issues. Furthermore, comments on core accounting issues are observed to have the highest cost of remediation. The results also suggest that, during the period of the global financial crisis, SEC reviews became disproportionately more extensive for bigger IPO firms, IPO firms having higher external financing, and IPO firms with a higher probability of bankruptcy.

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* 1. **Introduction**

This study aims to examine how the extensiveness of SEC reviews of S-1 filings, as indicated by the duration of the SEC, the number of SEC comment letters, the number of comments and the range of themes mentioned in the letters, relates to IPO firms’ characteristics. S-1 filings are registration statements prepared by firms going public in the U.S., which provide information about the initial-public-offering (IPO) firm’s financial health, business strategy, competitive advantage in their industry and financial prospects. The U.S. Securities and Exchange Commission (SEC) is an independent agency of the United States federal government, whose key responsibility is conducting a careful review of IPO firms’ prospectuses in order to ensure that IPO firms are reporting “meaningful financial and other information to the public” (SEC, 2013). In almost every comment letter, SEC reviewers express that “…the purpose of our review process is to assist you in your compliance with the applicable disclosure requirements and to enhance the overall disclosure in your filing”.

Generally speaking, SEC reviews of IPO registration statement play an important role since they aim to improve disclosure quality within U.S. IPO markets. The IPO environment is characterised by high levels of information asymmetry which may induce IPO firms to make insufficient or misleading disclosures to maximise the proceeds of the offering (Li & Liu, 2017). Therefore, understanding SEC review process for S-1 filings, especially the determinants of the review (e.g. IPO firms’ characteristics), is important since investors rely on the information discloses through S-1 filings when making investment decisions. S-1 filings typically contain an extensive amount of intangible information about the IPO firm’s future strategy and possible problems which will likely affect investors’ evaluations (Loughran & McDonald, 2013).

Public interest theory, developed by Pigou (1932), suggests that regulatory bodies are neutral and aim to protect the interests of society as a whole, rather than those of individuals in weak and inefficient markets. There are a growing number of studies providing evidence that SEC reviews are sensitive to firms’ characteristics as indicators of potential informational deficiencies. For example, prior research identify that SEC reviews of corporate disclosure are likely to more extensive for bigger firms (Cassell et al., 2013; Cassell et al., 2019; Cunningham & Leidner, 2019; Eiler & Kutcher, 2016; Ertimur & Nondorf, 2006; Heese et al., 2017; Johnston & Petacchi, 2017; Li & Liu, 2017; Wang, 2016), perhaps because bigger firms are likely to be more complicated (Boone et al., 2013; Chaplinsky et al., 2017) and more likely to display reporting violations (Correia, 2014).

In terms of firm age, older firms, who might have greater weaknesses derived from their diversified and complicated operations (Chaplinsky et al., 2017; Doyle et al., 2007), are identified to experience more extensive SEC reviews (Baugh et al., 2017; Cassell et al., 2013; Chen & Johnston, 2010; Colaco et al., 2018; Heese et al., 2017; Johnston & Petacchi, 2017). Concerning business complexity, empirical findings demonstrate that firms with greater complexity in their businesses, who have greater sales growth, more business segments, and who conduct restructuring and M&A activities, attract greater SEC scrutiny (Baugh et al., 2017; Cassell et al., 2013; Duro et al., 2017; Heese et al., 2017; Wang, 2016), perhaps because these firms have a weaker informational environment and low reporting quality (Cassell et al., 2013; Jiang et al., 2005).

With regard to financial health, prior research provides evidence that SEC reviews of corporate disclosures are more extensive for firms with complex financial issues or potential issues related to financial health as indicated by higher leverage (Duro et al., 2017; Ryans, 2015), greater probability of bankruptcy (Cassell et al., 2013), firms with positive earnings (Baugh et al., 2017; Wang, 2016) as they are more likely to be disclosing misleading earnings numbers in order to attract investors (Teoh et al., 1998a), and firms with lower external financing (Baugh et al., 2017; Cassel et al., 2013; Heese et al., 2013; Wang, 2016) who might have lower disclosure quality and reporting compliance (Ettredge et al., 2011; Lang & Lundholm, 1993; Wang, 2016).

Regarding auditor quality, SEC reviews are observed to be less extensive for firms audited by high-reputable auditors (Cassell et al., 2013; Cassell et al., 2019; Colaco et al., 2018) suggesting they mitigate reporting problems (Ball & Shivakumar, 2008; Chang et al., 2008; Johnston & Petacchi, 2017; Li & Liu, 2017 and Venkataraman et al., 2005). Finally, the strength of corporate governance arrangements has also been found to play an important role. Prior empirical findings suggest that firms with weak corporate governance, e.g. exhibiting CEO-chairperson duality, tend to experience more extensive SEC reviews (Cassell et al., 2013; Ettredge et al., 2011; Heese et al., 2017; Robinson et al., 2011) since they are likely to have more potential reporting deficiencies (Dechow et al., 1996; Ettredge et al., 2011; Ertimur and Nondorf, 2006; Robinson et al., 2011).

While a number of existing studies explore how firm characteristics affect the extensiveness of SEC reviews, as mentioned above, these research mostly examine SEC reviews of annual filings (e.g. 10-K, 20-F, 40-F), 8-K filings, proxy statement filings and filings other than IPO registration statements (i.e. S-1 filings). Findings from the above studies might not generalise to SEC reviews of S-1 filings since S-1 filings contain the information that is more specific to the securities offering. More closely related to this study, Ertimur & Nondorf (2006) examine effects of IPO firms’ managerial expertise and their corporate governance on SEC reviews on S-1 and SB-2 filings and identify that higher managerial expertise is likely to reduce the number of themes mentioned in SEC comment letters. Another related study is that of Colaco et al. (2018), who examine the determinants of IPO waiting periods, including the impact of information uncertainty and industry or market characteristics. They identify that firms with greater ex-ante information uncertainty, higher underpricing, and poorer post-IPO performance are likely to have experienced longer waiting periods, which include the period of their SEC review.

This study differs from Ertimur & Nondorf (2006) and Colaco et al. (2018) in three aspects. First, this study examines a broader range of IPO firm characteristics potentially impacting SEC reviews of S-1 filings than merely IPO firms’ managerial expertise, corporate governance (Ertimur & Nondorf, 2006) and industry or market characteristics (Colaco et al., 2018). Second, this study employs a more recent sample period, which covers recent and important regulatory changes which are likely to have substantially affected SEC reviews, e.g. the Dodd Frank Act in 2010 and the JOBS Act in 2012. Third, while Ertimur & Nondorf (2006) examine SEC reviews of S-1 and SB-2 filings, this study focuses only on S-1 filings in order to maintain consistency within the sample and the content analysis. SB-2 is a simplified version of S-1 filings which provides less detailed information about the IPO firm.

A further related study is Agarwal et al. (2017), who examine SEC comment letters during a more recent period 2010 to mid-2014. However, their study focuses on the style of SEC comment letters (e.g. tone, percentage of quantitative items), but not the intensity of SEC reviews. Differently to Agarwal et al. (2017), this study examines differences in the intensity of SEC reviews, which more closely relates to the effectiveness of their review activities, rather than merely the style of their reviews.

Motivated by (1) the importance of understanding SEC reviews of S-1 filings, (2) the paucity of research on how the broad range of IPO firm characteristics affect the intensity of SEC S-1 reviews, specifically, (3) the lack of research on S-1 filings in general, and (4) the lack of research on the impact of recent regulatory changes on S-1 reviews, e.g. the Dodd Frank Act, this study examines the key research question: ‘How do IPO firm characteristics affect SEC reviews of IPO registration statements?’. To answer the key research question, six broad categories of IPO firm characteristics are considered in this study, namely company size, company age, business complexity, financial health, auditor quality and corporate governance.

A sample of 909 U.S. IPO firms filing S-1 registration statements during the period 12th May 2005 to 31st December 2017 is employed. Four proxies are employed to measure the intensity of SEC reviews, namely: the duration of the IPO process; the number of SEC comment letters; the number of comments; and the range of themes covered within comment letters. Multivariate tests with negative binomial regressions are used to examine relationship between SEC S-1 reviews and IPO firm characteristics. In addition, this study also investigates how issue types mentioned in SEC comment letters affect remediation costs faced by the IPO firm, and whether the global financial crisis of 2008-2009 has any moderating effect on the sensitivity of SEC reviews to IPO firm characteristics.

The results show that bigger IPO firms are likely to: experience longer SEC reviews; receive more comment letters; more comments; and comments on a wider range of themes. Older IPO firms are also identified to experience a longer SEC review duration and receive more comment letters. This study also observes that SEC reviews are likely to be more extensive for firms having greater business complexity. Specifically, a wider range of themes in SEC comment letters is observed for IPO firms having more business segments. Firms conducting M&As are also likely to receive more comments and comments on a wider range of themes. However, the duration of SEC reviews is identified to be longer for IPO firms having lower sales growth who might have less business complexity, perhaps expressing the SEC’s concern that these firms are incentivised to manipulate downward their sales in order to qualify for EGC status under the JOBS Act.

The results also show that the extensiveness of SEC reviews is greater for firms with poor financial health or with potential issues related to the reporting of financial health, as SEC reviews appear to be shorter for IPO firms using more external financing and having positive reported earnings. IPO firms with higher bankruptcy risk are also identified to experience longer SEC review duration, receive more comment letters, more comments and more themes covered in the SEC letters. IPO firms not audited by Big4 auditors are also observed to experience longer SEC reviews and receive comments on a wider range of themes. Overall, the results highlight that SEC reviews of S-1 filings are more extensive for bigger and older firms, firms having more business segments, lower sales growth, firms conducting M&A activity, with less external financing, positive earnings, greater financial distress and are not audited by high-quality auditors.

Moreover, as compared with other possible issues highlighted in SEC comment letters, comments on core accounting issues, non-core accounting issues, business issues and disclosure issues are observed to result in higher remediation costs, and the costs are highest for comments on core accounting issues. Furthermore, this study identifies that, during the period of the global financial crisis, bigger IPO firms, IPO firms having higher external financing, and IPO firms having higher a probability of bankruptcy are more likely to experience greater SEC review extensiveness.

This study contributes to the extant literature by providing new and broad evidence about how IPO firms’ characteristics affect SEC reviews of S-1 filings. Prior research on the determinants of SEC reviews of IPO registration statements only identify impacts from a narrow range of firm characteristics. e.g. IPO firms’ managerial expertise (Ertimur & Nondorf, 2006), the financial crisis (Colaco et al., 2018), and the impact of technology industries and hot markets on the duration of the IPO process (Colaco et al., 2018). Therefore, findings in this study extend the literature by providing evidence on a much broader range of factors. In particular, it is the first to shed light on the impact of company size, firm age, sales growth, the number of segments, financial distress, external financing activities, M&A activities, profits and dual CEO and chair on the extensiveness of SEC S-1 reviews, specifically. These findings are important since they provide a better understanding of SEC reviews of S-1 filings, which is useful to investors, auditors and other stakeholders who rely on SEC reviews to ensure the high quality of S-1 filings, to facilitate their decision-making. In addition, this study, to some extent, provides IPO issuers with the knowledge of how to speed up SEC review processes. For example, regarding the choice of auditors, the findings suggest that IPO issuers should choose high-quality auditors (e.g. Big 4) to perform audit procedures could shorten IPO approval process. However, the issuer should bear in mind the audit fee premium associated with appointing a Big 4 auditor.

This study also contributes by providing evidence on the sensitivities of SEC S-1 reviews to IPO firms’ characteristics during a more recent period. This is important given important regulatory changes, e.g. the 2010 Dodd Frank Act and the 2012 JOBS Act. In addition, this study also deepens the understanding of the widespread effects of the global financial crisis 2008 – 2009 by providing evidence that SEC reviews are more likely to be more extensive for firms having potential issues in their reporting and funding activities during the financial crisis. Furthermore, this study provides managers and other IPO participants with more information about remediation costs in connection to SEC reviews by identifying that each type of issue mentioned in SEC comment letters is subject to the different levels of remediation cost. Finally, this study also contributes by providing a new coding scheme, which is a useful tool for future research on issues relating to SEC reviews of S-1 filings.

The remainder of this chapter is organised as follows. Section 3.2 reviews the relevant empirical literature. Section 3.3 discusses the data collection and methodology. The empirical results are presented and discussed in Section 3.4, while Section 3.5 concludes the chapter.

* 1. **Literature review**

Public interest theory, developed by Pigou (1932), suggests that regulatory bodies aim to protect the interests of the public as a whole rather than those of any individuals. He argues that the regulatory bodies aim to serve the public interest when they are required by the public to intervene, monitor and reform inefficient practices. Two main assumptions of public interest theory are that (1) markets are very weak and inefficient, and (2) regulatory bodies are neutral arbiters. Applying public interest theory, Godfrey et al. (2010) express that regulatory bodies will intervene in firms’ disclosure processes in order to correct wrongdoings in information reporting, to protect investors, and to gain the confidence of all market participants. Nevertheless, public interest theory might not hold in the real world, as regulatory bodies could be captured by big firms (Stigler, 1971) or lobbied by interest groups (Watts & Zimmerman, 1978).

In support of public interest theory, the prior literature provide evidence that SEC reviews can uncover existing or potential informational deficiencies, such as information uncertainty (Colaco et al., 2018; Chen & Johnston, 2010), low disclosure quality (Lowry, 2020; Schuldt & Vega, 2018), weak corporate governance (Cassell et al., 2013; Ertimur and Nondorf,, 2006; Ettredge et al., 2011), and can improve the quality of the information environment (Li & Liu, 2017; Lowry, 2020; Schuldt & Vega, 2018).

The literature investigating the determinants of SEC reviews of firm disclosure is diverse. For the sake of brevity, this study outlines empirical findings in relation to the research questions: How do the IPO firm’s characteristics affect SEC reviews of IPO registration statements? Specifically, this section addresses how SEC reviews are influenced by company size, age, business complexity, financial health, auditor quality and corporate governance quality.

**Company size**

Company size has long been argued to influence regulatory oversight, as Skinner (1994) suggests that bigger firms might attract greater regulatory scrutiny. Ettredge et al. (2011) suggest that corporate compliance with accounting and disclosure regulation is associated with company size. Boone et al. (2013) identify that bigger firms have greater complexity and diversity. Chaplinsky et al. (2017) also find that bigger firms tend to disclose more information. The SEC (2006) state that, in accordance with SOX Section 408 paragraph (b), the Division of Corporation Finance shall take company size, based either on market capitalization (SOX section 408 criterion 3) or the level of impact on a sector of the economy (SOX section 408 criterion 5), as a key criterion for selecting companies for periodic review. Correia (2014) suggests that bigger firms are more likely to violate federal securities laws, and consequently are identified to have greater probability of SEC enforcements.

Regarding the impact of company size on the extensiveness of SEC reviews, Cassell et al. (2013) identify that bigger firms are more likely to receive SEC comment letters on 10-K filings, experience longer SEC reviews (duration from the first comment letter to the ‘‘no further comment’’ letter) and receive more comment letters from the SEC. Similarly, Cassell et al. (2019) find a positive relationship between company size and the number of days in SEC review duration and the number of SEC letters on 10-K filings. Wang (2016) identify that the probability of receiving an SEC comment letter on segment disclosures and amending current reports is higher for bigger firms. Likewise, Eiler & Kutcher (2016) also find that bigger firms are more likely to receive PRE-related comment letters.[[1]](#footnote-1) Johnston & Petacchi (2017), Duro et al. (2017), Heese et al. (2017) and Cunningham & Leidner (2019) also identify that bigger firms have a higher probability of receiving comment letters on 10-K filings.[[2]](#footnote-2)

Li & Liu (2017) provide evidence that IPOs receiving comment letters on S-1 and SB-2 filings are bigger than those not receiving comment letters. Lowry et al. (2020) show that bigger firms are likely to receive longer comments about revenue recognition, capitalization, liquidity and risk factor issues (in terms of the number of words). Examining IPO registration statements, Ertimur & Nondorf (2006), find a positive relationship between company size and the range of themes in comment letters on S-1 and SB-2 filings. Overall, prior research supports the view that SEC reviews of corporate disclosures are likely to be more extensive for bigger firms.

The first hypothesis, therefore, is stated in an alternative form, as follows.

***H1­­­alternative:*** *SEC reviews of IPO registration statements are likely to be more extensive for bigger issuers.*

**Company age**

Chaplinsky et al. (2017) identify that older IPO firms are likely to disclose more information. Doyle et al. (2007) observe that the older firm tends to have weaknesses as they are more likely to have weaknesses in their accounting transactions. In line with the expectation that greater scrutiny in the review process might be experienced by older firms, Cassell et al. (2013) find that older firms are more likely to receive comment letters on 10-K filings and also experience higher cost of remediation as indicated by the number of comment letters received during the review process. Similarly, Chen & Johnston (2010) and Johnston & Petacchi (2017) provide evidence that the probability of receiving comment letters on 10-K filings is higher for older firms.

IPO firms receiving comment letters on 10-K filings are observed to be older than those not receiving any comment letter (Cassell et al., 2013; Heese et al., 2017). Likewise, Baugh et al. (2017) identify that the sample of firms receiving comment letters on their annual fillings are more mature than the sample of all firms on the Compustat database. Focusing on the IPO process, Colaco et al. (2018) observe that longer IPO waiting periods, which includes SEC review process, are likely to be experienced by older firms. Taken together, these findings indicate that older firms are likely to receive more extensive SEC reviews.

Therefore, the second hypothesis, stated in an alternative form, is as follows.

***H2alternative:*** *SEC reviews of IPO registration statements are likely to be more extensive for older issuers.*

**Company complexity**

According to Baugh et al. (2017), Cassell et al. (2013) and Duro et al. (2017), company complexity is greater for firms with higher sales growth, more reporting segments, and for firms conducting restructuring and M&A activities. Cassell et al. (2013) also suggest that company complexity may decrease the quality of financial disclosures. Jiang et al. (2005) identify that firms with greater expected growth are likely to be operating under conditions of higher information uncertainty, which might attract more SEC scrutiny (Chen & Johnston, 2010; Colaco et al., 2018; Ertimur & Nondorf, 2006). Heese et al. (2017) also state that firms with high sales growth rates, indicating high growth expectation (Jiang et al., 2005), are often targeted by the SEC for review.

Cassell et al. (2013) find evidence that high complexity increases the extensiveness of SEC reviews of 10-K filings. Specifically, the authors identify that, compared with firms not receiving any comment letters, firms receiving letters have greater business complexity as they have more business segments, and are more likely to conduct restructuring and M&A activities. They also observe that the SEC provide more comment letters for firms conducting M&A activities and wider ranges of themes in the comment letters for firms having more business segments. Likewise, Baugh et al. (2017) also observe that the sample of firms receiving comment letters on their annual fillings more frequently restructure their operations and conduct M&A than the sample of all firms on the Compustat database.

Heese et al. (2017) identify that the probability of receiving an SEC comment letter on 10-K filings is higher for firms conducting restructuring or M&A, who may have more complexity in their business. Similarly, Duro et al. (2017) find evidence that after May 12th, 2005 when SEC began publishing their comment letters and firms’ correspondence, the probability of receiving an SEC comment letter on 10-K filings is higher for firms conducting M&A. Wang (2016) observes that firms engaging in restructuring activities are more likely to have deficient disclosures as they receive comment letters addressing deficiencies in segmental reports, and are more likely to amend (or commit to amending) the reports. The authors also identify that firms with deficiencies in segmental disclosures are more likely to conduct M&A activities. In general, the empirical findings reveal that the SEC increase the extensiveness of their review for firms with greater complexity in their businesses.

The third hypothesis, therefore, is stated in an alternative form, as follows.

***H3alternative:*** *SEC reviews of IPO registration statements are likely to be more extensive for issuers with greater complexity in their business.*

**Financial health**

Building on prior work, this study focuses on firm leverage, financial distress, profitability and needs for external financing as indicators of firms’ financial health. Regarding firm leverage, Healy & Palepu (2001)argue that firms with high leverage ratios are likely to employ accounting methods to boost their profits. Filatotchev (2019) also suggest that leverage ratios are positively associated with the degree of earnings management. In line with arguments about the negative effects of firm leverage on disclosure quality, Ryans (2015) identify that the probability of receiving comment letters on 10-K filings is greater for firm with higher leverage. Likewise, Duro et al. (2017) present evidence that after the SEC began publishing their review correspondences in 2005, firms with higher leverage (i.e. have higher debt levels) are more likely to receive SEC comment letters on 10-K filings.

Concerning financial distress, Schwartz & Soo (1995) observe that more reporting deficiencies are conducted by firms that are close to bankruptcy. The authors also identify that firms in financial distress are less likely to ensure reporting compliance. Begley et al. (1996) also find that as compared with firms who do not have financial distress, distressed firms are more likely to commit fraud. Brazel et al. (2009) and Dechow et al. (1996) find that firms in financial distress are more likely to be noncompliant with GAAP. Similarly, Ettredge et al. (2011) suggest that firms in financial distress are less able to comply with reporting requirements as revitalizing profitability catches their managerial attention and is also their priority when investing their meagre financial resources. Supporting potential reporting problems driven by corporate financial distress, Cassell et al. (2013) identify that firms with a higher probability of bankruptcy have a higher probability of receiving SEC letters and also receive more comment letters on 10-K filings perhaps because they use their financial resources more sparingly when responding to comment letters (Ettredge et al., 2011).

With regard to profitability or the value of earnings, Teoh et al. (1998a) suggest that IPO firms often manipulate accounting information to report more positive earnings, in order to attract investors, during the IPO year. Burgstahler & Dichev (1997) and Degeorge et al. (1999) also argue that exceeding positive earnings thresholds incentivises firms to manage their earnings numbers. Bushman & Piotroski (2006) posit that the SEC is more susceptible to political issues derived from financial reporting scandals associated with overstatement rather than understatement of earnings numbers. Supporting the potential negative consequences of incentives to report positive earnings, Wang (2016) identifies that firms receiving SEC comment letters addressing deficient segment reports have higher abnormal profit than those not having the reporting deficiencies. Baugh et al. (2017) observe that the sample of firms receiving comment letters on their annual fillings typically report higher profits than the full sample of firms on the Compustat database.

In terms of external financing needs, Ettredge et al. (2011) and Lang & Lundholm (1993) identify that disclosure quality and reporting compliance are higher when firms have previously issued debt or equity securities. Wang (2016) suggests that firms with funding from external resources (e.g. equity or bond offerings) are likely to develop a more transparent information environment in order to reduce the cost of capital. In agreement with arguments about the positive information effects of external financing, Cassel et al. (2013) find that, as compared with firms not receiving comment letters, firms receiving letters on 10-K filings are less likely to require funding from outside the firms by issuing debt or equity securities. Cassel et al. (2013) and Heese et al. (2013) also identify that firms who have obtained external financing have lower probabilities of receiving comment letters on 10-K filings. Similarly, Wang (2016) find that firms receiving comment letters about segmental disclosure deficiencies are less likely to require external financing than those not receiving comment letters. Baugh et al. (2017) also identify that firms receiving comment letters on their annual fillings rely less on external financing than a sample of all firms on the Compustat database.

Overall, prior research provides evidence that SEC reviews of IPO registration statements are more extensive for firms with financial problems or deficiencies, as indicated by higher leverage, greater probability of bankruptcy, positive earnings, and lower external financing.

This thesis therefore states the fourth hypothesis in an alternative form, as follows.

***H4alternative:*** *SEC reviews of IPO registration statements are likely to be more extensive for issuers having more fragile financial health.*

**Auditor quality**

According to Healy & Palepu (2001), in the U.S., one of the key targets of auditing services is ensuring firms’ compliance with accounting regulations when preparing financial reports. Johnston & Petacchi (2017) and Li & Liu (2017) suggest that firms that are audited by Big 4 auditors tend to be of lower risk and have more standard reports. Ball & Shivakumar (2008) suggest that earnings numbers reported prior to IPOs are likely to be more conservative, explaining that it is likely due to increased auditor monitoring. Similarly, Venkataraman et al. (2005) suggest that aggressive income-increasing earnings management may be constrained by high quality auditors. Filatotchev et al. (2019) provide evidence that firms tend to have lower abnormal accruals when they are audited by high-quality auditors (i.e. Big 6, Big 5 or Big 4 auditors). Chang et al. (2008) also observe that higher quality auditors (i.e. Big 4 auditors) are more likely to mitigate accounting problems.

Consistent with the argument that Big 4 auditors constrain informational deficiencies, Cassell et al. (2013) find evidence that being audited by a Big 4 auditor reduces: the probability of receiving an SEC comment letter; review durations; the number of comment letters; and the range of themes mentioned in comment letters on 10-K filings. Cassell et al. (2019) also observe that firms audited by Big 4 auditors experience lower remediating costs as indicated by the duration of review process and the number of comment letters on 10-K filings. Johnston and Petacchi (2017) report that firms audited by Big 4 auditors are less likely to receive comment letters on 10-K filings. Focusing on IPO firms, Colaco et al. (2018) provide evidence that high-quality auditors decrease the duration of the IPO process. Taken together, these findings suggest that SEC reviews are less extensive for firms audited by high quality auditors.

The fifth hypothesis, therefore, stated in an alternative form, is as follows.

***H5alternative:*** *SEC reviews of IPO registration statements are likely to be less extensive for issuers that are audited by a Big 4 auditor.*

**Corporate governance[[3]](#footnote-3)**

Brazel et al. (2009) suggest that poor quality corporate governance is likely to result in impaired monitoring of corporate disclosure quality and hence increases the chance of fraud. Desai et al. (2006) identify that firms having a CEO who is simultaneously the chair are likely to have low quality of corporate governance. According to Dechow et al. (1996), firms conducting earnings management are more likely to have CEO-chair duality. Ettredge et al. (2011) also identify that low quality corporate governance, due to CEO-chair duality, is likely to decrease disclosure compliance. Robinson et al. (2011) identify that firms having a CEO who simultaneously serves as the chair have greater disclosure deficiencies. Examining IPO firms’ corporate governance, Ertimur and Nondorf (2006) suggest that the board’s ability to monitor is likely to be impaired if a member of management serves as the chair.

Robinson et al. (2011) identify that firms with weak corporate governance, as indicated by CEO-chair duality, receive more comments in the SEC letters. Ettredge et al. (2011) consistently observe that the probability of receiving a comment letter is lower when firms have separation between the CEO and chair position. Cassell et al. (2013) provide evidence that lower quality corporate governance, proxied by CEO-chair duality increases: the probability of receiving an SEC letter; the range of themes addressed in SEC letters; the review duration; and the number of comment letters issued to firms on their 10-K filings. Heese et al. (2017) identify that firms receiving SEC letters on 10-K filings are more likely to have CEO-chair duality. Taken together, these findings indicate that firms with weak corporate governance, as indicated by CEO-chair duality, are likely to experience a more extensive SEC review.

The sixth hypothesis is therefore specified, in an alternative form, as follows.

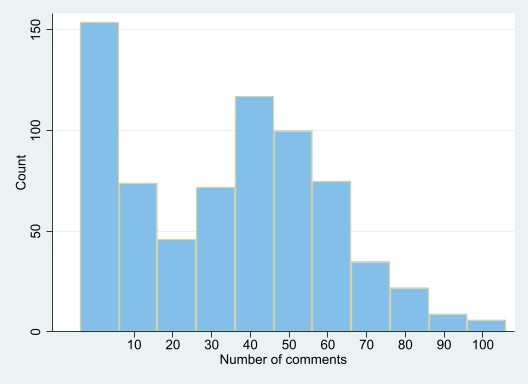
***H6alternative:*** *SEC reviews of IPO registration statements are likely to be more extensive for issuers with duality between the CEO and Chair positions.*

* 1. **Research design**
  2. **Sample selection**

Employing the Thomson Reuters Eikon database, the initial sample is formed from the population of IPOs who filed their registration statements during the period 12th May 2005 to 31st December 2017 on NASDAQ, NYSE and American Stock Exchange (AMEX).[[4]](#footnote-4) Following previous studies in the IPO context, this study includes only IPO firms offering common shares, and eliminates IPOs with offering price less than $5 per share, American Depositary Receipts (ADRs) and financial firms, unit issues and simultaneous offerings (Gounopoulos and Pham, 2017, 2018; Lee, 2011; Li and Liu, 2017; Sletten et al., 2018). Since the focus is on the S-1 review process, IPO filing registration statements on forms (e.g., SB-2, S-3) other than S-1 are excluded to ensure the consistency within the sample.

The final sample contains 909 IPO firms. Of these, 710 IPO firms receive SEC comment letters on their initial S-1 filings, consisting of 24,205 comments. Figure 1 demonstrates the distribution of the number of SEC comments in initial SEC comment letters relating to the IPO sample. The initial comment letter from the SEC most frequently comprises fewer than 10 comments, as illustrated in Figure 1, but the range varies from fewer than 10 comments to more than 100 comments, suggesting a substantial cross-sectional dispersion in the number of comments.

Figure 1. Histogram illustrating the number of SEC comments in initial SEC comment letters



SEC comment letters are manually collected from the EDGAR database.[[5]](#footnote-5) The date of initial S-1 filings and IPO effective dates are manually collected from EDGAR database. Accounting data are obtained from the Compustat North America while corporate governance data are collected from Thomson Reuters Eikon.

* 1. **Coding of SEC comment letters**

To examine the types of issues mentioned in the initial SEC comment letters, manual content analysis of themes is performed on a training sample of comments from initial comment letters,then Naïve Bayes machine learning is employed to code the full sample of 710 SEC comment letters.[[6]](#footnote-6) Most research examining themes in SEC comment letters conduct manual coding and therefore examine only a small sample. For instance, Ertimur & Nondorf (2006) carry out manual coding on 95 SEC comment letters addressing issues in S-1 and SB-2 filings, and Johnston & Petacchi (2017) manually code 157 SEC comment letters addressing issues in 10-K and 10-Q filings. While coding conducted by human coders may have higher level of accuracy, it has two main limitations including; small sample size due to concern about cost and time-consumption, and problems with reliability due to the subjective nature of the coding (Core, 2001). Especially, limited sample size may lessen the power of empirical tests as well as the possibility to generalise the findings.

An alternative technique, which may transcend the limitations of human coders, is computer-aided content analysis (Li, 2010). This approach is less costly and less subjective than manual coding. Specifically, this study employs statistical inference basing on some specific machine learning algorithm to infer and categorise coding units in a text (Manning & Schütze, 1999; Mitchell, 2006).

The detailed coding process, including design of coding scheme, application of Naïve Bayes algorithm and validation of Naïve Bayes algorithm, is presented as follows.

**Design of coding scheme**

Aself-constructed coding scheme for initial SEC comment letters is designed in order to capture issues mentioned in SEC comment letters. This process begins by following the standard coding procedure with 5 main stages as developed by Weber (1985). In the first stage, recoding units are defined as themes in each specific comment in the initial SEC comment letters. In each comment, the theme provides information about a certain issue relating to the information quality of initial S-1 filings, as evaluated by the SEC. The comments are extracted from each initial SEC comment letter by following the procedure presented in Appendix 3.2.

In the second stage, a random sample of 20 comment letters are chosen and themes are defined for each specific comment in the 20 comment letters. The themes are determined by identifying keywords in each paragraph of the comment. Keywords in each comment in the initial SEC comment letters are identified and subsequently, these keywords are sorted into groups which represent distinct themes. A name is then given to each key-word group to define the theme. These themes are then summarised to provide a mutually exclusive definition and code for each. In total, 45 distinct thematic codes are developed (Appendix…).

The thematic codes representing issue types are then grouped into seven general categories including; Core-accounting issues, Non-core-accounting issues, Offering Issues, Business Issues, Corporate Governance Issues, Disclosure Issues and No issues, based on the general context in which the thematic codes are used as well as the list of main chapters and sections within S-1 filings, as required by the SEC. The coding scheme is then tested on another random sample of 20 initial SEC comment letters in order to identify whether further refinement is required (e.g. if there are themes which have been overlooked). Percentage distributions of SEC comment topics are presented in Table 1 in the training dataset. Detailed definitions of the comment topics are provided in Appendix 1. Based on the self-constructed coding scheme, a sub-sample of 4,806 comments from a random sample of 261 comment letters are manually coded. Of those, 17.69% of comments are labelled as core-accounting issues (A), 10.61% as offering issues (C), 31.88% as business issues (D), and 29.88% as disclosure issues (F). Comments on non-core-accounting issues (B), corporate governance issues (E) and other issues (G) combine to a small percentage of the SEC comments with the total value less than 14%. The total value of 79.45% in categories A, D, F indicates that the majority of the SEC comments are about accounting, business and disclosure issues.

**Table 1. Percentage distributions of SEC comment topics in the training dataset**

|  |  |  |
| --- | --- | --- |
| **Code** | **Issue types** | **Percentage of issue types** |
| **A. CORE-ACCOUNTING ISSUES** | | **17.69%** |
| A1 | Assets | 2.08% |
| A2 | Liabilities | 0.65% |
| A3 | Equity | 1.77% |
| A4 | Income | 2.31% |
| A5 | Expense | 4.58% |
| A6 | Earnings | 0.67% |
| A7 | Other financial items | 1.27% |
| A8 | Accounting-related transactions/events | 4.37% |
| **B. NON-CORE-ACCOUNTING ISSUES** | | **4.26%** |
| B1 | Pro forma financial information | 2.48% |
| B2 | Non-GAAP measure | 1.00% |
| B3 | Internal controls | 0.31% |
| B4 | Claims, Commitments and Contingencies | 0.48% |
| **C. OFFERING ISSUES** | | **10.61%** |
| C1 | Characteristics of offering | 2.02% |
| C2 | Proceed | 1.52% |
| C3 | Parties of offering | 2.77% |
| C4 | Effect of offering | 0.37% |
| C5 | Risk factors (offering) | 0.50% |
| C6 | Offering-related document | 3.43% |
| **D. BUSINESS ISSUES** | | **31.88%** |
| D1 | Products/Services | 2.31% |
| D2 | External stakeholders | 3.95% |
| D3 | Business activities | 6.37% |
| D4 | Competition | 1.37% |
| D5 | Material Agreements | 3.23% |
| D6 | Properties and Facilities | 2.21% |
| D7 | Risk factors (business) | 5.08% |
| D8 | Results of operation | 5.70% |
| D9 | External reports | 1.27% |
| D10 | Status | 0.40% |
| **E. CORPORATE GOVERNANCE ISSUES** | | **6.91%** |
| E1 | Managers | 1.33% |
| E2 | Related parties' transactions | 1.25% |
| E3 | Organizational structure | 0.89% |
| E4 | Compensation | 3.14% |
| E5 | Employee | 0.29% |
| **F. DISCLOSURE ISSUES** | | **29.88%** |
| F1 | Technical information | 1.08% |
| F2 | Abstract word | 1.35% |
| F3 | Tone | 0.56% |
| F4 | Selective disclosure | 1.08% |
| F5 | Completeness | 10.04% |
| F6 | General information | 6.82% |
| F7 | Inaccurate/inappropriate disclosure | 3.39% |
| F8 | Disclosure too outdated, generic, or too detailed | 2.31% |
| F9 | Relevance | 1.41% |
| F10 | References | 0.29% |
| F11 | Format | 1.52% |
| **VII. OTHER ISSUES** | | **2.39%** |
| G1 | Other issues | 2.39% |
|  | **TOTAL** | **103.62%** |
| This table reports the percentage distributions of 4806 comments in training data set which are manually coded into 7 groups of issue types containing 45 issue types of S-1 filings. The 4806 comments are extracted from random sample of 261 initial SEC comment letters. Total percentage across 45 issue types exceed 100% since some comments are classified into more than one types of issue. | | |

**Application of Naïve Bayes Algorithm**

The specific type of machine learning algorithm employed in this study is the Naïve Bayesian machine learning algorithm. The Naïve Bayesian algorithm, which is a probabilistic machine learning model based on Bayes theorem, is commonly used in area of text classification (Ryans, 2014).[[7]](#footnote-7) Employing the Naïve Bayesian algorithm, this study categorises each comment in SEC comment letters into a particular type of issue or thematic code as developed in the self-constructed coding scheme. The Naïve Bayes algorithm classifies the issue type of a comment in an SEC comment letter based on the frequencies of single words or phrases in the comment.

Using the aforementioned training dataset, the remaining 16,440 comments are coded applying the Naïve Bayes algorithm, with the support of the WEKA machine learning software. The text of each comments in the training dataset and remaining dataset are first cleaned following the cleaning process outlined in Appendix 3.2. Each comment is then categorised as relating to one of the 45 individual codes in the coding scheme. Specifically, under the Naïve Bayes algorithm, each comment is first converted into a set of words or word phrases (*vector of words or phrases*). Following that, a model is trained by measuring, in each issue type as classified in training dataset, the relative frequency of each single word or phrase. Bayes’ theorem is then applied to determine the type of each comment as that with the highest conditional probability given the words and/or phrases contained in the comment, as follows.

where denoted issue type i developed from the training dataset (, is a vector of words or phrase in “unknown” comment *j* in the remaining dataset (), denotes the issue type categorised for comment *j* in the remaining dataset.

An important assumption in the Naïve Bayes algorithm, where the adjective “Naïve” comes from, is that the probability of a feature does not affect the probability of other features in the dataset. This assumption makes the calculation of the algorithm simpler and mitigates the issue of the “curse of dimensionality” (Bellman, 1961). Therefore, this study assumes that the probability of the occurrence of each word or phrase is mutually independent.[[8]](#footnote-8) The computation of the Naïve Bayes algorithm with support of WEKA machine learning software is presented in more detail in Appendix 3.3.

**Validation of the Naïve Bayes algorithm**

To evaluate the effectiveness of the Naïve Bayesian learning algorithm conducted the training dataset, this study applies two methods including training error and N-fold stratified cross validation. Regarding training error test applied to 4,806 comments within the training dataset, untabulated findings suggest that the overall training error is less than 10%. The finding indicates that in excess of 90% of the time, the Naïve Bayes algorithm will accurately categorize issue types mentioned in SEC comment letters.

The N-fold cross-validation method with N equal to 3, 5, 10, 25, 50 and 75 are applied to the training dataset.[[9]](#footnote-9) For example, when N equal 10, the training dataset is divided into ten parts with in which each part has approximately the correct proportion of each of the class values. 10 experiments are implemented and in each experiment, a part is employed as test data and 9 remaining parts are used as training data. Finally, average results of success rate over 10 experiments are calculated, indicating the accuracy level of the Naïve Bayesian learning model that is applied to predict the classification of comments in the training dataset.[[10]](#footnote-10) Table 2 shows the average correct classification rate for the six distinct values of N.

As shown in Table 2, when N = 3 and a SEC comment is classified into an issue types out of 7 possible issues types as defined in Appendix 1, the Bayesian algorithm has an approximate 64.93% success rate in the N-fold cross-validation, indicating that the training sample of SEC comments are correctly classified 64.93 % of the time. If we group the 7 issue types into 4 categories including corporate-function-related issue (categories A, B, D and E), offering issues (categories C), disclosure issues (category F) and other issues (category G), the success rate increases to 72.48%. Similarly, when 3-category classification is created by combining categories A, B, C, D and E into corporate-activity-related issue and using category F as disclosure issues and category G as other issue, the Bayesian algorithm achieves a success rate of 76.85%. In general, the N-fold cross-validation tests show that the Bayesian learning algorithm achieves a good classification rate. [[11]](#footnote-11) When N is increased from 3 to 75, these results remain consistent. In addition, baseline accuracy shows the successful rates of 71.41%, 77.41% and 80.27% for 7-category classification, 4-category classification and 3-category classification, respectively. The wider range of themes included in a coding scheme, the more likely the coding accuracy is reduced (Eskin & Bogosian, 1998; Long et al., 2009). Long et al. (2009) achieve successful rates of 87.6%, 67.1% and 47.7% when employing their Naïve Bayes algorithm with 2, 5 and 10 categories, respectively. Similarly, Li (2010) reports that increasing from 3 to 12 categories reduces the accuracy of Naïve Bayes algorithm from 63% to 2%.

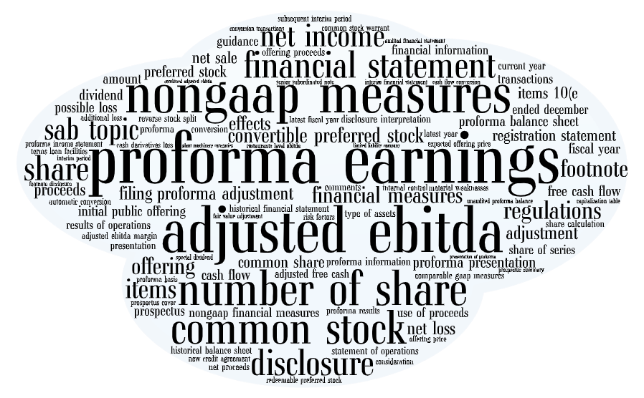
**Table 2. N-fold Cross-Validation Test**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **N** |  | **7 categories** |  | **4 categories** |  | **3 categories** |
| 3 |  | 64.93 |  | 72.48 |  | 76.85 |
| 5 |  | 65.33 |  | 73.1 |  | 76.93 |
| 10 |  | 65.38 |  | 73 |  | 76.73 |
| 25 |  | 65.53 |  | 72.94 |  | 76.53 |
| 50 |  | 65.31 |  | 72.96 |  | 76.61 |
| 75 |  | 65.29 |  | 72.98 |  | 76.63 |
| Baseline accuracy |  | 71.41% |  | 77.41 |  | 80.27 |
| This table outlines the results of N-fold cross-validation tests for the Naive Bayes algorithm. For each N, the average rate of correct classifications is provided. Specifically, the algorithm divides each sentence into N classifications and then reports the results of N-fold tests. The number of folds (N value) range from 3 to 75. N-fold cross validation tests are reported for 7-category, 4-category and 3-category classifications.7-category classification include core accounting issues (Code A); non-core accounting issues (Code B); offering-related issues (Code C) business-related issues (Code D); corporate-governance-related issues (Code E), disclosure-related issues (Code F) and other issues (Code G). For 4-category classification, code A, B, D, E are combined as corporate-function-related issue. For 3-category classification, code A, B, C, D, E are combined as corporate-activity-related issue. Baseline accuracy of each classification is also reported in the table. | | | | | | |
|  |

For presentation purposes, this study designs a word cloud of each SEC comment topic where the cloud highlights top 100 salient terms. The size of a term reflects how salient it is to the topic. Following the Nguyen (2014) methodology, this study measures the saliency of a term by calculating how frequently a term occurs in a document divided by the total number of terms in the document. It then multiplies the term frequencies (TF) with Inverse Document Frequencies (IDF), a weight indicating how often a word is used across documents.

As shown in Figure 2, the most salient root terms in topic A (Core accounting issues) are “financial statement”, “fair value”, “asc”, etc., whereas the most salient terms within topic E are “named executive officer”, “board of director”, “compensation committee”, etc. As expected, there is a similarity of key terms within a topic and a distinction of key terms between topics.

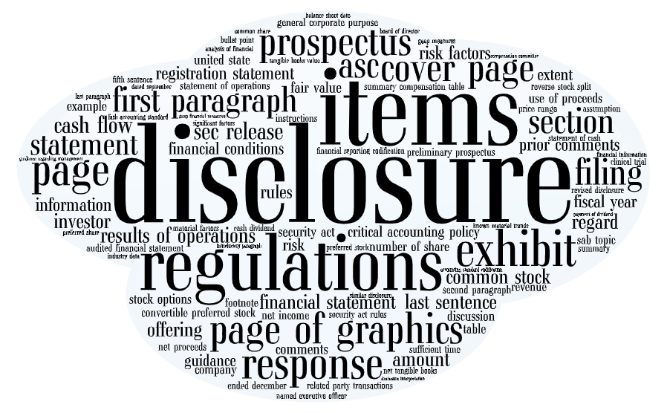
Topic A. Core accounting issues Topic B. Non-core accounting issues

Topic C. Offering issues Topic D. Business issues

Topic E. Corporate governance issues Topic F. Disclosure issues

Topic G. Other issues



* 1. **Key variables**
     1. **Content of SEC comment letter**

The range of themes (#*Themes)* in the initial SEC comment letters is employed in this study as a proxy of the content of SEC comment letters

*#Themes* is calculated by counting the number of issues types mentioned in the initial SEC comments letters. If the SEC do not issue comment letters for the initial S-1 filings, or they do not issue any comment letters during their review process, or they do not provide detailed comments in their letters due to matters relating to compliance with the SEC regulations, #*Themes* is set equal zero. The data of *#Themes* is obtained from the coding of the SEC’s comment letters by applying the Naïve Bayes algorithm as mentioned in Section 3.3.2.

* + 1. **IPO firms’ characteristics**

Following Cassell et al. (2013), Duro et al. (2017), Heese et al. (2017) and Johnston & Petacchi (2017), a number of proxies for IPO firm characteristics are employed, including; company size (*Size),* company age (*Age),* business complexity (*Sales growth, Segments, Restructuring, M&A)*, financial health (*Leverage, Zscore, External financing, Positive earnings),* auditor quality (*Big 4)*, CEO-chairperson duality (*CEOchairperson),*

Specifically, regarding company size, this study measures *Size* as total assets reported in the fiscal year immediately prior to the filing year of the initial S-1 filing (year t-1) (Duro et al., 2017). A positive relationship is expected between *Size* and each SEC review attribute.

As for *Age,* this studyfollows Heese et al. (2017) in calculating this proxy as the period between year t-1 and the year when data for the IPO firm first appeared on the Compustat database. This thesis also expects a positive relationship between *Age* and SEC review attributes.

In terms of company complexity, this study measures *Sales growth* as the percentage change in annual sales from year t-2 to year t-1 (where year t=0 is the IPO filing year). *Segments* is calculated as the number of non-empty and unique segment industry codes as reported on Compustat. *Restructuring* is an indicator variable reflecting whether IPO firms engage in restructuring activities or not. This variable equals 1 if the firm has non-zero restructuring costs on a pre-tax basis in year t-1, and 0 otherwise (Cassell et al., 2013; Heese et al., 2017). Similarly, *M&A* is an indicator variable reflecting whether IPO firms engage in merger and acquisition activities or not. This variable equals 1 if the firm has non-zero M&A costs on a pre-tax basis in year t-1, and 0 otherwise (Cassell et al., 2013; Heese et al., 2017). It is expected that SEC review attributes are positively related to *Sales growth, Segments, Restructuring,* and *M&A.*

Regarding financial health, this study calculates *Leverage,* which is an indicator of the IPO firm’s debt level, as the ratio of total liabilities to total equity in year t-1 (Duro et al., 2017). *Zscore*, which is an indicator of the firm’s financial distress, is measured by employing the modified Z-score model for private companies developed by Altman (2013) as follows

where: is current assets of firm i in year t-1 ; is current liabilities of firm i in year t-1; is retained earnings of firm i in year t-1; is earning before interest and tax of firm i in year t-1; is book value of equity of firm i in year t-1; is total assets of firm i in year t-1 and is total liabilities of firm i in year t-1. A Z-score of higher than 5.85 indicates that the IPO firm has a low risk of bankruptcy. A score of lower than 4.35 indicates that the IPO firm is in financial distress and is likely to go into bankruptcy, while scores in between 4.35 and 5.85 indicate a very first signal for possible bankruptcy (Altman, 2013). *Positive earnings,* which is an indicator of IPO firms’ profitability, is measured as an indicator variable which equals to 1 if the firm has net income in year t-1 equal to or higher than zero (Hesse et al., 2017), and 0 otherwise. This thesis calculates *External financing*, which is an indicator of IPO firm’s funding activities via new borrowing and stock issue, by using the following equation:

where: is sales of common and preferred stock of firm i in year t-1, is purchases of common and preferred stock of firm i in year t-1; is dividend made by firm i in year t; is long-term debt issued by firm i in year t-1, is long-term debt reduction of firm i in year t-1 and is change in current debt of firm i in year t-1. It is expected that SEC review attributes are positively related to *Leverage, Positive earnings* but negatively associated with *Zscore* and *External financing.*

Regarding auditor quality, this study measures *Big4* as an indicator variable which equals 1 if the IPO firm is audited by Big 4 auditors, namely Ernst & Young, Deloitte & Touche, KPMG, and PricewaterhouseCoopers (Johnston & Petacchi, 2017), and 0 otherwise. *Big 4* is expected to be negatively associated with SEC review attributes.

Regarding corporate governance quality, *CEOchairperson* is measured as an indicator variable which equals 1 if the IPO firm has a CEO who is also the chairperson of the board of directors in year t-1, and 0 otherwise (Hesse et al., 2017). Because the data obtained from Thomson Reuters Eikon is used to construct the variable *CEOchairperson,* there area considerable number of missing values. Therefore, this study follows Hanlon et al. (2003) and Cassell et al. (2013) and set missing value of *CEOchairperson* to 0. This thesis expects that *CEOchairperson* is positively correlated with SEC review attributes.

* + 1. **Empirical tests**

Negative binomial regressions are employed to examine the impact of IPO firms’ characteristics on SEC review attributes. As stated by Greene (2012), a variable is discrete if the set of its values is finite or countable and these values are obtained by counting its occurrence. In this study, main dependent variable *#Themes* is discrete because it has finite values obtained through the counts of hemes in each SEC comment letters. According to Rock et al. (2000), negative binomial regression outperforms other methods in estimating cross-sectional regression on discrete-count dependent variables. Likewise, Colaco et al. (2017); Li & Liu (2017) and Schuldt & Vega (2018), who use similar dependent variables to this study (e.g. the duration of IPO process, the number of SEC revenue recognition comments), employ negative binomial regressions.

This study employs negative binomial regression to estimate the following baseline model.

where definitions of these variables are discussed in Section 4.2 and Appendix 1. Following Cassell et al. (2013), industry fixed effects and year fixed effects are included to control for systematic variations in SEC review attributes across different years and two-digits SIC industries.[[12]](#footnote-12) In addition, following Colaco et al. (2018) and within-cluster correlation test, standard errors are robust and clustered at the two-digits SIC industry level.[[13]](#footnote-13) The results reveal that within each two-digit SIC industry cluster for *#Themes,* there are significant correlations across the observations. The test results favour clustering the standard errors at the industry level. Therefore, when estimating Equation 3.4, standard errors are clustered at the industry level in order to mitigate possible correlations across IPO firms within a given industry (Petersen, 2009; Rogers, 1994).[[14]](#footnote-14) The standard errors are also robust to potential heteroskedasticity.

* 1. **Sample descriptive statistics**
     1. **Sample distribution**

Panel A of Table 3.4 presents the sample distribution by year. The results show that the number of IPOs dramatically increases in 2013 and reaches a peak in 2014 with values of 114 (12.54%) and 123 (13.53%), respectively, in line with an expansion in IPO activity after the enactment of the JOBS Act in 2012.[[15]](#footnote-15) The number of IPOs is lowest in 2008 with a value of 19 (2.09%), which is at the height of the financial crisis in 2008. The number of IPOs receiving initial comment letters is highest in 2006 with a value of 93 (13.10%), which could be because, after deciding to publicly disclose comment letters and IPO firms’ response from 12th May, 2005, the SEC strengthen their regulatory discipline to decrease information asymmetry, and to protect investors as well as the SEC’s own reputation(Boone et al., 2013; Bozanic et al., 2017; Brown et al., 2018; Johnston and Petacchi, 2017). The number of IPOs receiving initial comment letters are also relatively high in 2013 with a value of 90 (12,68%), which is consistent with a dramatic increase in the number of IPOs in 2013.

The number of IPOs receiving initial comment letters is lowest in 2017 with a value of 15 (2.11%), which could be due to less onerous disclosure regulation under the JOBS Act; they are also relatively low in 2008, which is in line with the decline in the number of IPOs. The proportion of IPOs receiving an initial comment letter is the largest in 2009 with a value of 97.56%, which could be due to widespread uncertainty as a result of the financial crisis 2008-2009. The proportion of IPOs receiving an initial comment letter significantly decreases after 2013 and reaches a low in 2017 with a value of 31.91%, perhaps due to the relaxation of disclosure regulation for ECG IPOs under the 2012 JOBS Act. Figure 3.2 visualises the distribution of the sample by year.

Panel B in Table 3.4 presents the sample distribution by industry. The sample includes 15 industry groups, covering 55 industries as classified by two-digit SIC code.[[16]](#footnote-16) 41 of the industries covered represent at least 1% of the sample, implying broad coverage of industries. The number of IPOs is particularly high in Computer equipment & service and is highest in Chemical products with values of 216 (23.76%) and 258 (28.38%), respectively. The number of IPOs is lowest in Food products with a value of 7 (0.77%). Similarly, the number of IPOs receiving initial comment letters is high in Computer equipment & service and highest in Chemical products with a value of 173 (24.37%) and 177 (24.65%), respectively.

The number of IPOs receiving initial comment letters is lowest in Food products with a value of 7 (1.13%). The proportion of IPOs receiving initial comment letters is largest in Food products, Paper and Paper products, Engineering and Management Services; in each case, 100% of IPOs receive SEC comment letters. The proportion of IPOs receiving initial comment letters is smallest in Health services (66.67%). To some extent, the statistics suggest that if an industry has a higher volume of IPOs, the proportion of IPOs receiving an initial comment letters is lower, perhaps the SEC’s high workload may reduce the extensiveness of their reviews.

**Table 3.4. Sample distribution**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Panel A. Time distribution** | | | | | | | | |
| **Filing year of S-1** |  | **Total IPOs** | |  | **IPOs receiving initial comment letters** | |  | **Proportion of IPOs receiving initial comment letters (%)** |
|  |  | **N** | **%** |  | **N** | **%** |  |  |
| 2005 |  | 57 | 6.27 |  | 48 | 6.76 |  | 84.21 |
| 2006 |  | 103 | 11.33 |  | 93 | 13.1 |  | 90.29 |
| 2007 |  | 94 | 10.34 |  | 83 | 11.69 |  | 88.3 |
| 2008 |  | 19 | 2.09 |  | 16 | 2.25 |  | 84.21 |
| 2009 |  | 41 | 4.51 |  | 40 | 5.63 |  | 97.56 |
| 2010 |  | 66 | 7.26 |  | 59 | 8.31 |  | 89.39 |
| 2011 |  | 68 | 7.48 |  | 66 | 9.3 |  | 97.06 |
| 2012 |  | 41 | 4.51 |  | 38 | 5.35 |  | 92.68 |
| 2013 |  | 114 | 12.54 |  | 90 | 12.68 |  | 78.95 |
| 2014 |  | 123 | 13.53 |  | 75 | 10.56 |  | 60.98 |
| 2015 |  | 78 | 8.58 |  | 49 | 6.9 |  | 62.82 |
| 2016 |  | 58 | 6.38 |  | 38 | 5.35 |  | 65.52 |
| 2017 |  | 47 | 5.17 |  | 15 | 2.11 |  | 31.91 |
|  |  |  |  |  |  |  |  |  |
| Total |  | 909 | 100 |  | 710 | 100 |  | 78.11 |
| **Panel B. Industry distribution** | | | | | | | | |
| **Industry** |  | **Total IPOs** | |  | **IPOs receiving initial comment letters** | |  | **Proportion of IPOs receiving initial comment letters (%)** |
|  |  | **N** | **%** |  | **N** | **%** |  |  |
| Oil and Gas |  | 41 | 4.51 |  | 34 | 4.79 |  | 82.93 |
| Food products |  | 7 | 0.77 |  | 7 | 1.13 |  | 100 |
| Paper and paper products | | 9 | 0.99 |  | 9 | 1.41 |  | 100 |
| Chemical products |  | 258 | 28.38 |  | 177 | 24.65 |  | 68.6 |
| Manufacturing |  | 26 | 2.86 |  | 19 | 2.68 |  | 73.08 |
| Computer equipment & services | | 216 | 23.76 |  | 173 | 24.37 |  | 80.09 |
| Electronic equipment |  | 63 | 6.93 |  | 53 | 7.46 |  | 84.13 |
| Transportation & public utilities | | 50 | 5.5 |  | 42 | 5.92 |  | 84 |
| Scientific instruments |  | 68 | 7.48 |  | 48 | 6.76 |  | 70.59 |
| Wholesale trade |  | 20 | 2.2 |  | 19 | 2.68 |  | 95 |
| Retail trade |  | 56 | 6.16 |  | 50 | 7.04 |  | 89.29 |
| Entertainment services | | 16 | 1.76 |  | 12 | 1.69 |  | 75 |
| Health services |  | 27 | 2.97 |  | 18 | 2.54 |  | 66.67 |
| Engineering & Management Services | | 11 | 14 |  | 11 | 1.55 |  | 100 |
| All others |  | 38 | 4.18 |  | 38 | 5.35 |  | 100 |
| Total |  | 909 | 100 |  | 710 | 100 |  | 78.11 |
| This table presents the distribution of the full sample of 909 IPOs between 2005 and 2017 in terms of number of IPOs, number of IPOs receiving initial comment letters and proportion of IPOs receiving initial comment letters. Panel A present the sample distribution by filing year of initial S-1 filing. Panel B present the sample distribution by industry as classified by two-digits SIC code. | | | | | | | | |

**Figure 3.2. Distribution of the sample over time**

* + 1. **Descriptive statistics of SEC review attributes**

Table 3.5 provides descriptive statistics for the number of themes (*#Themes)*. Panel A presents summary descriptive statistics for the SEC review attribute. The result reveals thatthe mean (median) SEC comment letter addresses 3.50 (4) issue types or themes.

In general, the above results are all lower than comparable findings in the studies of Ertimur & Nondorf (2006) and Li & Liu (2017), who also employ the same measures of SEC reviews of S-1 filings. This may be because sample periods examined by Ertimur & Nondorf (2006) and Li & Liu (2017) are 12th May 2005 to 30th September 2006 and 12th May 2005 to 31st December 2011, respectively, while this study focuses a longer time period, from 12th May 2005 to 31st December 2017. In particular, the sample period employed in this study includes the period after the enactment of the JOBS Act in 2012. The JOBS Act relieved disclosure regulations for EGC IPOs, and hence is likely associated with decreases in the average values of SEC review attributes. It is worth noting that *#Themes* are moderately skewed. Furthermore, the proxy is discrete and countable. Therefore, this would be statistically problematic if these proxies are employed as independent variables within conventional OLS regressions (Rock et al., 2000).

Table 3.5, Panel B presents descriptive statistics for *#Themes* by year. A gradual increase in the mean value of this attribute is observed from 2005 to 2009 (2005 to 2011) and the mean value reaches a peak in 2011 with a value of 5.59, shortly after the enactment of the Dodd Frank Act in 2010. A steady decrease in the mean (median) value of #*Themes* is observedfrom 2012, reaching a low in 2017 with a value of 0.94 (0), during the post-JOBS Act era. Figure 3.3, Figure 3.4, Figure 3.5, Figure 3.6 display the mean and median value of each SEC review attribute by year, namely, *Duration, #Comments,* #*Letters* and *#Themes,* respectively*.*

Table 3.5, Panel C provides descriptive statistics for *#Themes* by industry. The mean (median) value is smallest for Chemical Products (Chemical Products) with a value of 2.42 (2) and largest for Paper and paper products (Paper and paper products) with a value of 5.42 (5.75). In general, this study observes that SEC reviews are the most extensive in Paper and Paper Products and the least extensive in the Chemical Products industry, perhaps due to the impact of the SEC’s workload.[[17]](#footnote-17)

**Table 3.5. Descriptive statistics for SEC review attributes**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Panel A. Summary descriptive statistics of SEC review attributes** | | | | | | | | | | | | | | | | | |
|  |  | **N** |  | **Mean** | | |  | | **p1** | | |  | **p50** |  | **p99** |  | **S.D.** |
| #Themes |  | 909 |  | 3.50\*\*\* | | |  | | 0 | | |  | 4 |  | 7 |  | 2.43 |
| **Panel B. Descriptive statistics of SEC review attributes by year** | | | | | | | | | | |  | | | | | | |
| **Year** | |  | **N** |  |  | **#Themes** | | | |
|  |  |  |  |  |  | **Mean** | | **Median** | |
| 2005 | |  | 57 |  |  | 4.23 | | 5 | |
| 2006 | |  | 103 |  |  | 4.51 | | 5 | |
| 2007 | |  | 94 |  |  | 4.64 | | 5 | |
| 2008 | |  | 19 |  |  | 5 | | 6 | |
| 2009 | |  | 41 |  |  | 5.39 | | 6 | |
| 2010 | |  | 66 |  |  | 5.27 | | 6 | |
| 2011 | |  | 68 |  |  | 5.59 | | 6 | |
| 2012 | |  | 41 |  |  | 4.41 | | 5 | |
| 2013 | |  | 114 |  |  | 2.6 | | 2.5 | |
| 2014 | |  | 123 |  |  | 1.98 | | 1 | |
| 2015 | |  | 78 |  |  | 1.6 | | 1 | |
| 2016 | |  | 58 |  |  | 1.88 | | 1.5 | |
| 2017 | |  | 47 |  |  | 0.94 | | 0 | |
| *Totals* | |  | *909* |  |  | *3.5* | | *4* | |

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Panel C. Descriptive statistics of SEC review attributes by industry** | | | | | | | | |  | |
| **Industry** | |  | **N** |  |  | **#Themes** | |
|  |  |  |  |  |  | **Mean** | **Median** |
| Oil and Gas | |  | 41 |  |  | 4.07 | 4 |
| Food products | |  | 7 |  |  | 4.43 | 5 |
| Paper and paper products | |  | 9 |  |  | 5.42 | 5.75 |
| Chemical products | |  | 258 |  |  | 2.42 | 2 |
| Manufacturing | |  | 26 |  |  | 4.37 | 4.6 |
| Computer equipment & services | |  | 216 |  |  | 3.47 | 4.6 |
| Electronic equipment | |  | 63 |  |  | 4.16 | 5 |
| Transportation & public utilities | |  | 50 |  |  | 4.22 | 4.57 |
| Scientific instruments | |  | 68 |  |  | 3.47 | 4 |
| Wholesale trade | |  | 20 |  |  | 4.9 | 5 |
| Retail trade | |  | 56 |  |  | 4.78 | 5.5 |
| Entertainment services | |  | 16 |  |  | 4.03 | 4.33 |
| Health services | |  | 27 |  |  | 3.85 | 4 |
| Engineering & Management Services | |  | 14 |  |  | 4.43 | 5 |
| All others | |  | 38 |  |  | 3.87 | 4.33 |
| *Totals* | |  | *909* |  |  | *3.5* | *4* |
| This table presents the descriptive statistics of three SEC review attributes including D*uration*, #L*etters, #Comments* and *#Themes*, for the full sample of 909 IPOs between 2005 and 2017. All variables are defined in Appendix 1. Panel A present the summary descriptive statistics of three SEC review attributes. Panel B presents the descriptive statistics of SEC review attributes by filing year of S-1 filing. Panel C presents the descriptive statistics of SEC review attributes by industry as classified by two-digits SIC code. Panel D presents the descriptive statistics of SEC review attributes by exchange listings, including AMEX, NYSE and NASDAQ. Panel E presents the summary descriptive statistics of SEC review attributes by SEC reviewers. Reviewer is the person who signed on the SEC comment letters. Among 710 initial comment letters, 4 comment letters having no signature are not included in this descriptive statistics. Panel F presents the descriptive statistics of SEC review attributes by offices of Division of Corporation Finance. Office by company is collected basing on the 4-digits SIC codes as presented on EDGAR database, SIC code & office list from SEC (<https://www.sec.gov/info/edgar/siccodes.htm?fbclid=IwAR05YInQ45LdvKZX1AJRrg-RQUG8p91Jz4wpn7EEBF13Ak4U2NSW_CC8hPo>) and name of the offices from SEC (<https://www.sec.gov/divisions/corpfin/ad-lookup.shtm> ). | | | | | | | | | |

**Figure 3.3. Duration of SEC reviews by year**

**Figure 3.4. The number of comment letters by year**

**Figure 3.5. The number of comments by year**

**Figure 3.6. The number of themes by year**

* + 1. **Descriptive statistics for IPO firm characteristics**

Table 3.6 provides descriptive statistics for IPO firm characteristics.[[18]](#footnote-18) Regarding company size, the median value of *Size*, which is based on the firms’ total assets, is $64.89 million, which indicates that on average, U.S. IPOs in the sample are large companies.[[19]](#footnote-19) Concerning company age, the median value of *Age* is 1, which indicates that on average, U.S IPOs are young, having been established for approximately 1 years.

In terms of business complexity, *Sales growth* is positive on average, with a median value of 30.89%, which indicates that U.S IPOs generally experience a relatively high growth in sales. The median value of *Segments* is 1, which indicates that on average, U.S IPOs are not diversified in their areas of operation, generally having only one business segment. The mean value of *Restructuring* is 0.09, which indicates that on average, 9% of U.S. IPOs in the sample engage in restructuring activities. The mean value of *M&A* is 0.12, which indicates that approximately 12% of U.S IPOs in the sample conduct M&A activities.

Regarding financial health, *Leverage* is negative with a median value of -0.18, which is derived from negative total equity or deficit of U.S IPOs in the sample. The result indicates that, on average, U.S IPOs experience accumulated losses in several years and high borrowing cost to cover their losses. The median value of *Zscore* is -0.01, which is lower than 4.35 and indicates that in general, U.S IPOs have a high probability of bankruptcy. The negative value of *Z-score* is also reflective of the negative total equity of U.S. IPOs in the sample as the book value of equity is one of components in the *Z-score* measure. The mean value of *Positive earnings* is 0.44, which indicates that on average, 44% of U.S IPOs in the sample make a profit. The median value of E*xternal financing* is 0.06, which indicates that on average, U.S. IPOs’ funds acquired from outside sources (debt financing and equity financing) equate to 6% of their total assets, which is a low level of external financing. As for auditor quality, mean value of *Big 4* is 0.81, which indicates that approximately 81% or most of U.S IPOs in the sample are audited by Big 4 auditors. Concerning corporate governance quality, the mean value of *CEOchairperson* is 0.47, which indicates that around 47% of U.S. IPOs in the sample have a CEO who is also the chairperson of the board of directors.

**Table 3.6. Descriptive statistics of IPO firms' characteristics**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  | **N** |  | **Mean** |  | **STD** |  | **p1** |  | **Median** |  | **p99** |
| **Company size** | | | | | | | | | | | | | |
|  | Size |  | 882 |  | 786.2\*\*\* |  | 5113.65 |  | 0.289 |  | 64.89\*\*\* |  | 10487.35 |
| **Company age** | |  |  |  |  |  |  |  |  |  |  |  |  |
|  | Age |  | 909 |  | 2.85\*\*\* |  | 5.85 |  | 0 |  | 1\*\*\* |  | 32 |
| **Business complexity** | | |  |  |  |  |  |  |  |  |  |  |  |
|  | Sale growth | | 577 |  | 233.75\*\*\* |  | 2413.92 |  | -100 |  | 30.89\*\*\* |  | 3006.25 |
|  | Segments |  | 869 |  | 1.44\*\*\* |  | 1.09 |  | 1 |  | 1\*\*\* |  | 6 |
|  | Restructuring | | 909 |  | 0.09\*\*\* |  | 0.29 |  | 0 |  | 0\*\*\* |  | 1 |
|  | M&A |  | 909 |  | 0.12\*\*\* |  | 0.33 |  | 0 |  | 0\*\*\* |  | 1 |
| **Financial health** | | |  |  |  |  |  |  |  |  |  |  |  |
|  | Leverage |  | 879 |  | -25.47\*\*\* |  | 733.69 |  | -28.75 |  | -0.18\*\*\* |  | 42.46 |
|  | Z-score |  | 826 |  | -13.35\*\*\* |  | 66.49 |  | -263.23 |  | -0.01\*\*\* |  | 17.05 |
|  | Positive earnings | | 872 |  | 0.44\*\*\* |  | 0.5 |  | 0 |  | 0\*\*\* |  | 1 |
|  | External financing | | 769 |  | 0.32\*\*\* |  | 1.24 |  | -2.25 |  | 0.06\*\*\* |  | 3.32 |
| **Auditor quality** | | | | | | | | | | | | | |
|  | Big 4 |  | 885 |  | 0.81\*\*\* |  | 0.39 |  | 0 |  | 1\*\*\* |  | 1 |
| **Corporate governance quality** | | | | | | | | | | | | | |
|  | CEOchairperson | | 403 |  | 0.47\*\*\* |  | 0.5 |  | 0 |  | 0\*\*\* |  | 1 |
| This table presents the descriptive statistics of the IPO firms' characteristics for the full sample of 909 IPOs between 2005 and 2017. The IPO firm's characteristics include *Size, Age, Sale growth, Segments, Restructuring, M&A, Leverage, Z-score, Positive earnings, External financing, Big 4, CEOchairperson*. All variables are defined in Appendix 1. | | | | | | | | | | | | | |

* + 1. **Correlation matrix of SEC review attributes and IPO firms’ characteristics.**

A correlation matrix for key variables including *#Themes* and IPO firms’ characteristics is presented in Table 3.7. Specifically, positive correlation is observed between *#Themes* and *Size,* in line with the arguments of more complication and violations in reports prepared by bigger firms, resulting in more extensive SEC reviews (Cassell et al., 2013; Cassell et al., 2019; Cunningham & Leidner, 2019; Eiler & Kutcher, 2016; Ertimur & Nondorf, 2006; Heese et al., 2017; Johnston & Petacchi, 2017; Li & Liu, 2017; Wang, 2016).

In addition, the results show a positive correlation between *#Themes* and *Age*, consistent with arguments that older firms experience more extensive SEC reviews (Baugh et al., 2017; Cassell et al., 2013; Chen & Johnston, 2010; Colaco et al., 2018; Heese et al., 2017; Johnston & Petacchi, 2017). Furthermore, it can be seen that *Age* is positively correlated with *Size*, suggesting that older firms are also larger. Correlation between all *#Themes* and *Segments* ia also positive, supporting the argument that reports prepared by firms having more business segments tend to be more complex, therefore attracting more intensive SEC reviews (Cassell et al., 2013).

Correlation between *#Themes* and *Restructuring* is also positive, in line with the argument that reports prepared by firms conducting restructuring activities are more complex, and therefore attract more extensive SEC reviews (Baugh et al., 2017; Cassell et al., 2013; Wang, 2016). *Restructuring* is also found to be positively correlated with *Size*, suggesting that restructuring activities are more likely to be conducted by larger firms.

Finally, a negative correlation is observed between *#Themes* and *External financing*, in agreement with extant studies documenting that IPO firms conducting external financing might have higher disclosure quality (Ettredge et al., 2011; Lang & Lundholm, 1993), suggesting less extensive SEC scrutiny ( Baugh et al., 2017; Cassel et al., 2013; Heese et al., 2017; Wang, 2016).

**Table 3.7. Pearson correlation matrix of SEC review attributes and IPO firms’ characteristics**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) | (11) | (12) | (13) |
| (1) #Themes | 1 |  |  |  |  |  |  |  |  |  |  |  |  |
| (2) Size | 0.08\*\* (0.02) | 1 |  |  |  |  |  |  |  |  |  |  |  |
| (3) Age | 0.13\*\*\* (0.00) | 0.51\*\*\* (0.00) | 1 |  |  |  |  |  |  |  |  |  |  |
| (4) Sale growth | -0.04 (0.36) | -0.01 (0.73) | -0.03 (0.52) | 1 |  |  |  |  |  |  |  |  |  |
| (5) Segments | 0.16\*\*\* (0.00) | 0.20\*\*\* (0.00) | 0.21\*\*\* (0.00) | -0.04 (0.40) | 1 |  |  |  |  |  |  |  |  |
| (6) Restructuring | 0.11\*\*\* (0.00) | 0.18\*\*\* (0.00) | 0.12\*\*\* (0.00) | -0.03 (0.51) | 0.18\*\*\* (0.00) | 1 |  |  |  |  |  |  |  |
| (7) M&A | 0.02 (0.59) | 0.05 (0.14) | 0.08\*\* (0.02) | -0.03 (0.44) | 0.12\*\*\* (0.00) | 0.31\*\*\* (0.00) | 1 |  |  |  |  |  |  |
| (8) Leverage | 0.05 (0.16) | -0.01 (0.90) | 0.01 (0.73) | -0.01 (0.93) | -0.21\*\*\* (0.00) | 0.01 (0.72) | 0.01 (0.69) | 1 |  |  |  |  |  |
| (9) Z-score | 0.02 (0.51) | 0.04 (0.29) | 0.06\* (0.08) | -0.11\*\*\* (0.01) | 0.09\*\*\* (0.01) | 0.08\*\* (0.03) | 0.08\*\*\* (0.01) | -0.01 (0.79) | 1 |  |  |  |  |
| (10) Positive earnings | 0.27\*\*\* (0.00) | 0.09\*\*\* (0.01) | 0.15\*\*\* (0.00) | 0.01 (0.84) | 0.31\*\*\* (0.00) | 0.21\*\*\* (0.00) | 0.16\*\*\* (0.00) | -0.04 (0.26) | 0.21\*\*\* (0.00) | 1 |  |  |  |
| (11) External financing | -0.06\* (0.09) | -0.03 (0.39) | -0.05 (0.13) | 0.07 (0.13) | -0.08\*\* (0.02) | -0.06\* (0.10) | -0.05 (0.20) | -0.01 (0.74) | -0.30\*\*\* (0.00) | -0.20\*\*\* (0.00) | 1 |  |  |
| (12) Big 4 | 0.02 (0.57) | 0.06\* (0.08) | 0.08\*\* (0.02) | 0.02 (0.70) | 0.01 (0.72) | 0.09\*\*\* (0.01) | 0.07\*\* (0.03) | -0.02 (0.61) | 0.14\*\*\* (0.00) | -0.01 (0.82) | -0.06\* (0.09) | 1 |  |
| (13) CEOchairperson | 0.02 (0.53) | -0.06 (0.21) | 0.01 (0.97) | 0.05 (0.37) | 0.06 (0.23) | -0.02 (0.72) | -0.01 (0.84) | 0.04 (0.49) | -0.09\* (0.08) | -0.06 (0.22) | 0.05 (0.33) | -0.06 (0.25) | 1 |
| This table presents the Pearson correlation matrix of the key variables employed in this study on the full sample of 909 IPOs between 2005 and 2017. All variables are defined in Appendix 1. Two-tailed p-values are reported in parentheses below correlation coefficients. . \*, \*\*, and \*\*\* denote significance at the 10%, 5%, and 1% levels, respectively. | | | | | | | | | | | | | | |

* 1. **Multivariate analysis**

A series of multivariate analyses are conducted by estimating negative binomial regressions of the form expressed in Equation 3.4, in which dependent variable is one of four SEC review attributes including; *Duration, #Letters,* #*Comments* or *#Themes,* and independent variables are the aforementioned IPO firm’s characteristics. The results are presented in Table 3.8, whereby model (1), (2), (3), (4) employs *Duration, #Letters, #Comments, #Themes* as dependent variable, respectively.

The results show positive effects of *Size* on all four SEC review attributes, indicating that the SEC spend more time reviewing S-1 filings prepared by bigger IPO firms and also provide more letters, more comments and comment on a wider range of themes. The findings are in line with arguments that bigger firms attract more SEC scrutiny (Cassell et al., 2013; Cassell et al., 2019; Cunningham & Leidner, 2019; Eiler & Kutcher, 2016; Ertimur & Nondorf, 2006; Heese et al., 2017; Johnston & Petacchi, 2017; Li & Liu, 2017; Wang, 2016) as they are likely to be more complicated (Boone et al., 2013; Chaplinsky et al., 2017) and have informational breaches (Correia, 2014).

The results also reveal positive effects of *Age* on *Duration* and *#Letters,* indicating that the SEC spend more time and provide more comment letters when reviewing older firms. The findings are in agreement with the conjecture that older firms, who might be more complicated and diversified (Chaplinsky et al., 2017; Doyle et al., 2007), experience more extensive SEC reviews (Baugh et al., 2017; Cassell et al., 2013; Chen & Johnston, 2010; Colaco et al., 2018; Heese et al., 2017; Johnston & Petacchi, 2017).

Regarding business complexity, this study identifies a negative relationship between *Duration* and *Sales growth,* indicating that the SEC spend more time reviewing S-1 filings prepared by firms with lower sales growth. Although inconsistent with prior expectations, these findings are not surprising given that, under the JOBS Act, the SEC may raise more concerns about IPO firms’ incentives to manage sales downwards in order to be eligible for EGC status under the Act.[[20]](#footnote-20) Cassell et al. (2013) also identify that as compared with firms not receiving any comment letter, firms receiving comment letters have lower sales growth.

A positive relationship between *Segments* and *#Themes* is also observed*,* suggesting that the SEC tend to comment on a wider range of themes when reviewing IPO firms with more business segments. The finding is consistent with the argument that firms with more segments have more complexity in their business, and thus attract more SEC scrutiny (Cassell et al., 2013). Additionally, it is identified that *M&A* is positively associated with *#Comments* and *#Themes,* indicating that the SEC tend to issue more comments and comment on a wider of themes for IPO firms conducting merger and acquisitions activity. The findings are in line with the conjecture that company complexity is higher for firms conducting M&A activities who therefore attract more SEC scrutiny (Baugh et al., 2017; Cassell et al., 2013; Duro et al., 2017; Heese et al., 2017).

In terms of financial health, negative relationships between *Z-score* and all four SEC review attributes are also identified, indicating that the SEC are likely to spend more time, provide more comment letters, more comments and comment on a wider range of themes when reviewing S-1 filings prepared by IPO firms having a higher probability of bankruptcy. The findings are in agreement with the expectation that financially-distressed firms, who are more likely to be noncompliant with reporting regulation (Begley et al., 1996; Brazel et al., 2009; Dechow et al. 1996; Ettredge et al., 2011; Schwartz & Soo, 1995), experience more extensive SEC reviews (Cassell et al., 2013).

A positive coefficient on *Positive earnings* is observed in the *Duration* regression*,* suggesting that the SEC spend more time reviewing profitable firms, in line with the argument that SEC reviews are more extensive for firms reporting profits (Baugh et al., 2017; Wang, 2016) as they might be indicative of misleading accounting information, since there are strong incentives for IPO firms to report positive earnings to attract investors (Teoh et al., 1998a).

A negative relationship between *Duration* and *External financing* is also identified, suggesting that the SEC spends less time reviewing S-1 filings prepared by firms with higher external funding via new borrowings and stock issues. The finding supports the argument that IPO firms that previously issued debt or equity experience less extensive SEC reviews (Baugh et al., 2017; Cassel et al., 2013; Heese et al., 2017; Wang, 2016) as their disclosure quality and reporting compliance might be higher (Ettredge et al., 2011; Lang & Lundholm, 1993).

Furthermore, the results reveal that *Big4* has a negative impact on *Duration* and *#Comments,* indicating that the SEC are likely to spend less time and provide fewer comments when reviewing IPO firms audited by Big 4 auditors. The findings support the argument that firms audited by Big 4 auditors attract less SEC scrutiny (Cassell et al., 2013; Cassell et al., 2019; Colaco et al., 2018) as they are less likely to have reporting deficiencies (Dechow et al., 1996; Ettredge et al., 2011; Ertimur and Nondorf, 2006; Robinson et al., 2011).

Overall, novel results are obtained relating to the sensitivities of SEC reviews of S-1 filings to a range of IPO firm characteristics including; company size, firm age, business complexity as indicated by sales growth, the number of segments, M&A activities, financial health as indicated by the probabilities of bankruptcy, earnings number, external financing activities, and auditor quality.

**Table 3.8. Multivariate analysis -Negative binomial regression**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | **Duration (1)** |  | **#Letters (2)** |  | **#Comments (3)** |  | **#Themes (4)** |
| **Company size** | | | | | | | | |
|  | Size | 0.001\*\*\* (4.01) |  | 0.001\*\* (2.25) |  | 0.001\*\*\* (3.94) |  | 0.001\*\*\* (3.39) |
| **Company age** | | | | | | | | |
|  | Age | 0.037\*\*\* (7.60) |  | 0.027\*\*\* (5.49) |  | 0.008 (0.80) |  | 0.008 (1.35) |
| **Business complexity** | | | | | | | | |
|  | Sale growth | -0.001\*\*\* (-6.01) |  | 0.001 (0.10) |  | 0.001 (0.92) |  | 0.001 (0.27) |
|  | Segments | 0.01 (0.41) |  | 0.016 (0.67) |  | 0.056 (1.44) |  | 0.034\*\* (2.00) |
|  | Restructuring | -0.014 (-0.10) |  | 0.180 (1.50) |  | 0.400 (1.56) |  | 0.181 (1.44) |
|  | M&A | -0.016 (-0.21) |  | 0.040 (0.38) |  | 0.399\*\* (2.24) |  | 0.152\* (1.75) |
| **Financial health** | | | | | | | | |
|  | Leverage | -0.002 (-0.51) |  | -0.001 (-0.21) |  | -0.004 (-1.04) |  | -0.001 (-0.31) |
|  | Z-score | -0.003\*\*\* (-7.50) |  | -0.002\*\*\* (-6.01) |  | -0.003\* (-1.80) |  | -0.003\*\*\* (-3.99) |
|  | Positive earnings | 0.123\*\*\* (2.66) |  | 0.029 (0.58) |  | 0.128 (1.15) |  | -0.01 (-0.19) |
|  | External financing | -0.079\*\*\* (-4.23) |  | -0.005 (-0.18) |  | 0.001 (0.00) |  | -0.035 (-0.69) |
| **Auditor quality** | | | | | | | | |
|  | Big 4 | -0.218\*\*\* (-2.56) |  | -0.006 (-0.08) |  | -0.328\*\* (-2.05) |  | 0.016 (0.25) |
| **Corporate governance quality** | | | | | | | | |
|  | CEOchairperson | 0.044 (0.71) |  | 0.044 (0.58) |  | -0.044 (-0.59) |  | -0.025 (-0.54) |
|  |  |  |  |  |  |  |  |  |
|  | FE year | Included |  | Included |  | Included |  | Included |
|  | FE industry | Included |  | Included |  | Included |  | Included |
|  |  |  |  |  |  |  |  |  |
|  | N | 455 |  | 455 |  | 455 |  | 455 |
|  | Pseudo R2 | 0.0990 |  | 0.1543 |  | 0.0752 |  | 0.1278 |
| This table presents the results of the multivariate analysis on the determinants of SEC review attributes for the sample of IPOs filing S-1 between 2005 and 2017. Negative binomial regression is employed in this analysis. Dependent variables are SEC review attributes including *Duration, #Letters, #Comments, #Themes*. Independent variables are IPO firm characteristics (*Size, Age, Sales growth, Segments, Restructuring, M&A, Leverage, Z-score, Positive earnings, External financing, Big4, CEOchairperson*). All variables are defined in Appendix 1. Results from Z-statistics are presented in parentheses below coefficient estimates, and are based on robust standard errors clustered at the industry level. \*, \*\*, and \*\*\* denote significance at the 10%, 5%, and 1% levels, respectively, based on a two-tailed test. | | | | | | | | |

* 1. **Additional tests**
     1. **Issue types and the costs of remediation**

The length of time between the date when IPO firms make the initial S-1 filing to the date when the IPO is declared effective (*Duration)* as well as the number of revisions, as measured by the number of comment letters during the IPO process (*#Letters)* may reflect not only the extensiveness of SEC reviews but also the cost of comment letter remediation (Cassell et al., 2013). The intuition is that longer response durations and more revision rounds suggest higher remediation costs with regard to IPO firms’ internal and external resources (e.g. IPO firm staffs’ working time, audit fees, lawyer fees).In this section, this study conducts the first additional examination to investigate how the severity of issue types affects the remediation cost. Specifically, this study examines 6 issue types including (1) core accounting (*#Core accounting issues)*; (2) non-core accounting (*#Non-core accounting issues)*; (3) offering-related (*#Offering issues)*; (4) business-related (*#Business issues)*; (5) corporate governance-related (*#Corporate governance issues)* and (6) disclosure-related issues (*#Disclosure issues)*. This thesis calculates these variables by counting the number of comments highlighted in the initial SEC comment letters about core-accounting, non-core accounting, offering, business, and corporate governance disclosure issues in the initial S-1 filing of each IPO firms, respectively. If the SEC do not issue comment letters for initial S-1 filings, or they do not issue any comment letters during their review process, or they do not provide detailed comments in their letters due to matters relating to compliance with the SEC regulations, *#Core-accounting issues, #Non-core accounting issues, #Offering issues,* #*Business issues, #Governance issues, #Disclosure issues,* are set equal to zero. Again, these variables are calculated by using the data obtained from the coding of comment letters which is based on the Naïve Bayes algorithm to identify specific issues highlighted in the SEC’s comment letters (Section 3.3.2).

Using negative binomial regressions, this study employs the proxies of remediation (i.e. *Duration* and *#Letters)* as dependent variables, the proxies of SEC comment themes as independent variables and IPO firms characteristics as control variables. Table 3.9 reports the results of the examination in which *Duration* is dependent variable in Model (1) and *#Letters* is dependent variable in Model (2). The results reveal positive coefficients of *#Core accounting issues* and *#Business issues* on *Duration* and positive coefficients of *#Core accounting issues, #Non-core accounting issues, #Business issues* and *#Disclosure issues* on *#Letters,* indicating that more comments on core accounting issues and business issues increase the cost of remediation in terms of the length of times and the number of rounds to close the review conversation. More comments on non-core accounting issues and disclosure issues also increase the remediation costs in terms of the number of rounds. Furthermore, in both Model (1) and (2), the magnitude of coefficients on *#Core Accounting Issues* are higher than that of coefficients on other independent variables, suggesting that comments on core accounting issues have the highest cost of remediation.

**Table 3.9. Sensitivity of the cost of remediation to comment types**

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Duration (1)** |  | **#Letters (2)** |
| #Core-accounting issues | 0.012\*\*\* (3.07) |  | 0.016\*\*\* (2.99) |
| #Non-core-accounting issues | 0.012 (0.46) |  | 0.031\*\* (2.2) |
| #Offering issues | 0.011 (0.62) |  | 0.01 (0.6) |
| #Business issues | 0.011\*\* (2.5) |  | 0.014\*\*\* (5.91) |
| #Governance issues | -0.015 (-0.57) |  | 0.019 (1.53) |
| #Disclosure issues | -0.001 (-0.13) |  | 0.011\*\*\* (6.28) |
| Size | 0.001\*\*\* (2.8) |  | 0.001 (0.44) |
| Age | 0.036\*\*\* (6.84) |  | 0.024\*\*\* (6.31) |
| Sale growth | -0.001\*\*\* (-5.79) |  | -0.001 (-0.34) |
| Segments | 0.007 (0.25) |  | -0.001 (-0.05) |
| Restructuring | -0.007 (-0.05) |  | 0.106 (1.32) |
| M&A | -0.047 (-0.78) |  | 0.046 (0.51) |
| Leverage | -0.002 (-0.49) |  | -0.001 (-0.62) |
| Z-score | -0.002\*\*\* (-7.99) |  | -0.002\*\*\* (-5.44) |
| Positive earnings | 0.099\*\* (2.43) |  | -0.027 (-0.57) |
| External financing | -0.078\*\*\* (-3.91) |  | -0.006 (-0.27) |
| Big 4 | -0.189\*\* (-2.11) |  | 0.07 (0.95) |
| CEOchairperson | 0.043 (0.83) |  | 0.008 (0.12) |
|  |  |  |  |
| FE year | Included |  | Included |
| FE industry | Included |  | Included |
|  |  |  |  |
| N | 455 |  | 455 |
| Pseudo R2 | 0.1037 |  | 0.1934 |
| This table presents the results of the analysis of association between the number of comment topics and remediation costs for the sample of IPOs filing S-1 between 2005 and 2017. Negative binomial regression is employed in this analysis. Dependent variables are the remediation costs including *Duration* and *#Letters*. Independent variables are the number of comment topics including *#Core-accounting issues, #Non-core-accounting issues, #Offering issues, #Business issues, #Governance issues, #Disclosure issues).* Control variables are IPO firm characteristics including *Size, Age, Sale growth, Segments, Restructuring, M&A, Leverage, Z-score, Positive earnings, External financing, Big4, CEOchairperson*. All variables are defined in Appendix 1. Results from Z-statistics are presented in parentheses coefficient estimates, and are based on robust standard errors clustered at the industry level. \*, \*\*, and \*\*\* denote significance at the 10%, 5%, and 1% levels, respectively, based on a two-tailed test. | | | |

* 1. **Conclusion**

This study investigates how a host of IPO firm characteristics affect the extensiveness of SEC reviews of S-1 filings, as indicated by the duration of the IPO process, the number of comment letters issued by the SEC on each S-1 filing, the number of comments within comment letters. and the number of themes commented upon the initial S-1 filings issued by the SEC.

Contributing to previous literature, this study provides new and broad evidence about the sensitivity of SEC S-1 reviews to IPO firm characteristics. Specifically, for a sample of 909 IPO firms over the period 12th May 2005 to 31st December 2017, this study identifies that the SEC spend more time reviewing S-1 filings, issue more comment letters, more comments and wider range of themes for initial S-1 filings prepared by bigger IPO firms. Older IPO firms experience longer SEC review duration and receive more comment letters. Regarding the impact of IPO firms’ business complexity, the results reveal that SEC reviews are likely to be more extensive when reviewing IPO firms who have greater complexity in their business, which may be related to lower reporting quality. Specifically, IPO firms having more business segments are identified to receive wider range of themes in SEC comment letters. More comments and wider range of themes in SEC comment letters are also received by IPO firms conducting M&A activities. However, IPO firms with lower sales growth, who might have less business complexity, are observed to experience longer SEC review duration, probably due the SEC’s concerns that these firms might manage sales downward in order to be eligible for EGC status under the JOBS Act.

In terms of financial health, IPO firms having a higher probability of bankruptcy are identified to have longer SEC reviews, receive more comment letters, more comments and more themes in the comment letters. More profitable IPO firms, who may be more likely to have disclosed misleading accounting information, are also observed to experience longer SEC reviews. The results also reveal that shorter review times are experienced by IPO firms using more external financing who are believed to have higher disclosure quality. With regard to auditor quality, this study observes shorter reviewing time and fewer comments are experienced by IPO firms audited by Big4 auditors. Overall, the findings suggest that SEC reviews are likely to be more extensive when IPO firms display characteristics that indicate potential deficiencies in informational quality of their IPO registration statements.

In addition, the results suggest that IPO firms incur higher cost of remediation when receiving comments on core accounting issues, non-core accounting issues, business issues, and disclosure issues, as compared with other issues. Furthermore, comments on core accounting issues are observed to have the highest cost of remediation. Furthermore, the results also suggest that, during the period of the global financial crisis, SEC reviews became disproportionately more extensive for bigger IPO firms, IPO firms having higher external financing, and IPO firms with a higher probability of bankruptcy.

The findings should be of interest to practitioners in terms of providing a better understanding of the SEC’s S-1 review process, specifically, which factors might attract SEC attention. In addition, the findings are insightful to investors, auditors, regulators and other stakeholders, who employ SEC S-1 comment letters to evaluate the quality of S-1 filings as well as IPO firms’ reporting compliance. The sensitivity of SEC review extensiveness to firm characteristics indicating potential informational deficiencies (e.g. high complexity, poor financial health, low auditor quality), to some extent implies that SEC comment letters can be considered as valuable and reliable source of information about going-public firms. Specifically, the findings imply that SEC comment letters can be used to identify undisclosed firm performance as well as obtain information about the quality of S-1 disclosures.

As for IPO issuers, the findings imply that choosing high-quality auditors (e.g. Big 4) to perform audit procedures could shorten IPO approval process. Because high-quality auditors can increase confidence in the IPO firm’s disclosures, which may reduce regulatory scrutiny (Alhadab & Clacher, 2018). However, it is unclear whether this reduced scrutiny is associated with sufficient regulatory cost reductions to justify the audit fee premium associated with appointing a Big 4 auditor. In addition, findings relating to the relationship between remediation costs and S1 filings’ issue types should be useful to issuers as remediation costs might affect IPO firms' capability to enter capital markets (Deloitte, 2013; Johnson, 2010). Specifically, core accounting issues are observed to result in the highest cost of remediation, implying that IPO firms should pay more attention to potential issues in their financial statements to reduce remediation costs and speed up the IPO process.

Furthermore, foreign issuers tend to face stricter reporting requirements when listing in the U.S. (e.g., those enforced by the SEC), as well as relatively strong investor protections (Ghosh & He, 2016). If the foreign issuer successfully completes an IPO in the U.S., it would be a good signal about their credibility, hence attracting investors (Ghosh & He, 2016). Similarly, Doidge et al. (2001) also state it is widely regarded that foreign firms listing on the U.S. stock markets benefit from enhanced prestige, cheaper cost of capital, larger shareholder base and higher liquidity as compared with listing in other countries (e.g., Canada, Hongkong, France, Germany). How to meet the SEC's reporting requirements is always a challenge for domestic IPOs, so it will be even more difficult for foreign IPOs. Therefore, the results of this study on which firms’ characteristics may attract the attention of the SEC will certainly be more useful to foreign issuers.

In addition, underlying regulatory oversight of capital markets is likely to be comparable in other nations. For example, according to Boskovic et al. (2010), securities regulations in the EU (e.g., the Market in Financial Instruments Directive 2004/39/EC (MiFID)) and United States (e.g., the 1933 Securities Act) have a similar focus on investor protection, fair and orderly markets, and price transparency as well as similar approval procedures for issuing firms.[[21]](#footnote-21) Silvia (2006) also states that supervisory authorities in the United Kingdom and the United States maintain similar goals and missions in monitoring the capital market. The Securities and Exchange Commission (SEC) of the US, the Financial Services Authority (FSA) of the UK, the [European Securities and Markets Authority](https://en.m.wikipedia.org/wiki/European_Securities_and_Markets_Authority) (ESMA) are all members of the International Organisation of Securities Commissions (IOSCO), who share similar 2003 IOSCO Core Principles of Securities Regulation (Boskovic et al., 2010). Therefore, findings in this study about the focus of the SEC on firms’ characteristics in the U.S context may be applicable to other countries. Furthermore, the findings may have implications for legislators in other countries such as South Korea (Kim, 2019), Canada (Murphy et al., 2020) who are seeking to replicate the filing review process of the US markets.

While providing evidence on the determinants of SEC reviews on S-1 filings, this study does not explore whether SEC reviews are effective in addressing deficiencies in the information quality of S-1 filings. There have been extensive arguments about the effectiveness of SEC reviews of IPO registration statements. On the one hand, prior research support the effectiveness of SEC reviews in detecting informational issues around IPOs (Ertimur & Nondorf, 2006; Colaco et al., 2018, Schuldt & Vega, 2018 and Lowry, 2020) and improving the IPO informational environment (Ertimur & Nondorf, 2006; Gupta & Israelsen, 2015; Li & Liu, 2017; Schuldt & Vega, 2018 and Lowry, 2020). On the other hand, the effectiveness of SEC reviews is observed to be constrained by some external factors, such as political connections and the JOBS Act (Johnston & Petacchi, 2017 and Chaplinsky et al., 2017). Future research on the sensitivity of SEC reviews to information quality of S-1 filings would therefore be informative. In addition, with the aim of filling the gap in the extant literature on firm-level factors associated with the SEC review, this study solely focuses on IPO firms’ characteristics and their impact on the SEC review extensiveness. Emphasis is placed on firm characteristics in this study because firm characteristics are identified to be among the most important factors on the SEC review of corporate disclosures (e.g., 10-K, 8-K) than S-1 filings, hence, it is worthwhile to investigate the influence of firm characteristics on the SEC S-1 review. Nevertheless, it is worth noting that factors other than firm-level factors may also have some impact on the SEC review extensiveness as suggested by recent research, e.g. the SEC workload (Köchling et al., 2021). Future research would be useful to investigate the incremental impact of factors other than firm-level factors on the extensiveness of the IPO approval process, e.g. the recent regulatory change, the allocation of the SEC’s budgetary resources. Furthermore, attention should be given to whether *Duration* is an effective indicator for the extensiveness of SEC reviews. This proxy could cover more than just the SEC review period, especially, the time lag between the date when SEC complete their review and date of publishing their comment letters. Consequently, there might be factors other than SEC reviews affecting the length of IPO processes, such as market timing or litigation. Therefore, results on the determinants of *Duration* should be considered with this limitation in mind.

# REFERENCES

SEC (2013). *The Investor’s Advocate: How the SEC Protects Investors, Maintains Market Integrity, and Facilitates Capital Formation*. Retrieved from http://www.sec.gov/about/whatwedo.shtml

Abdolmohammadi, M., & Wright, A. (1987). An examination of the effects of experience and task complexity on audit judgments. *The Accounting Review*, *62*(1), 1–13.

Agarwal, S., Gupta, S., & Israelsen, R. D. (2017). Public and Private Information: Firm Disclosure, SEC Letters, and the JOBS Act. *Kelley School of Business Research Paper No. 17-4*.

Akerlof, G. (1970). The Market for " Lemons ": Quality Uncertainty and the Market Mechanism. *The Quarterly Journal of Economics*, *84*(3), 488–500.

Altman, E. I. (1969). Financial Ratios, Discriminant Analysis and the Prediction of Corporate Bankruptcy. *The Journal of Finance*, *24*(3), 558–560.

Barry, C. B., & Brown, S. J. (1985). Differential Information and Security Market Equilibrium. *Journal of Financial and Quantitative Analysis*, *20*(4), 407–422.

Barth, M. E., Landsman, W. R., & Taylor, D. J. (2017). The JOBS Act and Information Uncertainty in IPO Firms. *The Accounting Review*, *92*(6), 25–47.

Baugh, M., Kim, K., & Lee, K. J. (2017). *The Effect of SEC Reviewers on Comment Letters and Financial Reporting Quality*. https://doi.org/10.3386/w19846

Becker, C. L., Defond, M. L., Jiambalvo, J., & Subramanyam, K. R. (1998). The Effect of Audit Quality on Earnings Management. *Contemporary Accounting Research*, *15*(1), 1–24.

Beyer, A., Cohen, D. A., Lys, T. Z., & Walther, B. R. (2010). The financial reporting environment: Review of the recent literature. *Journal of Accounting and Economics*, *50*(2–3), 296–343.

Bhabra, H. S., Pettway, R. H., & Molson, J. (2003). IPO Prospectus Information and Subsequent Performance. *The Financial ReviewThe Financial Review*, *38*(38), 369–397.

Blackburne, T. (2014). Regulatory Oversight and Reporting Incentives: Evidence from SEC Budget Allocations Terrence. *Working Paper*.

Bonner, S. E. (1990). Experience Effects In Auditing: The Role Of Task-Specific Knowledge. *The Accounting Review*, *65*(1), 72–92.

Boone, J. P., Khurana, I. K., & Raman, K. K. (2010). Do the Big 4 and the Second-tier firms provide audits of similar quality? *Journal of Accounting and Public Policy*, *29*(4), 330–352. Retrieved from 10.06.007

Boone, J. P., Linthicum, C. L., & Poe, A. (2013). Characteristics of accounting standards and SEC review comments. *Accounting Horizons*, *27*(4), 711–736.

Bozanic, Z., Dietrich, J. R., & Johnson, B. A. (2017). SEC comment letters and firm disclosure. *Journal of Accounting and Public Policy*, *36*(5), 337–357.

Brown, S. V, Tian, X., & Tucker. (2015). *The Spillover Effect of SEC Comment Letters on Qualitative Corporate Disclosure: Evidence from the Risk Factor Disclosure Stephen*. Retrieved from https://papers.ssrn.com/sol3/Papers.cfm?abstract\_id=2551451

Cassell, C. A., Dreher, L. M., & Myers, L. A. (2013). Reviewing the SEC’s review process: 10-K comment letters and the cost of remediation. *The Accounting Review*, *88*(6), 1875–1908.

Chahine, S., Mansi, S., & Mazboudi, M. (2015). Media news and earnings management prior to equity offerings. *Journal of Corporate Finance*, *35*, 177–195. https://doi.org/10.1016/j.jcorpfin.2015.09.002

Chaplinsky, S., Hanley, K. W., & Moon, S. K. (2017). The JOBS Act and the Costs of Going Public. *Journal of Accounting Research*, *55*(4), 795–836.

Chen, K. Y., Lin, K., & Zhou, J. (2005). Audit quality and earnings management for Taiwan IPO firms. *Managerial Auditing Journal*, *20*(1), 86–104. https://doi.org/10.1108/02686900510570722

Chen, R., & Johnston, R. (2010). The effect of regulator oversight on firms’ information environment: Securities and exchange commission comment letters. *Working Paper*.

Colaco, H. M. J., De Cesari, A., & Hegde, S. P. (2017). The waiting period of initial public offerings. *European Journal of Finance*, *0*(0), 1–34.

Dambra, M., Field, L. C., & Gustafson, M. T. (2015). The JOBS Act and IPO volume: Evidence that disclosure costs affect the IPO decision. *Journal of Financial Economics*, *116*(1), 121–143.

DeAngelo, L. E. (1981). Auditor size and audit quality. *Journal of Accounting and Economics*, *3*(3), 183–199.

Doyle, J., Ge, W., & McVay, S. (2007). Determinants of weaknesses in internal control over financial reporting. *Journal of Accounting and Economics*, *44*(1–2), 193–223.

Duro, M., Heese, J., & Ormazabal, G. (2017). Does the Public Disclosure of the SEC’s Oversight Actions Matter ? *CEPR Discussion Paper No. DP12145*.

Ernst and Young. (2016). *Update on emerging growth companies and the JOBS Act, November 2016*.

Ertimur, Y., & Nondorf, M. E. (2006). IPO Firms and the SEC Comment Letter Process. In *Working paper*.

Ettredge, M., Johnstone, K., Stone, M., & Wang, Q. (2011). The effects of firm size, corporate governance quality, and bad news on disclosure compliance. *Review of Accounting Studies*, *16*(4), 866–889. https://doi.org/10.1007/s11142-011-9153-8

Gao, X., Ritter, J. R., & Zhu, Z. (2013). Where have all the IPOs gone? *Journal of Financial and Quantitative Analysis*, *48*(6), 1663–1692.

Godfrey, J., Hodgson, A., Tarca, A., Jane, H., & Holmes, S. (2010). *Accounting Theory*. Australia: John Wiley & Sons.

Hambrick, D. C., & Mason, P. A. (1984). Upper Echelons: The Organization as a Reflection of Its Top Managers. *Academy of Management Review*, *9*(2), 193–206.

Hamilton, B. (n.d.). How Soon Will The SEC Review A Form S-1 Registration Statement? Retrieved April 25, 2019, from Securities and Going Public Lawyer website: https://www.securitieslawyer101.com/2015/sec-review-form-s-1-registration-statement/

Healy, P. M., & Palepu, K. G. (2001). Information asymmetry, corporate disclosure, and the capital markets: A review of the empirical disclosure literature. *Journal of Accounting and Economics*, *31*(1–3), 405–440.

Heese, J., Khan, M., & Ramanna, K. (2017). Is the SEC captured? Evidence from comment-letter reviews. *Journal of Accounting and Economics*, *64*(1), 98–122.

Henderson, J. C., & Nutt, P. C. (1980). The Influence of Decision Style on Decision Making Behavior. *Management Science*, *26*(4), 371–386.

Irvine, P. J., & Pontiff, J. (2009). Idiosyncratic return volatility, cash flows, and product market competition. *Review of Financial Studies*, *22*(3), 1149–1177.

Jensen, M. C., & Meckling, W. H. (1976). Theory of the firm: Managerial behavior, agency costs and ownership structure. *Journal of Financial Economics*, *3*(4), 305–360.

Jiang, G., Lee, C. M. C., & Zhang, Y. (2005). Information Uncertainty and Expected Returns. *Review of Accounting Studies*, *10*(2–3), 185–221.

Johnston, R., & Petacchi, R. (2017). Regulatory Oversight of Financial Reporting: Securities and Exchange Commission Comment Letters. *Contemporary Accounting Research*, *34*(2), 1128–1155.

Keating, T. (2012). The JOBS Act: Shifting into Gear and Accelerating Up the IPO On-Ramp. Retrieved from Keating Investments White Paper website: http://www.otcmarkets.com/content/doc/jobsact/keatingWhitepaper.pdf

Lang, M., & Lundholm, R. (1993). Cross-Sectional Determinants of Analyst Ratings of Corporate Disclosures. *Journal of Accounting Research*, *31*(2), 246–271.

Leuz, C., & Wysocki, P. (2008). Economic consequences of financial reporting and disclosure regulation: A review and suggestions for future research. *The CPA Journal*, *79*(10), 24.

Leuz, Christian, & Wysocki, P. D. (2016). The Economics of Disclosure and Financial Reporting Regulation: Evidence and Suggestions for Future Research. *Journal of Accounting Research*, *54*(2), 525–622.

Li, B., & Liu, Z. (2017a). BBThe oversight role of regulators: evidence from SEC comment letters in the BIPO process. *Review of Accounting Studies*, *22*(3), 1229–1260.

Li, B., & Liu, Z. (2017b). The oversight role of regulators: evidence from SEC comment letters in the IPO process. *Review of Accounting Studies*, *22*(3), 1229–1260.

Loughran, T., & Ritter, J. (2004). Why Has IPO Underpricing Changed Over Time ? *Financial Management*, 5–37.

McKenney, J., & Keen, P. (1974). How Managers’ Minds Work. *Harvard Business Review*, *52*(3), 79–90.

Mitnick, B. M. (1980). *The political economy of regulation*. New York: Columbia University Press.

Pigou, A. C. (1932). *The Economics of Welfare*. London: Macmillan and Co.

Posner, R. A. (1974). Theories of economic regulation. *Bell Journal of Economics and Management Science*, *5*, 335–358.

Robinson, J. R., Xue, Y., & Yu, Y. (2011). Determinants of disclosure noncompliance and the effect of the SEC review: Evidence from the 2006 mandated compensation disclosure regulations. *Accounting Review*, *86*(4), 1415–1444.

Singhvi, S. S., & Desai, H. B. (1971). An Empirical Analysis of the Quality of Corporate Financial Disclosure. *The Accounting Review*, *46*(1), 129–138.

Skinner, D. (1994). Why Firms Voluntarily Disclose Bad Business. *Journal of Accounting Research*, *32*(1), 38–60.

Stigler, G. J. (1971). The Theory of Economic Regulation. *The Bell Journal of Economics and Mangement Science*, *2*(1), 3–21.

Tan, T., & Netessine, S. (2014). When Does the Devil Make Work? An Empirical Study of the Impact of Workload on Worker Productivity. *Management Science*, *60*(6), 1574–1593.

Teoh, S.H., Wong, T. J., & Rao, G. R. (1998). Are accruals during initial public offerings opportunistic? *Review of Accounting Studies*, *3*(1/2), 175–208.

Teoh, Siew Hong, Welch, I., & Wong, T. J. (1998). Earnings Management and the Long-Run Market Performance of Initial Public Offerings. *The Journal of Finance*, *53*(6), 1935–1974.

Wang, Q. (2016). J . Account . Public Policy Determinants of segment disclosure deficiencies and the effect of the SEC comment letter process q. *Journal of Accounting and Public Policy*, *35*(2), 109–133. https://doi.org/10.1016/j.jaccpubpol.2015.11.005

Watts, R. L., & Zimmerman, J. L. (1978). Towards a Positive Theory of the Determination of Accounting Standards. *The Accounting Review*, *53*(I), 112–134.

Watts, R., & Zimmerman, J. (1986). *Positive Accounting Theory*. Englewood Cliffs, NJ: Prentice-Hall.

WilmerHale. (2011). 2011 IPO Report. *Wilmer Cutler Pickering Hale And Dorr LLP*. Retrieved from www.wilmerhale.com/2011IPOreport

WilmerHale. (2015). 2015 IPO Report. *WilmerHale IPO Report*, 26.

Zhang, X. F. (2006). Information Uncertainty and Stock Returns. *The Journal of Finance*, *61*(1), 105–137.

1. PRE stands for permanently reinvested earnings. The SEC oversight has concentrated on filers with PRE as PRE-related reports are one of the limited sources containing information about foreign businesses. Because PRE-related reports provide limited information, the SEC can make use of their review, particularly the PRE-related SEC letters, to inquire more details about foreign businesses. [↑](#footnote-ref-1)
2. The finding of Duro et al. (2017) is demonstrated in the period after May 12th, 2005 when SEC began publishing their comment letters. [↑](#footnote-ref-2)
3. Following previous studies (Cassell et al., 2013; Ertimur and Nondorf, 2006; Robinson et al., 2011), in a preliminary test, besides the duality of CEO and chairman, this study also includes other indicators of corporate governance such as the number of directors on the boards, the proportion of board seats held by managers, the proportion of shares held by CEO. However, these indicators did not appear to have a significant impact on SEC reviews. Moreover, the inclusion of these additional indicators of corporate governance reduces the test power due to the problems of data availability in the IPO context, hence this study decides to omit them from the main analyses. Therefore, it should be noted that the findings in this study are limited to one aspect of corporate governance, which is CEO duality. [↑](#footnote-ref-3)
4. The SEC started publishing the IPO firms’ filings and the SEC comment letters from 12th May, 2005. [↑](#footnote-ref-4)
5. Electronic Data Gathering, Analysis, and Retrieval (EDGAR) database is developed by the U.S SEC which contains public firms’ filings required by the SEC, the SEC comment letters and the firms’ correspondence. [↑](#footnote-ref-5)
6. This study restricts the focus to initial comment letters, i.e. the first comment letter issued by the SEC for each IPO. This study does so to avoid duplication, as subsequent comment letters tend to involve ongoing discussion of issues identified in the initial letter and/or merely acknowledge the company’s response. [↑](#footnote-ref-6)
7. Another Bayes theorem classifier is Latent Dirichlet Allocation (LDA) used by Lowry et al. (2020) to classify the issue types of IPO registration statements addressed in SEC comment letters. The main difference between Naïve Bayes and LDA is that LDA is based purely on computer-aided techniques to conduct the coding whereas the coding assisted by the Naïve Bayes algorithm is developed from the combination of human (i.e., development of coding scheme and training sample) and computer-aided coding. [↑](#footnote-ref-7)
8. Even if it is not realistic, independence is assumed. In the context of a SEC comment letter, for instance, the term "accounting policies" is more likely to be seen in combination with the term "critical". Nevertheless, empirical evidence from other disciplines suggests that although this assumption is unrealistic, it may have minimal influence on the outcomes (Domingos & Pazzani, 1997; Li, 2010). Domingos & Pazzani (1997) identify that attribute independence does not always affect the Bayesian classifier's performance. The mutual independence of word/phrase is an important assumption of all computer-aid textual analysis techniques (e.g., Naïve Bayes algorithm) that most studies using this technique in the field of Accounting and Finance follow (Li, 2010). The reason is that it is exceedingly difficult to create an algorithm that properly incorporates the context in which a word/phrase is used (i.e., natural language). [↑](#footnote-ref-8)
9. According to Li (2010), the N-fold cross-validation test is unbiased toward the training data and can discover both underfitting and overfitting. [↑](#footnote-ref-9)
10. The evaluation is conducted by using the “Cross-validation” test option in Weka which provides summary about the training classifier’s accuracy using Naïve Bayesian algorithm. [↑](#footnote-ref-10)
11. Adjustments to the original manual coding of the training dataset are also implemented until the acceptable values of the training classifier’s accuracy are achieved. Specifically, to conduct the adjustment, this study firstly adjusts self-constructed coding scheme by narrowing the number of issue types as previously developed in the scheme, particularly, grouping issue types, which have precision value equal to 0, with the most relevant issues types, which have precision value greater than 0, to create new and more general types of issue. Secondly, this study replaces the old codes for issue types in the training dataset with the equivalent codes for issue types according to the new coding scheme. [↑](#footnote-ref-11)
12. Chi-square test of joint null hypothesis reveals that the coefficients for all S-1 filings years and all two-digit SIC industries are not jointly equal to zero, therefore, this study controls for the year fixed effects and the industry fixed effects in the empirical models. The tests is conducted by applying Stata procedure testparm. [↑](#footnote-ref-12)
13. Within-cluster correlation test is undertaken by applying Stata procedure loneway. [↑](#footnote-ref-13)
14. Although the within-correlation test also show that within each filing year of S-1, there are significant correlations across the observation, this study does not cluster at the year level since there in no appreciable difference in clustered standard errors as compared with default standard errors. Petersen (2009) suggests using cluster when the clustered standard error is 2-4 time higher than white standard error. [↑](#footnote-ref-14)
15. The JOBS Act was enacted in 5th April, 2013 which lessens the mandatory reports and compliance on Emerging Growth Company (EGC) IPOs having total annual gross revenues less than $1 billion in the most recent fiscal year [↑](#footnote-ref-15)
16. The grouping of industries is conducted following Teoh et al. (1998). [↑](#footnote-ref-16)
17. The Paper and Paper products industry has the lowest number of IPOs, the Chemical products has the highest number of IPOs [↑](#footnote-ref-17)
18. As for continuous or discrete variables (including *Size, Leverage, External financing, Age, Segments, Zscore, IPOs by industry, Herfindahl index)*, this study uses median value rather than mean value to discuss the results in order to eliminate statistical noise caused by outliers. As for binary variable (including *Restructuring, M&A firms, Positive earnings, CEOchairperson,),* this study uses mean value to discuss the results. [↑](#footnote-ref-18)
19. This study follows classification used by Internal Revenue Service (IRS), which is a U.S. government agency responsible for collecting taxes and administering tax laws. Particularly, following IRS, U.S businesses are classified as small (or large) when they have the total assets less (or greater) than $10 million. [↑](#footnote-ref-19)
20. Approximately 51% IPOs in the sample are going public in the post –JOBS Act period (2012-2017). Under the Act, EGC status is given to company having total annual gross revenues less than $1 billion. [↑](#footnote-ref-20)
21. https://openknowledge.worldbank.org/bitstream/handle/10986/13528/52460.pdf?sequence=1&isAllowed=y [↑](#footnote-ref-21)