BOARD CHARACTERISTICS AND CORPORATE SOCIAL RESPONSIBILITY ASSURANCE

WHAT FACTORS MATTER IN THE U.S. MARKET?

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Board Characteristics and Corporate Social Responsibility Assurance: What Factors Matter in the U.S. Market?

Abstract:

This study aims to examine the influence of board characteristics – the critical components in the corporate governance mechanisms – on the adoption of corporate social responsibility (CSR) assurance. Based on a sample of 328 listed U.S. firms included in the S&P 500 Index at year-end 2017, we use logistic regression models to investigate the relationships between four typical board characteristics and the firms' CSR assurance decision. Our results confirm that a board with a larger size and a higher proportion of female directors is more likely to adopt CSR assurance in the U.S. market. However, inconsistent with our predictions, we do not find any impact of board independence and board tenure on the companies' CSR assurance decision. Through extended research, we confirm the critical mass theory regarding the board gender diversity's impacts, find a fact about the U.S. market that firms in the environmentally and socially sensitive industries are prone to choose non-accounting firms as assurance providers, and observe a positive effect of an extended diversity factor – board nationality diversity. Our findings not only fill the research gap in the currently under-researched CSR assurance field, but also have practical meanings for the CSR assurance providers, consumers and standard setters.

Keywords:

Corporate social responsibility, assurance, voluntary disclosure, board characteristics, corporate governance

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1. Introduction

"Consumers and investors are looking for transparency in companies' hiring practices, they're interested in where their food is grown, and they want to know how organizations track their greenhouse gas emissions." – AICPA, 2018

The environmental, social and governance (ESG) impacts of corporations have become an increasing concern of their stakeholders (Kolk and Perego, 2010). The term "triple bottom line[1]", raised by John Elkington (1994), is used to recommend companies to respond to this demand and value corporate social responsibility (CSR) as vital as profits. Nowadays, many companies are endeavoring to engage in CSR and disclose the CSR reports[2] to demonstrate their efforts on sustainability. A survey from KPMG (2017) verifies this trend by showing that the global CSR reporting rate has grown significantly between 2005 and 2017 (from 41% to 75% for N100 firms[3]).

"Sustainability assurance: The demand is there and so are the opportunities." – AICPA, 2018

However, the high CSR reporting rates do not mean the high quality and credibility of the CSR reports. Currently, CSR reporting has no unified reporting framework despite the recommendation to use reporting frameworks such as Global Reporting Initiative (GRI) standards[4] by many regulators, which thus creates a blind area for managers to conduct opportunistic behaviors. As more CSR reports are published, worries about that CSR reporting is used by companies only as a tool of impression management (Cho et al., 2010) or greenwash[5] (Lyon and Maxwell, 2011) are also rising significantly. Similar to the independent assurance for financial reports, external CSR assurance is regarded by lots of studies as an effective way to mitigate this trust risk regarding disclosed information (e.g., Chow, 1982; Simnett and Nugent, 2007).

[1] Triple bottom line, firstly raised by John Elkington in 1994, is a framework that improves companies' awareness of the environmental and social concerns, just as they do in profit. The three bottom lines are defined as profit, people and planet.
[2] CSR reports are also called as Sustainability Reports (SR), ESG reports and Corporate Citizenship reports.
[3] According to KPMG (2017), the N100 refers to a worldwide sample of 4,900 companies, which are the top 100 companies ranked by revenue in each of the 49 countries researched. These N100 statistics provide a broad-based snapshot of CSR reporting among large-cap and mid-cap firms around the world (KPMG, 2017).
[4] GRI is an independent international organization that has pioneered in the sustainability reporting field since 1997. The GRI Sustainability Reporting Standards are the frameworks to enable corporates to assess their ESG impacts from their own activities and their supply chain.
[5] According to Lyon and Maxwell (2011), greenwash is "the selective disclosure of positive information about a company's environmental or social performance, without full disclosure of negative information on these dimensions, so as to create an overly positive corporate image".

According to KPMG (2017), the CSR assurance rate has more than doubled among the G250 companies[6] from 2005 (30%) to 2017 (67%). Considering the increasing demand for CSR assurance services in practice, many scholars have started to conduct research to identify the intentions of companies to adopt assurance for the CSR reports. With Simnett et al. (2009) as the representative, a lot of efforts are contributed by researchers to examine the relationships between the country/industry/firm characteristics and the firms' CSR assurance decision (e.g., Kolk and Perego, 2010; Sethi et al, 2015; Casey and Grenier, 2015). In these studies, some significant associations are identified. However, compared to these well-studied external factors, corporate governance characteristics have been paid little attention to, while corporate governance mechanisms are influential on CSR assurance. Cohen et al. (2004) describe corporate governance processes and elements as a corporate governance mosaic that can either complement or substitute for external assurance. Supported by agency theory and stakeholder theory, Unerman and Bennett (2004) explain that good corporate governance demands companies to understand the stakeholders' expectations of social, environmental, economic and ethical concerns. Recent studies regarding corporate governance have lightly touched upon the issue of how corporate governance characteristics impact the choice of CSR assurance from three perspectives – ownership structure (Castelo Branco et al., 2014; Miras-Rodríguez and Di Pietra, 2018), organizational composition & activities (Peter and Romi, 2015; Kend, 2015), and board characteristics (Liao et al., 2016; Martinez-Ferrero et al., 2017). However, these studies are not sufficient to picture an acknowledged relationship, since conflicting results towards the same variables appear occasionally (e.g., Castelo Branco et al., 2014; Miras-Rodríguez and Di Pietra, 2018). Therefore, more efforts are needed to examine the relationships between corporate governance and CSR assurance.

Board of directors plays a central role in the internal governance mechanisms (Daily, 2003) and is highly involved in the implementation of corporate strategies, including the degree of CSR involvement (Pugliese et al., 2009). CSR assurance, a dimension to demonstrate a high CSR engagement, mainly relies on the intention of board directors correspondingly. Liao et al. (2016) verify the influence of board size, board gender diversity and board duality on CSR assurance decision in China. Besides, Martínez-Ferrero et al. (2017) examine the impacts of board independence and board size on the family firms' CSR assurance demand. Furthermore, Miras-Rodríguez and Di Pietra (2018) show that energy companies with fewer board insiders (non-independent directors) are of higher probability to have CSR reports assured. However, because of the small number of studies and the limited scope in each study, more research is deserved in this area (Cohen and Simnett, 2015).

In the CSR assurance field, the U.S. market has some interesting specialties. Previous

[6] G250 refers to the world's 250 largest companies by revenue based on the ranking of Fortune 500 in 2016 (KPMG, 2017).

transnational studies have found that both the CSR reporting rate and the CSR assurance rate in the U.S. lag behind those in other countries (Simnett et al., 2009; Kolk and Perego, 2010; Sethi et al., 2015). Besides, Casey and Grenier (2015) find the "enigma" in the U.S. market by comparing their results with the results of a transnational study conducted by Simnett et al. (2009). Interestingly, in contrast to the international study, they find that the U.S. firms in the sensitive industries such as finance and utilities are not more likely to obtain CSR assurance and that firms with more CSR concerns prefer to get assurance from "lower quality" providers (non-accounting firms). These unique findings of the U.S. market encourage us to dig deeper.

The aim of this thesis is to provide more research evidence at the market level about the influence of board characteristics – an important component in the corporate governance mechanisms – on the adoption of CSR assurance. Considering the specialties of the U.S. market, we are inspired to examine whether the relationships found in previous studies will still hold in the U.S. market. Thus, a research question is formulated as:

What is the influence of the board characteristics on a company's CSR assurance decision in the U.S. setting?

Based on a sample of 328 U.S. listed companies included in the S&P 500 Index at year-end 2017, we try to answer this research question in four parts. Firstly, by using the logistic regression models, we examine the influence of board size, gender diversity, board independence and board tenure on the adoption of CSR assurance. Secondly, we dig deeper into the effects of female directors on CSR assurance with the critical mass theory. Thirdly, after a company decide to undertake CSR assurance, the next step for it is to choose which CSR assurance provider. Following the logic of a firm's decision-making process, we further examine whether these corporate governance variables will influence companies' decision on assurance providers. Finally, from an integrated perspective regarding board diversity, we add board nationality diversity to our models to identify whether a more diversified board is prone to have CSR reports assured.

There are three main contributions made by our study to the existing literature. Firstly, the relationship between board characteristics and CSR assurance is paid little attention to by academia, and our research demonstrates the importance theoretically and provides more empirical evidence in this area. Our study proves that the earlier conclusions from the emerging market with incomplete and restricted corporate governance mechanisms can also be applied to the western market with mature corporate governance mechanisms. Secondly, as the first one to investigate the impacts of board tenure on the CSR assurance decision, our study fills in the blanks for this specific area and thus extend the scope of the CSR assurance research field

regarding corporate governance characteristics. Finally, in practice, our study will help assurance providers and customers understand the U.S. CSR assurance market and the role that boards play in this market.

This paper consists of seven sections. Sections 2 presents the literature review of CSR assurance as well as of corporate governance, and explains our four hypotheses. Section 3 outlines our sample selection, data collection, data quality check, and model design processes. Section 4 provides descriptive statistics of our variables, and the regression results as well as the corresponding discussions. Section 5 investigates three additional tests: the critical mass theory test, the assurance provider test, and the board nationality diversity test. This is followed by Section 6 which shows the robustness tests for our main regression models as well as the additional test models. Finally, Section 7 presents our conclusions, contributions, limitations, and suggestions for future research.

2. Literature Review and Hypotheses

In this section, we firstly review the existing literature on CSR reporting and related assurance. Then, we come to an overview of corporate governance, and further discuss the relationships between corporate governance and CSR assurance. Finally, four hypotheses are developed in Section 2.3.

2.1 CSR reporting and assurance

2.1.1 Background of CSR reporting and assurance

Stakeholders' increasing concerns of companies' ESG performance have prompted companies to disclose their ESG impacts (Simnett, 2009; Kolk and Perego, 2010). CSR Reporting or Sustainability Reporting, defined by GRI as "a company or organization publishes a report about the economic, environmental and social impacts caused by its everyday activities", is nowadays a common practice among large and mid-cap companies (KPMG, 2017). From a historical perspective, CSR reporting has a practical history for over 40 years. In the 1970s, some companies in the western countries attempted to complement the additional social reports as well as the traditional financial reports (Hahn and Kühnen, 2013). To date, CSR reporting has been no longer a voluntary choice but a mandatory choice in many countries with legal requirements from regulators such as governments and stock exchanges (Ernst & Young, 2013; GRI, 2015). Besides, CSR reporting guidelines and standards are gradually moving from non-uniformity towards harmonization (Ernst & Young, 2013; GRI, 2015; KPMG, 2017).

Along with this growing trend of CSR reports, the public's interest in the accuracy of these

reports also mounts (Kolk and Perego, 2010; Sethi et al., 2015). External CSR assurance, meaning that a third-party organization is hired by a firm to assess the CSR information and give its independent audit opinions (Simnett, 2009; GRI, 2013), has been adopted by managers as a tool to improve the confidence of sustainability performance data (GRI, 2013). Similar to the financial audit, external CSR assurance could effectively mitigate the credit risks of the sustainability information disclosed by firms (Chow, 1982; Nugent and Simnett, 2007). According to KPMG (2017), the CSR assurance rate has more than doubled among the G250 companies in the last 12 years, indicating that the largest firms in the world see the value in promoting the reliability of such information. However, compared to the popularity and increasing normativity of CSR reporting, CSR assurance is still under a less regulated environment and remains as a voluntary choice for firms.

2.1.2 CSR reporting and assurance in the U.S.

From a horizontal aspect, many transnational studies have identified that both the CSR reporting rate and the CSR assurance rate in the U.S. lag behind those in many other countries (Simnett et al., 2009; Kolk and Perego, 2010; Sethi et al., 2015). However, similar to the global trend, the U.S. market is also witnessed an increasing trend of CSR assurance from a historical perspective – the number of the externally assured GRI reports published by the U.S. firms more than tripled between 2008 and 2013 (GRI, 2014). To date, several studies in the CSR assurance area have identified the uniqueness of the U.S. market. Simnett et al. (2009) find that companies in such countries as the U.S. with a common law regime have a lower adoption rate of CSR assurance. Pflugrath et al. (2011) compare the different characteristics in three countries – the U.S., the U.K., and Australia. They find that financial analysts from the U.S. value higher for the CSR assurance provided by the professional accounting firms than by the sustainability experts, while financial analysts from Australia and the U.K. perceive little difference in the value of assurance provided by the different types of assurance providers. In addition, Casey and Grenier (2015) find that the U.S. companies in the sensitive industries such as finance and utilities are not more likely to obtain CSR assurance, which is different from the results found in other countries. Since the U.S. market seems to be different from the other countries, studies concerning the U.S. market might have high research value and thus contribute a lot to the under-researched CSR assurance field.

2.1.3 Theories of CSR assurance

Agency theory

Agency theory is first proposed by Jensen and Meckling (1976) to explain how the public corporation exists based on the assumption that managers are self-interested and that managers do not bear the full wealth effects of their decisions. This suggests that the agent (e.g., management) is more likely to make decisions out of his own interests rather than for the

interests of the principal (e.g., investors and stakeholders), when there are conflicts of interest between the two parties (Eisenhardt, 1989; Agrawal and Knoeber, 1996). Previous research shows that investors pay more attention to the social and environmental impacts of companies (Bebbington and Gray, 2001; Lacy et al., 2010) and meanwhile stakeholders such as employees, consumers and suppliers are also increasingly concerned about the firms' CSR performance (Van der Laan et al., 2008). This rising request encourages the management to take actions on improving the CSR performance and disclosing the CSR information to show their management ability and to reduce the principal's agency costs (e.g., Kolk and Pinkse, 2010). However, due to a lack of the generally accepted CSR reporting standards and the public's inexperience in this specific field, a platform is created for the management to conduct opportunistic behaviors. Similar to that financial reporting seeks for external auditing to constrain the managers' earning management behaviors (e.g., Becker et al., 1998), the external CSR assurance, which allows third-party assurers to evaluate and monitor the CSR reporting, is an effective instrument to reduce the information asymmetries and the conflicts of interests between the management team and the stakeholder groups (Velte and Stawinoga, 2017). In this way, agency theory helps to explain the motivation of firms to seek CSR assurance (Simnett, 2009).

Resource dependence theory

Resource dependence theory regards a corporation as an open system which relies on the external environment (Pfeffer and Salancik, 1978). In order to survive and succeed, companies must ensure that they have access to the necessary strategic resources and can gain these resources faster than their rivals to maintain or enhance their competitiveness (Wernerfelt, 1984). CSR reporting is considered as a functional way to help firms show their ability to access the critical strategic resources to their internal and external stakeholders (Darnall et al., 2009). Since CSR assurance can enhance the credibility and reliability of CSR reports that are highly demanded by stakeholders (Simnett et al., 2009; Pflugrath et al., 2011; Casey and Grenier, 2015), it serves as a role to help firms gain and keep these critical resources with stakeholders. As for the CSR assurance process, the expertise of the assurers is also regarded as an essential resource to ensure the quality of the CSR assurance (Darnall et al., 2009). Thus, following the resource dependence theory, "organizations should appoint a completely independent auditor that possesses significant industry expertise and knowledge in the field of CSR reporting" (Velte and Stawinoga, 2017).

Summary

Agency theory and resource dependence theory are two main theories used to explain the motivations of CSR assurance in prior literature. Besides, both of them are also often used to explain the companies' corporate governance characteristics (e.g., Unerman and Bennett, 2004). For example, both theories adequately explain the roles of directors: agency theory properly

conceptualizes the monitoring role of directors, and resource dependence theory helps to explain the directors' resource, service, and strategy role (e.g., Zahra and Pearce, 1989). These two theories provide theoretical supports to our thesis and will be used to link corporate governance and CSR assurance in the Section 2.2.

2.1.4 Determinants of CSR assurance

The decision on CSR assurance and assurance providers is a main research topic in the CSR assurance field (Velte and Stawinoga, 2017). Studies in this topic normally use quantitative research method with archival data collected at the market level. These quantitative studies are suggested by Cohen and Simnett (2015) to be divided into three groups: country, firm, and corporate governance characteristics. Currently, the research based on firm characteristics outnumbers the studies about the country and corporate governance characteristics.

Country characteristics

Researchers have identified that there are different country factors influencing the firms' CSR assurance decision, and have attributed them to the difference in country-level environment such as legal system (code law or common law) and legal enforcement mechanisms (weak or strong enforcement). A negative effect of common law regime on the CSR assurance decision has been found in several transnational studies (Simnett et al., 2009; Kolk and Perego, 2010; Sethi et al., 2015). Countries implementing common law (e.g., the U.S.) are shareholder-oriented, and the primary purpose of firms is shareholder wealth maximization. The demands from stakeholders (e.g., voluntary disclosure of ESG information) are less emphasized in such countries (Kolk and Perego, 2010). In terms of legal enforcement, Simnett et al. (2009) and Sethi et al. (2015) find countries with stronger legal environments have a higher demand of assurance, and explain this phenomenon as that the public's perceived credibility of CSR assurance is low in countries with a weak legal enforcement. However, Kolk and Pergo (2010) get an opposite result, since CSR assurance can serve as a substitute for absent or weak country-level protection mechanisms (Choi and Wong, 2007).

Firm characteristics

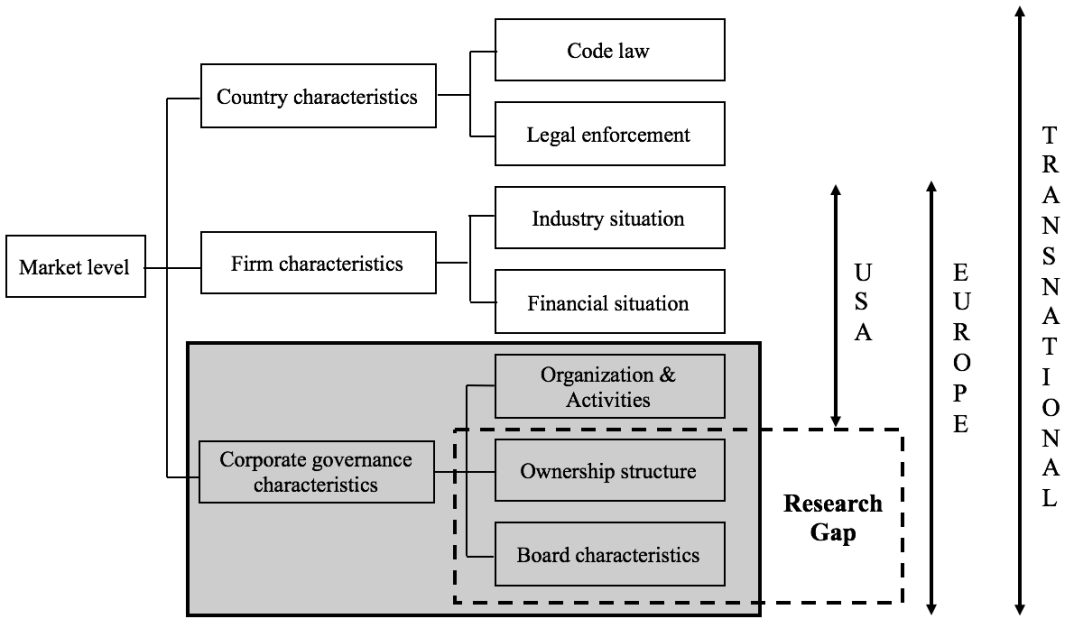
Firm characteristics are well studied in the CSR assurance area. Although some studies show conflicting results towards the same variables, these variables indeed influence the companies' CSR assurance decision. The dominant firm characteristic to affect a company's CSR assurance decision is sector sensitivity (Mock et al., 2007; Cho et al., 2014). Mock et al. (2007) and Cho et al. (2014) find companies in the environmentally sensitive industries (e.g., electricity & utilities, mining & oil) and in the socially sensitive industries (e.g., financial & other services) are more likely to adopt CSR assurance. Simnett et al. (2009) note a potential reason is that companies with greater environmental or social impacts are more exposed to the corresponding

risks and thus are prone to purchase CSR assurance to increase the users' confidence on their CSR information. Furthermore, several financial variables are also examined to see their effects on the CSR assurance decision. Sierra et al. (2013) and Castelo Branco et al. (2014) respectively examine the financial variables such as firm size (positive impact), leverage (negative impact) and profitability (positive impact) in Spain and Portugal, and confirm that the assurance of CSR reporting depends on these factors. There are also some studies examining the firm's financial disclosure factors. Considering the similarity between the financial report assurance and the CSR report assurance, two transnational studies find that firms with positive financial audit opinions are more likely to acquire CSR assurance and to choose big-four audit firms as assurance providers (Mock et al., 2007; Mock et al., 2013).

Corporate governance characteristics

Corporate governance is an area with the lowest research density and is called for further research by Cohen and Simnett (2015). Current studies regarding corporate governance are often from three perspectives: ownership structure, organizational composition & activities, and board characteristics (Velte and Stawinoga, 2017). As our research focus, corporate governance and its relationship with CSR assurance will be discussed thoroughly in Section 2.2. To summarize Section 2.1.4, we build our own research framework in Figure 1 to briefly present the current status of the CSR assurance research at the market level.

Figure 1: CSR assurance research at the market level and the current research gap



2.2 Corporate governance

2.2.1 Conception of corporate governance

In previous studies, scholars research the concept of corporate governance from various perspectives. Saravanamuthu (2004) regards corporate governance in a narrow view as "an enforced system of laws and of financial accounting, where socio-environmental considerations are accorded a low priority." MacMillan et al. (2004) explain a broader conception which stresses all business responsibilities toward the different stakeholder groups who could provide necessary resources for companies' survival, competitiveness and success. The participating groups in corporate governance under this broader view thus include not only those internal to firms (boards, managers, shareholders, and debt holders) but also those external to firms (employees, suppliers, and customers) (Gillan, 2006). Since CSR reporting and related assurance is a product of the stakeholders' demands (Kolk and Perego, 2010), the literature in this respect is always from the broader perspective of corporate governance.

2.2.2 Corporate governance and CSR assurance

Based on agency theory and stakeholder theory, Unerman and Bennett (2004) explain that good corporate governance should understand and address the stakeholders' social, environmental, economic and ethical expectations. It shows us the importance of the nexus between corporate governance and CSR engagements (Jo and Harjoto, 2012). Besides, with the rising expectations of the public toward the corporate disclosure, the public's view on good corporate governance is tightly linked to the degree of honesty and transparency of disclosure (Bellver and Kaufmann, 2005). Consequently, the credibility and reliability of CSR reports are highly valued by the requirement of good corporate governance. Servicing as an instrument to enhance the credibility of CSR reports (Simnett et al., 2009; Pflugrath et al., 2011; Casey and Grenier, 2015), external CSR assurance is thus vital to corporate governance.

As we stated before, current research regarding the relationship between corporate governance and CSR assurance could be grouped into three parts: ownership structure, organizational composition & activities, and board characteristics (Velte and Stawinoga, 2017). In terms of ownership structure, current studies discuss this part from different perspectives. Castelo Branco et al. (2014) show that there is no influence by ownership concentration, but Miras-Rodríguez and Di Pietra (2018) find a higher concentration is related to a higher CSR assurance adoption rate in energy companies. Furthermore, Darnall et al. (2009) expand the scope of ownership to a stakeholder view and conclude that external stakeholders prefer external CSR assurance while internal stakeholders are more likely to choose internal CSR assurance.

From the perspective of organizational composition and activities, many studies examine the

impacts of these organizational characteristics both on the CSR assurance decision and on the assurance provider decision. Based on a sample of 912 U.S. CSR reports, Peters and Romi (2015) find that the existence of a Chief Sustainability Officer (CSO) positively associates with CSR assurance and that this association strengthens when the CSO possesses sustainability expertise. Kend (2015) uses the frequency of committee meetings as a proxy to measure activeness and diligence of a committee in the U.K. and Australia, and finds that more audit committee meetings are in line with a higher adoption rate of CSR assurance and that more sustainability committee meetings are related with a preference to choose the audit firms as assurers.

Finally, as for board characteristics, some factors such as board size, board independence, board duality, gender diversity and foreign background of a director are picked up by researchers to find their effects on CSR assurance (Liao et al., 2016; Martínez-Ferrero et al., 2017; Miras-Rodríguez and Di Pietra, 2018). In summary, literature about the associations between corporate governance characteristics and CSR assurance is scarce (Velte and Stawinoga, 2017). Table 1 lists all the current articles we can find in this area. Considering board characteristics are our research focus, we will discuss it systematically from both theoretical and empirical perspectives in the next section.

Table 1: Articles with corporate governance (CG) characteristics as drivers of CSR assurance

Article	Country	CG variables with significant results
Ruhnke and Gabriel (2013)	Transnational	CSR department/committee[a]
Peters and Romi (2015)	USA	Corporate sustainability officer (CSO)
Kend (2015)	UK & Australia	Audit committee meeting
Liao et al. (2016)	China	Board size; Gender diversity; Board duality; Foreign directors
Martinez-Ferrero et al. (2017)	Transnational[b]	Board size; Board independence
Miras-Rodríguez and Di Pietra (2018)	Transnational	Board independence; Ownership concentration

[a] Under the condition that companies contain directors with environment expertise

[b] More stakeholder-oriented countries

2.2.3 Board characteristics and CSR assurance

The board of directors perhaps plays the most central role in the internal governance mechanisms (Daily, 2003). The important position of boards in corporate governance could be seen from the studies emphasizing on the different roles played by directors and the benefits brought by them. Agency theory illustrates the control/monitoring role of board directors, and

resource dependence theory as well as other theories explain the directors' resource, service, and strategy roles (e.g., Zahra and Pearce, 1989). Hillman and Dalziel (2003) summarize four benefits provided by boards, which are "advice and counselling (Mintzberg, 1983; Lorsch and MacIver, 1989), legitimacy (Selznick, 1949), channels for communicating information between external organizations and the company (Hillman et al., 1999) and preferential access to commitments or support from important stakeholders in the company's environment (Hillman et al. 2001)".

As such a critical role in companies, board directors are highly involved in the implementation of corporate strategy, including the degree of CSR involvement (Pugliese et al., 2009). CSR assurance, regarded as a dimension to demonstrate a high CSR engagement, mainly relies on the intention of board directors correspondingly. However, studies about the influence of board characteristics on CSR assurance are scanty at present (Liao et al., 2016; Martínez-Ferrero et al., 2017; Miras-Rodríguez and Di Pietra, 2018).

By investigating 2054 firm-years of Chinese listed companies with CSR reports between 2008 and 2012, Liao et al. (2016) find that firms with larger board size, higher proportion of female board members and the separation of CEO and board chairman are more likely to adopt CSR assurance in China and that in contrast to their prediction, foreign directors are less likely to engage in voluntary CSR assurance. In addition, Martínez-Ferrero et al. (2017) demonstrate the significantly positive effects of board independence and board size on the assurance demand of family business. Finally, based on the sample of 176 energy companies worldwide, Miras-Rodríguez and Di Pietra (2018) show that companies which are in a relation-based country and which have few board insiders (non-independent directors) are of higher probability to have the CSR reports assured.

There are another two studies investigating the correlations between board characteristics and CSR assurance in a somewhat different way. These two studies treat board characteristics and CSR assurance simultaneously as independent variables, and verify a moderating role that the CSR assurance plays (García-Sánchez and Martínez-Ferrero, 2017; Nekhili et al., 2017). García-Sánchez and Martínez-Ferrero (2017) examine the independent directors' influence on CSR disclosure, and Nekhili et al. (2017) study the effects of female directors on the firm value. Both of these two studies find a moderating effect from CSR assurance. Evidence in the study of García-Sánchez and Martínez-Ferrero (2017) demonstrates that independent directors show an initial opposition to the CSR disclosure practices, but this opposition can be avoided if there is an assurance statement that reduces the independent directors' reputation risks associated with the potentially misleading CSR information. Nekhili et al. (2017) find that the adoption of external CSR assurance is value relevant for firms without any female director, but not value

relevant for firms with female directors. Thus, they think there is a substituted relationship between gender diversity and CSR assurance. Although the direct effects on CSR assurance are not discussed in these studies, the moderating effects provide evidence for our study.

2.3 Hypotheses

Due to the importance of the board of directors and a low research density of board characteristics in the CSR assurance field, we extend the scope of the current CSR assurance research by exploring the impacts of four board characteristics on the firms' CSR assurance decision. In this section, four hypotheses are developed correspondingly.

Board size

Board size is one of the critical characteristics of a board. Resource dependence theory brings a theoretical foundation to the benefits of a large-size board that companies must ensure they have access to the necessary outside resources to maintain their competitiveness (Pfeffer and Salancik, 1978). Since a board with relatively larger size has more capabilities to link organization with the external environment and secure critical resources such as prestige and legitimacy (Pearce and Zahra, 1992), the firms that intend to have competitive advantages are more likely to choose for larger board size. García-Sánchez et al. (2011) prove us that a large-size board has better control on corporate activities as directors from different background provide the experience and diversity. The directors in such a board are thus prone to take suggestions from various stakeholders so that they can play better roles in monitoring corporates and developing strategies (e.g., Zahra and Pearce, 1989). Since stakeholders have an increasing demand for the higher quality of CSR reports (Kolk and Perego, 2010), boards with larger size will be of higher possibility to put efforts into finding methods to increase the quality and credibility of CSR reports. As Simnett et al. (2009) state that the purpose of CSR assurance is to increase the CSR reports' credibility and reputation, a larger board is thus more likely to assure the CSR reports. Some recent studies strengthen this relationship. Direct findings are from Liao et al. (2016) and Martinez-Ferrero et al. (2017): Liao et al. (2016) find that firms with larger board size are more likely to engage in CSR assurance in China, and Martinez-Ferrero et al. (2017) prove evidence that family firms with larger boards have a higher CSR assurance demand. To sum up, we build a hypothesis that:

> **H1:** There is a positive association between board size and the adoption of CSR assurance.

Female directors

Women's characteristics and corporate behavior are evaluated differently from men's (Jago and Vroom, 1982). Studies show that women have personalities such as ethics, cooperation, and concerns of social responsibility and philanthropy. Thus, female board members are more likely

to pursue a high corporate social achievement and a high corporate reputation than male directors (Bear et al., 2010; Nekhili et al., 2017). Based on a sample of 126 firms extracted from the S&P 500 Index over a 5-year period, Boulouta (2013) finds that a higher women director rate exerts a stronger influence on the concerns of "negative" business practices that might harm corporate reputation. Since CSR assurance can increase the CSR reports' credibility and thus corporate reputation (Simnett et al., 2009), it is reasonable to assume that the higher the number of women on the board, the higher probability the companies will have to adopt CSR assurance. Furthermore, Adams and Ferreira (2009) find that female directors demand more audit efforts and managerial accountability. Thus, CSR assurance could be in the consideration of female directors. Finally, Liao et al. (2016) directly evidence the relationship between the number of women directors and the adoption of CSR assurance. This relationship is significant when the companies have three or more female directors. Consequently, it is reasonable to assume that firms with more female directors are more likely to promote the credibility of their CSR reporting and seek CSR assurance services.

H2: There is a positive association between the percentage of female directors on the board and the adoption of CSR assurance.

Board independence

The agency theory points out that managers have incentives to opportunistically manipulate a company's performance and seek for their own interests (Jensen and Meckling, 1976). Compared to insider directors, independent directors (outside directors) are more prone to monitor the actions of managers on the CSR activities and force them to disclose more CSR information to avoid agency costs (Ibrahim and Angelidis, 1995). Empirical studies also find the influence of independent directors on the CSR related activities. Independent directors are generally more interested in developing and maintaining the firms' social responsibility (Zahra and Stanton, 1988), since doing so may enhance their prestige and honor in society. The study of Michelon and Parbonetti (2012) indicates that the presence of independent directors on the board is not per se positively associated with disclosure, but when independent directors are community influential, they become relevant in orienting sustainability disclosure. Research in financial auditing field shows that independent directors are more willing to pay for extra audit services to enhance the credibility of financial statements in order to reduce the opportunistic behaviors of the management (Carcello et al., 2002). Thus, from a similar credibility concern, independent directors might also be more interested in purchasing CSR assurance services. Finally, Martinez-Ferrero et al. (2017) provide direct evidence that a high proportion of independent directors positively impacts the family firms' assurance demand.

H3: There is a positive association between board independence and the adoption of CSR assurance.

Board tenure

The issue of board tenure has gained attention from academics and business management practice recently. Long-tenured outside directors are valued because of their experience and organizational memory (Huang and Hilary, 2018; Patro et al., 2018). However, long-term tenure may also diminish the effectiveness of the boards' role in monitoring and advising (Pozen and Hamacher, 2015). As the core of corporates, board of directors should take into account their role in creating and maintaining corporate reputation (Huynh, 2019). Musteen et al. (2010) have observed an inverted-U relationship between the average tenure of independent directors and the corporate reputation. Since CSR assurance is of great benefits to improve corporate reputation by increasing the report credibility and reliability (Simnett et al., 2009), it is reasonable to assume that this inverted-U relationship might also exist between board tenure and the adoption of CSR assurance. On the other hand, an inverted U-shaped association is also identified between independent director tenure and the firms' corporate social performance by Patro et al. (2018). However, firms with higher CSR performance are normally expected to be less likely to conduct CSR assurance (e.g., Peters and Romi, 2015). Thus, the relationship between board tenure and CSR assurance might also be U-shaped. In addition to the nonlinear relationships, it is also potential for board tenure to linearly associate with the CSR assurance decision. Handajani et al. (2014) find that boards with longer tenure have a negative relationship with CSR disclosure rate, and they explain that long-term relationships with other board members and management weaken their monitoring and supervision function and thus can become detrimental to a long-term CSR strategy. Moreover, based on a sample of 150 Australian companies, Rao and Tilt (2016) observe that boards with higher proportion of directors whose tenure is over 10 years tend to have a lower level of CSR disclosure. Thus, they argue that boards with higher tenure diversity (i.e. a mix of both long- and short-tenured directors) are more likely to make high-quality decisions regarding CSR issues. If a firm is unwilling to conduct CSR reporting, it seems to be unreasonable to assume that this firm will obtain CSR assurance, given CSR reports serving as the prerequisite. Thus, there might be a negative relationship between board tenure and CSR assurance. Although research about board tenure and CSR assurance has still been empty, the significant relationship either linear or nonlinear has been found in the related areas in prior studies. As a result, we assume that:

H4: There is an association between board tenure and the adoption of CSR assurance.

3. Method

This section starts with a description of our sample selection process, followed by an outline of how we collected our data and checked the data quality. We end this section with the introduction and discussion of our chosen models and all the related variables.

3.1 Sample selection

As mentioned before, this thesis focuses on the U.S. market, not only due to the uniqueness of this market in the field of CSR assurance, but also because the relevant research about CSR assurance on this market is scanty. Through choosing only one market as our research focus, we effectively control the strong country-level institutional impacts identified in the previous studies, such as the effects of whether a country implements code law or common law regime on the CSR assurance decision (Simnett et al., 2009; Kolk and Perego, 2010; Sethi et al., 2015). Considering the accessibility of the relevant information needed in our research, we only choose the publicly traded companies on the major U.S. regulated stock exchanges which refer to the New York Stock Exchange (NYSE) and the Nasdaq Stock Market (NASDAQ). There are more than 4,000 listed companies[7] in these two stock exchanges observed in the database. Considering the heavy workload of dealing with the data of over 4,000 companies and the time constraints, we limit our initial sample companies to the listed U.S. companies included in the S&P 500 Index at year-end 2017. These companies not only are the most representative companies in the U.S., but also have great international influence.

In accordance with the prior literature (Cho et al., 2014; Kend, 2015; De Beelde and Tuybens, 2015), we build our sample on the basis of the CSR reports of the most recent year with the available data. Following the definition in the Eikon database, we recognize a CSR report as either a stand-alone CSR report (also known as the Health & Safety / Sustainability / ESG / Citizenship report), or a separate section in the annual report on the sustainability information. The latter one is regarded as that a company uses integrated reporting for its CSR report. We collect the CSR reports and the relevant financial as well as non-financial information of the S&P 500 companies for their fiscal year 2017. The data collection and verification processes are described in detail in Section 3.2.

Table 2: Sample selection process

	Observations
Population	**500**
Less: Information not accessible even with manual collection	(16)
Subtotal	**484**
Less: Companies which do not issue CSR reports	(156)
Sample firms	**328**

Due to the unavailability of much necessary information (especially the ESG information) in

[7] This datum has been verified through the Thomson Reuters Datastream database.

the databases that we can access, our subsequent sample selection process is conducted after we finish the manual data collection of our initial sample companies. Table 2 presents the process of the sample selection. First, we exclude 16 companies without necessary information needed in our analyses even after the manual data collection process. This data deficiency is caused by two reasons: 1) fifteen of these companies were delisted from the stock exchanges or acquired by other companies after their fiscal year 2017, causing that we cannot access their information; 2) the company "DowDuPont Inc." lacks the critical comparable ESG score information that cannot be calculated by us manually. Next, 156 firms are excluded from the sample due to no release of CSR report in their fiscal year 2017. Finally, we get a sample of 328 listed companies which work as components of the S&P 500 Index.

3.2 Data collection and quality check

This thesis is based on the data of the S&P 500 companies of their fiscal year 2017. The data are obtained from three main ways: 1) Compustat database provided by Wharton Research Data Services (WRDS), 2) Eikon database offered by Thomson Reuters, and 3) manual collection. Compustat and Eikon are mainly used to collect the initial data, while manual collection is mainly used to supplement the missing financial and non-financial data. When manual collection is performed, the data primarily derive from the firm websites and the GRI website[8]. Around 200 CSR reports, 10 Proxy Statement reports, and 13 annual reports have been collected and assessed during this process. The details of how we extracted data to build our variables from each data source are shown in Table 3.

The reliability and credibility of data are vital in quantitative research. During the whole data collection process, several tests are conducted to ensure the data quality. First, since S&P 500 index adjusts company list every year, there might be slight differences in databases if the data are not updated in time. In order to ensure that we correctly identify the 500 firms included in the S&P 500 Index at year-end 2017, the company list has been cross-checked between Compustat and Wind database. The minor differences between the two databases are manually adjusted with additional information gathered from the Internet. Next, before starting our manual data collection process, we randomly pick 30 companies and compare their ESG and financial information obtained from Eikon to our hand-collected data from their CSR reports and annual reports. No material differences are found. Finally, after we finish manually collecting all the missing data, a double check is done to ensure the data accuracy. As a result, we believe that our data is reliable and credible enough to support our research.

[8] Available at http://database.globalreporting.org/search/

Table 3: Data source and extraction

Variables	Extracted data from databases	Data source
CSR reporting[a]	Whether a company has CSR reports or not	Eikon & Manual collection
CSR assurance	Whether a firm conducts external CSR assurance or not	Eikon & Manual collection
Board size	The number of board members	Eikon & Manual collection
Female directors	Board gender diversity (%)	Eikon & Manual collection
Independent directors	Proportion of independent directors	Eikon & Manual collection
Tenure	Average board tenure (year)	Eikon & Manual collection
Environmentally sensitive industry	Standard Industrial Classification (SIC) code	Compustat
Socially sensitive industry	SIC code	Compustat
Firm size	Total sales (in thousands)	Eikon & Manual collection
ROA	Return on assets	Eikon
Leverage	Total debt (in thousands) Total assets (in thousands)	Eikon
Board meeting	The number of board meetings	Eikon & Manual collection
Duality	The separation of CEO and board chairman	Eikon
ESG score	ESG combined score	Eikon
Foreign income	A firm's income from foreign operations in a given year	Compustat
GRI guidelines	Whether a firm's CSR report is published in line with the GRI guidelines	Eikon & Manual collection
Non-accounting firms[b]	CSR assurance provider's name	Eikon & Manual collection
Nationality[c]	Proportion of directors from different countries	BoardEx (WRDS)

[a] This variable is not part of our models, but a critical determinant variable in our sample selection process.

[b], [c] This variable is used in the "Additional Tests" section.

3.3 Main regression model

In line with previous studies (e.g., Simnett et al., 2009; Kolk and Perego, 2010; Cho et al., 2014; Peters and Romi, 2015; Liao et al., 2016), we use the logistic regression model in this thesis to investigate the influence of board characteristics on a firm's CSR assurance decision. The logistic regression model is more appropriate for the binary response and overcomes the disadvantage of the linear probability model that the fitted probabilities can be less than 0 and more than 1. Our main basic regression model named Regression Model (1) is shown as follows.

$$CSRA_{i,t} = \beta_0 + \beta_1 \cdot Board\_size_{i,t} + \beta_2 \cdot Female_{i,t} + \beta_3 \cdot Ind\_director_{i,t} + \beta_4 \cdot Tenure_{i,t} + \gamma \cdot Controls_{i,t} + \varepsilon_{i,t} \quad (1)$$

where *CSRA* is the dependent variable; β_0 is the intercept; *Board_size*, *Female*, *Ind_director*, and *Tenure* are the explanatory variables; $\beta_1 - \beta_4$ are the coefficients of the explanatory variables; *Controls* represents our ten control variables: *Envi_industry*, *Soci_industry*, *Firm_size*, *ROA*, *Leverage*, *Board_meeting*, *Duality*, *ESG_score*, *For_income* and *GRI_guide*; γ represents the corresponding coefficients of the control variables; ε is the error term.

3.3.1 Dependent variable

The dependent variable *CSRA* is a binary variable, which equals to 1 if a company assures its CSR reports, and 0 otherwise. Here, the scope of CSR assurance is restricted to the external assurance of CSR reports. Generally, CSR assurance services could be divided into two types: internal assurance and external assurance. Although internal audit has an appealing strength of its accessibility to the management system (Soh and Martinov-Bennie, 2015), the majority of studies in this area are based on external assurance (Velte and Stawinoga, 2017), because of the public unavailability concerning internal assurance. Our research is in line with the mainstream out of the same concern. Besides, when we determine whether a firm obtains CSR assurance, we distinguish neither among whether the CSR assurance provider is an audit, consulting or engineering firm, nor between whether the degree of assurance is limited or reasonable[9]. A noticeable thing is that when a company adopts integrated reporting for its CSR report, this company will be considered to adopt CSR assurance by us if it meets at least one of the following requirements[10]:

1) demonstrate an independent third-party assurance report of its sustainability part in the annual report; or
2) have a specific paragraph or sentence in the annual report to specify that it has obtained assurance or verification for its CSR information.

3.3.2 Explanatory variables

In this study, we choose four board characteristics and examine the relationships between them and a company's CSR assurance decision. Based on our hypotheses, five explanatory variables are designed and used in the regression model.

[9] There are two levels of assurance often provided by the CSR assurers: "reasonable assurance" (i.e., high but not absolute) or "limited review" (i.e., moderate). A higher level of assurance indicates a stricter assurance process, as defined in the standards and procedures of CSR assurance. (GRI, 2014)

[10] Since traditional financial statement audit does not assure the sustainability section in the annual reports, these two requirements are aimed to distinguish between financial assurance statement and CSR assurance statement.

Board size

Board_size is the first explanatory variable and is used to test Hypothesis 1. It is measured as the number of board directors serving in the company's fiscal year 2017. A positive relationship is expected between this explanatory variable and our dependent variable.

Female directors

Female is the second explanatory variable and is used to test Hypothesis 2. In accordance with the previous study conducted by Liao et al. (2016), *Female* is defined as the proportion of female directors on the total board directors. This percentage is often used as a proxy to show the gender diversity of the board. We expect that this explanatory variable is positively related to the propensity to adopt CSR assurance.

Independent directors

Ind_director is the third explanatory variable and is used to test Hypothesis 3. Following the earlier literature (e.g., Peters and Romi, 2015; Liao et al., 2016; Martínez-Ferrero et al., 2017), we use the ratio of independent directors[11] to the total board directors to measure the variable *Ind_director*. A positive relationship is anticipated between this explanatory variable and the dependent variable.

Board tenure

Because we do not know the relationship between the board tenure and the propensity to obtain CSR assurance is linear or nonlinear, in order to test Hypothesis 4, we design two explanatory variables to test the linear and nonlinear relationship separately. The first one is *Tenure* which is measured as the average number of years each board member has been on the board. *Tenure* is used in Regression Model (1) to test the linear relationship. The second one is *Tenure_sq* which is the square of *Tenure*. We use *Tenure_sq* to replace *Tenure* in Regression Model (1) with keeping other variables unchanged, and thus get our second regression model labelled Regression Model (2) (see below) to test the quadratic relationship between the explanatory and the dependent variable.

$$CSRA_{i,t} = \beta_0 + \beta_1 \cdot Board\_size_{i,t} + \beta_2 \cdot Female_{i,t} + \beta_3 \cdot Ind\_director_{i,t} + \beta_4 \cdot Tenure\_sq_{i,t} + \gamma \cdot Controls_{i,t} + \varepsilon_{i,t} \quad (2)$$

3.3.3 Control variables

As mentioned before, firm characteristics such as industry, size, profitability and leverage ratio have impacts on the firms' CSR assurance decision. Besides, some corporate governance

[11] "Independent director" is defined according to Rule 4200(a) (15) from the U.S. Securities and Exchange Commission (SEC), which is available at https://www.sec.gov/rules/sro/34-47516.htm

characteristics such as the duality of CEO and board chairman are also found correlated to the dependent variable. In this study, we control ten variables in total. These variables have been suggested to associate with the independent variables and/or to affect the dependent variable. Through controlling these variables, we significantly reduce the bias of our regression model. All control variables and their definitions are justified by prior research.

Environmentally sensitive industry

Lots of previous studies have found that firms in the environmentally sensitive industries are more likely to obtain assurance for their CSR reports (e.g., Mock et al., 2007; Simnett et al., 2009; Cho et al., 2014). Thus, in order to control for industry impacts, we build *Envi_industry* as a dummy variable which equals to 1 if a company belongs to the environmentally sensitive industries, and 0 otherwise. Following Peters and Romi (2015), we define the environmentally sensitive industries as the industries with two-digit SIC codes of 13, 26, 28, 29, 33 and 49. The six SIC codes indicate the oil, paper, chemical, petroleum, metals, and utilities industry respectively.

Socially sensitive industry

In addition to the environmentally sensitive industry membership, finance industry membership is also found to have influence on the firms' choice to adopt CSR assurance (Simnett et al., 2009; Cho et al., 2014; Casey and Grenier, 2015). Due to its great impacts on the financial well-being of our societies, finance industry is often regarded as the socially sensitive industry. We use the two-digit SIC codes of 60-67 to identify the financial firms, and thus build another variable named *Soci_industry* to further control for industry influence. *Soci_industry* is a binary variable where 1 indicates that a company is in the socially sensitive industries, and 0 otherwise.

Firm size

Firm size has been identified to positively relate to the firms' choice to assure its CSR reports (Sierra et al., 2013; Castelo Branco et al., 2014; De Beelde and Tuybens, 2015). In accordance with Simnett et al. (2009) and Liao et al. (2016), we define *Firm_size* as the natural logarithm of total sales and use it as a control variable in our regression models.

Return on assets

Return on assets is often used as a proxy for firms' profitability which has been found to be one of the determinants of CSR assurance in some studies (Sierra et al., 2013; Castelo Branco et al., 2014). We use *ROA* to indicate return on assets in our regression models, and this variable is measured as the income after taxes but before extraordinary items divided by the average total assets.

Leverage

Prior research has also found that a firm's decision to conduct CSR assurance is affected by its financial leverage level (Sierra et al., 2013; Castelo Branco et al., 2014; Casey and Grenier, 2015). Consistent with the studies of Sierra et al. (2013) and Liao et al. (2016), we include in our regression models the variable *Leverage* which is calculated as the ratio of total debt to total assets. *Leverage* works as an indicator for the financial risks of companies.

Board meeting

Board meeting is often used by previous literature as a measure to evaluate the activity level and diligence of the board. Generally, more frequent board meetings can increase the likelihood to choose assurance services (Carcello et al., 2002). Besides, more active boards are also regarded to have more impacts on companies (DeZoort et al., 2002). Hence, *Board_meeting* is established as a control variable in our regression models and measured as the number of board meetings held by companies during the fiscal year 2017.

Duality

Liao et al. (2016) have identified the positive relationship between the separation of CEO and board chairman and the choice to have CSR reports assured. Therefore, we use a binary variable *Duality* to indicate the separation of CEO and board chairman and control it in the regression models. *Duality* equals to 1 if the CEO is not the chairman of the board, and 0 otherwise.

ESG score

Similar to earlier studies (e.g., Peters and Romi, 2015; Liao et al., 2016; Birkey et al., 2016), we also control for a company's CSR performance through using a variable named *ESG_score* in the regression models. Previous research often uses the total environmental concerns score obtained from KLD Analytics as a proxy for a firm's CSR performance (Peters and Romi, 2015; Birkey et al., 2016). However, due to the data inaccessibility, we choose to use the ESG Combined Score obtained from the Eikon database as a replacement. The ESG Combined Score comprehensively evaluates a company's CSR performance from four perspectives – environmental, social, governance, and news controversies.

Foreign income

Because the U.S. lags behind a great number of countries in the CSR assurance field (Simnett et al., 2009; Kolk and Perego, 2010; Sethi et al., 2015), it is reasonable to expect that the U.S. companies which have greater international operations will face more pressure and expectations from the international stakeholders and thus will be more likely to assure the CSR reports. As a result, *For_income* is included as a control variable where 1 indicates a company has income from foreign operations, and 0 otherwise.

GRI guidelines

Ruhnke and Gabriel (2013) find that companies which publish their CSR reports in line with the GRI guidelines are more likely to obtain CSR assurance. The degree to which companies follow the GRI guidelines is regarded as an important indicator of the comprehensiveness of a CSR report, as cited by Peters and Romi (2015). Thus, a dummy variable labelled *GRI_guide* is built to control for the reporting quality, and it is measured as 1 if a firm publish its CSR reports in accordance with the GRI guidelines, and 0 otherwise.

4. Results and Analysis

In this section, we first present the descriptive statistics of our variables in Section 4.1. Then, the results obtained from the regression models are presented in Section 4.2 and discussed in Section 4.3.

4.1 Descriptive statistics

Table 4 presents the situation of CSR reporting and assurance for the S&P 500 companies in 2017. After excluding the companies which have still lacked necessary information, we observe that 328 firms have made CSR reporting out of the 484 companies, which indicates that the CSR reporting rate of the S&P 500 companies in 2017 is around 68%. Besides, out of our 328 sample firms, 145 companies assured their CSR reports in 2017. The CSR assurance rate of circa 44% indicates that the majority of the S&P 500 companies do not obtain CSR assurance for their CSR reports.

Table 4: CSR reporting and assurance in the U.S.

Year	Listed firms	CSR reporting		CSR assurance	
	No.	No.	Percentage	No.	Percentage
2017	484[a]	328	67.77%	145	44.21%

[a] This is the number of the firms which have all the necessary information after manual collection process.

Table 5 reflects the companies' appetite of CSR assurance providers in the U.S. during 2017. Out of the 145 companies which adopt CSR assurance, only 23 firms (15.86%) choose public accounting firms as their CSR assurance providers, and the remaining 122 companies (84.14%) employ the professions other than accounting firms (normally refer to consulting and engineering firms) to ensure their CSR reports. This observation is consistent with the previous studies (Peters and Romi, 2015; Casey and Grenier, 2015), that is, the U.S. CSR assurance market is dominated by the non-accounting companies. Among the accounting professions, Big

4 auditing firms own the majority of market share (95.65%), with Ernst & Young accounting for the largest market share (39.13%), followed by Deloitte (30.43%), PWC (17.39%), and KPMG (8.70%). For non-accounting firms, Bureau Veritas and Lloyd's Register Quality Assurance (LRQA) dominate the CSR assurance market, followed by ERM Certification and Verification Services (ERM CVS) and Trucost.

Table 5: The distribution of CSR assurance providers

Public accounting firms	Ernst & Young	Deloitte	KPMG	PWC	Non-big 4	Total
2017	9	7	2	4	1	23
Non-accounting firms[a]	Bureau Veritas	LRQA[b]	ERM CVS	Trucost	Others	Total
2017	34	19	15	7	47	122

[a] Non-accounting firms include both consulting and engineering firms.

[b] LRQA is the abbreviation of Lloyd's Register Quality Assurance.

Table 6 presents the descriptive statistics of all the variables used in our Regression Model (1) and (2). We divide our sample into two groups on basis of the existence of CSR assurance, and provide summary statistics for assured and non-assured reports respectively along with the entire sample. On average, the companies which adopts CSR assurance have larger board size than the companies which do not. The average value of *Board_size* is around 11.38 for the entire sample. Besides, the mean of *Female* for entire sample is 0.24, indicating that the S&P 500 companies on average have a board with 24% female directors. The percentage of female directors over the total board directors is higher in the companies which assure the CSR reports (25%) than in those which do not (22%). Furthermore, on average, independent directors (*Ind_director*) account for circa 84% of the total board members in the entire sample. Regarding *Tenure*, we observe that directors on average serve on the board for 8.79 years. *Tenure_sq* is the square of *Tenure*, and the average value of it is 85.12 for our 328 sampled companies. No statistically significant mean difference is found between the "Not assured" and "Assured" group for the variable *Ind_director*, *Tenure* and *Tenure_sq*.

Concerning the control variables, around 27% and 18% of our sampled companies belong to the environmentally sensitive industry (*Envi_industry*) and the socially sensitive industry (*Soci_industry*) respectively. In addition, the mean of *Firm_size* for the entire sample is 16.40, and the firms with assured reports have larger firm size than the firms without assured reports in our sample. Furthermore, the average value of *ROA* and *Leverage* are 6% and 33% respectively for the 328 sampled firms. In terms of *Board_meeting*, for our entire sample, on average about 8 board meetings are held during the year. Besides, approximately 71% of our sampled firms separate the position of CEO and the chairman of the board (*Duality*). Regarding

Table 6: Descriptive statistics of variables

	Not Assured					Assured					Entire Sample				
Variables	Obs	Mean	Min	Max	SD	Obs	Mean	Min	Max	SD	Obs	Mean	Min	Max	SD
CSRA	183	0.00	0.00	0.00	0.00	145	1.00	1.00	1.00	0.00	328	0.44	0.00	1.00	0.50
Board_size	183	11.11	6.00	18.00	1.89	145	11.71	5.00	17.00	1.95	328	11.38	5.00	18.00	1.94
Female	183	0.22	0.00	0.50	0.08	145	0.25	0.08	0.50	0.08	328	0.24	0.00	0.50	0.08
Ind_director	183	0.84	0.55	0.94	0.08	145	0.85	0.50	0.95	0.09	328	0.84	0.50	0.95	0.08
Tenure	183	8.82	2.00	18.82	2.64	145	8.74	1.00	22.02	3.04	328	8.79	1.00	22.02	2.82
Tenure_sq	183	84.77	4.00	354.07	52.02	145	85.56	1.00	485.10	65.54	328	85.12	1.00	485.10	58.29
Envi_industry	183	0.28	0.00	1.00	0.45	145	0.26	0.00	1.00	0.44	328	0.27	0.00	1.00	0.45
Soci_industry	183	0.17	0.00	1.00	0.38	145	0.20	0.00	1.00	0.40	328	0.18	0.00	1.00	0.39
Firm_size	183	16.24	13.81	20.03	1.12	145	16.61	14.00	19.28	1.16	328	16.40	13.81	20.03	1.15
ROA	183	0.05	-0.34	0.33	0.07	145	0.07	-0.15	0.28	0.06	328	0.06	-0.34	0.33	0.07
Leverage	183	0.33	0.00	1.85	0.21	145	0.32	0.00	0.90	0.17	328	0.33	0.00	1.85	0.19
Board_meeting	183	8.02	4.00	29.00	3.96	145	8.30	4.00	27.00	3.98	328	8.14	4.00	29.00	3.96
Duality	183	0.69	0.00	1.00	0.46	145	0.74	0.00	1.00	0.44	328	0.71	0.00	1.00	0.45
ESG_score	183	53.62	25.89	89.61	16.00	145	53.48	29.69	89.49	17.00	328	53.56	25.89	89.61	16.42
For_income	183	0.60	0.00	1.00	0.49	145	0.67	0.00	1.00	0.47	328	0.63	0.00	1.00	0.48
GRI_guide	183	0.64	0.00	1.00	0.48	145	0.87	0.00	1.00	0.34	328	0.74	0.00	1.00	0.44

Table 6 shows the descriptive statistics of the variables included in our main regression models. The difference in means between the "Not Assured" and "Assured" group has statistically significance for the variable *CSRA* (p-value = 0.000), *Board_size* (p-value = 0.006), *Female* (p-value = 0.002), *Firm_size* (p-value = 0.003) and *GRI_guide* (p-value = 0.000), but does not have statistically significance for the variable *Ind_director* (p-value = 0.608), *Tenure* (p-value = 0.798), *Tenure_sq* (p-value = 0.905), *Envi_industry* (p-value = 0.657), *Soci_industry* (p-value = 0.481), *ROA* (p-value = 0.106), *Leverage* (p-value = 0.856), *Board_meeting* (p-value = 0.534), *Duality* (p-value = 0.381), *ESG_score* (p-value = 0.939) and *For_income* (p-value = 0.205).

Table 7: Pearson correlation coefficients

Variables	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**	**(9)**	**(10)**	**(11)**
(1) *Board_size*	1.000***										
(2) *Female*	0.105*	1.000***									
(3) *Ind_director*	0.076	0.172***	1.000***								
(4) *Tenure*	-0.086	-0.084	-0.223***	1.000***							
(5) *Tenure_sq*	-0.086	-0.081	-0.260***	0.965***	1.000***						
(6) *Firm_size*	0.295***	0.198***	0.110**	-0.159***	-0.168***	1.000***					
(7) *ROA*	-0.070	0.035	-0.045	0.119**	0.101*	0.098*	1.000***				
(8) *Leverage*	-0.063	-0.097*	0.028	-0.057	-0.049	-0.126**	0.111**	1.000***			
(9) *Board_meeting*	0.120**	0.080	0.039	-0.155***	-0.140**	0.110**	-0.172***	-0.045	1.000***		
(10) *ESG_score*	-0.150***	0.001	0.154***	0.032	0.021	-0.374***	-0.024	-0.045	-0.133**	1.000***	
(11) *Nationality*	-0.024	0.011	0.052	-0.196***	-0.178***	0.029	0.017	0.037	-0.005	0.040	1.000***

Table 7 shows the Pearson's correlation matrix for the explanatory and control variables used in all of our regression models. Pearson's r is calculated on the basis of the cross-sectional data. Pearson's r cannot be computed on the variable *Envi_industry*, *Soci_industry*, *Duality*, *For_income*, *GRI_guide*, *Female_2*, *Female_3M*, *Female_3* and *Female_4M*, because they are factor variables. The variable *Female_2*, *Female_3M*, *Female_3*, *Female_4M* and *Nationality* are variables used in the "Additional Tests" section.

***, **, * indicate significance at 1%, 5% and 10% levels respectively.

ESG_score, in the entire sample, companies have a CSR performance score between 25.89 and 89.61, with a mean value of 53.56. The average value of *For_income* is 0.63 for our entire sample. As for *GRI_guide*, firms which conduct CSR assurance are more likely to publish the CSR reports in accordance with the GRI guidelines. Meanwhile, around 74% of the 328 sampled firms prepare their CSR reports following the GRI reporting guidelines. Finally, the difference in means between the "Not assured" and "Assured" group is statistically significant for the variable *Firm_size* and *GRI_guide*, but not for the remaining eight control variables.

Table 7 presents the Pearson's correlation matrix for all the continuous variables. We can observe that the majority of these variables have the Pearson's r below 0.3, indicating the correlations between variables are relatively low. The only exception is a strong correlation between *Tenure* and *Tenure_sq* with a coefficient value of 0.965. This high correlation can be explained by the intrinsic quadratic relation between *Tenure_sq* and *Tenure*. Since we include these two variables in the different regression models, this strong relation brings no multicollinearity issue in our study. To conclude, we think these is no potential issue with multicollinearity in our regression models.

4.2 Results from the regression models

Table 8 presents the results from seven different regression models. Regression Model (1a), (1b), (1c) and (1d) are based on Regression Model (1), and Regression Model (2a) is based on Regression Model (2). Regression Model (1a), (1b), (1c), (1d) and (2a) examine the relationships between the five explanatory variables and the dependent variable one by one, without changes in the ten control variables. Regression Model (1) and (2) include all the four board characteristics in one regression model respectively, and examine the combined effects of these explanatory variables on the dependent variable. All of these models use *CSRA* as the dependent variable.

In Table 8, Regression Model (1a) uses *Board_size* as the only one explanatory variable. A significant positive relationship is identified between the board size and the firms' decision to obtain CSR assurance, since the coefficient on *Board_size* is 0.150 with a p-value of 0.028. As for control variables, *Soci_industry*, *Firm_size*, *ROA*, *For_income* and *GRI_guide* are all significantly and positively related to the propensity to conduct CSR assurance, with a p-value of 0.019, 0.034, 0.049, 0.022, and 0.000 respectively.

Regression Model (1b) uses *Female* as the only one explanatory variable. We find that companies with higher proportion of female directors over the total board directors are more likely to assure the CSR reports (coefficient = 3.572, p-value = 0.021). Besides, socially sensitive industry membership (p-value = 0.017), firm size (p-value = 0.022), and following

Table 8: Results from the regression models

Regression	**(1a)**	**(1b)**	**(1c)**	**(1d)**	**(2a)**	**(1)**	**(2)**
	CSRA	CSRA	CSRA	CSRA	CSRA	CSRA	CSRA
Board_size	0.150**					0.147**	0.149**
	(0.028)					(0.033)	(0.031)
Female		3.572**				3.641**	3.673**
		(0.021)				(0.021)	(0.020)
Ind_director			-0.663			-1.173	-1.002
			(0.668)			(0.468)	(0.538)
Tenure				0.015		0.025	
				(0.741)		(0.600)	
Tenure_sq					0.002		0.002
					(0.389)		(0.312)
Envi_industry	0.101	0.170	0.149	0.143	0.155	0.163	0.170
	(0.738)	(0.572)	(0.619)	(0.633)	(0.604)	(0.595)	(0.577)
Soci_industry	1.005**	1.015**	1.028**	1.015**	0.995**	0.959**	0.940**
	(0.019)	(0.017)	(0.016)	(0.018)	(0.020)	(0.026)	(0.029)
Firm_size	0.256**	0.273**	0.330***	0.326***	0.339***	0.239*	0.247**
	(0.034)	(0.022)	(0.006)	(0.006)	(0.005)	(0.058)	(0.050)
ROA	4.169**	3.800*	3.802*	3.748*	3.642*	3.865*	3.783*
	(0.049)	(0.071)	(0.067)	(0.074)	(0.082)	(0.074)	(0.080)
Leverage	-0.332	-0.220	-0.318	-0.315	-0.301	-0.192	-0.182
	(0.607)	(0.734)	(0.618)	(0.623)	(0.638)	(0.768)	(0.781)
Board_meeting	0.007	0.007	0.012	0.013	0.015	0.005	0.007
	(0.826)	(0.837)	(0.703)	(0.686)	(0.642)	(0.875)	(0.842)
Duality	0.249	0.283	0.277	0.275	0.253	0.187	0.171
	(0.357)	(0.295)	(0.306)	(0.314)	(0.354)	(0.503)	(0.540)
ESG_score	0.003	0.001	0.003	0.002	0.003	0.004	0.004
	(0.673)	(0.882)	(0.722)	(0.768)	(0.734)	(0.643)	(0.628)
For_income	0.726**	0.608*	0.622**	0.629**	0.631**	0.688**	0.692**
	(0.022)	(0.052)	(0.046)	(0.043)	(0.043)	(0.031)	(0.030)
GRI_guide	1.420***	1.412***	1.439***	1.431***	1.450***	1.458***	1.475***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Constant	-8.485***	-7.752***	-7.407***	-8.007***	-8.279***	-8.264***	-8.580***
	(0.000)	(0.001)	(0.002)	(0.001)	(0.000)	(0.002)	(0.001)
Observations	328	328	328	328	328	328	328
AUC[a]	0.712	0.718	0.703	0.703	0.702	0.723	0.725

Table 8 shows the regression results with the dependent variable *CSRA* in all the models. All the regressions are based on the entire sample of 328 companies. P-values are shown in brackets below the coefficients.

[a] AUC is the area under the Receiver Operating Characteristic (ROC) curve. It is a critical metric to evaluate the performance of any classification model. Generally, the higher the AUC is, the better the performance of the model is.

***, **, * indicate significance at 1%, 5% and 10% levels respectively (two-tailed).

GRI guidelines to make CSR reporting (p-value = 0.000) also have significantly positive influence on the firms' CSR assurance decision. Different from Regression Model (1a), *ROA* and *For_income* only significantly associate with CSR assurance at the 10% level.

Regression Model (1c), (1d) and (2a) separately examine the impacts of the explanatory variable *Ind_director*, *Tenure* and *Tenure_sq* on the dependent variable. However, no significant relationship is found between any one of these three variables and the dependent variable. With regard to control variables, *Soci_industry*, *Firm_size*, *For_income* and *GRI_guide* significantly and positively influence the firms' decision to undertake CSR assurance. However, the indicator of profitability, that is *ROA*, only significantly correlates to CSR assurance at the 10% level.

Furthermore, when we inspect the combined impacts of the four board characteristics on the dependent variable through Regression Model (1) and (2), we find that the relationships identified in Regression Model (1a), (1b), (1c), (1d) and (2a) have not changed between the five explanatory variables and the dependent variable. For control variables, the relationships with the dependent variable *CSRA* still hold as we recognized before.

Finally, in all of the seven regression models, no statistically significant relationship is found between the rest of the control variables (i.e., *Envi_industry*, *Leverage*, *Board_meeting*, *Duality*, and *ESG_score*) and the dependent variable. Except the coefficient of *Leverage* is negative, the coefficients of the other four control variables are all positive.

4.3 Discussions of the results

After showing our results from the regression models, we will discuss the obtained results in this section. As expected in H1, a significantly positive association exists between the board size and the firms' propensity to obtain CSR assurance, which is demonstrated in Regression Model (1a), (1) and (2). This result implies that companies with more directors serving on boards are more likely to undertake CSR assurance. Resource dependence theory suggests that in order to survive and succeed, companies should make sure that they have access to the essential outside resources. A larger board not only represents the interests of more stakeholders, but also is more capable of building and strengthening links between firms and the external resources (Pearce and Zahra, 1992). Besides, boards with larger size have better control on corporate activities (García-Sánchez et al., 2011). CSR reporting is regarded as an effective way to build and/or enhance the relationships between firms and the providers of external resources, while CSR assurance is an approach to reinforce the quality of CSR reporting. When stakeholders require the firms to increase the quality of CSR reporting, boards with more directors are more likely to and have more power to prompt firms to conduct CSR assurance, not only for addressing the interests of stakeholders, but also for further strengthening the

connections between firms and outside resources. Therefore, it is reasonable to observe a positive relationship between board size and CSR assurance in our research. This result is consistent with that gotten by Liao et al. (2016) about the Chinese market. Different from theirs, the board size in our study is significant at the 5% level rather than at the 10% level. Thus, we enhance the credibility of the conclusion concerning board size made by Liao et al. (2016).

With regard to H2, Regression Model (1b), (1) and (2) show that the ratio of female members to the total members on board is positively related to the likelihood of firms to adopt CSR assurance. This finding supports H2 that a more gender-diverse board is more likely to assure the CSR reports, and meanwhile indicates that women indeed play a positive role in increasing the reliability and credibility of non-financial information. This finding could be accounted for by the fact that compared to males, females concern more about the social responsibility, and are more likely to pursue a high corporate social achievement and reputation (Nekhili et al., 2017). In addition, female directors demand more audit efforts and managerial accountability than male directors (Adams and Ferreira, 2009), which may cause that they also prefer to pursue assurance for CSR information. Similar to the finding in H1, this finding is also in accordance with the result of Liao et al. (2016). Through the results found in H1 and H2, we can conclude that no matter whether in China (the representative of the emerging market) or in the U.S. (the representative of the mature western market), the impacts of board size and gender diversity on CSR assurance do not change.

Regression Model (1c), (1) and (2) indicate that board independence does not have any influence on the companies' propensity to undertake CSR assurance, implying that H3 is not supported. Our result is inconsistent with that of Martinez-Ferrero et al. (2017) who find that the proportion of independent directors positively relates to the CSR assurance demand. The conflicting results are perhaps explained by that their study is in case of family business, while our study is under a "general condition"[12]. However, when we look into the prior studies which are also under "general condition", we find that Liao et al. (2016) get the same conclusion in the Chinese market and they attribute this statistically insignificant result to a reason that independent directors are perceived as a token in the board and are perfunctory in China. However, unlike the Chinese companies whose average percentage of independent directors is only 37%, the U.S. companies on average have 84% of directors to be independent, indicating that independent directors play a critical role in the U.S. boards. Thus, the above explanation used by many scholars such as Liao et al. (2016) might not be applicable to the U.S. market. One possible explanation is that independent directors in the U.S. companies may doubt

[12] "General condition" indicates that our sampled firms are not restricted to family firms, but also include the firms of other types of ownership property.

whether the benefits of CSR assurance justify the costs. Independent directors are external professionals with knowledge in international business and corporate finance[13], and have a lack of suitable training in the social and environmental issues which do not traditionally comprise their responsibilities (Ahmad et al., 2017). Different from many countries, the U.S. is a compliance-oriented country with formal legal governance and litigious tradition (Kolk and Perego, 2010), and meanwhile has a business culture focusing on legalism (Sison et al., 2019). Thus, these directors might tend to reduce the companies' credibility risks of non-financial information by strictly satisfying the rules of law rather than by additionally purchasing assurance services. This implies that when they make decisions, CSR assurance is probably outside the scope of their consideration, causing that higher proportion of independent directors does not mean higher possibility to assure the CSR reports. On the other hand, given the recent criticism about whether boards in the U.S. are over independent (Baum, 2017), we think this over-independence problem could be another possible explanation for our statistically insignificant result, since the average percentage of independent directors is up to 84% in our sample. Baysinger and Butler (1985) suggest that in order to better govern the corporates, an optimal board should have a diversified board composition in board independence (i.e., a mix of insider, independent, and perhaps also affiliated directors). Since independent directors have already dominated the boards in the U.S. companies, the increase of the percentage of independent directors could decrease the firms' diversity in board independence to some degree. Accordingly, in an over-independent board, the ability of independent directors to influence corporate strategies including the CSR assurance strategies might be restricted.

In terms of board tenure, the results from Regression Model (1d), (2a), (1) and (2) suggest that there is neither linear nor nonlinear relationship between board tenure and the firms' CSR assurance decision. Therefore, we reject H4 and find that the average board tenure has no impact on the companies' propensity to adopt CSR assurance. Since our study is the first research to examine the association between board tenure and CSR assurance, we cannot make references and any result comparison to previous literature. To date, the studies about board tenure in the CSR field have not been as many as those about other board characteristics. The influence of board tenure in the CSR field is still controversial in academia since current research is too limited to have a well-accepted conclusion. As we discussed in the hypothesis part, the association between board tenure and CSR assurance could be inverted U-shaped, U-shaped or linearly negative. This uncertainty might bring out ambiguousness in the relationship between board tenure and CSR assurance in the empirical results. Although we do not find any correlation between board tenure and the firms' CSR assurance decision in our study, we still consider our assumption that board tenure might have some effects on CSR assurance is

[13] "The areas of expertise most frequently cited in new nominations were international business, corporate finance, accounting, and industry expertise." (Ernst & Young, 2018)

reasonable. One possible explanation of our result is that we use the average board tenure to measure the variable *Tenure*, and this measure might not be so effective to reflect the board tenure diversity. Thus, when using some measures that could better capture the heterogeneity of tenure of directors in a board (e.g., the percentage of board directors with over 10-year tenure), we might obtain a different result. In this case, we cannot give a firm conclusion regarding board tenure, and we deliver messages of caution in the results of previous studies and give suggestions for further research.

To summarize, we have discussed the results of our main explanatory variables. Table 9 presents the acceptance and rejection status of our four hypotheses.

Table 9: Results of hypothesis tests

H1	There is a positive association between board size and the adoption of CSR assurance.	Accepted
H2	There is a positive association between the percentage of female directors on the board and the adoption of CSR assurance.	Accepted
H3	There is a positive association between board independence and the adoption of CSR assurance.	Rejected
H4	There is an association between board tenure and the adoption of CSR assurance.	Rejected

In terms of control variables, a positive association is identified between the socially sensitive industry membership and CSR assurance, which is in accordance with results found by previous research (Simnett et al., 2009; Cho et al., 2014). Our findings also confirm that firms with larger size and higher profitability are more likely to have their CSR reports assured, since these companies are more capable of absorbing the additional costs associated with the CSR assurance (Ruhnke and Gabriel, 2013; Sierra et al., 2013; Castelo Branco et al., 2014; De Beelde and Tuybens, 2015). As expected by us, companies with foreign income have higher possibility to obtain CSR assurance, indicating that greater operations internationally will prompt companies to conduct activities in the sustainability field. This phenomenon could be explained by the U.S. lagging in the CSR assurance field (Simnett et al., 2009; Kolk and Perego, 2010; Sethi et al., 2015). Finally, consistent with Ruhnke and Gabriel (2013), we find that if a firm prepares its CSR reports in line with the GRI guidelines, it will be more likely to adopt CSR assurance. Since CSR assurance is a suggested way to improve the quality of CSR reports by the GRI guidelines (GRI, 2014), it is conventional to observe a significantly positive association between them.

5. Additional Tests

In this section, we conduct several additional tests to make further investigation about our research question. Since we do not find any relationship between board tenure and CSR assurance, to simplify, the regression models used in this section are built on basis of Regression Model (1). Firstly, we use the critical mass theory to further examine the relationships between female directors and the firms' CSR assurance decision. Then, we study the impacts of board characteristics on the choice of CSR assurance providers. Finally, we add one more board characteristic to our regression model and examine the influence of it.

5.1 Critical mass: female directors and CSR assurance

From the results of Regression Model (1), we verify that the higher the proportion of female directors, the more probably companies purchase the external CSR assurance services. Also, it means that female directors devote more efforts to increase the credibility and reliability of CSR reports. In addition, from prior literature, we identify that some researchers also look into whether there is a difference among companies with different levels of female director proportions, in other words, whether there is a critical mass effect (i.e., the proportion of women is about or over 30 percent) in companies (Liao et al., 2016; Glass and Cook, 2018). Dahlerup et al. (1988) refer to critical mass as "a qualitative shift will take place when women exceed a proportion of about 30 percent in an organization". The critical mass theory is developed to overcome the limitations of "solo" and "tokens" status[14] (Dahlerup, 2016). Earlier studies about the board diversity and firm performance suggest that 30% is a potential "magic ratio" to break through gender barriers (Joecks et al., 2013; Strydom et al., 2016). Furthermore, derived from the initial "magic ratio", some studies further find that three is also a "magic number" in terms of board diversity, and this number is equal to circa 30% of board size (Kramer et al., 2006; Torchia et al., 2011). As for the CSR area, previous evidence shows that boards with three or more female members are more likely to have CSR reporting (Bear et al., 2010) and CSR assurance (Liao et al., 2016).

We follow previous literature and further investigate how the number of female directors impacts the adoption of CSR assurance. Firstly, we treat three as the critical threshold (Bear et al., 2010; Liao et al. 2016). Considering the status of our data, we divide the number of female directors into three groups: 1) one or fewer female, 2) two females, and 3) three or more females. Thus, two dummy variables are built to examine the effects. The variable *Female_2* is a binary variable which equals to 1 when a firm has exactly two female directors, and 0 otherwise.

[14] Kanter (1977) defines "solo" as a single member of a social group and "tokens" as members of a social group that are significantly underrepresented. His study illustrates that both "solo" and "tokens" have limited ability to impact organizational practice.

Female_3M is a dummy variable which equals to 1 when the number of female directors is three or more, and 0 otherwise. We use these two dummy variables to replace the variable *Female* in the original Regression Model (1), and keep other explanatory and control variables the same. Accordingly, a new Regression Model (3) is gotten.

$$CSRA_{i,t} = \beta_0 + \beta_1 \cdot Female\_2_{i,t} + \beta_2 \cdot Female\_3M_{i,t} + \beta_3 \cdot Board\_size_{i,t} + \beta_4 \cdot Ind\_director_{i,t} + \beta_5 \cdot Tenure_{i,t} + \gamma \cdot Controls_{i,t} + \varepsilon_{i,t} \quad (3)$$

Table 10, Panel A presents the descriptive statistics of extra variables added in Regression Model (3). Out of the 328 observations, 52% of companies have three or more female directors, and 38% of companies have two female directors. Thus, the firms with one or no female director only account for 10%. However, the results of Regression Model (3) in Table 11 show that both the "tokens" (*Female_2*) and the "critical mass" (*Female_3M*) group are not more likely to adopt CSR assurance.

Wiley and Monllor-Tormos (2018) argue the reason to use three as the critical mass is that "the 30% threshold combines the magic number of 'three women' on a 10-member board and is often used as a catalyst for improving group dynamics". Given that the board size in our sample has a large dispersion (min. 5 and max. 18 directors) and a large mean value (11.38), "four female directors" seems to be a more accurate measure to capture the 30% critical mass principle in our study (30% of the board size in our sample is 3.41). Thus, we define two additional new dummy variables. *Female_3* equals to 1 if the number of female directors in a firm is exactly three, and 0 otherwise. *Female_4M* equals to 1 if a firm has four or more female directors, and 0 otherwise. Then, Regression Model (4) is formulated as:

$$CSRA_{i,t} = \beta_0 + \beta_1 \cdot Female\_2_{i,t} + \beta_2 \cdot Female\_3_{i,t} + \beta_3 \cdot Female\_4M_{i,t} + \beta_4 \cdot Board\_size_{i,t} + \beta_5 \cdot Ind\_director_{i,t} + \beta_6 \cdot Tenure_{i,t} + \gamma \cdot Controls_{i,t} + \varepsilon_{i,t} \quad (4)$$

Table 10, Panel B and Table 11 respectively show the descriptive statistics and the results of our second critical mass test – Regression Model (4). We observe that *Female_4M* is significantly and positively related to the dependent variable *CSRA* (p-value = 0.036), indicating that a board with more than 30% of directors to be female (i.e., four or more female directors in our sample) is more likely to engage in CSR assurance. This finding is consistent with the critical mass theory of female directors in previous research (Liao et al., 2016). Besides, our finding also suggests that compared with using the magic number of three, using the magic ratio of 30% might be better in the studies which examine the board diversity.

Table 10: Descriptive statistics of variables added in additional tests

Variables	Obs	Mean	Min	Max	SD
Panel A: Descriptive statistics for Regression Model (3)					
Female_2	328	0.38	0.00	1.00	0.03
Female_3M	328	0.52	0.00	1.00	0.03
Panel B: Descriptive statistics for Regression Model (4)					
Female_2	328	0.38	0.00	1.00	0.03
Female_3	328	0.32	0.00	1.00	0.03
Female_4M	328	0.20	0.00	1.00	0.02
Panel C: Descriptive statistics for Regression Model (5)					
Non_acc	145	0.84	0.00	1.00	0.03
Panel D: Descriptive statistics for Regression Model (6)					
Nationality	328	0.17	0.00	0.90	0.01

Table 11: Results from regression models in additional tests

Regression	**(3)**	**(4)**	**(5)[a]**	**(6)**
	CSRA	CSRA	Non_acc	CSRA
Female_2	0.249 (0.606)	0.293 (0.544)		
Female_3M	0.602 (0.236)			
Female_3		0.387 (0.456)		
Female_4M		1.209** (0.036)		
Nationality				1.416** (0.032)
Board_size	0.108 (0.146)	0.074 (0.334)	-0.112 (0.432)	0.149** (0.032)
Female			-3.359 (0.257)	3.688** (0.020)
Ind_director	-1.154 (0.476)	-1.014 (0.535)	1.245 (0.695)	-1.184 (0.466)
Tenure	0.024 (0.606)	0.027 (0.573)	-0.041 (0.623)	0.041 (0.396)
Envi_industry	0.143 (0.638)	0.150 (0.623)	1.469** (0.048)	0.179 (0.560)

(To be continued)

Soci_industry	0.960**	0.917**	1.979**	0.924**
	(0.026)	(0.034)	(0.036)	(0.033)
Firm_size	0.250**	0.239*	-0.119	0.241*
	(0.047)	(0.059)	(0.648)	(0.057)
ROA	3.899*	3.657*	7.934	3.920*
	(0.070)	(0.091)	(0.127)	(0.071)
Leverage	-0.220	-0.148	-0.891	-0.201
	(0.736)	(0.822)	(0.575)	(0.761)
Board_meeting	0.009	0.003	0.092	0.008
	(0.775)	(0.935)	(0.251)	(0.819)
Duality	0.179	0.214	-0.359	0.243
	(0.519)	(0.447)	(0.546)	(0.390)
ESG_score	0.004	0.004	-0.008	0.003
	(0.599)	(0.652)	(0.650)	(0.712)
For_income	0.713**	0.631**	0.909	0.554*
	(0.025)	(0.049)	(0.182)	(0.087)
GRI_guide	1.444***	1.476***	-0.640	1.440***
	(0.000)	(0.000)	(0.466)	(0.000)
Constant	-7.616***	-7.175***	4.271	-8.643***
	(0.004)	(0.007)	(0.424)	(0.002)
Observations	328	328	145	328
AUC	0.716	0.727	0.750	0.732

Table 11 presents the results of the four regression models used in additional tests. Regression Model (3), (4) and (6) use *CSRA* as the dependent variable, while Regression Model (5) use *Non_acc* as the dependent variable. Except that Regression Model (5) is based on the sample of the 145 firms with assured CSR reports, the remaining three regressions are based on the entire sample of 328 companies. P-values are shown in brackets below the coefficients.

[a] Since a low absolute number of events and a low event rate in the sample of Regression Model (5), we also use the Firth's penalization for the logistic regression in case of the separation problems caused by directly using logistic regression. The significant relationships are the same as the case of original logistic regression.

***, **, * indicate significance at 1%, 5% and 10% levels respectively (two-tailed).

5.2 CSR assurance providers

After the decision to purchase an assurance service, firms need to consider the choice of assurance providers. Distinct from financial assurance that requires the expertise in accounting, CSR assurance does not have such a high barrier in financial expertise due to the broad coverage of different nonfinancial areas such as economy, environment, labor, human rights, product responsibility and society (Pflugrath et al., 2011). Along with other reasons such as the assurance in CSR currently without uniform assurance standards and scopes, the market of external CSR assurance is thus competitive with different types of assurance providers. In this market, there are not only accounting firms such as Big 4, but also non-accounting firms such as sustainability consulting firms and engineering firms (e.g., Bureau Veritas).

Accounting and non-accounting firms both have their own advantages in CSR assurance services. Farooq and De Villiers (2017) conclude that accounting providers are viewed as assurance experts and their financial auditing process can have a synthesis effect on their CSR assurance process. Moreover, Big 4 accounting firms with a well-known global reputation are considered to effectively enhance the perceived credibility of the readers towards the CSR reports (Simnett et al., 2009; Kolk and Perego, 2010). On the other hand, non-accounting firms are regarded as subject matter expertise and have a better understanding of the subject of sustainability assurance (Farooq and De Villiers, 2017). Since accountancy organizations dominate the global CSR assurance market (KPMG, 2015), many pieces of previous research have examined the factors that impact the firms' decision to choose accounting firms as CSR assurance providers, and have found some choice drivers such as country, industry and firm factors (Mock et al., 2007; Simnett et al., 2009; Kolk and Perego, 2010; Sierra et al., 2013). However, the little knowledge about whether stakeholders are capable of differentiating the information and valuing the assurance makes it hard to explain these results (Casey and Grenier, 2015).

In contrast to the fact that the accounting firms take the market-leading position from a global perspective, the non-accounting firms dominate the U.S. CSR assurance market (GRI, 2013). We observe the same situation in our sample, that is, only 23 out of 145 S&P 500 firms with assured reports choose accounting firms as providers during the fiscal year 2017. Both Simnett et al. (2009) and Casey and Grenier (2015) speculate that the results are due to the litigation concerns of the accounting firms. Meanwhile, they think that these results also indicate the ineffective marketing conducted by accounting firms for their CSR assurance services to their large U.S. clients. In order to find out the reasons underlying the U.S. firms' preference of non-accounting firms and meanwhile to examine the influence of corporate board on the assurance provider choice, we follow Regression Model (1) and only substitute the dependent variable *CSRA* with a new dummy variable *Non_acc*. The variable *Non_acc* equals to 1 if the CSR assurance provider is non-accounting firms and 0 otherwise. The new model named Regression Model (5) is shown as follows.

$$Non\_acc_{i,t} = \beta_0 + \beta_1 \cdot Board\_size_{i,t} + \beta_2 \cdot Female_{i,t} + \beta_3 \cdot Ind\_director_{i,t} + \beta_4 \cdot Tenure_{i,t} + \gamma \cdot Controls_{i,t} + \varepsilon_{i,t} \quad (5)$$

Table 10, Panel C shows the descriptive statistics of the new dependent variable *Non_acc*. Table 11 presents the regression results from Regression Model (5). Through Table 11, we can see that the four board characteristic variables seem not to influence the firms' choice of CSR assurance providers. In terms of control variables, companies in the environmentally sensitive industries (p-value = 0.048) and the socially sensitive industries (p-value = 0.036) are more

likely to choose non-accounting firms as the CSR assurance providers. After a content analysis, we find that the majority of companies in these industries have an assurance scope on certain sections of the CSR reports (e.g., GHG[15] verification) rather than on the aggregate reports. This result is in accordance with the findings of Zhou and Simnett (2016) that the proportion of GHG assurance provided by the accounting professions in the U.S. is the lowest among 33 countries in CDP database (9.62%).

5.3 Board nationality diversity

Nationality diversity is also a widely used dimension to measure board diversity (e.g., Liao et al., 2016). Foreign directors could be benefitial to the boards' group decisions, since their nationality and educational diversity could help teams avoid pitfalls such as premature consensus or "group work" (Janis, 1982). From the CSR perspective, some studies point out the positive influence of foreign directors on the firms' CSR engagements (Lau et al., 2014; Horjoto et al., 2019).

As cited by Horjoto et al. (2019), "with respect to CSR activities, foreign directors could bring their cultural values and perspectives on the role of corporations in society." Previous research has found that the continental European countries have a high CSR reporting and CSR assurance rate, and that the executive directors as well as the board directors in these countries might perceive a higher value on the benefits of CSR engagements and CSR assurance (Simnett et al., 2009). In contrast, the U.S. has a relatively lower CSR engagement and CSR assurance rate. Sison et al. (2019) explain that American have a business culture focusing on individualism and legalism, and this business culture makes companies more reluctant to add a social dimension to business and to disclose information that is not required by the legal departments. Horjoto et al. (2019) have proved that the degree of board nationality diversity is positively associated with the corporate social performance in the U.S. market. Similarly, we want to examine whether the level of nationality diversity will have positive impacts on the decision to obtain CSR assurance. Thus, Regression Model (6) is built as:

$$CSRA_{i,t} = \beta_0 + \beta_1 \cdot Nationality_{i,t} + \beta_2 \cdot Board\_size_{i,t} + \beta_3 \cdot Female_{i,t} + \beta_4 \cdot Ind\_director_{i,t} + \beta_5 \cdot Tenure_{i,t} + \gamma \cdot Controls_{i,t} + \varepsilon_{i,t} \quad (6)$$

To build Regression Model (6), we add one new variable *Nationality* to the original Regression Model (1). *Nationality* is measured as the proportion of foreign directors over the total board directors. The dependent variable and the control variables remain the same as those in Regression Model (1). Table 10, Panel D shows the descriptive statistics of the new variable

[15] GHG is the abbreviation of greenhouse gas. United States Environmental Protection Agency (EPA) has promulgated a regulation to require reporting of greenhouse gas emissions from all sectors of the economy since 2009.

Nationality. We can find that in our entire sample, the U.S. companies on average have 17% of directors coming from countries other than the U.S. The nationality diversity rate ranges from 0% (150 firms have no foreign directors) to 90% (2 firms have 90 percent of directors to be foreigners). The regression results from Regression Model (6) are shown in Table 11. Obviously, the degree of nationality diversity positively affects the adoption of CSR assurance (p-value = 0.032), indicating that foreign directors in the U.S. firms perceive a higher value of CSR assurance. One possible explanation is that the U.S. lags behind other counties in the CSR reporting and assurance field (Simnett et al., 2009; Kolk and Perego, 2010; Sethi et al., 2015). Therefore, directors from other counties can to some extent promote the U.S. firms to conduct CSR reporting and assurance. Finally, after we add this new variable, the signs of coefficients and the significance level of our four explanatory variables remain the same, meaning that our original Regression Model (1) is robust.

6. Robustness Tests

In this section, we conduct several tests to examine the robustness of our results from the main regression models. In Section 6.1, we do robustness checks for the results obtained from Regression Model (1) and (2). And in Section 6.2, we test the multicollinearity of the independent and control variables used in our regression models.

6.1 Robustness analysis

Based on the state of our data, we cannot change the definition or classification of our dependent variable and explanatory variables to conduct a robustness analysis. Thus, we make the robustness checks from the perspective of control variables. In our study, we use two dummy variables *Envi_industry* and *Soci_industry* to separately control for the influence of the environmentally sensitive industry membership and of the socially sensitive industry membership. And we have observed a significantly positive association between *Soci_industry* and our dependent variable *CSRA*. However, in the earlier studies that are similar to our research, only one dummy variable that measures whether a firm belongs to the environmentally sensitive industries or not is used to control for industry effect (Peters and Romi, 2015; Liao et al., 2016). Therefore, if we follow the previous research to use only one variable to control for industry effect, a possible robustness test could be either to drop *Soci_industry* from our main regression models or to replace *Envi_industry* and *Soci_industry* by a new control variable. We conduct the robustness checks from these two aspects respectively. Firstly, we drop *Soci_industry* from Regression Model (1) to get Regression Model (1_t1). Secondly, we use a new dummy variable *Sens_industry* to replace *Envi_industry* and *Soci_industry* in Regression Model (1), and get a new model named Regression Model (1_t2). *Sens_industry* equals to 1 if a firm is in the environmentally or socially sensitive industries, and 0 otherwise. For Regression Model (2), we

also do the same transformations and obtain other two models labelled Regression Model (2_t1) and (2_t2).

Table 12 represents the results of the robustness tests for Regression Model (1) and (2). In the table, we can see that *Board_size* and *Female* remain significant at the 5% level, while the other three explanatory variables *Ind_director*, *Tenure* and *Tenure_sq* are still statistically insignificant at any significance level. Furthermore, the signs of the coefficients of all the five explanatory variables do not change, when compared with those in the main results. Thus, it is reasonable for us to conclude that our main findings are robust to some degree.

Table 12: Robustness test results for Regression Model (1) and (2)

Regression	**(1_t1)**	**(1_t2)**	**(2_t1)**	**(2_t2)**
	CSRA	CSRA	CSRA	CSRA
Board_size	0.152** (0.026)	0.146** (0.032)	0.153** (0.024)	0.148** (0.030)
Female	3.706** (0.018)	3.830** (0.015)	3.733** (0.018)	3.856** (0.014)
Ind_director	-1.172 (0.463)	-1.387 (0.389)	-0.988 (0.540)	-1.194 (0.462)
Tenure	0.036 (0.437)	0.038 (0.416)		
Tenure_sq			0.003 (0.213)	0.003 (0.198)
Controls	Yes	Yes	Yes	Yes
Constant	-7.592*** (0.003)	-7.863*** (0.003)	-7.879*** (0.002)	-8.152*** (0.002)
Observations	328	328	328	328
AUC	0.712	0.712	0.716	0.716

Table 12 shows the robustness test results for Regression Model (1) and (2), with *CSRA* as the dependent variable in all the regressions. All the regressions are based on the entire sample of 328 companies. Control variables used in Regression Model (1_t1) and (2_t1) are *Envi_industry*, *Firm_size*, *ROA*, *Leverage*, *Board_meeting*, *Duality*, *ESG_score*, *For_income* and *GRI_guide*. Control variables used in Regression Model (1_t2) and (2_t2) are *Sens_industry*, *Firm_size*, *ROA*, *Leverage*, *Board_meeting*, *Duality*, *ESG_score*, *For_income* and *GRI_guide*. P-values are shown in brackets below the coefficients.

***, **, * indicate significance at 1%, 5% and 10% levels respectively (two-tailed).

6.2 Multicollinearity

Multicollinearity describes a phenomenon that the predictor variables in a multivariate regression model not only correlate to the dependent variable but also to each other. The

existence of multicollinearity will cause problems when you fit the models and interpret the results. Thus, in order to secure the reliability of the coefficients of the explanatory variables, conducting multicollinearity analysis is critical when using a logistic model.

Pearson correlation coefficient

Pearson correlation coefficient, also referred to as Pearson's r, is a common method to test the correlations between two continuous variables. The correlations between the explanatory variables are often regarded as the initial indicator of potential multicollinearity. We use Pearson's r to calculate the correlations between the continuous variables included in our regression models. Pearson's r has a value between −1 and +1, where 0 indicates no linear correlation, and +1 (or −1) indicates a perfect positive (or negative) correlation. According to Cohen (1988), $0.1 < |r| < 0.3$ indicates a small relation, $0.3 < |r| < 0.5$ indicates a moderate relation, and $|r| > 0.5$ indicates a strong relation. The Pearson's correlation matrix in our study is presented in Table 7 of Section 4, and the results are also discussed in Section 4.1. According to Section 4.1, we find that multicollinearity is not an issue in our regression models.

Variance inflation factor

Beyond Pearson's r, the variance inflation factor (VIF) is also computed to evaluate the multicollinearity. As suggested by Wooldridge (2015), if the calculated VIF is more than ten, multicollinearity could be thought to exist. Appendix B presents the VIF analysis for the six regression models that we use in the main and additional tests. Through the table, we can see that there is no single VIF higher than ten. Therefore, we can reasonably conclude that multicollinearity does not exist in our data.

7. Conclusions

Few studies about CSR assurance at the market level have considered corporate governance characteristics. Playing a vital role in the corporate governance mechanisms, the board of directors is highly involved in the implementation of corporate strategies, including the strategic decision of CSR assurance. This thesis aims to examine whether some typical board characteristics influence the adoption of CSR assurance. Based on a sample of 328 S&P 500 companies with CSR reports, we investigate the influence of four board characteristics – board size, board gender diversity, board independence, and board tenure. In line with the findings of Liao et al. (2016) in the Chinese market, our results demonstrate that board size and board gender diversity have significantly positive effects on the CSR assurance decision in the U.S. market. It indicates that the earlier conclusions regarding board size and board gender diversity drawn by Liao et al. (2016) from the emerging market still hold in a mature western market. In

terms of board independence, we do not observe any association between the proportion of independent directors and the propensity to adopt CSR assurance, which is inconsistent with the findings in the study of Martinez-Ferrero et al. (2017). We explain that their study is based on the family companies but our research expands the scope to a "general condition". On the other hand, our finding about board independence is in line with that gotten by Liao et al. (2016) in the Chinese market. Instead of using their explanation, we build another two possible explanations based on the actual situation of the U.S. market. One is that independent directors are professionals in their own expertise with less CSR training and they may perceive the costs of CSR assurance weighs heavier than benefits; the other is that boards in the U.S. firms are over independent. Finally, inconsistent with our prediction, average board tenure has no influence on the adoption of CSR assurance. This result reflects the controversial attitudes towards board tenure among scholars. Currently, the number of studies concerning board tenure in the CSR field is limited. In these studies, no well-acknowledged conclusion about the impacts of board tenure has been achieved in academia. Besides, in business practice, corporates also hold different attitudes towards a long-tenured director. On the one hand, long-tenured directors could bring their experience and intelligent decision-making skills to the firms. On the other hand, they could also weaken the effectiveness of the monitoring and advising ability of boards. Therefore, we cannot give a firm conclusion regarding board tenure.

In addition to our main tests, we also conduct several additional tests to further investigate our research question. We verify that compared to companies with the number of female directors regarded as "solo" and "token", companies with female directors reaching the "critical mass" threshold are more likely to purchase CSR assurance services in the U.S. market. This result is consistent with the findings in the Chinese market (Liao et al., 2016). Regarding assurance providers, we identify that firms from the environmentally and socially sensitive industries are prone to choose non-accounting firms as the CSR assurance providers in the U.S. market. Although Casey and Grenier (2015) find that the U.S. companies in the sensitive industries are not more likely to obtain CSR assurance, we find that after they have decided to adopt CSR assurance, companies in these industries are prone to give priority to non-accounting firms as assurance providers. Finally, we find that board nationality diversity contributes to the strategic decision of CSR assurance. Through combining board nationality diversity and gender diversity, we conclude that a more diversified board perceives more benefits of CSR assurance in enhancing the credibility and reliability of the CSR reports.

7.1 Contributions

This study contributes to the CSR assurance field from both academic and practical aspects. Firstly, the relationship between board characteristics and CSR assurance is paid little attention to by academia. Our research demonstrates the importance of board characteristics theoretically

and provides more empirical evidence in this area. Consistent with the findings of Liao et al. (2016) in the Chinese market, we confirm a positive effect of board size and board gender diversity on CSR assurance decision in the U.S. market. Our study proves that the earlier conclusions drawn in the emerging market with incomplete and restricted corporate governance mechanisms can also be applied to the western market with mature corporate governance mechanisms. Secondly, we are the first to investigate the influence of board tenure on the CSR assurance decision. Although we do not find any significant result for board tenure, we fill in the gap of studies about board tenure in the CSR assurance research field, and suggest future research from other perspectives such as tenure diversity, thus extending the current research scope. Thirdly, by further exploring the enigma of the U.S. market, we find the accounting firms in the U.S. have ineffective marketing, even if they have advantages such as global operation, objectivity, knowledge of assurance, and cross-selling cost reduction (Farooq and De Villiers, 2017). This finding could make scholars have a more critical attitude towards their previous arguments that accounting firms have relative advantages in CSR assurance marketing and executing (Simnett et al., 2009; Carson, 2009). Fourthly, when further digging the impacts of board diversity, our study also suggests that the magic ratio of 30% might be more useful than the magic number of three in the CSR assurance research area.

In practice, this study will help assurance providers, customers and standard setters understand the U.S. CSR assurance market and the role that directors of the board play in this market. Moreover, our results practically guide assurance providers in the marketing strategy, that is to anchor clients with characteristics related to a higher demand of CSR assurance services. Also, the finding of the inferior market position of accounting firms in the U.S. could encourage them to self-examine and adjust current marketing strategies to take full advantages of their benefits. Finally, since we find that the scope, quality level and provider choice of CSR assurance vary significantly among the U.S. companies, the current less optimistic situation of the U.S. CSR assurance market can encourage the standard setters (e.g., government and Securities and Exchange Commission) to formulate some relevant rules to regulate this market to some extent.

7.2 Limitations and future research

In addition to the contributions, we also acknowledge the limitations of this study. Firstly, our research is based on cross-sectional data (one-year sample in 2017) since many studies have shown that there is no time effect on CSR assurance decision (Simnett et al., 2009; Liao et al., 2016). However, it is still possible for our independent variables to have some lagging effects in the U.S. market. Thus, further research is suggested to examine the impacts of the explanatory variables of the last year on the dependent variable of the current year. Secondly, board tenure is a new variable added by us to investigate its relationship with CSR assurance. Although neither linear nor quadratic relationship has been found, we still consider board tenure

might have some impacts. The fact that average board tenure is not good enough to capture tenure diversity might explain our statistically insignificant results. Therefore, we encourage further research to use some factors that could better reflect the tenure diversity to verify the effects of the heterogeneity in board tenure. Thirdly, the setting of the critical mass threshold is still a debate in many organization studies (e.g., Grey et al., 2006), and either to use the "magic ratio" (30%) or to use the "magic number" (three) is indeterminate. We only verify this theory based on the 30% ratio threshold and further research is needed to provide more supports. Fourthly, following the GRI guidelines and seeking external assurance are two ways to improve CSR disclosure quality and credibility (Miras-Rodríguez and Di Pietra, 2018). Since our research only focuses on external assurance, further research could examine the factors driving both of them or whether these two ways have an interaction effect. Finally, regarding the accounting providers, we find that the U.S. firms in environmentally and socially sensitive industries have a preference for non-accounting firms. Further research such as the analysis of CSR assurance contents, scopes and levels could contribute to explain the underlying reasons for this preference.

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9. Appendix

Appendix A: Summary of the definitions to the variables

Variables	Definition
Dependent variables	
CSRA	1 if a firm conducts CSR assurance, and 0 otherwise
Non_acc	1 if CSR report is assured by non-accounting firms, and 0 otherwise
Explanatory variables	
Board_size	The number of board directors
Female	The proportion of female directors on the total board directors.
Ind_director	The ratio of independent directors to the total board directors
Tenure	The average number of years each board member has been on the board
Tenure_sq	The square of average board tenure
Female_2	1 if the firm has exactly two female directors, and 0 otherwise
Female_3M	1 if the firm has three or more female directors, and 0 otherwise
Female_3	1 if the firm has exactly three female directors, and 0 otherwise
Female_4M	1 if the firm has four or more female directors, and 0 otherwise
Nationality	The proportion of foreign directors over the total board directors.
Control variables	
Envi_industry	1 if a firm belongs to the environmentally sensitive industries (SIC codes of 13, 26, 28, 29, 33 and 49), and 0 otherwise
Soci_industry	1 if a firm belongs to the socially sensitive industries (SIC codes of 60-67), and 0 otherwise
Firm_size	The natural logarithm of total sales
ROA	Return on assets
Leverage	The ratio of total debt to total assets
Board_meeting	The number of board meetings held during a given year
Duality	1 if the CEO is not the chairman of the board, and 0 otherwise
ESG_score	ESG Combined Score provided by Eikon database
For_income	1 if a firm has foreign income, and 0 otherwise
GRI_guide	1 if CSR report is prepared in line with the GRI guidelines, and 0 otherwise.
Sens_industry	1 if a firm belongs to the environmentally and socially sensitive industries, and 0 otherwise

Appendix B: Variance inflation factor (VIF)

Regression	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
	CSRA	CSRA	CSRA	CSRA	Non_acc	CSRA
Board_size	1.158	1.159	1.381	1.433	1.321	1.157
Female	1.071	1.072			1.166	1.070
Ind_director	1.170	1.186	1.202	1.195	1.327	1.166
Tenure	1.194		1.199	1.195	1.230	1.227
Tenure_sq		1.200				
Female_2			3.757	3.735		
Female_3M			4.421			
Female_3				4.093		
Female_4M				3.489		
Nationality						1.106
Envi_industry	1.264	1.265	1.263	1.266	1.238	1.262
Soci_industry	1.929	1.924	1.943	1.916	1.958	1.926
Firm_size	1.398	1.402	1.409	1.402	1.620	1.396
ROA	1.226	1.216	1.226	1.223	1.298	1.229
Leverage	1.105	1.105	1.112	1.110	1.128	1.109
Board_meeting	1.119	1.119	1.122	1.124	1.275	1.116
Duality	1.093	1.082	1.099	1.105	1.094	1.102
ESG_score	1.341	1.343	1.351	1.338	1.580	1.346
For_income	1.605	1.605	1.617	1.614	1.810	1.649
GRI_guide	1.124	1.127	1.126	1.131	1.103	1.124

The table presents the VIF analysis for the six regression models that we use in the main and additional tests. No single VIF is higher than 10.