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A: Agios Loukas, P.C. 65404, Kavala, Greece
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Financial Reporting Material Misstatements, Earnings Conservatism and Managerial Replacement Decisions

Jo-Ting Wei [†]

Providence University, 200, Sec. 7, Taiwan Boulevard, Shalu Dist., Taichung City 43301, Taiwan

ARTICLE INFO	ABSTRACT
	Purpose: Based on signal theory and legitimacy theory, this paper examines whether firms with financial reporting misstatements (restatements) would prefer conservative financial reporting to send signals regarding their determinants of improving financial reporting credibility and legitimate organizational image in Taiwan. This paper further examines whether these firms reduce the demand for conservative financial reporting after replacing managers in the reveal of restatements. **Design/methodology/approach:** This paper adopts the ordinary least squares (OLS) regression models to estimate the hypotheses and uses different measures of earnings conservatism, such as the Basu's (1997) asymmetric timeliness of earnings measure based on a one-year period and the Basu's (1997) asymmetric timeliness of earnings measure based on a multi-year period. **Finding:** The results show that financial reporting behavior of restating firms would become more conservative in the reveal of restatements. However, when restating firms make replacement decisions for managers following restatements, they would demand less conservative financial reporting. This suggests that earnings conservatism and corporate governance may be substitutes in the context of restatements in Taiwan. **Research limitations/implications:** The findings have essential implications for Taiwanese security regulators and those who are debating the value of earnings conservatism for capital markets. When Taiwanese security regulators make regulations in relation to corporate governance and financial reporting, they must consider how to encourage firms to strengthen corporate governance and financial reporting credibility. Furthermore, to some extent, the findings of this paper support the efforts made by security regulators to enhance manager turnover disclosure transparency. **Originality/value:** By extending and advancing past research on restatements and earnings conservatism, this paper contributes to support that restating firms would enhance earnings conservatism following restatements in Taiwan. Moreover, this paper also contributes to support that earnings conservatism may be the substitute of governance mechanisms such as manager replacement in the context of restatements in Taiwan. Due to different institutional backgrounds and governance strength between Western countries and Asian countries, it's important to examine what post-restatement actions would be taken by Taiwanese firms and how they select optimal governance structure in the reveal of restatements. The findings of this paper facilitate to enhance the understanding of the relationship between restatements and earnings conservatism and how corporate governance affects the above relationship following restatements in Taiwan.

1. Introduction

Financial reporting scandals have drawn increased attention from market participants and regulators (i.e., Enron). The Enron scandal forces the passage of the Sarbanes-Oxley Act (SOX), which strengthens financial reporting accountability of top management and the oversight functions of the board and the board sub-committees. The SOX requires CEOs and CFOs to be named to certify the fairness of the presentation of financial statements (Kryzanowsk and Zhang, 2013; Chang and Choy, 2016; Zhao et al., 2017). Following the SOX, the past few years have seen more

governance reforms all around the world. There is no exception to Taiwan. In order to provide good investor protection and to assure reliable financial disclosure, the Taiwanese government has continuously improved corporate governance practices by revising security-related regulations. Restatements show that there are misstatements in financial statements, which thus provide visible targets for blame. Prior literature has predominately supported the great adverse economic consequence of restatements, such as declined stock prices, increased bankruptcy probability, increased litigation costs and more difficulties in raising firm capital (Bardos and Mishra, 2014; Amel-Zadeh and Zhang, 2015; Ma et al., 2015). Restatements enhance investors' risk perceptions of financial reporting and represent a loss of organizational legitimacy, which send signals to financial statement users that financial reporting has low credibility and thus would mislead their decisions (Dao et al., 2014; Farhangdoust and Sayadi, 2020). Restatements destabilizes governance equilibrium of restating firms (Johnstone et al., 2011). Restating firms may be motivated to take actions to send signals about their determinants of improving governance practices and legitimate organizational image. A majority of studies have examined the real actions pertaining to governance reforms proceeded by restating firms in responding to restatements (Kryzanowski and Zhang, 2013; Xu and Zhao, 2016; Agrawal and Cooper, 2017), including the reduction of executive compensation (Cheng and Farber, 2008), the replacement of executives and auditors (Agrawal and Cooper, 2017) and the appointment of a successor CEO with specific qualities (Gomulya and Boeker, 2014; Xu and Zhao, 2016). However, the literature has paid less attention to what kinds of post-restatement actions that restating firms can take to directly improve financial reporting credibility, such as enhancing earnings conservatism[1] (Huang et al., 2009; Ettredge et al., 2012; Chen et al., 2014; Farhangdoust and Sayadi, 2020). As restatements are trust-destroying events for investors (Almer et al., 2008), it's important to investigate the issue.

Earnings conservatism refers to economic losses to be recognized more timely than economic gains (Ruch and Taylor, 2015; Zhong and Li, 2017). Adopting conservative financial reporting policies may be vital financial reporting strategy for restating firms to respond to the crisis of the loss of financial reporting credibility. Few studies investigate the relationship between restatements and earnings conservatism, particularly which mainly focus on American firms and adopt the Basu's (1997) single-period asymmetric timeliness measure (here refers to the traditional Basu measure) to examine earnings conservatism (Huang et al., 2009; Ettredge et al., 2012; Chen et al., 2014). There's necessary to provide more examination on the issue and turn attention to investigate firms in Asian countries such as Taiwan. Taiwanese regulators have continuously strengthened governance practices. However, compared to American firms, Taiwanese firms have weaker governance practices and provide weaker protection for shareholders (Yeh and Woidtke, 2005). In order to provide Taiwanese investors accurate financial reporting, in the mid-2007, the Taiwan Stock Exchange (TWSE) has established a specialized area for revised financial reporting on the Market Observation Post System website. Nowadays, Taiwanese investors can clearly distinguish misstated and corrected financial reporting of restating firms (TWSE, 2007).

Due to little evidence regarding the association between restatements and earnings conservatism and unique institutional environment and governance features in Taiwan, based on signal theory and legitimacy theory (Cho and Patten, 2007; Sanders and Boivie, 2004; Chakravarthy et al., 2014; Islam et al., 2020), this paper examines whether restating firms would take particular post-restatement actions to send signals regarding their determinants of improving financial reporting credibility and legitimate organizational image in Taiwan, such as adopting more conservative financial reporting policies. In major analysis, this paper adopts the Basu's (1997) measure estimated cumulatively over multiple years (here refers to the modified Basu measure) to mitigate the bias in the Basu's (1997) measure estimated based on a one-year period (Ahmed and Duellman, 2007; Lafond and Roychowdhury, 2008; LaFond and Watts, 2008). This paper also examines the hypotheses by adopting the Basu's (1997) single-period asymmetric timeliness measure and re-examines the hypotheses by replacing the dummy variable of manager replacement with the continuous variable of manager replacement frequency and using the Ball and Shivakumar's (2005) model with regressions based on cash flows and total accruals.

A plenty of studies have examined the association between corporate governance and earnings conservatism, which adopt composite governance measure (Lara et al., 2009) or common governance mechanisms such as the board of director characteristics (Beekes et al., 2004; Ahmed and Duellman, 2007; Lara et al., 2007; Chi et al., 2009) and managerial ownership (LaFond and Roychowdhury, 2008). These research investigates the countries with different institutional environment, different extent of investor protection (Bushman and Piotroski, 2006) and informational asymmetry (LaFond and Watts, 2008). Furthermore, these research also examines the issues related to family firms (Raithatha and Shaw, 2019) and business group affiliated firms (Chan and Hus, 2013; Yang et al., 2014). The divergent findings show that earnings conservatism and corporate governance are likely to be substitutes (LaFond and Watts, 2008; LaFond and Roychowdhury, 2008; Chi et al., 2009; Chan and Hsu, 2013)) or complements (Beekes et al., 2004; Bushman and Piotroski, 2006; Ahmed and Duellman, 2007; Lara et al., 2007; Xia and Zhu, 2009; Yang et al., 2014). However, past literature investigating the relationship between earnings conservatism and corporate governance rarely concerns on restatement-related issues (Ettredge et al., 2012). Ettredge et al. (2012) examine the impact of restatements on earnings conservatism for American firms and examine how particular governance mechanism--the change of outside directors affects the above relationship. They find that restating firms would enhance earnings conservatism and earnings conservatism is high in the firms improving governance following restatements. This suggests that earnings conservatism and governance mechanisms may be complements for American firms involving restatements. As top managers are the first to be blamed for the restatement events, a

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[1] Earnings conservatism includes conditional conservatism and non-conditional earnings conservatism. Conditional conservatism is news-dependent earnings conservatism whereas non-conditional earnings conservatism is news-independent earnings conservatism (Ahmed and Henry, 2012). In this paper, earnings conservatism adopts conditional conservatism.

plenty of studies have examined the effect of restatements on manager turnover. It is suggested that manager replacement is a common disciplinary action in response to restatements (Burks, 2010; Land, 2010; Wang et al., 2013; Dao et al., 2014) and is a vital outcome of governance quality in a firm in the literature (Aivazian et al., 2005).

Ahmed and Henry (2012) indicate that firms may select an optimal governance structure according to their unique governance environment. Unlike American firms with stronger governance practices and better investor protection, Taiwanese firms feature weaker governance practices and worse protection for minority shareholders (Yeh and Woidtke, 2005). Due to Taiwan's institutional backgrounds and unique governance features, it is unlikely for Taiwanese firms with restatements to adopt multiple actions to alleviate the negative impact of restatements. Thus, in the setting of Taiwan, when restating firms make manage replacement decisions following restatements, they may demand less earnings conservatism. In this regard, it is reasonably expected that earnings conservatism and corporate governance are more likely to be substitutes rather than complements in the context of restatements in Taiwan. Based on the above, this paper further examines if restating firms make manager replacement decisions following restatements, whether their financial reporting will become less conservative. The findings of this paper show that Taiwanese firms would adopt more conservative financial reporting policies in the reveal of restatements whereas the above relation becomes weaker when managers are replaced.

The remainder of this paper is as follows. Section 2 presents the literature review and hypothesis development. Section 3 provides the research methodology. Section 4 presents the results. Finally, conclusions, contributions, research limitations and future research directions are reported in Section 5.

2. Literature Review

With the rise of many financial reporting scandals, restatement issues have been increasingly received concern. Restatements represent that financial reporting has misstatements and is corrected late (Hasnan et al., 2020). Restatements bring negative economic consequences such as the increase the incidence of shareholder lawsuits and more difficulties in raising capital (Bardos and Mishra, 2014; Amel-Zadeh and Zhang, 2015; Ma et al., 2015). Given that restatements constitute a more direct breach of investors' trust (Almer et al., 2008), restating firms have incentive to improve financial reporting credibility. Modern business operations are built on all kinds of contracting relationship such as debt contracts. Contracting explanation is generally used to explain how earnings conservatism assists firms in alleviating agency problems such as reducing information asymmetry or litigation costs. Earnings conservatism facilitates efficient contracting between mangers and shareholders in the existence of agency problems and can effectively reduce market uncertainly, information asymmetry (Ahmed and Duellman, 2007; Lafond and Roychowdhury, 2008; LaFond and Watts, 2008), information risk (Kravet and Shevlin, 2010), bankruptcy risk (Biddle et al., 2020), financial reporting credibility (Francis et al., 2004) and litigation risk (Watts, 2003a, b; Ruch and Taylor, 2015). Moreover, earnings conservatism is an efficient financial reporting mechanism in the absence of contracting, which constrains managers' opportunistic behavior and thus can assure reliable financial disclosure (Watt, 2003a, b; Ahmed and Duellman, 2007; Lafond and Roychowdhury, 2008; LaFond and Watts, 2008; Zhong and Li, 2017; Xia et al., 2019).

In order to recover investors' confidence in financial reporting, restating firms may change financial reporting policies in the reveal of restatements. For example, Wiedman and Hendricks (2013) document that accrual quality improves following restatements (both earnings and non‐earnings error restatements). Furthermore, firms' aggressive financial reporting policies often leads to accounting scandals such as restatements (Almer et al., 2008). Hence, restatement events have underscored the value of conservative financial reporting (Krishnan and Visvanathan, 2008; Ettredge et al., 2012). Adopting conservative earnings recognition methods should be a direct way for restating firms to restore the loss of investors' confidence in the capital markets. Signal theory and legitimacy theory illustrate why firms encountering troubles would send positive signals to the market and take decisive actions to defend their legitimacy. Signal theory depicts why firms in an uncertain market would convey the information about the quality of activities which are credible to individuals (Sanders and Boivie, 2004; Bergh et al., 2014). Legitimacy theory asserts that firms will do whatever they regard as necessary to preserve the image of legitimate businesses with legitimate aims and methods of achieving it (Cho and Patten, 2007; Islam et al., 2020). According to signal theory and legitimacy theory (Cho and Patten, 2007; Sanders and Boivie, 2004; Chakravarthy et al., 2014; Islam et al., 2020), restating firms would view post-restatement actions (i.e., enhancing earnings conservatism) as positive signals to stakeholders and as legitimizing tools against legitimacy loss to re-gain firm reputational capital often lost at the revelation of restatements.

Past literature only provides limited understanding of the relationship between restatements and earnings conservatism (Huang et al., 2009; Ettredge et al., 2012; Chen et al., 2014; Farhangdoust and Sayadi, 2020). For example, Huang et al. (2009) examine the change of earnings conservatism following restatements after SOX for American firms. They find that earnings conservatism slightly increases in the post-restatement period after the SOX enactment in 2002. Ettredge et al. (2012) examine the linkage of earnings conservatism to overstated earnings in and after the restatement period for American firms. Their results show that restating firms have lower conservatism level in financial reporting in the restatement period whereas the conservatism increases after the restatement period. Farhangdoust and Sayadi (2020) examine the association between restatements and earnings conservatism for companies listed on the Tehran Stock Exchange. Their findings indicate that restating firms have higher conservatism during the years of restatements. The above studies suggest that financial reporting is an essential way for firms to communicate with the users of financial statements. Particularly, conservative financial reporting may be

an important financial reporting strategy for restating firms as the response to restatements. Drawing from signal theory and legitimacy theory (Cho and Patten, 2007; Sanders and Boivie, 2004; Chakravarthy et al., 2014; Islam et al., 2020), restating firms would have incentive to adopt conservative financial reporting policies following restatements to send messages about their efforts of enhancing financial reporting credibility and legitimate the organizational image. Based on the above, this paper proposes H1:

H1: Compared to non-restating firms, in the reveal of restatements, restating firms tend to adopt conservative financial reporting strategy.

As managers in restating firms agreed financial misstatements, punishing these managers and appointing new managers with particular expertise following restatements can help alleviate the negative perceptions of investors (Collins et al., 2008; Wang et al., 2013). Past research has provided the evidence regarding the punishments for managers involving in restatements, including the replacement of managers and auditors (Chakravarthy et al., 2014; Dao et al., 2014; Rich and Zhang, 2016; Agrawal and Cooper, 2017) and the reduction of executive compensation (Cheng and Farber, 2008; Collins et al., 2008; Wang et al., 2013) and improved actions such as the appointment of a successor CEO with specific qualities (Gomulya and Boeker, 2014; Xu and Zhao, 2016). Compared to compensation reduction, the loss of jobs must be more severe punishment for managers. Nowadays, Taiwanese firms are required to disclose manage turnover information in time on the Market Observation Post System website of the TWSE. This shows that manager turnover information is significantly relevant to financial statement users' decision-making. As mentioned earlier, restating firms may adopt conservative financial reporting strategy as the response to restatements. Previous studies document that the level of earnings conservatism mainly depends on governance strength. There are inconsistent findings in the relationship between earnings conservatism and corporate governance. On the one hand, prior evidence shows that earnings conservatism and corporate governance are complements, suggesting that firms with strong governance mechanisms prefer to adopt conservative financial reporting policies (Beekes et al., 2004; Bushman and Piotroski, 2006; Ahmed and Duellman, 2007; Lara et al., 2007; Xia and Zhu, 2009; Yang et al., 2014). For example, Beekes et al. (2004) examine how earnings timeliness and conservatism are related to the composition of the board of directors. Their findings show that there is positive relationship between the percentage of outside directors and earnings conservatism, suggesting that firms with more outside directors tend to rapidly recognize bad news in earnings. Ahmed and Duellman (2007) investigate the association between the characteristics of the board of directors and earnings conservatism. They find that more inside directors harm earnings conservatism whereas more outside directors enhances earnings conservatism. Lara et al. (2007) examine the linkage of the board characteristics and earnings conservatism. Their findings show that when the influence of the CEO on the board of directors in a firm is low, the firm would have high earnings conservatism. Yang et al. (2014) investigate the linkage between business group firms and earnings quality such as earnings conservatism. Their evidence shows that compared to non-group firms, group firms have more informational asymmetry problems and thus report less conservative earnings.

On the other hand, prior evidence also shows that earnings conservatism and corporate governance are substitutes, suggesting that firms with weak governance mechanisms demand more earnings conservatism (LaFond and Watts, 2008; LaFond and Roychowdhury, 2008; Chi et al., 2009; Chan and Hsu, 2013). For example, LaFond and Watts (2008) examine how information asymmetry between firm insiders and shareholders is related to earnings conservatism. Their results show that information asymmetry reduces with the increase of earnings conservatism because conservative earnings deters managers to manipulate earnings. LaFond and Roychowdhury (2008) examine the relationship between managerial ownership and earnings conservatism. They document that managerial ownership is negatively associated with earnings conservatism, showing that earnings conservatism can deter agency problems between managers and shareholders. Chi et al. (2009) examine the association between earnings conservatism and corporate governance. Their results show that firms with CEO duality report more conservative earnings whereas those with more institutional shareholding report less conservative earnings. Ettredge et al. (2012) investigate whether resting firms increase earnings conservatism following overstated earnings. Their findings indicate that the earnings conservatism increases following restatements and the extent of the increase following restatements are contingent on the extent of governance improvement such as the increase of the percentage of outside directors.

Restating firms can take different post-restatement actions to convey messages regarding their efforts of enhancing financial reporting credibility and legitimate organizational image. Firms may choose optimal governance structure based on their unique governance environment (Ahmed and Henry, 2012). Manager replacement is also a possible post-restatement action and is one of major governance mechanisms (Aivazian et al., 2005). The survey of Dianto and Aswar (2020) shows several factors such as top management support is vital to improve financial reporting with implementation of accrual accounting. This suggests that new managers may implement accrual-based accounting with considering earnings conservatism in the future. Taiwanese firms feature weak protection for minority shareholders (Yeh and Woidtke, 2005). Hence, if Taiwanese firms experience restatements, it is less likely for them to adopt multiple actions following restatements to send signals regarding their determinants of improving financial reporting credibility and legitimate organizational image. When restating firms choose to replace managers to respond to restatements, they would demand less conservative earnings recognition methods. According to the above, this paper proposes H2.

H2: In the reveal of restatements, restating firms replacing firm executives would reduce the demand for conservative financial reporting.

3. Data, Methodology and Empirical Results

This paper examines a sample of publicly traded companies listed on the TWSE and Over-The-Counter (OTC) that announced restatements during 1995-2005, excluding the financial and insurance industry due to their unique security regulations. In Taiwan, firms are required to disclose manager turnover information in time in the Market Observation Post System website of the TWSE. This paper follows previous literature to collect data for manager turnover (Desai et al., 2006; Arthaud-Day et al., 2006). Data for manager turnover was constructed from the Market Observation Post System website of the TWSE, using variations of the word "replace". Control variables were also collected from the Taiwan Economic Journal (TEJ) database.

3.1 Sample Descriptions

The restatement sample was obtained from the TEJ database, including quarterly or annual restatements. Initially, this paper obtained a sample of 1,359 firm-year observations. Observations not meeting the following criteria were dropped: (1) missing and incomplete data on the TEJ database (226 observations), (2) restatements for technical reasons[2] (852 observations), (3) multiple restatements during the aggregation period[3] (170 observations) and bankruptcy (55 observations). Finally, the restating firms total fifty-six. Further, this paper selects a control firm for each sample firm based on the following criterions (Agrawal and Chadhad, 2005; Desai et al., 2006): (1) each pair of firms are in the same industry, (2) a control firm has similar firm size in terms of log of total market capitalization to the matched restating firm at the beginning of the restatement announcement year, and (3) a control firm does not announce any restatement in two years before and after the restatement year announced by its matched restating firm. The final sample used to the test hypotheses includes one hundred and twelfth firms. The sample size is similar to other studies on earnings quality (Dechow, 1995) and manager turnover (Duggal and Cudd, 1993).

3.2 Research Models

This paper adopts ordinary least squares (OLS) regression models to estimate the hypotheses. Traditionally, earnings conservatism is measured based on Basu's (1997) single-period asymmetric timeliness of earnings measure. NI is earnings per share before extraordinary items and discontinued operations deflated by share price at the beginning of the period. R is the buy and hold return (measuring the timeliness of earnings with respect to positive returns or good news). DR is a dummy variable that equals 1 if R is less than 1 and 0 otherwise. The interaction term of R*DR measures the incremental timeliness of earnings with respect to negative returns or bad news. Basu's (1997) single-period asymmetric timeliness of earnings measure is shown as follows.

$$NI = \beta_0 + \beta_1 R + \beta_2 DR + \beta_3 R^*DR + \varepsilon$$

The single-period Basu measure is dependent on the composition of equity at the beginning of the period and ignores conservatism effects prior to the estimation period. Therefore, several studies suggest that it is better to cumulatively estimate the asymmetric timeliness of earnings measure over several prior years to mitigate the bias in the Basu's (1997) single-period asymmetric timeliness of earnings measure (Ahmed and Duellman, 2007; Lafond and Roychowdhury, 2008; LaFond and Watts, 2008). The focus of this paper is to examine whether financial reporting behavior of restating firms becomes conservative in the reveal of restatements. Following the above literature, this paper uses the Basu's (1997) measure estimated cumulatively over multiple years (three years) to measure earnings conservatism. In the multi-year test, this paper measures earnings and returns cumulatively over the current and the following two fiscal years. The aggregation period includes the restatement announcement year and two years after the restatement announcement year.

Variables definitions are as follows. *NI* refers to cumulative net income before extraordinary income divided by market value of equity at the beginning of aggregation period. *R* refers to buy and hold return over the aggregation period. *DR* refers to a dummy variable equals 1 if R is less than 1 and 0 otherwise. *FR* refers to a dummy variable equals 1 if a firm restated earnings and 0 otherwise. *REPLACE* refers to a dummy variable equals 1 if there is any manager replacement over the aggregation period and 0 otherwise. *GROWTH* refers to the sales growth rate, defined as the average annual sales growth rate for two years prior to the end of the aggregation period. *ROA* refers to the return of assets, defined as operating income after depreciation scaled by average assets at the end of the aggregation period. *LEV* refers to the leverage ratio, defined as the ratio of total liabilities divided by total assets at the end of the aggregation period. *SIZE* refers to firm size, defined as the natural log of market capitalization at the end of the aggregation period. The model of this paper is as follows.

$$NI = \beta_0 + \beta_1 R + \beta_2 DR + \beta_3 R^*DR + \beta_4 FR + \beta_5 FR^*R + \beta_6 FR^*DR + \beta_7 FR^*R^*DR$$

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[2] In consistent with most studies (Agrawal and Chadha, 2005; Aier et al., 2005), this paper excludes restatements prompted by mergers and acquisitions, discontinued operations, stock splits, accounting rule changes, and changes in accounting method.

[3] In order to provide a clean window to observe financial reporting behavior of restating firms in the reveal of restatements, this paper requires that each restating firm has only announced a restatement in the aggregation period.

$+ \beta_8\,REPLACE + \beta_9\,REPLACE*R + \beta_{10}\,REPLACE*DR + \beta_{11}\,REPLACE*R*DR + \beta_{12}\,FR*\,REPLACE$

$+ \beta_{13}\,FR*\,REPLACE*R + \beta_{14}\,FR*REPLACE*R*DR + \beta_{15}\,GROWTH + \beta_{16}\,GROWTH*R$

$+ \beta_{17}\,GROWTH*DR + \beta_{18}\,GROWTH*R*DR + \beta_{19}\,LEV + \beta_{20}\,LEV*R$

$+ \beta_{21}\,LEV*DR + \beta_{22}\,LEV*R*DR + \beta_{23}\,ROA + \beta_{24}\,ROA*R + \beta_{25}\,ROA*DR$

$+ \beta_{26}\,ROA*R*DR + \beta_{27}\,SIZE + \beta_{28}\,SIZE*R + \beta_{29}\,SIZE*DR + \beta_{30}\,SIZE*R*DR + \varepsilon$

NI	=	cumulative net income before extraordinary income divided by market value of equity at the beginning of the aggregation period;
R	=	buy and hold return over the aggregation period;
DR	=	a dummy variable equals 1 if R is less than 1 and 0 otherwise;
FR	=	a dummy variable equals 1 if a firm announced restated earnings and 0 otherwise;
$REPLACE$	=	a dummy variable equals 1 if there is any manager replacement over the aggregation period and 0 otherwise;
$GROWTH$	=	The sales growth rate, defined as the average annual sales growth rate for two years prior to the end of the aggregation period;
ROA	=	The return of assets, defined as operating income after depreciation scaled by average assets at the end of the aggregation period;
LEV	=	The leverage ratio, defined as the ratio of total liabilities divided by total assets at the end of the aggregation period;
$SIZE$	=	Firm size, defined as the natural log of market capitalization at the end of the aggregation period.

This paper adds FR with R, DR and the interaction term of $R*DR$ to examine H1. H1 predicts that restating firms will enhance earnings conservatism as the response to restatements, representing that they may tend to incorporate bad news into earnings on a timely basis. This should lead to a statistically significant negative coefficient on $FR*R$ and a statistically significant positive coefficient on $FR*R*DR$. $R*DR$ captures the sensitivity to bad news for firms where FR equals zero, while $FR*R*DR$ captures the marginal effect for firms where FR equals one. Manager replacement ($REPLACE$) is a dummy variable equals 1 if there is any replacement of firm executives over the aggregation period and 0 otherwise. $REPLACE$ is interacted with R, DR and $R*DR$. Due to the uncertain relationship between manager replacement and earnings conservatism, this paper does not expect that manager replacement has any particular relationship with the asymmetric timeliness of earnings measure. Manager replacement is an essential indicator to measure firm risk. When manager replacement is bad news, restating firms would choose to adopt conservative financial reporting strategy as the post-restatement action. Conversely, when manager replacement is good news, restating firms would demand less earnings conservatism to respond to restatements. The interaction term of $FR*REPLACE*R*DR$ is used to test H2. H2 proposes that restating firms replacing managers in the reveal of restatements would be less motivated to adopt conservative earnings recognition methods. This suggests that the coefficient on $FR*REPLACE*R$ will be positive and the coefficient on $FR*REPLACE*R*DR$ will be negative.

In consistent with prior literature (Ahmed and Duellman, 2007; Lafond and Roychowdhury, 2008), this paper controls for several variables in the model: the sales growth rate ($GROWTH$), the leverage ratio (LEV), ROA and firm size ($SIZE$) to incorporate the effect of sales growth, the leverage, ROA and firm size on the association among restatements, manager replacement and earnings conservatism. All control variables in the regression model are also interacted with R, DR and $R*DR$. Firms with high sales growth are likely to adopt aggressive financial reporting (Palmrose et al., 2004), suggesting that $GROWTH$ will result in a lower asymmetric timeliness coefficient. Moreover, firms with high leverage face more shareholder and bond-holder conflicts and thus have high demand for conservative financial reporting (Ahmed and Duellman, 2007; Lafond and Roychowdhury, 2008). High-performing firms and large firms have high political costs and face high public concern. They would tend to enhance earnings conservatism. According to the above, this paper expects that these variables (LEV, ROA and $SIZE$) will result in high asymmetric timeliness coefficients.

4. Empirical Results

4.1 Descriptive Statistics and Regression Analysis

Descriptive statistics of the variables on the modified Basu measure (NI, R and DR) for restating firms are depicted as follows. The mean (median) value of net income before extraordinary income divided by the beginning market value of equity (NI) is -0.708 (0.136). The average of buy and hold return (R) is 0.231 (the median is -0.305) and the average of DR is 0.643 (the median is 1.000). This paper also examines the correlation of the modified Basu measure with FR. The results show that FR is significantly negatively related to NI ($p<0.1$) and significantly positively

related to *DR* (p<0.1). *NI* is significantly negatively correlated with *DR* (p<0.1), showing that reported earnings reflect at least a portion of the information reflected in returns. The inter-correlation among these independent variables used in the model is lower than 0.7, indicating that there exists no serious multicollinearity problems. Table 1 presents detailed industry distribution of the sample. Most observations derive from the electronics industry (36%), reported in Table 1. Table 2 presents restatement reasons. The result shows that securities-related (30.36%) is the most common restatement reason, which is followed by other restatement reasons such as revenue recognition (17.86%) and cost of goods sales or operating expense (16.07%).

Table 1: Industry Classification of the 112 Firms

Industry	Number of Firms	Percentage (%) of Total Sample
Cement	4	4%
Food	4	4%
Plastic	4	4%
Textiles	12	12%
Electric and machinery	4	4%
Electrical appliance and cable	4	4%
Chemical and Bio	2	2%
Glass and ceramics	4	4%
Steel and iron	2	2%
Fiber	2	2%
Automobile	2	2%
Electronics	36	36%
Construction	8	8%
Transportation	8	8%
Tourism	2	2%
Department stores	6	6%
Others	8	8%
Total	112	100%

Table 2: Restatement Reasons

Reasons	Numbers	Frequency (%)
Revenue recognition	10	17.86
Cost of goods sales or operating expense	9	16.07
In-process R&D	2	3.57
Net income adjustments	2	3.57
Restructuring, assets and inventory	7	12.50
Securities-related	17	30.36
Related-party transactions	4	7.14
Unspecified	5	8.93
Total	56	100

Table 3 reports empirical results. In Table 3, model 1 is the restricted model and model 2 is the full, unrestricted model in which this paper enters main effects, interaction terms and control variables to ensure a rigorous test of the hypothesized effects. As expected with H1, the results from model 1 and model 2 both indicate that there is greater timeliness of earnings with respect to bad news for restating firms in the reveal of restatements ($p < 0.1$), suggesting that restating firms adopt conservative financial reporting following restatements. Besides, in consistent with H2, the results from model 2 point out that good news ($p < 0.1$) for restating firms replacing managers in the reveal of restatements will be reflected in earnings over a number of periods and accounting is less timely than for bad news ($p < 0.05$), showing that restating firms replacing managers would reduce the demand for earnings conservatism.

As expected, this paper does not find that *REPLACE* has any particular relationship with the asymmetric timeliness of earnings. In addition, control variables are generally significant in the hypothesized directions in the models. The results from model 1 and model 2 show that firms with high sales growth tend to delay recognition of bad news in earnings ($p < 0.1$) whereas those with high leverage tend to delay recognition of good news in earnings. The results from model 1 indicate that firms with high *ROA* prefer to recognize good news less timely ($p < 0.1$). Unexpectedly, the results from model 1 and model 2 show that big size firms would delay recognition of bad news in earnings ($p < 0.05$). The t-values reported in Table 3 are adjusted according to White's heteroskedasticity-consistent standard errors.

This paper also adopts the traditional Basu measure to examine the hypotheses, reported in Table 4. Prior studies assert that the Basu's (1997) single-period measure omits conservatism effects prior to the estimation period (Ahmed and Duellman, 2007; Lafond and Roychowdhury, 2008; LaFond and Watts, 2008). As expected, the results adopting the Basu's (1997) one-year measure (reported in Table 4) show that there is low statistical significance of the hypotheses. Moreover, the results are not very consistent with those adopting the modified Basu measure based on a multi-year period (reported in Table 3). In consistent with the assertions of past literature (Ahmed and Duellman, 2007; Lafond and Roychowdhury, 2008; LaFond and Watts, 2008), the results support that the modified Basu model estimated cumulatively over long horizons can mitigate the bias in the traditional Basu measure and thus is better to explain the hypotheses. As those reported in Table 3, the t-values reported in Table 4 are also adjusted according to White's heteroskedasticity-consistent standard errors.

Table 3: Restatements, Earnings Conservatism and Manager Replacement - -the Modified Basu Measure (Dependable Variable-- *NI*)

Variables	Sign	Mode 1		Model 2	
		Coefficient	t value	Coefficient	t value
Intercept	?	0.498	1.023	0.618	1.247
R	+	-0.109	-0.759	-0.246	-1.244
DR	?	3.704	1.539	3.181	1.615
*R*DR*	+	1.019	1.883**	8.956	2.051**
FR	?	-0.038	-0.904	-0.051	-0.911
*FR*R*	-	-0.007	-0.420	-0.011	-0.402
*FR*DR*	?	1.780	1.141	2.788	1.227
*FR*R*DR*	+	4.280	1.365*	6.328	1.450*
REPLACE	?			-0.001	-0.007
*REPLACE *R*	?			-0.025	-0.640
*REPLACE *DR*	?			0.135	0.062
*REPLACE *R*DR*	?			-0.789	-0.178
FR REPLACE*	?			0.074	0.754
FR REPLACE *R*	+			0.003	0.063
FR REPLACE*DR*	?			-7.166	-1.857*
FR REPLACE *R*DR*	-			-1.482	-1.968**
GROWTH	?	0.000	-0.169	0.000	-0.311
*GROWTH*R*	+	0.000	-1.239	0.000	-0.456
*GROWTH*DR*	?	-0.088	-1.435	-0.100	-1.582
*GROWTH*R*DR*	-	-0.162	-1.377*	-0.179	-1.444*
LEV	?	0.135	0.527	0.103	0.380
*LEV*R*	-	-0.018	-0.168	0.031	0.221
*LEV*DR*	?	1.548	1.264	1.679	1.540
*LEV*R*DR*	+	4.453	1.603*	4.894	1.926**
ROA	?	0.010	3.726***	0.011	3.306***
*ROA*R*	-	-0.001	-1.398*	-0.001	-0.482
*ROA*DR*	?	0.264	1.015	0.137	0.650
*ROA*R*DR*	+	0.577	1.093	0.359	0.896
SIZE	?	-0.062	-0.774	-0.076	-0.941
*SIZE*R*	-	0.018	0.722	0.033	1.208

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Variables	Sign	Coefficient	t value	Coefficient	t value
SIZE*DR	?	-6.285	-1.550	-5.542	-1.650
SIZE*R*DR	+	-1.743	-1.871**	-15.752	-2.079**
Adjusted R2		0.468		0.536	

Note: p-value in parentheses. ***significant at the 0.01 level, **significant at the 0.05 level, and *significant at the 0.10 level. The number of the sample firms is 112. The t-values are adjusted according to White's heteroskedasticity-consistent standard errors.

Table 4: Restatements, Earnings Conservatism and Manager Replacement – the Traditional Basu Measure
(Dependable Variable-- *NI*)

Variables	Sign	Mode 1		Model 2	
		Coefficient	t value	Coefficient	t value
Intercept		-5.014	-1.350	-4.801	-1.305
R	+	-0.502	-2.143**	-0.179	-0.473
DR	?	1.453	0.740	1.156	0.550
R*DR	+	4.219	1.029	3.820	0.917
FR	?	-0.399	-1.109	-0.304	-0.937
FR*R	-	2.459	1.073	1.807	0.823
FR*DR	?	3.137	1.067	2.907	0.954
FR*R*DR	+	-5.502	-1.248	-5.185	-1.188
REPLACE	?			0.346	0.715
REPLACE *R	?			-0.156	-0.287
REPLACE *DR	?			-0.236	-0.480
REPLACE *R*DR	?			-0.427	-0.688
FR* REPLACE	?			0.174	0.283
FR*REPLACE *R	+			-0.592	-0.741
FR* REPLACE *DR	?			0.269	0.368
FR*REPLACE *R*DR	-			2.708	1.661*
GROWTH	?	0.004	1.017	0.003	0.686
GROWTH*R	+	-0.003	-1.074	-0.002	-0.638
GROWTH*DR	?	-0.002	-0.372	0.000	0.067
GROWTH*R*DR	-	0.012	1.306*	0.015	1.403*
LEV	?	-5.152	-1.444	-5.641	-1.410
LEV*R	-	4.571	1.442*	4.538	1.333*
LEV*DR	?	4.362	1.195	4.508	1.117
LEV*R*DR	+	-5.725	-1.757**	-6.504	-1.787**
ROA	?	-0.014	-0.722	-0.023	-0.952
ROA*R	-	2.984	1.290	2.937	1.195
ROA*DR	?	2.749	1.139	4.237	1.441*
ROA*R*DR	+	-5.116	-1.728**	-2.207	-0.562
SIZE	?	1.026	1.403*	1.009	1.373
SIZE*R	-	-0.534	-1.202	-0.468	-1.011
SIZE*DR	?	-0.887	-1.127	-0.832	-1.035
SIZE*R*DR	+	0.510	2.179**	0.507	2.141**
Adjusted R2		0.289		0.253	

Note: ***significant at the 0.01 level, **significant at the 0.05 level, and *significant at the 0.10 level. The number of the sample firms is 112. The t-values are adjusted according to White's heteroskedasticity-consistent standard errors.

4.2 Robustness Tests

This paper further tests the robustness of the results for H1 and H2. First, this paper replaces the dummy variable of manager replacement reported in Table 3 with the continuous variable of manager replacement frequency (*REPLACES*) (reported in Table 5) to re-examine the hypotheses. The results in Table 5 are generally consistent

with those in Table 3 (the major analysis). In Table 5, the coefficients on *FR*R*DR* in model 1 and model 2 are significantly positive (p<0.1) and the coefficient on *FR*R* in model 2 is significantly negative (p<0.05), revealing that restating firms recognize bad news in earnings more timely whereas delay recognition of good news in earnings. Hence, H1 receives further support. Furthermore, model 2 shows that the coefficient on *REPLACES*FR*R* is significantly positive (p<0.05), which further supports H2. Restating firms would reduce the demand for earnings conservatism when replacing managers in the reveal of restatements. The t-values reported in Table 5 are also adjusted according to White's heteroskedasticity-consistent standard errors. Second, this paper adopts the model of Ball and Shivakumar (2005). Ball and Shivakumar (2005) assert that their measure is more efficient to calculate earnings conservatism than the traditional Basu measure based on a one-year period and can reduce the risk of drawing incorrect inferences due to market inefficiencies. Hence, this paper also follows the model of Ball and Shivakumar (2005) to measure earnings conservatism with adopting regressions based on total accruals and cash flow, which is reported as follows.

$$ACCR = \beta_0 + \beta_1 CF + \beta_2 DCF + \beta_3 CF*DCF + \varepsilon$$

$ACCR$ = total accruals (defined as income before extraordinary items minus cash flow from operations) scaled by average total assets;

CF = cash flows from operations divided by average total assets;

DCF = a dummy variable equals 1 in the case of negative CF and 0 otherwise.

This paper augments the model of Ball and Shivakumar (2005) by interacting independent variables with *FR* and *REPLACE*. *FR* and *REPLACE* are defined as the above mentioned. As prior literature (Lara et al., 2009), control variables adopted in the traditional Basu model are ignored in the model of Ball and Shivakumar (2005). The augmented model of Ball and Shivakumar (2005) is shown in the following.

$$ACCR = \beta_0 + \beta_1 CF + \beta_2 DCF + \beta_3 CF*DCF + \beta_4 FR + \beta_5 FR*CF + \beta_6 FR*DCF$$
$$+ \beta_7 FR*CF*DCF + \beta_8 REPLACE + \beta_9 REPLACE*CF + \beta_{10} REPLACE*DCF$$
$$+ \beta_{11} REPLACE*CF*DCF + \beta_{12} FR*REPLACE + \beta_{13} FR*REPLACE*CF$$
$$+ \beta_{14} FR*REPLACE*DCF + \beta_{15} FR*REPLACE*CF*DCF$$

Table 5: Robustness Tests -Restatements, Earnings Conservatism and Manager Replacement –the Modified Basu Measure (Dependable Variable-- *NI*)

Variables	Sign	Model 1	
		Coefficient	t value
Intercept		0.453	0.780
R	+	-0.246	-1.046
DR	?	0.396	1.548
R*DR	+	1.068	1.860**
FR	?	0.046	1.006
FR*R	-	-0.042	-2.244**
FR*DR	?	4.587	1.521
FR*R*DR	+	8.138	1.495*
REPLACES	?	0.084	1.492
REPLACES*R	?	-0.029	-1.231
REPLACES*DR	?	2.415	1.121
REPLACES*R*DR	?	4.008	1.002
FR*REPLACES	?	-0.146	-2.232**
FR*REPLACES*R	+	0.069	2.000**
FR*REPLACES*DR	?	-3.522	-1.079
FR*REPLACES*R*DR	-	-4.927	-0.766
GROWTH	?	0.000	0.102
GROWTH*R	+	-0.001	-1.332*

		Coefficient	t value	Coefficient	t value
GROWTH*DR	?	-0.086		-1.362	
GROWTH*R*DR	-	-0.159		-1.301*	
LEV	?	0.116		0.422	
LEV*R	-	0.035		0.314	
LEV*DR	?	1.452		1.146	
LEV*R*DR	+	4.287		1.484*	
ROA	?	0.010		3.242***	
ROA*R	-	0.000		-0.045	
ROA*DR	?	0.253		0.937	
ROA*R*DR	+	0.557		1.005	
SIZE	?	-0.058		-0.609	
SIZE*R	-	0.032		0.929	
SIZE*DR	?	-6.860		-1.570	
SIZE*R*DR	+	-1.848		-1.862**	
Adjusted R2		0.422			

Note: ***significant at the 0.01 level, **significant at the 0.05 level, and *significant at the 0.10 level. The number of the sample firms is 112. The t-values are adjusted according to White's heteroskedasticity-consistent standard errors.

The results in Table 6 are similar to those in Table 3 and Table 5. In Table 6, model 2 shows that the coefficient of the interaction term for $FR*CF*DCF$ is significantly positive (p < 0.05). Consistent with H1, restating firms tend to adopt conservative financial reporting as the response to restatements. Model 2 further shows that the coefficient of the interaction term for $FR*REPLACES*CF*DCF$ is significantly negative (p < 0.05). H2 receives further support. Restating firm replacing managers would adopt less earnings conservatism in the reveal of restatements. The t-values
reported in Table 6 are adjusted according to White's heteroskedasticity-consistent standard errors.

Table 6: Robustness Tests -- Restatements, Earnings Conservatism and Manager Replacement (Dependent Variable-- *ACCR*)

Variables	Sign	Mode 1		Model 2	
		Coefficient	t value	Coefficient	t value
Intercept	?	-0.028	-1.212	-0.023	-0.830
CF	-	-1.429	-3.793***	-1.891	-4.028***
DCF	?	-0.072	-1.539	-0.089	-1.618
CF*DCF	+	1.386	11.594***	1.424	10.665***
FR	-	-0.016	-0.558	-0.002	-0.066
FR*CF	-	0.086	0.333	0.061	0.188
FR*DCF	+	0.073	1.369	0.079	1.262
FR*CF*DCF	+	0.517	1.143	1.031	1.840**
REPLACE	-			-0.017	-0.363
REPLACE*CF	?			-0.122	-0.793
REPLACE*DCF	+			0.032	0.297
REPLACE*CF*DCF	?			0.805	1.231
FR*REPLACE	-			-0.058	-0.957
FR*REPLACE*CF	+			0.197	0.450
FR*REPLACE*DCF	+			-0.018	-0.159
FR*REPLACE*CF*DCF	-			-1.375	-1.770**
Adjusted R2		0.604		0.600	

Note: ***significant at the 0.01 level, **significant at the 0.05 level, and *significant at the 0.10 level. The number of the sample firms is 112. The number of the sample firms is 112. The t-values are adjusted according to White's heteroskedasticity-consistent standard errors.

5. Conclusion

Many outbreaks of financial reporting scandals lead to an increasing interest in firms' financial reporting quality (Chang and Choy, 2016; Zhao et al., 2017). These events violate investors' expectations about credible financial reporting (Wans, 2020). Earnings misstatements (restatements) bring about significant economic negative consequence (Bardos and Mishra, 2014; Amel-Zadeh and Zhang, 2015; Ma et al., 2015) and deteriorate investors' confidence in financial reporting credibility (Chen et al., 2014). Firms' aggressive financial reporting policies often result in restatements (Almer et al., 2008). Accordingly, in the reveal of restatements, in order to alleviate the negative perceptions of investors, restating firms may prefer conservative financial reporting policies. Earnings conservatism can produce earnings that reflect bad news faster than good news and assist firms in reducing information asymmetry, agency problems, market uncertainty (Watts, 2003a, b; Ahmed and Duellman, 2007; LaFond and Roychowdhury, 2008; Ruch and Taylor, 2015; Zhong and Li, 2017), bankruptcy risk (Biddle et al., 2020), information risk (Kravet and Shevlin, 2010) and litigation risk (Watts, 2003a, b; Ruch and Taylor, 2015) and improving financial reporting credibility (Francis et al., 2004).

Based on signal theory and legitimacy theory (Cho and Patten, 2007; Sanders and Boivie, 2004; Chakravarthy et al., 2014; Shan and Taylor, 2014; Islam et al., 2020), restating firms may enhance earnings conservatism to respond to restatements so that they can convey messages about their efforts of enhancing financial reporting credibility and restore the image of legitimate businesses. Past studies provide little examination into the relationship between restatements and earnings conservatism and most focuses on American firms. These findings show that adopting conservative financial reporting policies may be important strategy for restating firms to respond to restatements (Huang et al., 2009; Ettredge et al., 2012; Farhangdoust and Sayadi, 2020). It's necessary to enhance the understanding of the issue and extend the investigation to the setting of Asian countries such as Taiwan. Compared to American firms, Taiwanese firms have weaker governance practices and feature worse investor protection (Yeh and Woidtke, 2005). This raises the question whether financial reporting of Taiwanese firms involving in restatements would become conservative in the reveal of restatements.

A plenty of studies have examined the association between earnings conservatism and corporate governance. However, the findings are divergent. Some studies show that they are complements (Beekes et al., 2004; Bushman and Piotroski, 2006; Ahmed and Duellman, 2007; Lara et al., 2007; Xia and Zhu, 2009; Yang et al., 2014) whereas some studies show that they are substitutes (LaFond and Watts, 2008; LaFond and Roychowdhury, 2008; Chi et al., 2009; Chan and Hsu, 2013). Very few studies examine the association between earnings conservatism and corporate governance with discussing the restatement issues. Ettredge et al. (2012) provide some examination on the above association. Their results indicate that earnings conservatism and corporate governance (the changes of different types of outside director positions) are complements and the above relationship will be strengthened with governance improvement. However, they focus on American firms, do not examine the interaction effect and ignore to examine the changes of manager positions. Ahmed and Henry (2012) indicate that firms would consider their unique governance environment to select an optimal governance structure. Due to institutional environment and unique governance features in Taiwan (Yeh and Woidtke, 2005), if Taiwanese firms involving in restatements determine to adopt particular governance improvement as the post-restatement actions, they are likely to demand less earnings conservatisms. This suggests that earnings conservatism and corporate governance may be substitutes in the setting of Taiwan. Prior research documents that firm executives often lost their jobs when financial reporting scandals explode (Chakravarthy et al., 2014; Dao et al., 2014; Rich and Zhang, 2016), showing that manager turnover is a vital outcome of governance quality in a firm (Aivazian et al., 2005). Thus, this paper further examines if restating firms choose to replace managers in the reveal of restatements, whether they would reduce the demand for earnings conservatism in the setting of Taiwan. In line with prior literature (Huang et al., 2009; Ettredge et al., 2012; Farhangdoust and Sayadi, 2020), the results of this paper indicate that restating firms report their financial statements more conservatively following restatements, suggesting that enhancing earnings conservatism is a direct way for restating firms to send messages about their efforts of improving financial reporting credibility and legitimate organizational image. Moreover, the findings further indicate that restating firms with manager replacement would be less motivated to enhance earnings conservatism. The results support that earnings conservatism and corporate governance are substitutes (LaFond and Watts, 2008; LaFond and Roychowdhury, 2008; Chi et al., 2009; Chan and Hsu, 2013).

This paper contributes to the literature and the practice in three ways. First, prior research seldom examines the association between restatements and earnings conservatism and manly examines American firms (Huang et al., 2009; Ettredge et al., 2012; Chen et al., 2014; Farhangdoust and Sayadi, 2020). Drawing from signal theory and legitimacy theory (Cho and Patten, 2007; Sanders and Boivie, 2004; Chakravarthy et al., 2014; Islam et al., 2020), this paper extends the above examination to the context of restatements in the setting of Taiwan and thus facilitates the understanding of how earnings conservatism changes following restatements in Taiwan. In consistent with prior research (Huang et al., 2009; Ettredge et al., 2012; Chen et al., 2014; Farhangdoust and Sayadi, 2020), the results of this paper indicate that earnings conservatism can capture the actions taken by restating firms to convey messages about their efforts of improving financial reporting credibility and legitimate organizational image in the reveal of restatements. The impact of restatements and the degree of adopting earnings conservatism may be different between Western countries such as America and Asian countries such as Taiwan due to different institutional backgrounds and governance strength (Yeh and Woidtke, 2005; LaFond and Watts, 2008; Lin et al., 2014). Hence, the findings of this

paper have essential implications for Taiwanese security regulators and those who are debating the value of earnings conservatism for capital markets.

Second, although many studies have paid attention to examine the relationship between earnings conservatism and corporate governance (LaFond and Watts, 2008; LaFond and Roychowdhury, 2008; Chi et al., 2009; Chan and Hsu, 2013; Beekes et al., 2004; Bushman and Piotroski, 2006; Ahmed and Duellman, 2007; Lara et al., 2007; Xia and Zhu, 2009; Yang et al., 2014), these research has mixed findings and rarely investigates restatement-related issues. Ettredge et al. (2012) examine how corporate governance affects the change of earnings conservatism following restatements. However, they do not examine the interaction effect. They only focus on four types of changes in the positions of outside directors and ignore to examine the changes of the positions of firm executives. Moreover, they focus on American firms. Compared to American firms, Taiwanese firms have more informational asymmetry problems between managers and shareholders and provide weaker investor protection (Yeh abd Woidtke, 2005). By extending and advancing past research on restatements and earnings conservatism, this paper contributes to complement previous studies arguing whether earnings conservatism and corporate governance are complements (Beekes et al., 2004; Bushman and Piotroski, 2006; Ahmed and Duellman, 2007; Lara et al., 2007; Xia ad Zhu, 2009; Yang et al., 2014) or substitutes (LaFond and Watts, 2008; LaFond and Roychowdhury, 2008; Chi et al., 2009; Chan and Hsu, 2013). The results indicate that when restating firms choose to replace firm executives following restatements, they would reduce the demand for earnings conservatism.

This paper documents that earnings conservatism may be the substitute of governance mechanisms such as manager replacement in the context of restatements in Taiwan. When Taiwanese security regulators make regulations regarding governance practices and financial reporting policies, they must think how to encourage firms to strengthen governance mechanisms and financial reporting credibility. In Taiwan, manager turnover is regarded as a vital screening standard to review firm financial statements, which is required to be disclosed on the Market Observation Post System website of the TWSE . Since 2007, Taiwanese firms have to report the information about the turnover of firm executives in the annual reports and have to depict their turnover reasons . Therefore, to some extent, the findings of this paper support the efforts made by Taiwanese security regulators to strengthen manager turnover disclosure transparency. Third, several studies indicate that Basu's (1997) contemporaneous asymmetric timeliness of earnings measure leads to biased conclusions and suggest that it is better to cumulatively estimate the traditional Basu measure over multi-year intervals (Ahmed and Duellman, 2007; Lafond and Roychowdhury, 2008; LaFond and Watts, 2008). In line with prior research, the results of this paper show that the modified Basu measure estimated cumulatively over multiple years can yield more meaningful explanations and provide a more powerful test than the traditional Basu measure. There are also several limitations in this paper. First, due to the research focus, this paper only adopts particular measures to examine conditional earnings conservatism. Future research can examine conditional earnings conservatism via other measures and examine unconditional earnings conservatism to investigate restatement-related issues. Second, this paper focuses on Taiwan and uses manager replacement to measure corporate governance. Future research can investigate other countries with unique institutional environment and adopt other governance mechanisms such as board sub-committees as the moderating factors, such as the number of audit committee members to confirm whether earnings conservatism and other governance mechanisms are also substitutes rather than complements in the context of restatements in Taiwan. Besides, as restating firms have different restatement reasons, future research can further investigate whether the reasons of restatements can affect earnings conservatism.

References

Agrawal, A., and Chadha, S. 2005. "Corporate governance and accounting scandals". *Journal of Law and Economics*, 48(2), 371-406.

Agrawal, A., and Cooper, T. 2017. "Corporate governance consequences of accounting scandals: Evidence from top management, CFO and auditor turnover". *Quarterly Journal of Finance*, 7(1), 1-41.

Ahmed, A., and Duellman, S. 2007. "Accounting conservatism and board of director characteristics: An empirical analysis". *Journal of Accounting and Economics*, 43(2-3): 411-437.

Ahmed, K., and Henry, D. 2012. "Accounting conservatism and voluntary corporate governance mechanisms by Australian firms". *Accounting and Finance*, 52, 631-662.

Aier, J. K., Comprix, J., Gunlock, M. T., and Lee, D. 2005. "The financial expertise of CFOs and accounting restatements". *Accounting Horizons*, 19 (3): 123-135.

Aivazian, V. A., Ge, Y., and Qiu, J. 2005. "Corporate governance and manager turnover: An unusual social experiment". *Journal of Banking and Finance*, 29(6), 1459-1481.

Almer, E., Gramling, A. A., and Kaplan, S. E. 2008. "Impact of post-restatement actions taken by a firm on non-professional investors' credibility perceptions". *Journal of Business Ethics*, 80(1), 61-76.

Amel-Zadeh, A., and Zhang, Y. 2015. "The economic consequences of financial restatements: Evidence from the market for corporate control". *The Accounting Review*, 90(1), 1-29.

Arthaud-Day, M. L., Certo, S. T., Dalton, C. M., and Dalton, D. R. 2006. "Changing of the guard: Executive and director turnover following corporate financial restatements". *The Academy of Management Journal*, 49(6), 1119-1136.

Ball, R., and Shivakumar, L. 2005. "Earnings quality in UK private firms: Comparative and accounting: The influence of legal and political institutions". *Journal of Accounting and Economics*, 42 (1-2), 107-148.

Bardos, K. S., and Mishra, D. 2014. "Financial restatements, litigation and implied cost of equity". *Applied Financial Economics*, 24(1), 51-71.

Basu, S. B. 1997. "The conservatism principle and the asymmetric timeliness of earnings". J*ournal of Accounting and Economics*, 24(1), 3-37.

Beekes, W., Pope, P., and Young, S. 2004. "The link between earnings timeliness, earnings conservatism and board composition: Evidence from the UK". *Corporate Governance: An International Review*, 12, 47-59.

Bergh, D. D., Connelly, B. L., Ketchen, D. J., and Shannon, L. M. 2014. "Signalling theory and equilibrium in strategic management research: An assessment and a research agenda". *Journal of Management Studies*, 51(8), 1334-1360.

Biddle, G. C., Ma, M. L. Z., Song, F. M., and Basu, S. 2020. "Accounting conservatism and bankruptcy risk". *Journal of Accounting, Auditing and Finance*. https://doi.org/10.1177/0148558X20934244

Burks, J. J. 2010. "Disciplinary measures in response to restatements after Sarbanes–Oxley". *Journal of Accounting and Public Policy*, 29(3), 195-225.

Bushman, R. M., and Piotroski, J. D. 2006. "Financial reporting incentives for conservative accounting: The influence of legal and political institutions". *Journal of Accounting and Economics*, 42(1-2), 107-148.

Chakravarthy, J., deHaan, E., and Rajgopal, S. 2014. "Reputation repair after a serious restatement". *The Accounting Review*, 89(4), 1329-1363.

Chi, W., Liu, C., and Wang. T. 2009. "What affects accounting conservatism: A corporate governance perspective". *Journal of Contemporary Accounting and Economics*, 5 (1), 47-59.

Chan, A. L. C., and Hsu, A. W. H. 2013. "Corporate pyramids, conservatism and cost of debt: Evidence from Taiwan". *The International Journal of Accounting*, 48 (3), 390- 413.

Chang, H., and Choy, H. H. 2016. "The effect of the Sarbanes–Oxley Act on firm productivity. Journal of Centrum Cathedra". 9(2), 120-142.

Chen, X., Cheng, Q., and Lo, A. 2014. "Is the decline in the information content of earnings following restatements short-lived?" *The Accounting Review*, 89, 177-207.

Cheng, Q., and Farber, D. B. 2008. "Earnings restatements, changes in CEO compensation, and firm performance". *The Accounting Review*, 83(5), 1217-1250.

Cho, C., and Patten, D. M. 2007. "The role of environmental disclosures as tools of legitimacy: A research note". *Accounting, Organizations and Society*, 32(7/8), 639-647.

Collins, D., Reitenga, A. L., and Sanchez, J. M. 2008. "The impact of accounting restatements on CFO turnover and bonus compensation: Does securities litigation matter?" *Advances in Accounting*, 24(2), 162-171.

Dao, M., Huang, H. W., Chen, K. Y., and Huang, T. C. 2014. "Can management turnover restore the financial statement credibility of restating firms? Further evidence". *Journal of Business, Finance and Accounting*, 41(7-8), 893-925.

Dechow, P., Sloan, R. G., and Sweeney, A. P. 1995. "Detecting earnings management". *The Accounting Review*, 70, 193-225.

Desai, H., Hogan, C. E., and Wilkins, M.S. 2006. "The reputational penalty for aggressive accounting: Earnings restatements and management turnover". *The Accounting Review*, 81: 83-112.

Dianto, A. W., and Aswar, K. 2020. "Assessing accrual accounting implementation in Cianjur Regency: An empirical investigation". *International Journal of Business and Economic Sciences Applied Research*, 13(1), 7-13.

Duggal, R., and Cudd, M. 1993. "Successful antitakeover defenses, top management turnover and stock prices". *Managerial and Decision Economics*, 14, 509-517.

Ettredge, M., Huang, Y., and Zhang, W. 2012. "Earnings restatements and differential timeliness of accounting conservatism". *Journal of Accounting and Economics*, 53(3), 489-503.

Farhangdoust, S., and Sayadi, L. 2020. "Capturing differences in conservatism following earnings restatements: Further evidence from Tehran Stock Exchange". *Asian Journal of Accounting Research*, 5 (1), 147-173.

Francis, R. L., Olsson, P., and Schipper, K. 2004. "Cost of equity and earnings attributes". *The Accounting Review*, 79:, 967-1010.

Gomulya, D., and Boeker, W. 2014. "How firms respond to financial restatement: CEO successors and external reactions". *Academy of Management Journal*, 57(6), 1759–1785.

Hasnan, S., Razali, M., and Hussain, M. 2020. "The effect of corporate governance and firm-specific characteristics on the incidence of financial restatement". *Journal of Financial Crime*. https://doi.org/10.1108/JFC-06-2020-0103

Huang, R., Shangguan, Z., and Vasudevan, G. 2009. "Do firms become more conservative after financial restatements?" *International Journal of Accounting and Finance*, 1(4), 375-394.

Islam, M.T., Kokubu, K., and Nishitani, K. 2020. "Corporate social reporting in the banking industry of Bangladesh: A test of legitimacy theory". *Social Responsibility Journal*. https://doi.org/10.1108/SRJ-05-2019-0185

Johnstone, K. M., Ii, C., and Rupley, K. H. 2011. "Changes in corporate governance associated with the revelation of internal control material weaknesses and their subsequent remediation". *Contemporary Accounting Research*, 28(1), 331-383.

Kryzanowsk, L., and Zhang, Y. 2013. "Financial restatements and Sarbanes–Oxley: Impact on Canadian firm governance and management turnover". *Journal of Corporate Finance*, 21, 87-105.

Kravet, T., and Shevlin, T. 2010. "Accounting restatements and information risk". *Review of Accounting Studies*, 15, 264–294.

Krishnan, G. V., and Visvanathan, G. 2008. "Does the SOX definition of an accounting expert matter? "The association between audit committee directors' accounting expertise and accounting conservatism". *Contemporary Accounting Research*, 25(3), 827-857.

Kryzanowski, L., and Y. Zhang. 2013. "Financial restatements and Sarbanes–Oxley: Impact on Canadian firm governance and management turnover". *Journal of Corporate Finance*, 21, 87-105.

Lafond, R., and Watts, R. L. 2008. "The information role of conservatism". *The Accounting Review*, 83(2), 447-478.

Lafond, R., and Roychowdhury, S. 2008. "Managerial ownership and accounting conservatism". *Journal of Accounting Research*, 46(1), 101-135.

Land, J. 2010. "CEO turnover around earnings restatements and fraud". *Pacific Accounting Review*, 22(3), 180-198.

Lara, J. M. G., Osma, B. G., and Penalva, F. 2009. "Accounting conservatism and corporate governance". *Review Accounting of Studies*, 14, 161–201.

Lara, J. M. G., Beatriz, G. O., and Penalva, F. 2007. "Board of directors' characteristics and conditional accounting conservatism: Spanish evidence". *European Accounting Review*, 16(4), 727-755.

Lin, F., Wu, C. M., Fang, T. Y., and Wun, J. C. 2014. "The relations among accounting conservatism, institutional investors and earnings manipulation". *Economic Modelling*, 37, 164–174.

Ma, C. Zhang, J., and Yang, B. 2015. "Financial restatement and auditor dismissal". *Journal China Journal of Accounting Studies*, 3(3), 209-229.

Palmrose, Z., Richardson, V. J., and Scholz, S. 2004. "Determinants of market reactions to restatement announcements". *Journal of Accounting and Economics*, 37, 59-89.

Raithatha, M., and Shaw, T. S. 2019."Do family firms choose conservative accounting practices?" *The International Journal of Accounting*, 54(4), 1-44.

Rich, K.T., and Zhang, J. X. 2016. "Municipal accounting restatements and top financial manager turnover". *Journal of Public Budgeting, Accounting and Financial Management*, 28(2), 222-249.

Ruch, G. W., and Taylor, G. 2015. "Accounting conservatism: A review of the literature". *Journal of Accounting Literature*, 34, 17-38.

Sanders, W. G., and Boivie, S. 2004. "Sorting things out: Valuation of new firms in uncertain markets". *Strategic Management Journal*, 25(2), 167 − 186.

Shan, Y. G., and Taylor. D. 2014. "Theoretical perspectives on corporate social and environmental disclosure: Evidence from China". *Journal of Asia-Pacific Business*, 15(3), 260-281.

Taipei Exchange. 2007. "The basic introduction of Taiwan corporate governance systems". https://www.tpex.org.tw/web/index.php?l=zh-tw.

Taiwan Stock Exchange Corporation (TWSE). 2008. "Securities trading value percentage - types of investors". http://www.twse.com.tw.

Wang, T. S., Lin, Y.M., and Chao, C. F. 2013. "Board independence, executive compensation and restatement". *Applied Financial Economics*, 23(11), 963-975.

Wans, N. 2020. "Corporate social responsibility and market-based consequences of adverse corporate events: Evidence from restatement announcements". *Journal of Accounting, Auditing and Finance*, 35(2), 231-262.

Watts, R. L. 2003a. "Conservatism in accounting part I: Explanations and placations". *Accounting Horizons*, 17, 203-221.

Watts, R. L. 2003b." Conservatism in accounting part II: Evidences and research opportunities". *Accounting Horizons*, 17, 287-301.

Wiedman, C. I., and Hendricks, K. B. 2013. "Firm accrual quality following restatements: A signalling view". *Journal of Business, Finance and Accounting*, 40, 9-10, 1095-1125.

Xia, D., and Zhu, S. 2009. "Corporate governance and accounting conservatism in China". *China Journal of Accounting Research*, 2(2), 81-108.

Xia, B. S., Liitiäinen, E., and I. D. Beelde. 2019. "Accounting conservatism, financial reporting and stock returns". *Journal of Accounting and Management Information Systems*, 18(1), 4-24.

Xu, Y., and Zhao, L. 2016. "An investigation of financial expertise improvement among CFOs hired following restatements". *American Journal of Business*, 31(2), 50-65.

Yang, Y. J., Kweh, Q. L., and Lin, R. C. 2014. "Earnings quality of Taiwanese group firms". *Asia-Pacific Journal of Accounting and Economics*, 21 (2), 134–156.

Yeh, Y. H., and Woidtke, T. 2005. "Commitment or entrenchment? Controlling shareholders and board composition". *Journal of Banking and Finance*, 29, 1857-1885.

Zhao, Y., Bedard, J. C., and Hoitash, R. 2017. "SOX 404, auditor effort, and the prevention of financial report misstatements". *AUDITING: A Journal of Practice and Theory*, 36(4), 151-177.

Zhong, Y., and Li, W. 2017. "Accounting conservatism: A literature review". *Australian Accounting Review*, 27(2), 195-213.

R&D and human capital policies as determinant factors for a company's performance and profitability

Elena Valentina Țilică*[1]

*Department of Finance, Bucharest University of Economic Studies, Romania

ARTICLE INFO	ABSTRACT
Article History Received 25 September 2020 Accepted 8 March 2021 *JEL Classifications* *G30* **Keywords:** profitability rates; company performance; human capital; R&D expenses; CEO-chairman duality	**Purpose**: This paper investigates the impact of R&D expenses and human capital related indicators on the performance and profitability of companies from the European pharmaceutical sector. **Design/methodology/approach:** The database includes 26 listed companies from different European countries in the period 2011-2017. The study consists in a panel data analysis, using either fixed or random effects based on the results of the Hausman test. **Findings:** The results show that R&D expenses and CEO-chairman duality have a positive impact both on a company's performance and profitability and their effects can be seen starting with the year they were employed. However, a CEO change has a more pronounced impact on performance indicators which is observed starting with the year following the one it was performed. Furthermore, while pension related expenses prove to have no effect on either profitability rates or performance margins, an increase of employee productivity shows a positive impact only on the company's performance. **Research limitations/implications:** These results show that all parties interested in the development of a company and the increase of its profitability will have a tough mission when trying to find the correct policies to implement, as some that improve a firm's performance might not influence its profitability. Nonetheless, R&D related expenses could provide a solid policy for the European pharmaceutical sector as they appear to have a positive impact on both profitability and performance. However, the relative low number of companies included in the database limits the degree of generalization of the obtained results, especially considering a global perspective. Furthermore, the short analysis period could generate biased results when considering the impact of the human capital indicators on a company's results as their impact could be seen in a more prolonged time. In order to test the robustness of the findings, additional years should be included in the database, taking into consideration also non-stable periods. **Originality/value:** The paper includes a wide array of indicators (related to R&D, corporate governance and human capital, alongside the typical financial indicators) to provide a comprehensive picture of the possible determinants of a company's profitability and performance.

1. Introduction

A company's performance is a well-studied theme in financial literature as maximizing a company's profit represented the main purpose of a good financial management process, given the shareholders interest for this indicator (Dragotă et al., 2012). In time, the view expanded to include the interest of all other stakeholders: employees, customers,

suppliers, communities and governments. Because, oftentimes, these categories have different expectations, a company has difficulties pleasing all of them. Thus, the policies it implements have to be chosen carefully in order to balance all of the stakeholders' interests while also adapting to the changing demands of the economic environment.

When talking about a company's performance, financial literature has proposed several interpretations of this concept, based on the financial conditions present on the market and, also, the perspective of the different categories of investors. In the beginning, most studies defined a company's performance as its profitability, represented by its net return. However, in time, the economic environment became more complicated, and the simple fact of having a high net return became insufficient to insure the prosperous development of a company. Due to problems in, for example, cashing in their earnings from clients, the concept was updated by including, simultaneously, a high net return and a positive cash-flow.

Presumably, shareholders would be satisfied by having a high return, even though the level that is considered high enough for this indicator is somewhat subjective. However, creditors and employees are dependent on a firm's capacity to have earnings, in order to be able to pay the fees and salaries. For this reason, in financial literature, there are multiple indicators defined as related to a company's performance or profitability which take into account the different needs of the stakeholders. Moreover, in order to make these concepts less subjective (in regard to what level is considered to be good enough) and to increase their comparability, these indicators are presented as ratios.

The pivotal importance of this theme is also supported by the constant competition companies from the same sector face to attract continuous funding (either from shareholders or creditors), the best employees (in terms of both knowledge and efficiency) and a high number of customers by offering the best possible product on the market (either best quality, best price or a combination of the two). By reaching these goals, a management team would succeed in positioning the company in the forefront of the race for long-term development and profitability. The pharmaceutical sector is all the more influenced by the policies implemented to reach these goals, as their research and development (hereafter, R&D) projects need substantial financing and should be implemented constantly in order to discover new drugs or improve the existing ones.

The current paper endeavours to provide useful insights regarding the impact of certain human capital-related policies (labour-related expenses, CEO-chairman duality, the CEO change) and R&D investments on the improvement of a pharmaceutical company's performance and profitability. The results could be used by practitioners (the managerial staff) to choose the needed strategy, based on which policy is the most likely to yield the desired goal. Additionally, academics could find this paper a starting point to forecast the implications of the current healthcare crisis on the pharmaceutical sector and develop a plan for a sustainable development of the domain.

The remainder of the paper is structured as follows. Section 2 provides a brief description of the perspective given by financial literature on the three main concepts used in the analysis: firm performance and profitability, its financial determinants and the impact of human capital. Section 3 presents the database used in the analysis and the tested hypotheses, while the methodology is detailed in section 4. Section 5 depicts the results, split in three major directions: the determinants of a company's performance, the determinants of a company's profitability and the impact of human-capital related indicators' variation on performance and profitability. Section 6 provides the conclusions of the paper.

2. Review of Literature

2.1 Firm performance and profitability

There are various indicators used to study a firm's profitability, viewed in the narrow sense which can be linked, primarily to its net profit. The most commonly used in literature are: the return on assets (ROA), return on equity (ROE) or return on invested capital (ROIC). Return on equity specifically targets a shareholders' perspective by considering what they earn through the investment in this company. In a financially sound firm, this rate will be higher that ROA or ROIC because shareholders have the highest risk, so they should also register the highest return. Return on assets is the company's return obtained by using its assets. In some studies, like Deloof (2003), financial assets are removed from the value of total assets when determining ROA because these assets have little contribution to the net profit of a company, if it is not a financial institution. Return on invested capital shows the return obtained by both shareholders and creditors through their investment in the company. This rate is a weighted average between ROE and the average interest rate paid by the company to its creditors. Thus, modifying the capital structure of a company (percentage of equity and of debt) can be a method for the management to change this rate of return.

Hirshey and Wichern (1984) showed that both accounting-based and market-value indicators can be used to present a company's performance, both categories creating a consistent, but imperfect picture of the firm's situation. They suggest to use Return on Assets and Return on Equity as accounting measures of profitability. For the market-based indicators, they consider the Q ratio, which is defined as the market-value of the firm divided by the replacement cost of the tangible assets.

In order to perform a broader analysis of a company's profitability, the following four indicators can be included, alongside the previously presented ones. They are connected to the firm's performance, by showing what percentage of its main income source (total sales) transforms into a profit for the company. Return on sale (ROS or net margin)

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shows the percentage of sales that becomes net profit for the company. The operating margin (OPS) takes into account only the results linked to the company's activity (revenues and costs of doing business), not being influenced by the financing method (without the influence of paid interests). The Gross Margin excludes the impact of the taxation process, by taking into account the whole gross profit of a company. The EBITDA margin considers only the impact of the basic firm's activity, excluding the amortization, financing and taxation processes. While ROS depicts the results obtained by shareholders, the other margins offer the possibility to compare the results of companies from different countries (where the taxation level might differ), different sectors or different time periods (when the amortization and financing structure might suffer variations).

Table 1 highlights some of the most common indicators used in financial literature following the accounting-based perspective, as this is the point of view that will be used later in this paper.

Table 1. Performance or profitability indicators

Abrev.	Name	Formula	Found in studies:
ROE	Return on equity	$\dfrac{Net\ profit}{Owner's\ equity}$	Dewenter and Malatesta(2001), Pantea et al. (2014), Ibhagui and Olokoyo (2018), Padochi (2006), Duru et al. (2016), Wangari et.al (2019), Killins (2020)
ROA	Return on assets	$\dfrac{Net\ profit}{Total\ assets}$	Dewenter and Malatesta(2001), Joh(2003), Pantea et al. (2014), Duru et al. (2016), Ibhagui and Olokoyo (2018), Rodrigues and Rodrigues (2018), Pais and Gama (2015), Grau and Reig (2018), Nanda and Panda(2018), Wangari et.al (2019), Hsu et al. (2019), Killins (2020)
ROIC	Return on invested capital	$\dfrac{Net\ profit + Interest}{Invested\ capital}$	Rumpelt(1982)
ROS (NMG)	Return on sales (net margin)	$\dfrac{Net\ profit}{Sales}$	Dewenter and Malatesta (2001), Duru et al. (2016), Mun and Jang(2018), Rodrigues and Rodrigues (2018), Nanda and Panda (2018), Huang and Hou(2019)
OPS	Operating margin	$\dfrac{EBIT}{Sales}$	Rodrigues and Rodrigues (2018), Akintoye (2008)
GRMG	Gross margin	$\dfrac{Gross\ profit}{Sales}$	Yu et al. (2017), Rodrigues and Rodrigues (2018), Murimi et al. (2019)
EBMG	EBITDA margin	$\dfrac{EBITDA}{Sales}$	Rodrigues and Rodrigues (2018)

2.2 Financial determinants of firms' profitability

By considering either one or more of the indicators presented before, numerous papers have looked for possible determinants of firms' profitability as ways that could help managers insure higher profits without endangering the long-term perspectives. On one hand, different financial indicators have been studied, while, on the other hand, other factors were analyzed, like the impact of the human capital or corporate social responsibility policies. This section will focus on the first category, for which financial literature has offered numerous possibilities, linked to different aspects of a firm's activity. Table 2 presents a brief summary of the main financial indicators used for this type of analysis. Some of these indicators were included in the current paper based on the methodology presented in the next section.

Table 2. List of financial indicators studied as determinants of profitability and/or performance

Financial indicator	Formula:	Found in studies:	Found impact:
Tangible or intangible assets (% of total assets)	$\dfrac{Tang.\ or\ intang.\ assets}{Total\ assets}$	Pantea et al. (2014), Grau and Reig (2018), Hsu et al. (2019)	+
Company size	log(Total revenue)	Dewenter and Malatesta (2001), Deloof (2003), Pantea et al. (2014), Ibhagui and Olokoyo (2018), Huang and Hou(2019)	+
Company size	log(Total assets)	Dewenter and Malatesta(2001), Deloof (2003), Joh(2003), Duru et al. (2016), Hsu et al. (2019),	+

Liquidity (current ratio)	$\dfrac{\text{Current assets}}{\text{Current liabilities}}$	Rodrigues and Rodrigues (2018), Grau and Reig (2018), Nanda and Panda(2018)	+
Liquidity	$\dfrac{\text{Cash \& short term inv.}}{\text{Assets}}$	Killins (2020)	+
Leverage	$\dfrac{\text{Long term debt}}{\text{Shareholder's equity}}$	Deloof (2003), Nanda and Panda(2018)	-
Debt	$\dfrac{\text{Long term or total debt}}{\text{Total assets}}$	Duru et al. (2016), Rodrigues and Rodrigues (2018), Ibhagui and Olokoyo (2018), Hsu et al. (2019)	-
Accounts receivables (no.of days)	$\dfrac{\text{Acc. receiv.}}{\text{Total revenue}} \times 360$	Deloof (2003), Pais and Gama (2015)	-
Accounts payable (no.of days)	$\dfrac{\text{Acc. pay.}}{\text{Total revenue}} \times 360$	Deloof (2003), Pais and Gama (2015)	-

These are just a few of the studies conducted on this subject which highlights the continued interest the financial literature has shown for it, throughout a long period of time. The used approach varied between these articles, based on the perspective the author had or the data they used (e.g. Dewenter and Malatesta, 2001 wanted to observe if there are any differences between the profitability of state-owned versus private companies from around the world, while Joh, 2003 was more interested in the impact of corporate governance on companies from Korea). However, their results lead to similar conclusions: the profitability of a company is obtained by compounding the effects of different aspects of a firm's activity, like its capacity to pay her current liabilities (liquidity), her long-term financing policy (leverage), her size, the management of her current activity (accounts payable, accounts receivable)

2.3 Human capital as determinant of firms' profitability
The concept of human capital has been a concern in economic literature for a long period of time, starting with the seminal works of Adam Smith (1776), Say (1971, first published in 1821) and List (1841). In time, human capital started to be taken into consideration as an important factor influencing the productivity of people (Schultz, 1961, Becker, 1962). More recently, it has been considered as a major factor in the enhancing of workers productivity and companies performance (Lucas, 1988). A more detailed presentation on the evolution of the human capital related economic literature is provided by Teixeira (2002).

Numerous definitions have been given which highlight the perspectives that are currently or were present at the time in literature. Becker at al. (2002) consider human capital as "the productive efforts of an organization's workforce". Chen et al (2004) postulate that "no value can be generated without human capital". Micah et al. (2012) include in human capital "the energies, skills, talents and knowledge of people" who are employed in the company. These are only a few of the given definitions which show that this concept includes many different aspects and can be evaluated from different perspectives. Some of the recent findings are presented next.

Veltri and Silvestri (2011) analyzed if information related to the intellectual capital is value relevant to the company's investors. Additionally, the authors evaluated the impact of the components of intellectual capital (human capital, organizational capital and relational capital) on the firm's value. Their results showed that shareholders take into account information related to intellectual capital in their firm evaluation process. Moreover, investors consider more value relevant the human capital component, compared to the other intellectual capital components.

Lafuente and Rabetino (2011) examine certain human capital indicators (employee education, previous work experience, employment motivations and the presence of family members in the firm) and their impact on company growth. The authors decided to use employment growth as a proxy for company growth, using two methods of computing it. Their results point to a positive relation between human capital indicators and employment growth. From a similar perspective, Avdullahi and Ademi (2020) analyze Small and Medium Enterprises' (SME) growth, through their sales increase. They show that an entrepreneur's education has no significant relation to the company's growth and, moreover, a female one could have a negative impact on the SME's growth. However, they prove that firm size (through employee number) and age show a positive impact on the company.

Onkelinx et al. (2016) observed companies' investment in employee human capital by determining the company's training cost per employee and developed a model that evaluates the effect of these investments on SME's productivity. They used as a productivity proxy the level of value added per worker. Additionally, the authors linked this productivity, to the company's degree of internationalization. Their results show that SME's with a strategy of rapid internationalization need employees with high levels of education and training which would increase their overall productivity. However, in companies with a gradual internationalization labour productivity is less critical.

Detthamrong et. al (2017) analyzes the relation between corporate governance indicators and firm performance (seen as the return on equity). The human capital related indicators that are included in the study as independent variables are: board size, board independence, audit committee size, dummy for the female CEO situation and CEO-chairman duality. Results show that board size and independence and the CEO being a woman have a positive lagged influence on firm profitability. However, audit committee size and CEO-chairman duality have a negative impact on profitability. However, Duru et al. (2016) found that board independence is linked to a positive impact of CEO duality on firm performance: a higher number of independent directors can transform the negative impact of CEO duality into a positive one. Other studies showed that the impact of the CEO duality on firms' profitability can be influenced by other external factors, like information costs. Hsu et al. (2019) showed that this factor enforces the negative impact of the CEO duality.

Fedyk and Hodson (2017) investigate the impact of human capital on financial performance. They viewed human capital through the employee turnover in a company and the skills of the workers. Their results suggest that a company's future return is negatively influenced by the employee turnover. Also, their findings indicate that a larger number of employees with sales-oriented skills lead to a better firm performance that a high number of employees with administrative skills.

Bendickson and Chandler (2019) study if human capital development programs can lead to positive outcomes in a firm's activity. Their results show that improvements in a company's operational performance can be obtained through these programs, which in turn lead to higher levels of revenues and sales.

The next section provides a detailed description of the database used in the analysis. Furthermore, it presents the hypotheses tested in the paper, based on the implications of other related studies.

3. Database and tested hypotheses

This paper studies the impact of both financial indicators and the human capital involvement on a company's profitability because both factors have been proven in literature to influence a firm's results. Additionally, financial indicators can be seen as control variables which help correctly identify the impact of the human capital-related ones.

The initial database consists in the 48 listed companies from the European pharmaceutical sector from the Thomson Reuters Europe Pharmaceuticals Index. Due to data unavailability of certain indicators' values or presumed database errors (negative total assets or debt values), some companies were removed from the database. Additionally, other companies were excluded from the database because they showed no variability in the indicators related to the management team (CEO duality or changing of the CEO). However, the remaining 26 companies included in the final database cover more than 79% of the European pharmaceutical listed companies (in terms of market capitalization, as shown in Appendix 1, Table A1) . They are relatively large, ranging from a minimum of 300 to 124,000 employees and an average revenue (between 2011-2017) between 60 million euro to over 43,000 million euro. They are from different countries and branches of the sector thus providing a comprehensive overview of the European pharmaceutical environment.

The analyzed period is between 2011 and 2017, with the exception of ConvaTec Group which provided information only beginning 2013. The information was mainly provided by the Thomson Reuters Eikon database. Additional information regarding the changing of the chief executive officer (hereafter CEO) and the duality of the CEO and Chairman of Board of Directors (hereafter Chairman) was collected by hand from the internet sites of the companies.

Table 3 provides information about initial list of variables considered to be included in the analysis, which can be either dependent or independent variables. The dependent variables will be used consecutively as proxies for a company's profitability (ROE and ROIC) or a company's performance: the gross margin (hereafter GRMG), EBITDA margin (EBMG) and net margin (NMG). These indicators are calculated as previously presented in Table 1. The control variables are represented by highly known financial indicators. The current ratio is used as a liquidity proxy, for evaluating the short-term activity of the company. As a leverage proxy, either one of the three indicators was used: the assets to equity ratio (As_Eq), debt to equity ratio (D_eq) or the long-term debt as percentage of total capital (LTD_Cap). These present different perspectives of a company's financing policy.

Table 3. List of indicators included in the analysis

Indicators	Abbreviation	Used as:	Variable type
Gross Margin	GRMG	Performance proxy	Dependent variable
EBITDA Margin	EBMG		
Net Margin	NMG		
Return on equity	ROE	Profitability proxy	
Return on invested capital	ROIC		
Current Ratio	Crat	Liquidity proxy	Independent variable
Assets/Equity	As_eq	Leverage proxy	
Debt/Equity	D_eq		

% LT Debt to Total Capital	LTD_Cap		
Revenue per employee	Rev_em	Human capital productivity	
Pension expenditure/Revenue	Pens_rev	Human capital expenditure	
Administrative expenditure/Revenue	Adm_rev		
Supplemental labour expenditure/Revenue	Supl_rev		
Research and development expenditure/ Revenue	Rd_rev	Human capital innovation	
Changing of CEO, dummy variable	CEO_ch	Human capital in management	
Duality CEO - Chairman, dummy variable	Dual		

When assessing the human capital, four perspectives were taken into consideration, as shown in Table 3, starting with evaluating the productivity of the human capital employed in the company. It is determined as the average annual revenue obtained for each employee. Yu et al. (2017) show that the growth in employee productivity "accounts for a substantial portion" of the firm's growth rate, seen as an increase of sales. As firm performance should be highly connected to its sales, the first tested hypothesis is: an increase of employee productivity will lead to a higher firm's performance and profitability.

Secondly, I considered the labour related expenses of the company. This category consists of the pension expenditures (aggregating the mandatory and voluntary ones), the administrative expenditure (which include mainly the ordinary expenses with employees, but also advertising services), the labour related supplemental expenditures (that include the occasional expenses a company has related to internal and/or external training courses or other labour related enhancing activities). These categories can be seen as expenses the company is obligated to make in order to continue its normal activity. In this case, the presumed impact of the labour related expenses on firms' profitability is negative, as observed by Mun and Jang (2018) or Killins (2020). The latter also found that the relation between some determinants and firm profitability can be time-varying. That suggests that, in certain situations, these expenses could be used by the company as a signal in the relation with their employees. For example, an increase of pension expenditures could show people that their employer is interested in their future, thus increasing their loyalty. Similarly, higher administrative (wage-related) expenses could increase employee motivation and loyalty, especially in a sector with a high demand of new personnel (like the pharmaceutical one) or in a period defined by job insecurity. Higher supplemental expenditures, generated by additional training courses, could lead to a more qualified, better functioning team of employees, as concluded by Bendickson and Chandler (2019). Thus, the second tested hypothesis is: higher labour related expenses will lead to a higher firm's performance and profitability, for the analysed period.

Additionally, I included the R&D expenses. These can be seen as a control variable, as the pharmaceutical sector is one that relies primarily on constant innovation, due to the specifics of the domain. However, these expenses can also represent an investment the company makes in the development of new or improved products which, if successful, should lead to higher sales. Thus, the third tested hypothesis is: higher R&D related expenses will lead to a higher firm's performance or profitability. This is in line with the conclusions of Huang and Hou(2019) who found a direct causality from "a firm's innovative activities to firm profitability".

The fourth perspective considers the human capital activity at the management level, by observing the moment when changes were made at the executive level (the change of the CEO) or if there is a duality between CEO and Chairman of the Board (the two management positions are not held by two different people). Literature suggests that CEO changes initially reduce a firm's profitability, but, in time, the company changes significantly (Beatty and Zajac, 1987). The views regarding the impact of the CEO-chairman duality on firm performance and profitability are split. Initially, a negative impact or the absence of one was reported (Cochran et al., 1985), but in more recent years, studies showed a positive relation between them (Boyd, 1995, Erhardt et. al, 2003). However, Duru et al. (2016) showed that the CEO duality-firm performance connection is more complicated. While CEO duality has a significant negative impact on performance, it can be "positively moderated by board independence". A similar conclusion is obtained by Hsu et al. (2019) which show that the negative impact of CEO duality is present when information costs are high. The present database consists in listed pharmaceutical firms, which are presumed to have a large percentage of independent directors and a high level of transparency. For this reason, the fourth tested hypothesis is: the CEO changing and the duality of CEO-chairman have a positive impact on the firm's performance and profitability.

The next section presents the general approach of the paper. It starts with the description of the methodology employed to choose which independent variables are included simultaneously in the model, based on their correlation. It continues by presenting the general form of the model used to determine their impact on a company's performance and profitability. Because the impact of the variables could appear both simultaneous (in the same year the variables are recorded) or with a time differential (the effects appear in the following year), both models are tested.

4. Methodology

To test the previously presented hypotheses, the panel data analysis is employed.. The descriptive statistics of the dependent variables are provided below, in Table 4. All these variables are determined as percentages which explains the relative low values. The maximum values above 1 (above 100%) represent abnormal values registered by these

indicators in some special circumstances. However, they are not frequent in the sample, which can be seen in the mean and median values, however they increase the standard deviation of the indicators.

Table 4. Descriptive statistics for the dependent variables

Variable	EBMG	GRMG	NMG	ROE	ROIC
Mean	0.28	0.66	0.16	0.31	0.20
Median	0.28	0.69	0.13	0.14	0.09
Maximum	0.72	0.94	4.10	12.38	7.19
Minimum	-0.09	0.16	-0.48	-0.51	-0.36
Std. Dev.	0.11	0.14	0.34	1.05	0.63

Source: Own calculations

The fact that the dependent variables are determined as percentages creates the need for the independent variables to be calculated in a similar manner as to not obtain results which are biased by the size effect. In the case of the indicators used as proxy for liquidity and leverage, this is not a problem because they are typically calculated as percentages. However, the company's expenditure related to its human capital (pension, administrative and supplemental labour expenditure) is typically determined in million euros. To make them comparable, these indicators were reported as percentage in total revenue. The indicators CEO_Ch and Dual are two dummy variables: CEO_Ch takes the value 1 in the years when the CEO of the company was changed and 0 otherwise and Dual takes the value 0 in the years when the same person was the CEO and the Chairman of the company and 1 otherwise. All these indicators are used to test the second, third and fourth of the previously stated hypotheses.

Their descriptive statistics are presented in Table 5. For the liquidity and leverage proxies, they show that, while extremely large maximum levels can be seen (with the exception of Ltd_Cap), no negative values have been recorded. Additionally, the large values are infrequent, thus leading to reduced mean and median indicators. By looking at the CEO_Ch and Dual statistics, it can be observed that changes in management were not very frequent in the database (low values of mean and median), while a division of the CEO-Chairman positions between two people was a much more normal situation (high values of mean and median). Studying the human-capital related expenses' statistics shows that the one concerning the pension funds is extremely low compared to the other two. Furthermore, the administrative ones are higher and more stable across the database compared to the supplemental expenses which can be easily explained as the pharmaceutical sector is highly regulated one. An interesting observation is that the R&D expenses appear to be lower than the supplemental ones, suggesting that the companies from the database are more inclined to invest in their employees' continued learning process than in the development of new products.

Table 5. Descriptive statistics for the initial independent variables

Variable	Crat	As_Eq	D_Eq	Ltd_Cap	CEO_Ch
Mean	2.16	2.97	1.04	0.25	0.11
Median	1.73	1.81	0.27	0.18	0.00
Maximum	19.42	94.06	79.57	2.76	1.00
Minimum	0.51	1.06	0.00	0.00	0.00
Std. Dev.	1.85	8.07	6.18	0.34	0.31
Variable	Dual	Adm_Rev	Pens_Rev	Rd_Rev	Supl_Rev
Mean	0.61	0.31	0.01	0.11	0.16
Median	1.00	0.31	0.01	0.12	0.22
Maximum	1.00	0.69	0.03	0.38	0.54
Minimum	0.00	0.02	0.00	0.00	0.00
Std. Dev.	0.49	0.09	0.01	0.08	0.14

Source: Own calculations

The revenue per employee is initially determined in euro. In order to make it comparable to the other indicators in the database, its annual percentage variation was determined. This is used to test the first stated hypothesis and lead to a second type of analysis: observing the impact that variations of the initial human capital related variables have on the performance and profitability of a company. Their descriptive statistics are presented in Table 6. They show that the pension related expenses were relatively constant in the analyzed period, varying to only a degree of around ± 2%. The administrative and supplemental expenses were significantly more volatile and registered considerable larger increases (maximum of 45% to 50%) than decreases (minimum of -14% to -26%). R&D expenses appear to vary significantly less in the analyzed period and its increases seem lower than its decreases. The employee number seems

to be the most volatile indicator. However, its variation is larger than ±50% in only 5 cases (3 above 50%, 2 below -50%). A similar situation is seen for employee productivity, the second most volatile indicator, where it's maximum variation is above ±60%.

Table 6. Descriptive statistics for the second analysis

Variable	M_ADM	M_PENS	M_SUPL	M_REVEM	M_EMPL	M_RD
Mean	0.7%	0.0%	3.0%	3.3%	5.7%	-0.1%
Median	-0.2%	0.0%	0.0%	2.5%	1.9%	0.0%
Maximum	45.7%	1.7%	50.0%	68.1%	330.9%	13.9%
Minimum	-14.6%	-2.5%	-26.1%	-64.8%	-100.0%	-25.9%
Std. Dev.	6.6%	0.6%	11.0%	17.4%	31.2%	3.2%

Source: Own calculations

The large number of indicators which were taken into consideration for the first analysis type, especially as some of them can be considered as proxies for the same factor (e.g. leverage proxy), lead to the necessity of a basic statistical test which would show if certain indicators are correlated. In that situation, those indicators will not be included in the same equation as independent variables. Table 7 presents the correlation coefficient computed for all the indicators that could be used as dependent variables.

Table 7. Correlation coefficient matrix

	As_Eq	D_Eq	Ltd_Cap	CEO_Ch	Dual	Pens_Rev	Adm_Rev	Rev_Em	Supl_Rev	Rd_Rev
As_eq	1.00	0.97	0.38	-0.03	0.08	0.17	-0.02	-0.01	0.12	0.00
D_eq		1.00	0.55	-0.03	0.07	0.18	-0.08	-0.05	0.13	-0.05
Ltd_cap			1.00	-0.09	-0.04	0.20	-0.31	-0.12	0.13	-0.15
CEO_Ch				1.00	0.02	-0.04	0.13	0.00	-0.06	0.01
Dual					1.00	0.15	0.04	0.28	0.27	0.05
Pens_rev						1.00	-0.14	0.12	0.12	0.26
Adm_rev							1.00	-0.19	0.11	0.08
Rev_em								1.00	-0.14	0.44
Supl_rev									1.00	-0.10
Rd_rev										1.00

Source: Own calculations

As predicted, the indicators used as leverage proxies are significantly positively correlated, which means that only one of these should be used in an equation. I decided to use the leverage (D_Eq), as this is a standard indicator that shows the degree of financial autonomy of a company (the higher this indicator is, the lower the level of the financial autonomy). Also, the correlation coefficient between the revenue per employee and the R&D expenditure (as percentage of revenue) is positive and relatively high. The negative correlation coefficient between the administrative expenditure (as percentage of total revenue) and the long term debt (as percentage of total capital) is somewhat surprising, at first impression. However, it might point to the fact that when a company has a higher level of long term debt, it has to pay higher interests, so it will try to limit her administrative expenditure (which consist mainly of labour related expenditure and other general expenses).

The second analysis observes if the annual variations of the human capital related indicators have an impact on a company's performance or profitability (pension expenditure, administrative expenditure, supplemental labour expenditure, R&D expenditure - all as percentage of total revenue, the variation of the number of employees and the variation of the revenue per employee). The theoretical assumption and the underlying tested hypothesis is that an increase in employee-related expenditures would attract better trained and more involved employees which should lead to a higher company performance and profitability. Additionally, an increase in the average revenue per employee could signal an increase in employee productivity which should transform in a better working, more efficient company. Similarly, an increase in the number of employees should lead to an increase in a company's performance, provided that it employs the necessary personnel to help increase its activity. To test these hypotheses, I calculated the variations of these indicators and determined their correlation coefficients, which are presented in Table 8.

Table 8. Additional correlation coefficients

	M_ADMIN	M_PENS	M_SUP	M_REVEM	M_EMPL	M_RD
M_ADMIN	1.00	−0.04	0.40	−0.46	−0.02	0.32
M_PENS		1.00	0.02	0.04	−0.23	0.03
M_SUP			1.00	−0.22	−0.04	0.31
M_REVEM				1.00	−0.26	−0.25
M_EMPL					1.00	−0.09
M_RD						1.00

Source: Own calculations

The results show a positive, high correlation between the variation of the administrative expenses and the supplemental labour expenses, which means that, when a company has sufficient funds to increase expenditure for administrative purposes, it also invests additional sums in the training and development of its labour-related human capital (supplemental labour related expenses). Also, there is a high negative correlation between the variation of the administrative expenses and the revenue per employee. which suggests that if a company increases their administrative expenses, its employees' performance decreases. Additionally, a high positive correlation can be observed between R&D expenditures and the administrative and supplemental expenses, respectively. This outcome is to be expected because the pharmaceutical sector is one which is highly dependent on R&D projects.

Taking into account the results previously obtained, by using in a single equation only indicators with a low correlation coefficient, I use consecutively as dependent variables the 5 proxies for profitability (ROE and ROIC) and for performance (GMG, EBMG, NMG). Initially, for each of them, I considered as possible explanatory factors: the current ratio, the leverage, the 2 dummy variables related to the human capital in managerial positions and the human capital related expenses (as percentage of total revenue): pension, administrative, supplemental labour and R&D. Consequently, in the second analysis, the modification of these human capital related expenses and the variation of the human capital productivity have been included as possible determinants of the 5 dependent variables. For each of these, the equations are constructed as shown in equation(1):

$$Y_{i,t} = c + \sum_{i=1}^{n} \sum_{j=1}^{S} \sum_{t=1}^{T} \alpha_{i,j,t} \times X_{i,j,t} + \varepsilon_{i,t} \, (1)$$

Where $Y_{i,t}$ is the dependent variable for company i in the moment t, c is a constant, $\alpha_{i,j,t}$ is the coefficient that is determined in the regression, $X_{i,j,t}$ is the independent variable j for company i in the moment t

The model was constructed using either fixed or random effects, based on the results of the Hausman test.

If the coefficient for an independent variable is statistically significant, then that variable has an impact on a company's performance or profitability. The sign of the coefficient (positive or negative) shows the relation between the variables: direct or inverse, while the magnitude of the coefficient shows how important is the impact of the independent variable.

5. Results

This section presents the empirical findings and interpretations of the research. The first subsection includes the results of the first type of analysis: the impact of the financial, R&D and human capital related indicators on a company's performance, while the second presents their impact on a company's profitability. The third subsection takes into consideration the variation of human-capital related expenses, productivity and R&D as possible determinants for both performance and profitability.

5.1 Performance analysis

The variables used as proxy for performance are: gross margin (GRMG), EBITDA margin (EBMG) and Net margin (NMG). The potential determining factors are: current ratio, leverage, duality of CEO and Chairman, changing of CEO and human capital related expenses (as percentage of total revenue): pension, administrative, supplemental labour and R&D. If the human related expenses are to be considered as investments a company makes in the development and increased loyalty of its workers than the effects could be delayed a year. Also, the changes made at a managerial level (changing of the CEO or of the Chairman, leading to a duality) need time until their effects are visible. Thus, the model is studied both with contemporaneous variables (the values of the dependent and independent variables from the same year) and with 1 lag (the values of the dependent variables are taken from the year following the values of the independent ones). The results obtained are presented in Table 9.a and b. Based on the Hausman test

results, the null hypothesis is accepted for EBMG and GRMG, meaning that the model with random effects is best. However, in the case of NMG, fixed effects are used.

Table 9. Determinants of performance indicators

	a. Simultaneous model				b. Lagged model		
Variable	EBMG	GRMG	NMG	Variable	EBMG	GRMG	NMG
c	0.4401***	0.4849***	-0.2931**	c	0.3439***	0.5858***	0.2910
CRAT	-0.0013	-0.0017	-0.0203	CRAT	-0.0018	-0.0030	-0.0125
D_EQ	0.0004	0.0001	0.0004	D_EQ	0.0000	-0.0021	-0.0131
RD_REV	-0.0672	0.4934***	6.5489***	RD_REV(-1)	0.3571**	0.3610**	1.4350
ADM_REV	-0.4585***	0.4273***	-1.2700***	ADM_REV(-1)	-0.2727**	0.1631	-0.7371
PENS_REV	-0.5766	-1.5095	-4.4592	PENS_REV(-1)	-0.2228	-1.3974	0.0496
SUPL_REV	-0.0282	0.0037	0.3662*	SUPL_REV(-1)	0.0941*	0.0183	-0.6602**
DUAL	0.0028	0.0088	0.2302**	DUAL(-1)	-0.0411*	0.0077	0.0724
CEO_CH	0.0178	0.0237	-0.1183	CEO_CH(-1)	-0.0125	0.0185	0.3924***

Source: Own calculations. ***, ** and * show a level of significance of 1%, 5% and 10%, respectively

Based on the simultaneous model, only the administrative expenses have a significant impact on EBMG. However, in the lagged model, the implications change considerably. The expenses related to R&D and supplemental labour expenses made in the previous year lead to an increase of a company's EBITDA margin. However, the administrative expenses (the day-to-day ones) do not act as an incentive for human capital, but as a normal expense. This means that an increase of these expenses will lead to a reduction of the performance. A curious result is the negative impact that the duality of the CEO and chairman has on the EBMG in the lagged model. In literature, it is considered that the existence of different people as CEO and Chairman should lead, in time, to a higher performance because the independence of the managerial team is, thus, insured.

The results for GRMG are somewhat different from the ones obtained for the EBMG. Firstly, the effect of the CEO change are not significant in either model. However, the impact of R&D expenses is positive and significant in both equations, but in the simultaneous one the impact is greater. Curiously, the administrative expenses also have a positive effect in the simultaneous model, while in the lagged one the impact becomes insignificant. The expected result would be that these expenses have a negative effect in the simultaneous model, as they are expenses which lead to a decrease of the gross return of the company, as is the case for the other two dependent variables.

In the simultaneous model, the NMG is positively influenced by the R&D expenses, the supplemental labour related expenses and the duality of the CEO and chairman and negatively influenced by the administrative expenses. Some of these results are in line with existing literature, like the impact of the administrative expenses or the duality of management. However, the positive impact the R&D and supplemental expenses show that the response to these expenses is almost instantaneous, the end performance improving rapidly. However, the impact of the supplemental labour expenses with a 1-year lag is negative. This shows that a continuous investment in supplemental expenses, like additional training on the job, might prove detrimental to the performance of the company. Additionally, in the lagged model, the variable related to the change of CEO is significant, with a positive impact, which is in line with existing literature. It might show that changes in the executive management are needed in some moments, but their effects appear after 1 year because the new management team needs time to implement their decisions.

5.2 Profitability analysis
A similar analysis is made for the profitability proxies: ROE and ROIC, and the results obtained are presented in Table 10 a. and b. They could provide certain insight in choosing the correct mix of policies that could improve a company's profitability, without affecting its performance. Hausman test showed that fixed effects are the best methodology for both ROE and ROIC, in the simultaneous and lagged models.

Table 10. Determinants for profitability indicators

a. Simultaneous model			b. Lagged model		
Variable	ROE	ROIC	Variable	ROE	ROIC
c	0.2342***	0.1293***	c	0.2800**	0.2396***
CRAT	-0.0012	-0.0037	CRAT	-0.0025	-0.0035
D_EQ	-0.0400***	-0.0126*	D_EQ	-0.0554***	-0.0147*
RD_REV	1.1106**	1.3328***	RD_REV(-1)	-0.0710	0.2668
ADM_REV	-0.6358***	-0.5430***	ADM_REV(-1)	-0.2781	-0.3841*
PENS_REV	0.7617	-0.7682	PENS_REV(-1)	4.7359	0.6141
SUPL_REV	0.0642	0.0635	SUPL_REV(-1)	-0.0090	-0.0446
DUAL	0.0981*	0.0717**	DUAL(-1)	0.0406	0.0114
CEO_CH	-0.0484	-0.0290	CEO_CH(-1)	0.0218	0.0473

Source: Own calculations. ***, ** and * show a level of significance of 1%, 5% and 10%, respectively

For the simultaneous model, four variables have a significant impact on ROE. The leverage has a negative influence on profitability, which is to be expected because it shows that the higher the level of debt in a company, the lower its profitability will be. This is an intuitive result as a higher debt implies a higher interest, which, in turn, affects the bottom line of the company. Also, a negative impact is that of the administrative expenses, which implies the same intuitive explanation. There are, also, two variables with a positive impact: the R&D expenses and the duality of the CEO and Chairman. While the latter is in line with financial literature, the former requires some further explanations. At a first glance, the R&D expenses should have, like all other expenses, also a negative impact on the net profit. However, it seems that they start some internal processes in the company which lead to an increase of the company's profit inside the same year, which is also seen in the results obtained for NMG. When the lagged model is observed, only one variable has a significant impact: the leverage, and its sign remains the same. This suggests that whatever impact the human related expenses might have, it should be seen during the year when they are made.

When considering the alternative profitability proxy, ROIC, the results show that, for the simultaneous model, the same four variables have a significant impact. However, for three of the four, the impact seems to be smaller on ROIC than on ROE, with the exception of the R&D expense which appear to have a somewhat bigger impact. When analyzing the lagged model, the impact of the leverage is still negative, but the impact is, also, smaller on ROIC than on ROE. However, an additional negative impact emerges: the one due to the administrative expenses. This suggests that an increase in these expenses from the previous year would also lead to a decrease of profitability in the current year.

5.3 Impact of variations of indicators on the performance and profitability of a company
The subsection presents the results of the second type of analysis: the impact of the variation of several human capital related indicators on the profitability or performance of a company. Because of their high correlation, some indicators were included in separate equations, thus using three different models. Equation 1 includes: the variation of employee productivity, employee number, pension expenses and R&D expenses, leaving the other two in individual equations: administrative expenses in equation 2 and supplemental expenses in equation 3. As dependent variables, all previously presented 5 indicators are used consecutively.

Similar to the previous analysis, both a contemporaneous and a lagged model was considered, as the impact of all these indicators is possible to appear in both situations. The results obtained for the two profitability proxies are presented in Table 11. a and b. Based on the Hausman test results, fixed effects should be used for ROE in all equations of the simultaneous model and in equations 2 and 3 from the lagged model and for ROIC, in equation 2 from the simultaneous model and the lagged one. The coefficients from the other equations are determined using random effects.

The results showed that neither of the six indicators has a significant effect on ROE, either in the simultaneous model or the lagged one, but the R&D expenses variation have a significant positive effect on ROIC, in the same year. Based on these findings, the variations of none of the analyzed indicators have a lagged influence on a firm's profitability. However, an increase of the R&D expenses should lead to an higher ROIC, but not ROE. Also, an increase of administrative expenses, supplemental labour-related ones or the ones to the pension funds did not influence the profitability of a firm in the year they are made, or in the following year. Similarly, neither does an increase in the number of employees or of the employees productivity.

		a. Simultaneous model				b. Lagged model	
Eq.	Variable	ROE	ROIC	Eq.	Variable	ROE	ROIC
1	C		0.2206***	0.1289***		C	0.2356***	0.1296***
	M_REVEM	0.1765	0.0751		M_REVEM(-1)	0.0346	0.0935
	M_EMPL	-0.0225	-0.0320	1	M_EMPL(-1)	-0.0647	-0.0322
	M_PENS	-0.8127	-0.5925		M_PENS(-1)	2.7980	0.7805
	M_RD	1.2603	0.9312***		M_RD(-1)	-0.0346	0.1068
2	C	0.4641**	0.2205***	2	C	0.3312***	0.2178***
	M_ADM	-0.0286	-1.0515		M_ADM(-1)	-0.1642	-1.4447
3	C	0.4650**	0.2102***	3	C	0.3333***	0.2149**
	M_SUPL	-0.0670	0.0234		M_SUPL(-1)	-0.0733	-0.1697

Source: Own calculations. ***, ** and * show a level of significance of 1%, 5% and 10%, respectively

The results obtained for the three performance proxies are presented in Table 12. a and b. Hausman test results suggested using random effects for most of the equations, with the exception of equation 1 for GRMG in both the simultaneous and lagged model and equation 2 for NMG in the simultaneous model, where fixed effects are used.

Results show that the variation of the number of employees and the pension expenditure have no impact on the EBMG in the simultaneous model. However, the increase of employee productivity should lead to a higher performance, which is consistent with financial theory. However, an increase of the R&D expenses, or the administrative ones or the supplemental ones should lead to a lower performance. Given that these expenses are compared with the EBMG from the same year, the results seem to reinforce the results obtained in the previous sub-section. When analysing the lagged model, the findings show that the same two variables also have a significant impact: employee productivity and R&D expenses. While the coefficient of employee productivity maintains the same sign as the one in the simultaneous model (positive), the one of the R&D expenses changes from negative to positive. This points out that, even though an increase of the R&D expenses will lead to a decrease of the current EBMG, it will lead to an increase of the firm's performance in the following year. This is concordant with the idea that R&D projects are employed to develop new or improved products which lead to an increase in her performance.

The same cannot be said for the increase of pension expenses and supplemental expenses, which only reduce the current EBMG, but do not influence the one from the following year. This suggests that these indicators act only as necessary expenses for the normal activity of the company, not as investments the firm makes in order to improve her performance, evaluated through EBMG. However, the previous analysis showed that supplemental expenses have a positive impact on EBMG which leads to the conclusion that, while increasing them annually (through continuous training of the same employees) will not lead to increases in performance, they are necessary in order to have a high EBMG.

Table 12. Variations of human related indicators impact on performance proxies

		a. Simultaneous model				b. Lagged model		
Eq.	Variable	EBMG	GRMG	NMG	Eq.	Variable	EBMG	GRMG	NMG
1	C	0.2779***	0.6662***	0.1718***	1	C	0.2796***	0.6677***	0.1543***
	M_REVEM	0.0767**	0.0189	0.0300		M_REVEM(-1)	0.0792***	-0.0273	0.4745**
	M_EMPL	-0.0208	-0.0655***	-0.0510		M_EMPL(-1)	0.0041	-0.0529***	0.0420
	M_PENS	-0.9444	-0.7035	-0.6836		M_PENS(-1)	-0.0779	-1.5609	0.9249
	M_RD	-0.3873**	0.1199	4.2798***		M_RD(-1)	1.1288***	0.1887	0.8277
2	C	0.2864***	0.6658***	0.1671***	2	C	0.2806***	0.6646***	0.1681***
	M_ADM	-0.4515***	0.1893***	-0.2165		M_ADM(-1)	0.0543	0.1834**	0.5922
3	C	0.2898***	0.6634***	0.1424***	3	C	0.2787***	0.6656***	0.1731***
	M_SUPL	-0.2175***	-0.0359	0.7223***		M_SUPL(-1)	0.0632	-0.0011	-0.0577

Source: Own calculations. ***, ** and * show a level of significance of 1%, 5% and 10%, respectively

Additionally, the increase of labour productivity, of the pension, R&D or supplemental labour-related expenses seem to have no impact on the GRMG. However, the increase of the number of employees has a detrimental effect on this indicator, suggesting that an increase in personnel does not lead to a similar increase of production and/or profit. Nevertheless, an increase of the administrative expenses should lead to a higher GRMG. For the lagged model, the results show that the variables with a significant impact are the same as in the simultaneous model: variation of employee number and of administrative expenses, and that their coefficients maintain the same sign, suggesting that the impact of these variables can be seen both in the current year and in the following one.

In the case of NMG, only the R&D expenses and the supplemental ones have an significant impact in the simultaneous model. Their coefficient is positive, meaning that an increase in these expenses leads to a higher firm's performance in the same year. However, the impact of the R&D expenditures is considerably higher than the supplemental ones (about 6 times higher), which is to be expected considering the importance that these projects have in the pharmaceutical sector. In the lagged model, only the variation of employee productivity has a significant impact on NMG. Its increase by 1% should lead to a higher NMG in the following year with around 0,47%. Summing up the results of both the simultaneous and lagged models for NMG, an increase in employee productivity should lead to a higher firm's performance in the following year and an increase of the R&D expenses and the supplemental expenses should also have a positive effect on the performance, but in the same year. At a first glance, this last result might seem contra intuitive due to the method of determining NMG: an increase in expenses should lead to a decrease of the net return, leading, in turn, to a lower NMG. However, these results suggest that the increase of R&D and supplemental expenses creates additional effects in a company that lead to a higher net return, thus obtaining a positive impact on NMG.

The following section sums up the results obtained in this analysis and presents some conclusions that can be made based on them.

6. Conclusion and Recommendations

This study aims to investigate the impact of several human capital related indicators and R&D expenses on the performance and profitability of listed European companies from the pharmaceutical sector. Financial literature has established that both financial policies and human capital policies should be taken into account when analyzing a company's situation because they are both major factors in determining the future development of that firm.

The company's performance was evaluated through three proxies: the net margin (NMG), the gross margin (GRMG) and the EBITDA margin (EBMG), which offer a relatively different perspective of this issue. The profitability was represented through two rates of return: return on equity (ROE) and return on invested capital (ROIC). The current ratio and the leverage were taken into account in the analysis as control variables. The human capital related indicators included in the analysis can be split into: current expenses (administrative expenses, pension related expenses, supplemental labour related expenses), management structure (CEO-chairman duality and changes of the CEO) and employee productivity (as revenue per employee). The innovation process was also taken into account, through the R&D expenses, as the studied sector is one highly dependent on such development policies. Including simultaneously all these independent variables in the analysis can be considered a contribution to the vast existing literature, as this is, as far as I know, the only paper that includes both corporate governance indicators (the ones linked to the management structure) and other human capital related indicators. This creates a more detailed picture of the influences that appear in the company through each of the studied policies and the link it develops with other internal company-specific factors.

The database includes the 48 companies from the Thomson Reuters Europe Pharmaceuticals Index, for the period 2011-2017. Missing data or incorrect values for certain indicators lead to the exclusion of some companies from the analysis. Thus, the study was conducted for 26 listed companies which represent more than 79% of the index's market capitalization. They are from different European countries and different branches of the pharmaceutical sector, thus reducing the possible biases that could influence the results.

The analysis is split in two as demanded by the specific characteristics of the variables. The first type of analysis considers the impact of the independent variables on the performance and profitability indicators. Thus, it determines the magnitude and sign of the connection and it includes all indicators with the exception of employee productivity. In the second type of analysis, the variation of the independent variables is considered, taking into account all R&D and human-related indicators, excluding the ones related to the management structure, as they are depicted as dummy variables.

The results for the first analysis concerning a company's performance show that each of the three proxies is influenced by some of the considered factors, as presented in Table 13. However, the impact can vary in sign or magnitude. For example, the R&D expenses improve the gross and net margin in the year they were made, but they influence the EBITDA margin only in the following year. This suggests that R&D investments are important in the company, regardless of the proxy used, thus confirming the third hypothesis that was tested in this paper and the existing literature (Huang and Hou, 2019).

Additionally, not all current expenses have a positive impact on performance. Pension related expenses have no significant impact (both in the simultaneous and lagged model), while administrative ones have, mainly, a negative one (with the exception of GRMG). The supplemental expenses have a positive impact on the net margin, in the

current year (and a negative one in the next), and on the EBITDA margin in the next one. This latter category seems to partially confirm the second tested hypothesis of the paper, thus creating a clear separation between itself and the pension and administrative ones. Thus, the findings of both Bendickson and Chandler (2019) and Killins (2020) are supported.

Table 13. Review of factors that influence the performance of a company

Variable	Simultaneous model				Lagged model				
	Rd_rev	Adm_rev	Supl_rev	Dual	Rd_Rev	Adm_rev	Supl_rev	Dual	CEO-chan.
EBMG		-			+	-	+	-	
GRMG	+	+			+				
NMG	+	-	+	+			-		+

Source: Own calculations. "+" represents a positive significant impact, "-" represents a negative significant impact. A blank cell represents the absence of a significant impact.

Both variables linked to management structure have a positive impact on NMG. These results are in line with some studies from financial literature and confirm the fourth hypothesis of the paper. The positive impact of the CEO-chairman duality is linked to the higher level of independency of the management (Erhardt et. al, 2003, Duru et al., 2016), meaning that their decisions are taken in the interest of the whole company, not based on the opinion of one person. The delayed impact of the CEO-change suggests that the changes made by the new management improve the firm's performance (highlighting the importance of the CEO change), but the effects appear in the following year due to the accommodation period the company needs to absorb the new policies (Beatty and Zajac, 1987).

The results obtained for the analysis on a company's profitability provide similar conclusions to the ones related to performance indicators, thus confirming (partially) the third and fourth hypothesis. The only noticeable absence is the positive and significant impact of the supplemental expenses and CEO changes. Additionally, the results show a much more coordinated impact of the analyzed indicators on both proxies, as shown in Table 14. However, the impact of the same variable seems to be marginally bigger on ROE, than on ROIC. This suggests that this rate, which is the primary focus of shareholders, can be influenced to a higher degree by the internal decisions made by the company, like the level of debt that the company should reach (evaluated through the leverage), the level of expenses the company should have to encourage the R&D activity or to repay its workers.

Table 14. Review of factors that influence the profitability of a company

Indicator	Simultaneous model				Lagged model			
	D_Eq	RD_rev	Adm_rev	Dual	D_Eq	RD_rev	Adm_rev	Dual
ROE	-	+	-	+	-			
ROIC	-	+	-	+	-		-	

Source: Own calculations. "+" represents a positive significant impact, "-" represents a negative significant impact. A blank cell represents the absence of a significant impact.

The second type of analysis shows that the variation of certain human capital related indicators have an impact on the profitability or performance of a company, as shown in Table 15. For example, the increase of R&D expenses has a positive impact on a firm's profitability, seen as ROIC, but not as its ROE. This seemingly contradicting results can be caused by the different perspectives offered by either proxy. The ROIC indicator, that considers the profitability of a company's activity, would register a positive variation as increasing R&D investments lead to the development of other products. However, the ROE indicator, which takes into consideration only the company's bottom line, does not register the same immediate result as increases in R&D expenses are usually seen by the firm's creditors as creating new risk sources which leads to an increased interest rate to its existing loans. Increases in current expenses (pension, supplemental or administrative ones) show no significant impact on a company's profitability. This suggests that, while these expenditures are needed, once they reach a certain level, they cannot be used as market signals in order to attract better, more loyal employees or improve a company's image which could, thus, lead to higher profitability.

Table 15. Review of impact of factors' variation on the profitability/performance of a company

Indicator	Simultaneous model					Lagged model				
	ROE	ROIC	EBMG	GRMG	NMG	ROE	ROIC	EBMG	GRMG	NMG
M_revem			+					+		+
M_empl				-					-	
M_RD		+	-		+			+		
M_pens										
M_adm			-						+	
M_supl			-		+					

Source: Own calculations. "+" represents a positive significant impact, "-" represents a negative significant impact. A blank cell represents the absence of a significant impact.

The company's performance is positively influenced by an increase in employee productivity, thus confirming the first hypothesis suggested in the paper. This is in line with the findings of Yu et al. (2017) which find a direct connection between employee productivity and its sales. The same results was not obtained for the gross margin, which is, however, influenced negatively by the increase of the employee number. Increases in R&D investments usually have a positive impact on a firm's performance which suggests that these projects are successful, leading to increases in the company's sales. The different impact that employee productivity and R&D expenses had on the three performance proxies could be linked to the different perspectives they offer. However, this could also be the result of the relatively low number of companies included in the database. Thus, additional research should be performed on this subject.

Increases in administrative and supplemental expenses also show a variant impact on performance proxies. The only labour related indicator that was constantly not a determinant factor for either the profitability or performance of a company from the database was the pension expense. This suggests that the situation at the end of their career is not of great importance for the personnel in this sector. Thus, a higher investment in pension funds does not attract better employees which would improve the company's performance. This conclusion is not necessarily true. Further investigation should be made, in order to observe if employees are, in fact, highly interested in their pension situation and, thus, prefer to invest on an individual level. This could explain why an increase in administrative expenses (which includes salary expenses) leads to an increase of the company's gross margin in the following year.

These results show that the managerial staff or all other interested parties will have a tough mission when trying to find the correct policies which would lead to the development of a company and the increase of its profitability. They suggest that all these fit together like puzzle pieces in forming the picture of the company and they should be seen as such. Additionally, it is very important to clearly define the desired goal, as policies that improve firm's performance might not influence its profitability (e.g. supplemental labour related expenses). However, some policies have an impact on several indicators (but not all of them), like the CEO-chairman duality which has a positive impact of firm's profitability and its performance (seen as net margin).

The low number of analyzed firms can represent a limitation of the paper, as it hinders its ability to determine conclusions which could be easily generalized to the whole pharmaceutical sector. At best, they should be considered specific to the European sector in a period of relative stable economic environment. For further research, in order to test the robustness of the current paper's conclusions, the database could be extended to include other companies, from Europe or other geographical areas. Additionally, the analysis period could be increased, in order to consider years of financial distress (e.g. the Global Financial Crisis) or of healthcare distress (e.g. the 2020 Pandemic Crisis). Thus, the impact of a non-stable economic environment could be assessed. Another possible research development consists in including other human capital related indicators in the database. For example, variables that were found, by financial literature, to mitigate the impact of the CEO-Chairman duality on a company's profitability (e.g. board independence, board size, information costs, etc.) should be included.

References

Akintoye, I., 2008, "Effect of capital structure on firms' performance: the Nigerian experience", *European Journal of Economics, Finance and Administrative sciences*, 10, pp. 233-243

Avdullahi, A. and Ademi,V.F, 2020, "The Impact of the Entrepreneur and Firm Related Factors on Small and Medium Enterprise Sales Growth", *International Journal of Business and Economic Sciences Applied Research*, 13, 1, pp. 61-68

Beatty, R. P., and Zajac, E. J., 1987,"CEO change and firm performance in large corporations: Succession effects and manager effects", *Strategic Management Journal*, 8,4, pp. 305-317

Becker, G., 1962, "Investments in human capital: a theoretical analysis", *Journal of Political Economy*, 70, pp. 9-44

Becker, B., Huselid, M.A., and Ulrich, D., 2002, "Six key principles for measuring human capital performance in your organization", available at http://mgt2.buffalo.edu/files/faculty/ohr/becker/homepage/management.html (September 2020)

Bendickson, J. and Chandler, T., 2019, "Operational performance: The mediator between human capital developmental programs and financial performance", *Journal of Business Research*, 94, pp. 162-171

Chen, J., Zhu, Z. and Xie, H., 2004, "Measuring intellectual capital: a new model and empirical study", *Journal of Intellectual Capital*, 5, pp. 195-212

Cochran, P. L, Wood, R. A. and Jones, T. B., 1985, "The Composition of Boards of Directors and Incidence of Golden Parachutes", *Academy of Management Journal*, 28, 3, pp. 664-671

Deloof, M., 2003, "Does working capital management affect profitability of Belgian firms?", *Journal of Business and Finance*, 30, pp. 573-587

Detthamrong, U., Chancharat, N. and Vithessonthi, C., 2017, "Corporate governance, capital structure and firm performance: Evidence from Thailand", *Research in International Business and Finance*, 42, pp. 689-709

Dewenter, K. and Malatesta, P., 2001, "State-Owned and Privately Owned Firms: An Empirical Analysis of Profitability, Leverage,and Labor Intensity", *The American Economic Review*, 91, 1, pp. 320-334

Dragot, V., Obreja Brasoveanu, L. and Dragot, I.-M., 2012, Management financiar. Diagnosticul financiar al companiei. *Editura Economic Publisher, second edition*, Bucharest, Romania

Duru,A., Iyengar, R. and Zampelli, E., 2016, " The dynamic relationship between CEO duality and firm performance: The moderating role of board independence", *Journal of Business Research*, 69, 10, pp. 4269-4277

Erhardt, N. L., Werbel, J. D. and Shrader, C. B., 2003, "Board of director diversity and firm financial performance", *Corporate Governance: An International Review*, 11, 2, pp. 102-11

Fedyk, A. and Hodson, J., 2017, "Trading on talent: human capital and firm performance", working paper available at scholar.harvard.edu/files/fedyk/files/humancapital_firmperformance_nov2017.pdf

Grau, A.J. and Reig, A., 2018, " Trade credit and determinants of profitability in Europe. The case of the agri-food industry", *International Business Review*, 27, 5, pp. 947-957

Hirschey, M. and Wichern, W., 1984, "Accounting and Market-Value Measures of Profitability: Consistency, Determinants, and Uses", *Journal of Business & Economic Statistics*, 2, 4, pp. 375-383

Hsu, S., Lin, S., Chen, W. and Huang, J., 2019, CEO duality, information costs, and firm performance", *North American Journal of Economics and Finance*, In press, available online 19 June 2019

Huang, C-H. and Hou, T.C-T., 2019, "Innovation, research and development, and firm profitability in Taiwan: Causality and determinants", *International Review of Economics & Finance*, 59, pp. 385-394

Ibhagui, O. and Olokoyo, F., 2018, "Leverage and firm performance: New evidence on the role of firm size", *North American Journal of Economics and Finance*, 45, pp. 57-82

Joh, S., 2003, "Corporate governance and firm profitability: evidence from Korea before the economic crisis", *Journal of Financial Economics*, 68, pp. 287–322

Killins, R., 2020, " Firm-specific, industry-specific and macroeconomic factors of life insurers' profitability: Evidence from Canada", *North American Journal of Economics and Finance*, 51, available online January 2020

Lafuente, E. and Rabetino, R., 2011, " Human capital and growth in Romanian small firms", *Journal of Small Business and Enterprise Development*, 18, 1, pp. 74–96

List, F., 1841, The national system of political economy, translated by Sampson Lloyd, Longmans, Green, and Co. Publisher, London, UK available at https://www.econlib.org/library/YPDBooks/List/lstNPE.html

Lucas, R., 1988, "On the mechanics of economic development", *Journal of Monetary Economics*, 22, pp. 3-42

Micah, L, Ofurum, C and Ihendinihu, J., 2012, "Firms financial performance and human resource accounting disclosure in Nigeria", *International Journal of Business and Management*, 7, 14, pp. 67-75

Mun, S.G. and Jang, S., 2018, "Restaurant operating expenses and their effects on profitability enhancement", *International Journal of Hospitality Management*, 71, pp 68-76

Murimi, M.M., Ombaka, B. and Muchiri, J., 2019, "Influence of strategic physical resources on performance of small and medium manufacturing enterprises in Kenya", *International Journal of Business and Economic Sciences Applied Research*, 12, 1, pp. 20-27

Nanda, S. and Panda, A. K., 2018, "The determinants of corporate profitability: an investigation of Indian manufacturing firms", *International Journal of Emerging Markets*, 13, 1, pp. 66-86

Onkelinx, J., Manolova, T. S. and Edelman, L., 2016, "The human factor: Investments in employee human capital, productivity and SME internationalization", *Journal of International Management*, 22, pp. 351-364

Pais, M. A. & Gama, P. M., 2015, "Working capital management and SMEs profitability: Portuguese evidence", *International Journal of Management Studies*, 11, 3, pp. 341-358

Pantea, M., Gligor, D. and Anis, C., 2014, "Economic determinants of Romanian firms' financial performance", *Procedia- Social and Behavioral Sciences*, 124, pp. 272-281

Rodrigues, L. & Rodrigues, L., 2018, "Economic-financial performance of the Brazilian sugarcane energy industry: An empirical evaluation using financial ratio, cluster and discriminant analysis", *Biomass and Bioenergy*, 108, pp. 289-296

Rumpelt, R. P., 1982, "Diversification strategy and profitability", *Strategic Management Journal*, 3, 4, pp. 359-369

Say, J-B, 1971, A treatise of political economy, *Augustus M. Kelley Publishers*, New York, USA

Schultz, T., 1961, "Investment in human capital", *American Economic Review*, 51, pp. 1-17

Smith, A., 1776, The wealth of nations, *Wordsworth Publishing*, New York, USA

Teixeira, A., 2002, "On the link between human capital and firm performance: A theoretical and empirical survey", working papers da FEO, no. 121

Veltri, S. and Silvestri, A., 2011, "Direct and indirect effects of human capital on firm value: evidence from Italian companies", *Journal of Human Resources Costing & Accounting*, 15, 3, pp. 232-254

Wangari, M.G, Gichuhi, D.M. and Macharia S.M., 2019, "Influence of Eomotional Intelligence on organizational performance among insurance companies in Kenya", *International Journal of Business and Economic Sciences Applied Research*, 12, 2, pp. 42-51

Yu, X., Dosi, G., Grazzi, M. and Lei, J.,2017, " Inside the virtuous circle between productivity, profitability, investment and corporate growth: An anatomy of Chinese industrialization", *Research Policy*, 46, 5, pp. 1020-1038

Appendix 1. Table A1. Companies included in the analysis

Thomson Reuters Europe Pharmaceuticals Index	Weight %	In database	No. employees (2018)	Average revenue (mil.euro)
AB Science SA	0.02	NO	-	-
Abcam PLC	0.27	YES	948	169.47
ALK-Abello A/S	0.12	NO	-	-
Almirall SA	0.08	YES	1,833	717.06
AstraZeneca PLC	9.08	NO	-	-
Bavarian Nordic A/S	0.11	NO	-	-
Bayer AG	10.21	NO	-	-
Biofrontera AG	0.02	NO	-	-
Biotest AG	0.06	NO	-	-
Boiron SA	0.07	YES	3,718	593.86
BTG PLC	0.27	YES	1,355	392.87
Camurus AB	0.02	NO	-	-
Celon Pharma SA	0.04	NO	-	-
ConvaTec Group PLC	0.43	YES	9,541	1433.48
Cosmo Pharmaceuticals NV	0.09	YES	301	60.65
DBV Technologies SA	0.14	NO	-	-
Dechra Pharmaceuticals PLC	0.34	YES	1,338	297.07
Faes Farma SA	0.12	NO	-	-
Fagron NV	0.08	NO	-	-
GlaxoSmithKline PLC	10.02	YES	98,462	32211.14
Grifols SA	1.56	YES	18,309	3259.44
Guerbet SA	0.04	NO	-	-
H Lundbeck A/S	0.44	YES	5,068	2052.34
Hikma Pharmaceuticals PLC	0.25	YES	8,521	1207.36
Indivior PLC	0.42	YES	1,012	934.27
Infant Bacterial Therapeutics AB	0.03	NO	-	-
Ipsen SA	0.62	YES	5,401	1472.13
Merck KGaA	1.32	YES	52,880	12443.29
Mithra Pharmaceuticals SA	0.05	NO	-	-
Nicox SA	0.03	NO	-	-
Novartis AG	22.21	YES	124,000	43161.29
Novo Nordisk A/S	5.88	YES	42,688	12432.14
Orexo AB	0.01	NO	-	-
Orion Oyj	0.46	YES	3,168	1006.17
Pharma Mar SA	0.04	NO	-	-
Recipharm AB (publ)	0.05	NO	-	-
Recordati Industria Chimica e Farmaceutica SpA	0.41	YES	4,176	1001.29
Richter Gedeon Vegyeszeti Gyar Nyrt	0.05	YES	12,457	1206.5
Roche Holding AG	17.57	YES	93,734	41292
Sanofi SA	8.88	YES	106,556	34296.86
Shire PLC	5.55	YES	23,044	6339.57
STADA Arzneimittel AG	0.20	YES	10,126	2026.74
Swedish Orphan Biovitrum AB	0.39	YES	850	363.2
Ucb SA	0.97	YES	7,478	3676.86
Vectura Group PLC	0.08	NO	-	-
Vifor Pharma AG	0.78	YES	2,650	8012.05
Virbac SA	0.07	NO	-	-
Wilson Therapeutics AB	0.06	NO	-	-
Total	*100.00*	*79.53*		

Source: Thomson Reuters Eikon Database

Corporate Social Responsibility, Environmental Pollution, and Stock Market Reaction

Ya-Fang Wang †

Providence University, 200, Sec. 7, Taiwan Boulevard, Shalu Dist., Taichung City 43301, Taiwan

ARTICLE INFO	ABSTRACT
             	Purpose: This paper analyzes whether and how the environmental protection concern of corporate social responsibility companies affects market participants' perceptions by examining the nature and structure of corporate social responsibility companies. **Design/methodology/approach:** I begin constructing my sample by hand-collecting data related to the material information of environmental pollution issues and the list of corporate social responsibility companies from the *Market Observation Post System*, the *Gre Tai Securities Market*, and the companies' websites. The sample period began in 2007 because it was at that time that information related to corporate social responsibility activities became available. Then, I use the multivariate regression analysis to test research questions. **Finding:** Empirical findings indicate that a statistically significant relation between material pollution concerns of corporate social responsibility companies and their subsequent negative stock performance. But, when such corporate social responsibility companies have a complete mechanism or corporate governance environment to support corporate social responsibility engagements, they are less likely to receive the subsequent negative stock performance. After considering the corporate social responsibility foundation, there is no evidence of corporate social responsibility foundation supporting to modulate the negative shock of pollution concerns. However, empirical results seem to imply that market participants give a higher tolerance for the companies with corporate social responsibility foundation, and hence give them a slight negative impact on market returns. **Research limitations/implications:** Due to the costs of hand-collection, the sample comprised 7,707 firm-year observations associated with Taiwan listed companies over the period from 2007 to 2012. **Originality/value:** From a theoretical perspective, this study provides a new perspective on the effect of corporate social responsibility concerns by examining environmental pollution cases. From a practical perspective, this study examines a rarely discussed issue on the effect of corporate social responsibility concerns and identifies a corporate social responsibility concern factor (environmental pollution) that influences market returns.

1. Introduction

In the recent decade, Corporate Social Responsibility (hereafter, CSR) has developed into a hot topic in the business environment receiving substantial attention from academics, corporations, governments and other bodies. The CSR is a complex interaction between companies and market participants, and it is also a subjective concept in which companies voluntarily integrate social, cultural and environmental concerns into their operations and into the interaction with their stakeholders (Cochran 2007; Dahlsrud 2008). The objective of CSR is fulfilling its obligation of the social and environmental responsibility, and hence, companies must comply with the CSR requirement for fulfilling the social responsibility of business and controlling the environmental pollution (Lyon and Maxwell 2008; Liu and Fong 2010). In the era of CSR, one of the crucial challenges for companies is to deal with the consequences of economic development.

Economic development brings not only economic improvement but also the pressure of environmental protection. Environmental protection is a matter of global concern and it is a crucial task for pollution preventing and controlling. Environmental pollution is one of the most crucial challenges for humans, and it has been formed the

main concerns of the global health and economic system (World Bank 2016). Although sustainable environmental development appears to have economic justification, many serious problems are the direct result of economic development. Pollution from different industrial and activities deteriorates the environmental conditions, it not only threatens the human health condition but also impairs the economic growth. In general, pollution includes air, water, and other ecological forms of pollutions that are degrading the environment and depleting the natural resources. For example, World Health Organization (hereafter, WHO) reported that air pollution is one of the biggest global economic and health concerns and the most widely ignored one, and it kills an estimated seven million people worldwide every year (WHO 2016). The research report (WHO 2018) further reveals that 90% of the world's population breathed polluted air in 2018, indicating that the air pollution is a major health problem of environmental pollution in many countries and the severity level of air pollution has attracted a lot of attention from the public.

In the era of CSR, companies require a careful consideration of how to deal with environmental pollution problems. Numerous prior studies (WHO 2006; WHO 2016; Cohen et al. 2017; WHO 2018; Liu et al. 2019) have been conducted on the effects of environmental pollution on human's health, however, no studies concerning CSR issues have attempted to explore whether and how market participants react environmental pollution. In this regard, the aim of this study is to investigate how CSR companies behave about the material information of environmental pollution (hereafter, MIEP) disclosure and how market participants react such particular type of voluntarily disclosures.

2. Related literature and research question
"*Corporate Social Responsibility is the continuing commitment by business to behave ethically and contribute to economic development while improving the quality of life of the workforce and their families as well as of the local community and society at large (Holme and Watts 2000).*"

According to the above CSR definition, companies have to ensure financial success and thus ensure that it brings a positive impact on the environment and society. In the era of CSR, the social responsibility not only plays a vital role in the business environment but also takes into consideration the relationship between business and society. Fulfilling social responsibility not only brings positive effects to the interaction of companies with the society but also bears significant cost and effort (Barnett and King 2008; Delmas and Montes-Sancho 2010; Gustafsson 2013; Dian et al. 2014). Thus, the cost-effectiveness evaluation of CSR performance also has become a subject of growing importance and debate in the social and economic development.

"*WHO shows that 9 out of 10 people breathe air containing high levels of pollutants. WHO estimates that around 7 million people die every year from exposure to polluted air (WHO 2016, 2018).*"

Environmental protection is one of the increasingly important tasks in CSR activities and communications, and it is relevant to human health. Thus, CSR companies are expected to preventing or controlling of environmental pollution to help improve environment quality. According to the WHO report (WHO 2016, 2018), environmental pollution has become one of the emerging environmental health problems over the world, and its negative effect is everywhere in the world. Hence, it is a difficult and arduous issue about how to reduce environmental pollution through CSR investments. In the era of CSR, CSR companies has faced the grand challenge that how to balance economic growth, social development, and environmental protection in their frameworks and activities.

In Taiwan, publicly listed companies must be legally required to disclose CSR reporting, and CSR reporting is driven by mandatory reporting regulations from the Taiwan Stock Exchange (hereafter, *TSE*). Mandatory CSR disclosures are more likely to become a formality or public-relation ploy. To advocate the importance of CSR and to encourage the substantive CSR activities, the Commonwealth Magazine annually selects outstanding CSR companies and confers them with the honor of CSR. An increasing number of Taiwanese listed companies start to engage in more socially responsible activities and use CSR reporting as a strategic management tool to communicate with market participants and shareholders. However, CSR-related governance mechanisms of Taiwanese listed companies are not yet well developed. In fact, most Taiwanese listed companies focus more on the framework of CSR reporting, and ignore the importance of CSR-related governance mechanism in fulfilling the CSR mission. Different from prior studies (Peloza 2006; Godfrey et al. 2009; Deng et al. 2013; Flammer 2013; Christensen 2016; Wans 2017; Lins et al. 2017; Bartov et al. 2021) which discussed the association between market reaction and CSR reporting from a disclosure perspective, this study considers a detailed discussion about the CSR-related governance mechanism to examine its impact on the economic consequences of CSR concern cases.

This raise a question that as to how are CSR companies viewing and dealing with environmental pollution problems? Whether are they voluntarily disclosing the material information of environmental pollution to the public? Whether and how are market participants reacting such material information of environmental pollution disclosures?

3. Sample distribution
I begin constructing my sample by hand-collecting data related to the material information of environmental pollution issues and the list of CSR companies from the *Market Observation Post System* (hereafter, *MOPS*), the *Gre Tai Securities Market* (hereafter, *GTSM*), and the companies' websites. The sample period began in 2007 because it was at that time that information related to CSR activities became available. Due to the costs of hand-collection, the sample

comprised 7,707 firm-year observations associated with Taiwan listed companies over the period from 2007 to 2012. Company level data is obtained from the *Taiwan Economic Journal* (hereafter, *TEJ*) database.

Table 1 shows sample distribution by CSR activity status and environmental protection status. This table shows that 377 observations issued material information of environmental pollution (which account for 4.89% of the final sample), and 330 out of 337 are CSR observations (which account for 4.28% of the final sample). This result seems to be inconsistent with the argument that MIEP issued is less likely to be associated with CSR companies. A possible reason underlying this finding is that CSR companies take a proactive stance to fulfill their social responsibility behavior and minimize CSR risk. In the next section, this study will use multivariate analyses to explore this issue.

Table 1: Distribution CSR[a] and MIEP[b]

	Non-CSR Obs.	CSR Obs.	Total
Non-MIEP Obs.	1,040 (13.49%)	6,290 (81.61%)	7,330 (95.11%)
MIEP Obs.	47 (0.61%)	330 (4.28%)	377 (4.89%)
Total	1,087 (14.10%)	6,620 (85.90%)	7,707

[a] CSR denotes companies engage in socially responsible activities relating to environmental, social, and governance issues.
[b] MIEP denotes companies issue material information of environmental pollution.

Table 2 provides the sample distribution by year based on company's material information of environmental protection status. Over the sample period, there is a faster growth in number of MIEP in 2011. The underlying this finding is possible that Taiwan enacted the Air Pollution Control Act in 2011 for environmental protection and sustainability. To minimize the potentially CSR risk, this Act may prompt companies to voluntarily disclose MIEP.

Table 2: Distribution of MIEP[a] Obs. by Year

Year	Number of Observations	Percent of Sample
2007	44	11.67
2008	51	13.53
2009	56	14.85
2010	66	17.51
2011	92	24.40
2012	68	18.04
Total	377	100

[a] MIEP denotes companies issue material information of environmental pollution.

As shown in Table 3, the sample distribution of MIEP issued was across a broad range of industries. Table 3 shows that electronics industries have the largest number of observations with 141 observations and about 37.40% of the MIEP sample. Chemicals and electric & machinery industries also have the high percentages of observations in the MIEP sample (19.10% and 17.24%, respectively).

Table 3: Distribution of MIEP[a] Obs. by Industry

Industry	Number of Observations	Percent of Sample
Foods	19	5.04
Plastics	18	4.77
Textiles	19	5.04
Electric & Machinery	65	17.24
Chemicals	72	19.10
Cement	15	3.98
Oil & Gas	2	0.53
Electronics	141	37.40
Constructions	9	2.39
Transportations	7	1.86
Tourism	1	0.27
Wholesale & Retail	3	0.80
Others	6	1.59
Total	377	100

[a] MIEP denotes companies issue material information of environmental pollution.

Figure 1 illustrates and compares the performance of different company types (CSR, CSR&MIEP, and CSR&Non-MIEP). Figure 1 shows that the positive cumulative returns for the CSR&MIEP group is relatively low in

comparison to the CSR&Non-MIEP group. Moreover, the negative cumulative returns for the CSR&MIEP group is relatively less losses in comparison to the CSR&Non-MIEP group.
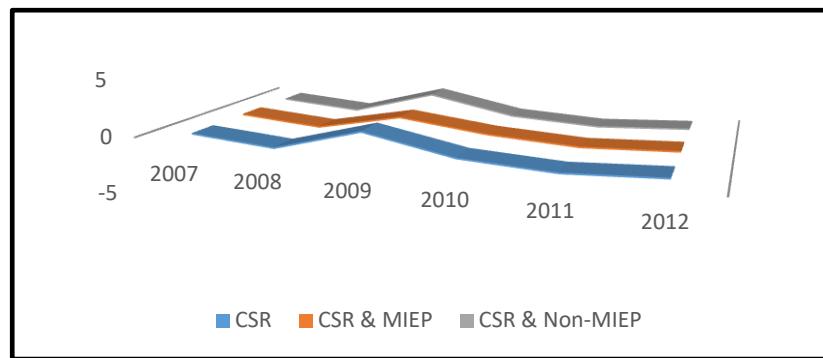

Figure 1: The CSR, CSR&MIEP, and CSR&Non-MIEP Return

4. Results

In each of primary research settings, I estimate the following ordinary least squares (OLS) regression to test research questions:

$$Return_{it} = \beta_0 + \beta_1 CSR_{it} + \sum OLS\ Controls_{it} + \varepsilon_{it}. \quad (1)$$
$$Return_{it} = \beta_0 + \beta_1 MIEP_{it} + \sum OLS\ Controls_{it} + \varepsilon_{it}. \quad (2)$$

In Equations (1) and (2), the dependent variable, *Return*, is market returns. The test variable of Equation (1), *CSR*, which is a dummy variable equal to 1 if companies engage in socially responsible activities relating to environmental, social, and governance issues; otherwise 0. The test variable of Equation (1), *MIEP*, which is a dummy variable equal to 1 if companies issue material information of environmental pollution, otherwise 0.

Table 4 reports empirical results on the relationship among environmental pollution, corporate social responsibility, and stock market reaction. As shown in Column (1), the coefficient of *CSR* is positively significant ($p < 0.01$), indicating that companies practicing CSR activities are more likely to have high stock market return. Next, this study examines the effects of material information of environmental pollution associated with corporate social responsibility on the stock market reaction. This study further partitions research sample into two groups based on the CSR activity status: companies engaged in CSR activities (n = 6,620), and companies not engaged in CSR activities (n = 1,087). As shown in Columns (2) and (3), the coefficient of *CSR* is only significant and negative ($p < 0.05$) in Column (3), whereas it is insignificant in Column (2). These results indicate that a statistically significant relation between material CSR concerns and subsequent negative stock performance in the CSR sample. This clearly implies that unfavorable stock performance likely reflects market participants' concerns of CSR engagements. Additionally, the adjusted R^2 in Column (1) is equal to 10.16%, suggesting that approximately 10.16% of the variation in market returns is explained. When I partition the sample into two groups based on whether companies engage in CSR activities, the adjusted R^2 is substantially increased in both CSR companies (48.08%) and Non-CSR companies (40.86%).

Table 4: The Association among MIEP[a], CSR[b], and Return

Variables[c]	Pred. Sign	(1) All Obs. Coef.	(1) All Obs. *t*-value[d]	(2) Non-CSR Obs. Coef.	(2) Non-CSR Obs. *t*-value	(3) CSR Obs. Coef.	(3) CSR Obs. *t*-value
CONSTANT		-2.8996	-7.68***	0.1786	1.45	0.0485	0.90
CSR	+	0.3232	3.90***				
MIEP	–			-0.0227	-0.30	-0.0558	-2.01**
YEAR		Included		Included		Included	
IND		Included		Included		Included	
Adj. R^2		10.16%		40.86%		48.08%	
N		7,707		1,087		6,620	

[a] MIEP denotes companies issue material information of environmental pollution.
[b] CSR denotes companies engage in socially responsible activities relating to environmental, social, and governance issues.
[c] The definition of the variables reported in this table are: *RETURN* = cumulative returns; *CSR* = 1 if the company engaged in socially responsible activities relating to environmental, social, and governance issues, otherwise 0; *MIEP* = 1 if the company issued material information of environmental pollution, otherwise 0; *YEAR* = fiscal year dummies; *IND* = dummy variables controlling for industries.
[d] Asterisks*,**,***indicate significance at the 0.10, 0.05,and 0.01 levels, respectively. One-tailed for directional expectations, and two-tailed for others.

CSR engagements need a complete mechanism in promoting the CSR activity and improving the CSR performance. Therefore, the organizational structure of CSR plays a significant role in performing the key responsibilities. This study further focuses on the organizational structure of CSR and investigates how market participants react CSR

concerns about the material information of environmental pollution. Focusing on the CSR samples (companies engaged in CSR activities, n = 6,620), Table 5 partitions the CSR samples into two groups and re-run the main regression analysis: CSR companies with a complete organizational system for CSR implementation (n = 1,989), and CSR companies without a complete organizational system for CSR implementation (n = 4,631). As shown in Columns (1) and (2), the coefficient of *MIEP* is only significant and negative ($p < 0.05$) in Column (1), whereas it is insignificant in Column (2). The empirical results reveal that CSR companies with the material information of environmental pollution are less likely to receive the subsequent negative stock performance, particularly when they have a complete mechanism to support CSR engagements. According these results, market participants seem to perceive the function of complete mechanism as a mediator role in modulating the CSR effectiveness and risks. The adjusted R^2 is very high at least at 40% in both CSRORG and Non-CSRORG groups implying that *MIEP* explains a significant portion of the variability of market returns, no matter whether these CSR companies have a complete organizational system.

Table 5: MIEP[a] and Return: Considering the Organizational Structure of CSR[b]

Variables[d]	Pred. Sign	(1) Non-CSRORG Obs.		(2) CSRORG[c] Obs.	
		Coef.	*t*-value[e]	Coef.	*t*-value
CONSTANT		0.0191	0.28	0.1181	1.28
MIEP	–	-0.0639	-1.85**	-0.0551	-1.18
YEAR		Included		Included	
IND		Included		Included	
Adj. R²		49.98%		42.72%	
N		4,631		1,989	

[a] MIEP denotes companies issue material information of environmental pollution.
[b] CSR denotes companies engage in socially responsible activities relating to environmental, social, and governance issues.
[c] CSRORG denotes CSR companies constructed a complete organizational system for CSR implementation.
[d] The definition of the variables reported in this table are: *RETURN* = cumulative returns; *CSR* = 1 if the company engaged in socially responsible activities relating to environmental, social, and governance issues, otherwise 0; *MIEP* = 1 if the company issued material information of environmental pollution, otherwise 0; *YEAR* = fiscal year dummies; *IND* = dummy variables controlling for industries.
[e] Asterisks*,**,***indicate significance at the 0.10, 0.05,and 0.01 levels, respectively. One-tailed for directional expectations, and two-tailed for others.

Corporate governance plays a positive and responsible role in determining the direction, control, and accountability of CSR engagements. This study further focuses on the corporate governance system of CSR and investigates whether and how corporate governance environment relates to CSR performance. Focusing on the CSR samples (companies engaged in CSR activities, n = 6,620), Table 6 partitions the CSR samples into two groups and re-run the main regression analysis: CSR companies with a comprehensive governance system for CSR implementation (n = 1,193), and CSR companies without a comprehensive governance system for CSR implementation (n = 5,427). As shown in Columns (1) and (2), the coefficient of *MIEP* is only significant and negative ($p < 0.05$) in Column (1), whereas it is insignificant in Column (2). The empirical results indicate a significant difference between the market reaction to CSR companies with and without the corporate governance system when CSR companies release the material information of environmental pollution. These results indicate that the governance environment of CSR matters, and thus reduce the impact of the negative shock. Empirical results also imply that market participants view a complete governance system can help CSR companies to appropriately deal with environmental protection problems, and thus, this study finds no evidence of a negative market reaction to such CSR companies. Table 6 should also be noted that the adjusted R^2 is high in both CSRCG and Non-CSRCG groups (35.80% and 50.14%, respectively).

Table 6: MIEP[a] and Return: Considering the Corporate Governance System of CSR[b]

Variables[d]	Pred. Sign	(1) Non-CSRCG Obs.		(2) CSRCG[c] Obs.	
		Coef.	*t*-value[e]	Coef.	*t*-value
CONSTANT		0.0690	1.04	0.0354	0.51
MIEP	–	-0.0561	-1.81**	-0.0267	-0.46
YEAR		Included		Included	
IND		Included		Included	
Adj. R²		50.14%		35.80%	
N		5,427		1,193	

[a] MIEP denotes companies issue material information of environmental pollution.
[b] CSR denotes companies engage in socially responsible activities relating to environmental, social, and governance issues.

c CSRCG denotes CSR companies developed a comprehensive governance mechanism in CSR system to implement CSR activities.

d The definition of the variables reported in this table are: *RETURN* = cumulative returns; *CSR* = 1 if the company engaged in socially responsible activities relating to environmental, social, and governance issues, otherwise 0; *MIEP* = 1 if the company issued material information of environmental pollution, otherwise 0; *YEAR* = fiscal year dummies; *IND* = dummy variables controlling for industries.

e Asterisks*,**,***indicate significance at the 0.10, 0.05,and 0.01 levels, respectively. One-tailed for directional expectations, and two-tailed for others.

CSR foundation plays a key role in providing various resources and enhancing the CSR effectiveness. To examine the relationship between the market reaction of negative shock and CSR foundation, this study focuses on the CSR samples (companies engaged in CSR activities, n = 6,620) and further partitions the CSR samples into CSRFD and Non-CSRFD groups: CSR companies with a foundation supporting CSR activities (n = 1,001), and CSR companies without a foundation supporting CSR activities (n = 5,619). As shown in Columns (1) and (2) of Table 7, the coefficients of *MIEP* are both significantly negative, indicating that market participants react unfavorably to CSR companies with the material information of environmental pollution, no matter whether they have foundation in promoting CSR practices. Notably, the coefficients of *MIEP* reported in these two columns are slightly different. The results seem to imply that market participants give a higher tolerance for the CSRFD group. Finally, I find similar results of the adjusted R² in Columns (1) (48.08%) and (2) (51.48%) when I partition my sample into two groups based on whether these CSR companies have a foundation to support CSR activities.

Table 7: MIEPᵃ and Return: Considering the CSRᵇ Foundation

Variablesᵈ	Pred. Sign	(1) Non-CSRFD Obs.		(2) CSRFDᶜ Obs.	
		Coef.	*t*-valueᵉ	Coef.	*t*-value
CONSTANT		0.0539	0.98	-0.1488	-0.73
MIEP	–	-0.05491	-1.73**	-0.0884	-1.38*
YEAR		Included		Included	
IND		Included		Included	
Adj. R²		48.08%		51.48%	
N		5,619		1,001	

a MIEP denotes companies issue material information of environmental pollution.

b CSR denotes companies engage in socially responsible activities relating to environmental, social, and governance issues.

c CSRFD denotes companies' CSR system included a foundation on the promotion of CSR activities.

d The definition of the variables reported in this table are: *RETURN* = cumulative returns; *CSR* = 1 if the company engaged in socially responsible activities relating to environmental, social, and governance issues, otherwise 0; *MIEP* = 1 if the company issued material information of environmental pollution, otherwise 0; *YEAR* = fiscal year dummies; *IND* = dummy variables controlling for industries.

e Asterisks*,**,***indicate significance at the 0.10, 0.05,and 0.01 levels, respectively. One-tailed for directional expectations, and two-tailed for others.

5. Discussion and conclusion

This paper analyzes whether and how the environmental protection concern of CSR companies affects market participants' perceptions by examining the nature and structure of CSR companies. Empirical findings indicate that a statistically significant relation between CSR companies' material pollution concerns and their subsequent negative stock performance. But, when such CSR companies have a complete mechanism or corporate governance environment to support CSR engagements, they are less likely to receive the subsequent negative stock performance. After considering the CSR foundation, there is no evidence of CSR foundation supporting to modulate the negative shock of pollution concerns. However, empirical results seem to imply that market participants give a higher tolerance for the companies with CSR foundation, and hence give them a slight negative impact on market returns.

In my view, empirical findings have a number of implications for theory and practice. From a theoretical perspective, empirical findings extend CSR-related literature in two primary ways. First, this study provides evidence that market returns reflects the expectation of market participants for the future prospects and highlight that concerns of CSR engagements play an important role in affecting the perspective of the market and shareholders. Second, empirical findings provide a new perspective on the CSR concern effects by examining environmental pollution cases and add to the CSR-related literature on the important role that the governance environment of CSR companies plays in moderating the CSR effectiveness and risks in CSR concern cases.

From a practical perspective, this study examines a rarely discussed issue on the effect of CSR concern cases and identifies a CSR concern factor (environmental pollution) that influences market returns because such concern has negative effects on market participants' wealth, profitability and future prospects. Empirical results suggest that a completely CSR-related governance mechanism plays a key component of promoting CSR practices and moderating CSR concerns. Therefore, both regulators and policy-makers could encourage companies to set CSR-related objectives

and governance mechanisms in order to provide greater transparency about CSR active information by which the market and shareholders can evaluate CSR effectiveness and influence on market returns.

References

Barnett, M. L. and A. A. King. 2008. Good fences make good neighbors: A longitudinal analysis of an industry self-regulatory institution. *Academy of Management Journal*, 51(6): 1150-1170.

Bartov, E., A. Marra, and F. Momenté. 2021. Corporate social responsibility and the market reaction to negative events: Evidence from inadvertent and fraudulent restatement announcements. *The Accounting Review*, 96(2): 81-106.

Cochran, P. L. 2007. The evolution of corporate social responsibility. *Business Horizons*, 50(6): 449-454.

Cohen, A. J., M. Brauer, R. Burnett, H. R. Anderson, J. Frostad, K. Estep, and V. Feigin. 2017. Estimates and 25-year trends of the global burden of disease attributable to ambient air pollution: an analysis of data from the Global Burden of Diseases Study 2015. *The Lancet*, 389(10082): 1907-1918.

Christensen, D. 2016. Corporate accountability reporting and high-profile misconduct. *The Accounting Review*, 91 (2): 377-399.

Dahlsrud, A. 2008. How corporate social responsibility is defined: an analysis of 37 definitions. *Corporate Social Responsibility and Environmental Management*, 15: 1-13.

Delmas, M. A. and M. J. Montes-Sancho. 2010. Voluntary agreements to improve environmental quality: Symbolic and substantive cooperation. *Strategic Management Journal*, 31(6): 575- 601.

Deng, X. J., K. Kang, and B. S. Low. 2013. Corporate social responsibility and stakeholder value maximization: Evidence from mergers. *Journal of Financial Economics*, 110(1): 87-109.

Dian, M., D. Made, S. Djumahir, and G. S. Eko. 2014. CSR effect on market and financial performance. *International Journal of Business and Management Invention*, 3(1): 56-66.

Flammer, C. 2013. Corporate social responsibility and shareholder reaction: The environmental awareness of investors. *Academy of Management Journal*, 56(3): 758-781.

Godfrey, P., C. Merrill, and J. Hansen. 2009. The relationship between corporate social responsibility and shareholder value: An empirical test of the risk management hypothesis. *Strategic Management Journal*, 30 (4): 425-445.

Gustafsson, K. 2013. H&M grabs more control of factories amid bangladesh unrest. Bloomberg, November 13.

Holme, R. and P. Watts. 2000. Corporate social responsibility: Making good business sense. World Business Council for Sustainable Development, January, 2000.

Lins, K. V., H. Servaes, and A. Tamayo. 2017. Social capital, trust, and firm performance: The value of corporate social responsibility during the financial crisis. *Journal of Finance*, 72(4): 1785-1824.

Liu, C., R. Chen, F. Sera, A. M. Vicedo-Cabrera, Y. Guo, S. Tong, and N. Valdes Ortega. 2019. Ambient particulate air pollution and daily mortality in 652 cities. *New England Journal of Medicine*, 381(8): 705-715.

Liu, H. and M. Fong. 2010. The corporate social responsibility orientation of Chinese small and medium enterprises. *Journal of Business Systems, Governance and Ethics*, 5(3): 33-50.

Lyon, T. P. and J. W. Maxwell. 2008. Corporate social responsibility and the environment: A theoretical perspective. *Review of Environmental Economics and Policy*, 1(1): 1-22.

Peloza, J. 2006. Using corporate social responsibility as insurance for financial performance. *California Management Review*, 48 (2): 52-72.

Wans, N. 2017. Corporate social responsibility and market-based consequences of adverse corporate events: Evidence from restatement announcements. *Journal of Accounting, Auditing and Finance*, 35 (2): 231-262.

World Bank. 2016. The cost of air pollution: strengthening the economic case for action. Washington: World Bank Group.

World Health Organization. 2006. Air quality guidelines: global update 2005: particulate matter, ozone, nitrogen dioxide, and sulfur dioxide.

World Health Organization. 2016. Ambient Air Pollution: A global assessment of exposure and burden of disease. WHO Press: 30-33.

World Health Organization. 2018. 9 out of 10 people worldwide breathe polluted air, but more countries are taking action. WHO, May 2, 2018.

Prize Money Earnings of Tennis Professionals and the Impact of COVID-19 Pandemic

Vladimir Šimić [†1,2]

[1] University of Split, Faculty of Economics, Business and Tourism, Cvite Fiskovića 5, 21000 Split, Croatia
[2] CERGE-EI Foundation Teaching Fellow, 110 Jabez Street #1004, Newark, NJ 07105 USA

ARTICLE INFO	ABSTRACT
	Purpose: The purpose of this study is to investigate the effects of COVID-19 pandemic on the earnings of tennis professionals. With the COVID-19 pandemic being an unmatched blow to the global economy resulting in one of the largest global recessions in recorded history, it might be expected that some sectors will be hit harder than others. Tennis world was particularly strongly hit, practically stopping for five long months. The corona year provides a unique occasion to revisit the issue of the earnings of top tennis professionals and make comparisons with the normal tennis years. The opportunity to collect the fresh data makes these comparisons interesting and timely. **Design/methodology/approach:** Using the most recent data we constructed the database on the prize money earnings of the TOP 100 tennis professionals. This allowed an investigation of the earnings of tennis professionals in general, but of particular interest in this paper was the impact of the COVID-19 pandemic on these earnings. The data collected for the pandemic year (2020) enabled a comparison with the normal years (2019 and 2018) revealing some interesting findings. The source of the data for investigation conducted in this study is the ATP (Association of Tennis Professionals) website. **Findings:** The empirical investigation conducted in this paper finds a strong negative impact of the COVID-19 pandemic on the tennis world and prize earnings of the top tennis professionals. The analysis also suggests that a decline in inequality among the top tennis professionals might be another consequence of the pandemic. **Research limitations/implications:** While the empirical investigation on the impact of the COVID-19 on the tennis world conducted in this paper provides some interesting insights, it also opens a couple of avenues for future research. It might be interesting to conduct a comprehensive study of the earnings of all tennis professionals, not just those belonging to the TOP 100 group. In addition, the associated dynamics may be interesting to explore on the women's tour and make comparisons on the differences of the effects of the pandemic across the ATP and WTA tours. Data limitations might be seen as a serious obstacle for these investigations, but the analysis in this paper provides a direction as to how these obstacles might be circumvented possibly resulting in more interesting studies to come. **Originality/value:** Many studies have investigated the economic effects of the COVID-19 pandemic. With its focus on the tennis world the present study makes a contribution to the empirical literature by filling the gap on the effects of the pandemic on the sports industry. The study also opens interesting avenues for future research, especially on the impact of the pandemic on inequality.

1. Introduction

This paper investigates the effects of COVID-19 pandemic on the earnings of tennis professionals. This is an empirical study conducted to provide an additional insight into the numerous effects of COVID-19 investigated across different

fields and activities. With the COVID-19 pandemic being an unmatched blow to the global economy resulting in one of the largest global recessions in recorded history, it might be expected that some sectors will be hit harder than others. The scary health aspects the COVID-19 brought around the world and the associated lockdowns strongly affected the tennis world practically stopping it for five long months. Even after the official tournaments resumed in August 2020, it was under very strict COVID-19 protocols and practically without audience.

The top ranked tennis players are enjoying the status of super stars earning huge money. As a theoretical background this paper takes the winner-take-all models and observes the tennis industry as a peculiar market within the business of spectacle. The corona year provides a unique opportunity to revisit the issue of the earnings of top tennis professionals and make comparisons with the normal tennis years. The chance to collect the fresh data makes these comparisons interesting and timely. This paper contributes to the empirical literature on the economic consequences of the COVID-19 pandemic by exploring the effects on the earnings of the top tennis professionals. However, it should be also noted that there emerges a large body of evidence that questions the effectiveness of lockdowns. In this context, the present study allows the comparison with the economic effects of the pandemic on other sectors.

The paper is structured as follows. Section 2 briefly outlines the effects of COVID-19 pandemic on the global economy and reviews the related literature. Empirical investigation of the TOP 100 tennis players is conducted and the main findings are reported in Section 3. Section 4 concludes.

2. Motivation and related literature

The year 2020 started as any other, cheerfully and optimistically. The tennis season starting early with the first tournaments beginning in parallel with the New Year celebrations gave shiny views on the tennis prospects for this year. The same positive tone might have been related to the global economy with expectations of strong growth for the global economy and prosperity all around the world[1]. However, soon enough the news about a strange virus occurring in China hit the headlines. Probably, with the exception of a few epidemiologists, nobody saw a big problem with it. Unfortunately, the corona virus spread really quickly around the world resulting in a pandemic that practically blocked the whole world. The COVID-19 pandemic has soon resulted in a devastating health and economic crisis making the 2020 the year of great suffering in terms of both health and people lives[2] and one of the deepest recessions of the modern global economy[3]. The health concerns with the virus spreading around the globe with deadly consequences forced the country leaders to introduce a lockdown the world has probably never seen before. This lockdown has had devastating effects on economies around the world. The recent Global Economic Prospects (2021) published by World Bank in January reports that the global economy was hit strongly in 2020 with the estimated decline in world output of 4,3 percent, with this decline unevenly distributed around the world. Advanced economies saw the real GDP decline of 5,4 percent (with the US economy shrinking 3,6 percent, that of the euro area 7,4 percent and Japan 5,3 percent). The global trade flows were also strongly disrupted with the world trade shrinking 9,5 percent in 2020. Low income countries saw a real GDP decline of 0,9 percent. China was among the rare economies that grew in 2020, at the rate of 2,0 percent.

These numbers suggest that the lockdown caused a major disruption in the world economy, but there were economic activities (industries) that were particularly severely hit[4], for example the world tourism sector. An industry closely linked to the tourism sector that might have been also strongly impacted by the COVID-19 pandemic is the sports industry[5]. The present study focuses on one part of the sport industry, the tennis world and investigates the impact of the COVID-19 pandemic using the example of the ATP (Association of Tennis Professionals) tour and the earnings of the ATP TOP 100 players and the tournaments they compete in. As one might expect the money circulating in the tennis world, one of the most popular global sports, is huge and it probably comes as no surprise that the top players earn a lot. To preview the empirical investigation coming below and to give an insight into the big earnings of the top ranked tennis players let us have a look at the prize money awarded to the players that competed in the final of the first Grand Slam of the year 2020 – Australian Open[6]. Novak Djokovic of Serbia beat Dominic Thiem of Austria to capture the title of the first Grand Slam of the year earning A$ 4.120.000, while Thiem received A$ 2.065.000. So, for just this win in the final Djokovic earned the amount of A$ 2.055.000. A player losing in the first round of this tournament was awarded the amount of A$ 90.000.

Before embarking on the empirical investigation of the earnings of the top tennis professionals and the impact of the pandemic on it in Section 3, in the remainder of this section we briefly review the related literature to help us understand the numbers that will be investigated in the empirical part of this paper.

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[1] As reported in January 2020 the global growth was projected to rise from an estimated 2,9 percent in 2019 to 3,3 percent in 2020 (IMF World Economic Outlook, January 2020).

[2] As of January 9 2021 the World Health Organization reports 87,5 million confirmed cases in the world. More scarring is the reported number of confirmed deaths amounting to 1,9 million since the outbreak of the COVID-19 pandemic.

[3] European Central Bank estimates in its recent report that the COVID-19 pandemic has caused the largest short-term decline in economic activity for centuries (ECB Economic Bulletin, 2020).

[4] As reported by Blundell et al (2020) entire sections of the economy were ordered to shut down by the government. In the UK but also in many other countries, these sectors have included all non-food, non-pharmaceutical retail, hotels and restaurants, and arts and leisure activities (including sports). The direct and immediate economic impact has thus been concentrated among workers in these shutdown sectors.

[5] Evans et al. (2020) suggest that the COVID-19 prompted an almost complete shutdown of competitive sports at both the national and global level and the cancellation of competitions has placed severe pressure on wages, prize monies and livelihoods of those linked with the sport competitions.

[6] Note that this tournament was held under normal circumstances, with no effects of the COVID-19 pandemic on the tennis world yet.

How come that tennis players earn so much money? It is not just the tennis players that earn a lot. Other popular sports also reward its top players abundantly, e.g. golf, basketball, football etc. Balliauw et al (2017) state that like other popular sports professional tennis is perceived as a lucrative profession. As reported by these authors economic explanation for the much higher income of superstars can be found in Rosen (1981), with the top tennis players, the same as the top players from other popular sports, being given the status of superstars. The underlying explanation may be briefly summarized as follows. The audience is much more interested and willing to pay to see the best players playing than the players at lower levels. This results in a bigger demand and higher earnings for the best players. On the other hand, the marginal cost of extra spectators in the stadium is negligible and this gets more pronounced with new technologies (television, internet broadcasting etc.) being available and increasing match-coverage[7]. Consequently, the top players (and top tournaments) can meet their high market demand easily resulting in relatively high prices and high revenues without much cost. While this explains nicely why the best players might be earning a lot, it can be also thought of as an explanation for weaker players earning less, which generates inequality in many professions, especially in tennis[8]. Garcia-del-Barrio and Pujol (2011) provide an alternative explanation for the high earnings in the tennis industry, which they see as a peculiar market within the business of spectacle. Tennis as a business builds upon the talent of players, whose sport performance brings forth success and sport awards. It is stressed in this study that the economic contribution of players goes far beyond their corresponding sporting achievements. This is derived from the players' media value arising from their skill and talent which is the most valuable asset and one of intangible nature. This can be also related to the concept of winner-take-all market (as proposed by Frank and Cook, 1995). This hypothesis states that the workers who are slightly better become the winner of the market, with earnings much larger than those of the losers (in magnitude much larger than the corresponding difference in productivity)[9]. In this context Dobson and Goddard (2001) also point to the skewed earnings distributions that may stem from scarcity of supply of outstanding talent, together with large audiences that they attract. Finally, as well recognized and documented by Garcia-del-Barrio and Pujol (2011) the media value of players (which is directly related with merchandizing, TV rights and other commercial sources of revenues) can be seen as a channel through which the high earnings in the most popular sports can be explained[10].

3. Empirical investigation

As outlined in Section 2 the COVID-19 pandemic has caused major problems in the world in 2020. The health issues and severe consequences the pandemic has caused are unprecedented in recent history of humankind. Strong disturbances in functioning of the global economy have additionally hurt people around the world economically. Empirical investigation in this section focuses on one of the many aspects related to economic consequences of the corona virus, in the present case it being the earnings of the top 100 tennis players in the world. The analysis that follows concentrates on the ATP (Association of Tennis Professionals) tour, the tournaments the tennis players compete in and the associated earnings from the prize money in these tournaments. The investigation will focus on the TOP 100 tennis players which may be treated as a group of the most successful tennis professionals in the world. As the collection of the data is quite cumbersome and time consuming, the decision was made to focus only on this group of players.

Given the analysis in the previous section, it should not come as a surprise to learn that the tennis world has been also strongly hit by the pandemic. The lockdown from March 2020 that was introduced in most of the countries in the world practically stopped the professional tennis activities (tournaments) around the world with the tournaments being cancelled one after another. The ATP was cancelling the tournaments until July and the tournaments started only in August under very strict rules trying to contain the spreading of the virus and practically without audience. Some tournaments were postponed and some completely cancelled, but in general it can be said that the ATP tour stopped for five long months strongly hitting the tennis world and its most important protagonists, tennis professionals. It should be noted that similar conclusions could be reached and the analysis of the same type conducted on the WTA tour (the female counterpart to the male ATP tour), but given the similar principles on which these tennis tours are organized and given the difficulty related to collection of the data, this investigation is left for some future study.

In the remainder of this section we will explain as to how the data was collected and report the main findings focusing on the earnings of the ATP TOP 100 players. This investigation will then be complemented by exploring the tournaments and the prize money awarded across different levels of tournaments.

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[7] Frick and Simmons (2007) suggest that similar to most top-tier matches in professional basketball, baseball and soccer, high-level competitions in individualistic sports, such as the top tennis tournaments attract not only thousands of spectators, but also a TV audience of millions of fans.

[8] Balliauw et al (2017) find that although the earnings in the tennis world are high, this particularly applying to the top ranked players, it is difficult for players with a ranking below 250 to cover their expenses.

[9] Ivankovic (2007) observes that by applying the tournament model similar principles can be detected on which the earnings of the top sportsmen and the top managers are determined. Citing Dye (1984) Ivankovic (2007) gives an example where the difference between the chief executive salary and the salary of a vice president is extensive, or put differently, the difference in the pay of chief executives and their immediate subordinates seems to be greater than the difference in their abilities or outputs, suggesting that the chief executives are the winners of the contest.

[10] Koronios et al. (2016) provide additional evidence on importance of sports sponsorship in a sport team context focusing on basketball. They report that sponsorship has gathered exceptional funding in recent decades creating business-to-business relationships with sports teams leading to creation of sources of revenues for all parties involved.

3.1. Collection of data

The source of data for the empirical analysis conducted in this study is the ATP website (https://www.atptour.com/en/) which makes the earnings of the tennis professionals publicly available. It should be said immediately that these are the earnings from the prize money from tournaments at which tennis professionals compete and have nothing to do with the amounts the tennis players earn from lucrative contracts which they have with manufacturers of tennis equipment, clothing, commercials and so on. According to Forbes (see https://www.forbes.com/athletes/#2113b4d655ae) Roger Federer is the best paid athlete in the world. Forbes thus estimates that Roger Federer as one of the top tennis players earned from prize money in tournaments 6,3 million US $ in 2019, but in the same year his earnings from endorsements amounted to additional 100 million US $. However, as these additional earnings are not reported and cannot be accessed publicly (with only a few exceptions including Roger Federer, Novak Djokovic and Rafael Nadal), we focus in our analysis on the earnings from prize money. In addition, the data that are reported by the ATP tour are the gross earnings and the net earnings will naturally depend on the residence of the tennis player and the tax treatment of the country in question.

This data can be accessed by opening the publicly available profile of a tennis player at the ATP tour website and then under a player's activity collecting the earnings year by year. To give an example we may mention the profile of the No. 1 in the world Novak Djokovic (see https://www.atptour.com/en/players/novak-djokovic/d643/overview). His career earnings at the end of 2020 amounted to US $ 145.656.177 (145 million US $). By additionally exploring his activity, we can access his earnings per year. Thus, his earnings from prize money were 6,4 million US $ in 2020, whilst in 2019 his prize money earnings amounted to 11,5 million US $. We can investigate other years as well, but we are primarily interested in the years 2019 and 2020 to see the impact of COVID-19 on the earnings of tennis professionals. In the case of the world No. 1 this amounts to a drop of huge 44 percent. The same procedure is then applied for other ATP TOP 100 players and the database formed (constructed). The investigation of the collected database is conducted alongside different criteria (different groupings of tennis players: TOP 100, TOP50, TOP20, TOP10, those ranked 11-20, those ranked 21-30 etc.; total and average earnings of these groups across different years in US $; percentage changes in 2020 in comparison to 2019). The results of this investigation are reported below.

3.2. Results – prize money earnings

In this subsection we report the results of our empirical investigation. In the graphs to follow we report the earnings of different groupings of tennis professionals.

Figure 1 – Prize money earnings (in US $)
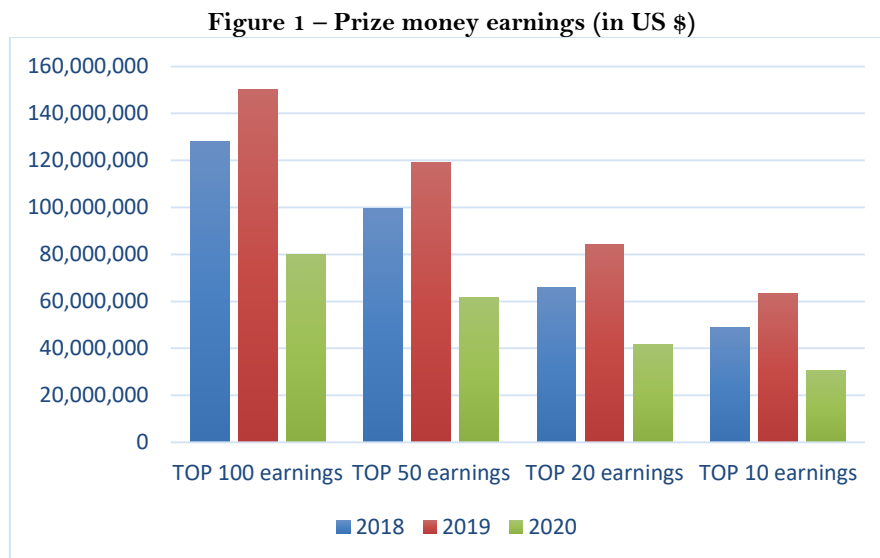
Source: ATP (https://www.atptour com/en/) and author's calculations

The data in Figure 1 offer some striking findings concerning the impact of COVID-19 on tennis world. While we can see a big increase in earnings in 2019 compared to 2018 (from 127 million US $ to 150 million US $ in a group consisting of the players which were the TOP 100 at the end of 2020), we can see a huge drop in 2020 in comparison to 2019, from 150 million to 80 million US $ or in percentage terms, a drop of 46 percent. It appears that the same general trends can be also observed in the TOP 50, TOP 20 and TOP 10 groups. We also report the average earnings (earnings per player) across these groups (Figure 2).

Figure 2 – Prize money earnings per player (in US $)
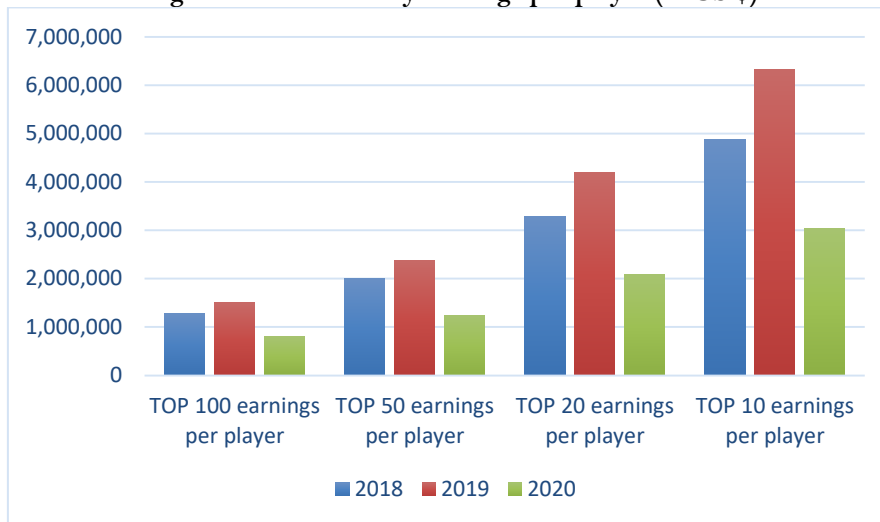
Source: ATP (https://www.atptour com/en/) and author's calculations

In Figure 2 we can see that, as expected, the same general developments can be noticed over the years as in total earnings, with an increase from 2018 to 2019, and then a huge drop in 2020. From this figure it can be also seen that earnings from the prize money per player are at a high level, this especially being the case in the TOP 10 group where the earnings per player in 2019 were 6,3 million US $, dropping to the 3,03 million in 2020. These are, of course, high numbers but it should be kept on mind that these are the best tennis athletes in the world and the demand for their services (ability to play tennis) is quite strong. The earnings per player are lower with lower ranked groups (TOP 20, TOP 50, TOP 100) and this is nicely observed in Figure 2. We also calculated the ratio of the TOP 10 earnings in comparison with the average earnings from the groups of lower ranked players (those ranked 11-12 – group named R11-20, then R21-30, R31-40, R41-50, R51-100, respectively).

Figure 3 – Ratio of TOP 10 earnings to earnings in lower ranked groups
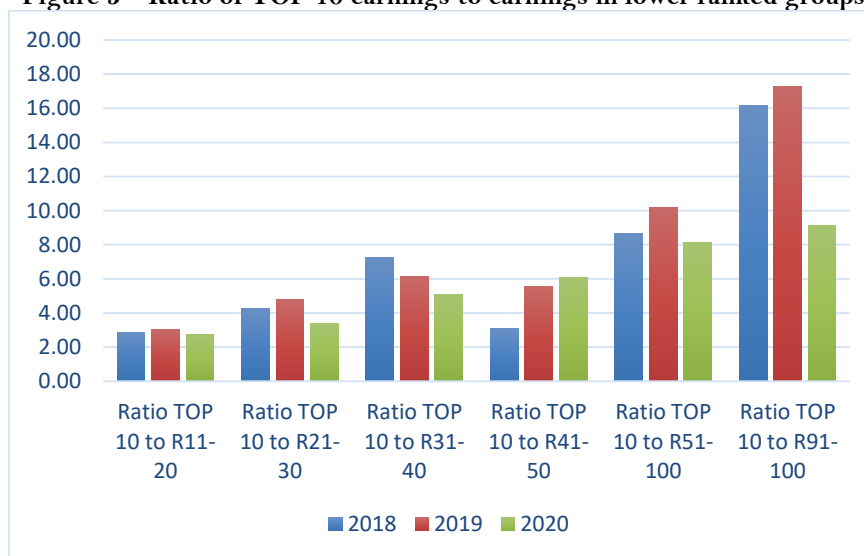
Source: ATP (https://www.atptour com/en/) and author's calculations

Earnings per player reported earlier suggested that there exist strong differences between the groups, or in other words there exists a strong inequality in earnings present in the tennis world. This can be neatly seen in Figure 3 where we report the ratio of the earnings of a player belonging to the TOP 10 group compared to the earnings of a player belonging to lower ranked groups. Thus, it appears that this ratio is above 2 if we compare the earnings from TOP 10 group and the R11-20 group (players ranked 11-20), meaning that they earn twice as much as the players from the lower ranked group. The biggest ratio is above 17 between the TOP 10 and R91-100 groups in 2019. Although not of this magnitude, similar differences can be observed in other groups as well. All this suggests that there exist large inequalities in earnings from prize money in the tennis world. However, despite the downward trend in the earnings in the pandemic year, as detected earlier, we can additionally observe from Figure 2 that this drop in earnings was not of the same magnitude in all groups that we have had an opportunity to investigate, with the pandemic year resulting in a strong decline in inequality. From the data in Figure 3 we can see that the inequalities

across different groups increased from 2018 to 2019, but in 2020 we can notice a general decrease in the calculated ratios. This particularly applies to the ratios related to earnings of lower ranked players. Some observers might see this as a positive development and optimistically conclude this is a good consequence of the COVID-19 pandemic resulting in less inequality[11]. At any rate this is an interesting avenue for future research begging comprehensive study providing comparisons across different sectors/activities.

In order to shed further light on these developments the investigation of the changes in the earnings of players in different groups may be helpful. Thus, we calculated these changes in 2020 in comparison to 2019 and the associated percentage changes are reported below in Figure 4.

Figure 4 – Percentage changes in earnings in different groups (2020 over 2019)
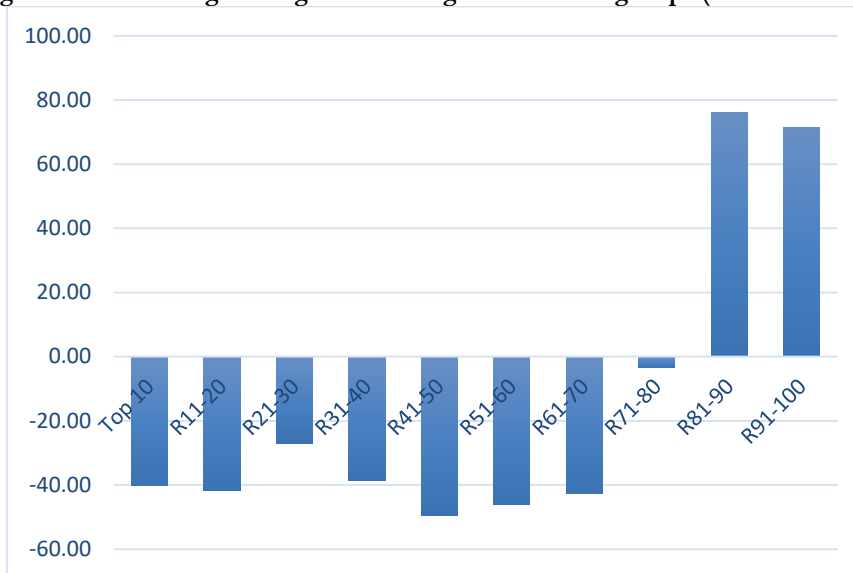
Source: ATP (https://www.atptour com/en/) and author's calculations

Before commenting on the data presented in Figure 4, let us briefly note that the change in earnings in a specific group is the average change of earnings of players belonging to that group. Namely, we calculated the percentage change for each player belonging to the TOP 100 ranking at the end of 2020, and then averaged these percentage changes across different groups. The data reported in Figure 4 is rather interesting and helps us understand the drop in inequality reported earlier. Although the drop in earnings detected in our earlier investigation might not be coming as a surprise, it is still quite a big one amounting on average to some 40 percent. However, it might be surprising to notice that with lower ranking the drop in earnings decreases, and in the two lowest ranked groups the earnings of players belonging to these groups at the end of 2020 appear to have increased. This indeed helps explain the spotted decline in inequality of earnings coming with the COVID-19 pandemic. The reasons for these differences and developments are further explored in the following subsection in which we investigate as to how the pandemic affected the ATP tour by analyzing the number of tournaments and the changes in the specific tournaments that were held both in 2019 and 2020.

3.3. The number of tournaments and prize money on the ATP tour – 2019 vs. 2020
As seen in previous sections COVID-19 pandemic has strongly affected most of the economic activities, with the tennis world being hit pretty strongly. As shown above the earnings of the top tennis players have declined sharply. We have already linked this decline to the lockdown imposed on most of the world economies. In addition to what was already investigated, in this subsection we analyze further the impact of COVID-19 on the number of ATP tennis tournaments and the prize money that was awarded at these tournaments. In order to investigate the mentioned effects we compare the 'normal' ATP year (2019) and the one impacted by COVID-19 (2020). Given the lockdown(s) imposed in 2020 it is expected that the number of tournaments declined strongly. This comes as a natural consequence. Possibly, it is of more interest to investigate the differences in the prize money (Total financial commitment) of the tournaments that were held. In what follows we document these differences to further show as to how large the impact of the pandemic has been.

3.3.1. The number of ATP tournaments
Before reporting on the effects of the pandemic on the number of tournaments, a brief explanation on the structure of the ATP tournaments is needed. The tennis men tour is run across several levels of tournaments, at the very bottom consisting of the ITF (International Tennis Federation) futures series (with prize money of US $ 15.000-25.000),

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[11] This finding is in contrast to the now usual effect found in the recent literature with the COVID-19 pandemic exacerbating the inequalities in the society (see for example Blundell et al., 2020; Goldwin and Muggah, 2020; Stiglitz, 2020).

ATP challengers (prize money up to US $ 162.480) and at the top the ATP tournaments (ATP 250 – prize money up to US $ 1.416.205, ATP 500 – prize money up to US $ 3.666.275, ATP 1000 – prize money up to US $ 9.314.875, and the end-of-year ATP Finals – prize money US $ 9.000.000) and Grand Slam tournaments (prize money up to US $ 26.758.750). Table 1 below gives an idea about the importance of these tournaments with the different categories being linked to the number of ranking points and the awarded prize money. In addition two columns are added with the number of tournaments held in 2019 and 2020 across different categories.

Table 1: The structure of the men's tennis tour

Tournament	Prize money (US $)*	Ranking points (awarded to the winner)	Number of tournaments in a normal year (2019)	Number of tournaments in the COVID-19 year (2020)
ITF Men's World Tennis Tour			540	152
ITF M15	15.000	15	385	116
ITF M25	25.000	25	155	36
ATP challenger tour			158	57
ATP Challenger 80	54.160	80	99	35
ATP Challenger 90	81.240	90	21	2
ATP Challenger 100	108.320	100	11	10
ATP Challenger 110	135.400	110	7	0
ATP Challenger 125	162.480	125	20	10
ATP tour			66	33
ATP Tour 250	589.680 to 1.416.205	250	39	18
ATP Tour 500	1.937.740 to 3.666.275	500	13	7
ATP Cup				1
ATP Tour Masters 1000	6.735.690 to 9.314.875	1000	9	3
ATP Finals	9.000.000	1500	1	1
Grand Slam	Up to 26.758.750	2000	4	3

Source: ATP (https://www.atptour.com/en/) and IMF (https://www.itftennis.com/en/)
Note: * The data refers to 2019 prize money

Table 1 explains nicely the structure of the men's tennis tournaments to provide an informed insight as to how the tour is organized and run. In what follows we will concentrate our investigation on the ATP Tour tournaments and Grand Slams. This is not to say that the other categories of tournaments (ITF Tour tournaments and ATP Challenger Tour tournaments) are of minor importance. Since it was the TOP 100 players that we focused our analysis on in the previous sub-section, and these players mostly compete in the ATP tournaments, the subsequent analysis will focus on the ATP Tour and Grand Slam tournaments. The table is in itself very informative and we will investigate the issue of prize money at different levels in detail below. At this point we find particularly striking the two last columns with the number of tournaments in 2019 and 2020. As for the ATP Tour tournaments the effect of the pandemic and the associated lockdown can be seen in the number of tournaments dropping from 66 in 2019 to 33 in 2020. Practically from the beginning of March 2020 until August 22 2020 no tournament was played due to the COVID-19 pandemic. Quite a lockdown we have to say. This exerted a major negative impact on the tennis world. A part of this impact was investigated in Subsection 3.2. dealing with the earnings of the top tennis players. In the remainder of this sub-section we investigate the impact of COVID-19 pandemic on the prize money awarded at the ATP tour tournaments.

3.3.2. Prize money and the impact of COVID-19
Given the large impact of the pandemic on economic activity (primarily the consequence of the lockdown), as established in Section 2, it is also to be expected that the amount of money circulating in the tennis world drops significantly. This was further exacerbated when the ATP tour started again in August under very strict protocols and practically without audience. This naturally decreases the revenues of the tournaments with no revenues from tickets, lower sales at tournaments, less commercials, etc. Below we document the changes in prize money awarded by tournaments (Total financial commitment per tournament, prize money awarded to the winner, and prize money awarded to the first round loser – participant fee).

In order to make this investigation easier to follow we organize our analysis across different levels of the ATP tournaments (ATP 250, ATP 500, ATP 1000, ATP Finals and Grand Slams). We compare the tournaments on the mentioned criteria from 2019 and 2020 both before the lockdown and after the tour resumed in August 2020. We first report the complete table (Table 2) and then report a couple of figures (Figures 5 and 6) to show the most important trends/changes so that the reader can easier understand the main dynamics and not get lost in too much data at one place.

Table 2: ATP tournaments and the impact of the COVID-19 pandemic

| Name of tournament and category	2019 Prize money (in US $)	2020 Prize money (in US $)	Change in %	2019 Winner	2020 Winner	Change in %	2019 1st round	2020 1st round	Change in %
Auckland ATP 250	589.680	610.010	3,45	90.990	91.625	0,70	5.320	5.450	2,44
Kitzbuhel ATP 250 (€)	586.140	400.335	−31,70	90.390	24.880	−72,47	5.285	5.415	2,46
Dubai ATP 500	2.887.895	2.950.420	2,17	565.635	565.075	−0,10	20.815	21.525	3,41
Hamburg ATP 500 (€)	1.855.490	1.203.960	−35,11	354.845	79.330	−77,64	13.065	13.640	4,40
Cincinnati ATP 1000	6.735.690	4.674.780	−30,60	1.114.225	285.000	−74,42	22.045	24.560	11,41
London ATP Finals	9.000.000	5.700.000	−36,67	2.656.000	1.564.000	−41,11	215.000	153.000	−28,84
Australian Open (A$)	29.687.000	32.505.000	9,49	4.100.000	4.120.000	0,49	75.000	90.000	20,00
US Open	28.619.350	21.656.000	−24,33	3.850.000	3.000.000	−22,08	58.000	61.000	5,17

Source: ATP (https://www.atptour com/en/) and author's calculations

Table 2 reports the detailed data on prize money (Total financial commitment), prize money awarded to the winner of the tournament, and the prize money awarded to the player losing in the first round. All these data are reported for 2019 and 2020, as well as the percentage change in these indicators in 2020 over 2019. The tournaments held before the lockdown are colored in green. All the rest of the tournaments in the table are the tournaments held after the resumption of the tour in August 2020[12]. The main difference that can be observed is the change in all categories depending on whether the tournament was held before the lockdown or after the resumption. Tournaments before the lockdown were running on 'the business as usual' mode seeing the increase in the total prize money, small or no increase in the prize money awarded to the winner and a relatively small increase in the prize money awarded to the first round loser (only a big increase can be observed in Australian Open). A big change can be observed in the total prize money after the tour resumed (in some tournaments amounting to a drop of considerable 30 or more percent). The winners of tournaments seem to have fared the worst with their prize money dropping as much as 74 percent as for example in the ATP Masters Cincinnati. Notwithstanding the pandemic, a good news is that those losing in the first round have generally seen their prize money increasing (with the exception of the ATP Finals in London where the participant fee saw a decline of 29 percent[13]). The general trends observed above can be seen nicely in Figures 5 and 6 below.

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[12] Please note that not all 33 tournaments are included in the table. We decided to include representative ATP tournaments of different levels, two per category if in 2020 at least one was held before the pandemic stopped the ATP tour and one after it started again. Otherwise, only one tournament is included per category.

[13] Note however that only the TOP 8 tennis players qualify to compete in this tournament. Therefore, the argument offered earlier referring to lower ranked players does not really apply here.

Figure 5 – Changes in ATP 250 and ATP 500 tournaments
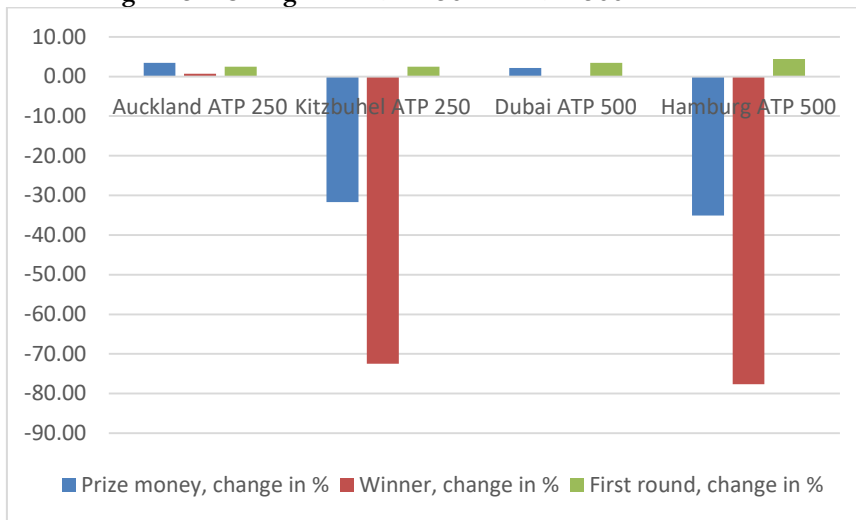
Source: ATP (https://www.atptour com/en/) and author's calculations

Figure 5 documents strikingly a big change occurring at the ATP 250 and ATP 500 level tournaments after the resumption of the ATP tour in August. The biggest decline relates to the prize money awarded to the winners of tournaments (above 70 percent), but the decline was also considerable in the total prize money (above 30 percent). Although the tournaments shrank significantly, it appears that the people in charge decided not to decrease the prize money awarded to losers in the first round, and these 'weaker' players saw small increase in the rewarded prize money[14]. This change probably made it easier for lower ranked and 'weaker' players to overcome the burdensome year of 2020.

Figure 6 - Changes in ATP 1000, Grand Slams and ATP Finals
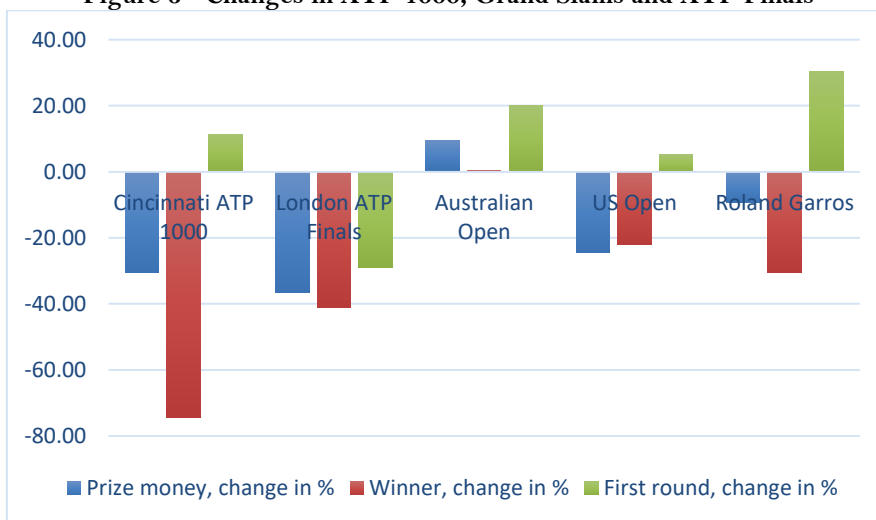
Source: ATP (https://www.atptour com/en/) and author's calculations

Figure 6 also documents these trends with the increase in the total prize money observed only in Australian Open, but this was before the pandemic started. The other world biggest tennis tournaments shrank considerably under the strong impact of the COVID-19 pandemic, with the increase in the prize money seen again only for those losing at early rounds of tournaments. These figures offer additional explanation for some of the findings reported in Subsection 3.2. In that subsection where we investigated the earnings from prize money of the ATP TOP 100 players we spotted a huge decrease in earnings of the highest ranked players (on average 40 and 41 percent for TOP 10 players and those ranked 11-20, respectively), while those ranked lower for example from 81-90 and 91-100 saw their earnings increasing in 2020 over 2019. Without intention at elaborating on this further, it is possible that although the pandemic has strongly hit the tennis world, it might have decreased some of the strong inequalities that exist between the top ranked players and those with lower rankings.

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[14] Given the high fixed costs for showing up in a tournament (travel arrangements and the salaries and costs for the accompanying team members – coach, physio etc.) this sounds as a good decision, because with the pandemic and all of the troubles it has caused it might completely kill the incentive for lower ranked players to show up for a tournament (if their rewards are reduced) and thus possibly put in danger the very competition.

While the empirical investigation on the impact of the COVID-19 on the tennis world conducted in this paper provides some interesting insights, it also opens a couple of avenues for future research. It might be interesting to conduct a comprehensive study of the earnings of all tennis professionals, not just those belonging to the TOP 100 group. In addition, the associated dynamics may be interesting to explore on the women's tour and make comparisons on the differences of the effects of the pandemic across the ATP and WTA tours. Data limitations might be seen as a serious obstacle for these investigations, but the analysis in this paper provides a direction as to how these obstacles might be circumvented possibly resulting in more interesting studies to come.

4. Concluding remarks

This paper explored the impact of the COVID-19 pandemic on the prize money earnings of the top tennis professionals. The pandemic has made a strong impact on the world, both in terms of health and economy. As shown in this paper the year 2020 saw one of the worst recessions in the global economy in recorded history. The lockdown(s) introduced globally have resulted in serious disturbances in the economic sphere in practically all countries in the world. The economic consequences in some sectors have been devastating. Using the most recent data we constructed the database on the prize money earnings of the TOP 100 tennis professionals. This allowed an investigation of the earnings of tennis professionals in general, but of particular interest in this paper was the impact of the COVID-19 pandemic on these earnings. The data collected for the pandemic year (2020) enabled a comparison with the normal years (2019 and 2018) revealing some interesting findings. The analysis in this paper provides an indication of a strong negative impact of the COVID-19 pandemic on the tennis world and prize earnings of the top tennis professionals. The highest ranked players have seen the biggest decline in earnings in the pandemic year, amounting to 48 percent for the TOP 50 players. The pandemic also resulted in a strong drop in prize money in tournaments, with the biggest one occurring at the ATP Finals amounting to 37 percent. Other tournaments have also considerably decreased their prize monies. However, there might be also a positive consequence of the pandemic with a decline in inequality among the top tennis professionals detected in 2020 as compared to 2019.

By now many studies have investigated the economic effects of the COVID-19 pandemic. The most recent literature (see for example Allen, 2021) takes a very critical stance towards the effectiveness of lockdowns, both in terms of health and economic aspects. Through a very comprehensive review of COVID-19 literature Allen (2021) suggests that the lockdowns fail to pass a cost/benefit test. The uncertainty surrounding the impact of COVID-19 and the measures undertaken to fight it call for further research leading to a build-up of strong evidence on which to assess this particular moment in the human history. With its focus on the tennis world the present study makes a contribution to the empirical literature by filling the gap on the effects of the pandemic on the sports industry. This might lead to a better understanding of the economic effects of the pandemic and possibly allow a broader academic use which may arise through comparison to the effects of the pandemic in other sectors/activities. The study also opens interesting avenues for future research, especially on the impact of the pandemic on inequality in the sport industry.

References

Allen, D.W., 2021, "Covid Lockdown Cost/Benefits: A Critical Assessment of the Literature", April, 2021 (available at: http://www.sfu.ca/~allen/LockdownReport.pdf)

ATP Tour – Association of tennis professionals (available at: https://www.atptour.com/en/)

Balliauw, M., Verlinden, T., Van Den Spiegel, T. and Van Hecke, J., 2017, "Towards a sustainable financial model for professional tennis players", *Faculty of Economics, University of Antwerp, Research Paper 2017-006*

Blundell, R., Dias, M.C., Joyce, R. and Xu, X., 2020, "COVID-19 and Inequalities", *Fiscal Studies*, 41, 2, pp. 291-319

Dobson, S. and Goddard, J., 2001, *The Economics of Football*, Cambridge University Press: Cambridge, United Kingdom

Dye, R.A., 1984, "The Trouble with Tournaments", *Economic Inquiry*, 22, pp. 147-149

European Central Bank, 2020, *ECB Economic Bulletin (2020)*, Economic Bulletin, Issue 8

Evans, A.B., Blackwell, J., Dolan, P., Fahlen, J., Hoekman, R., Lenneis, V., McNarry, G., Smith, M. and Wilcock, L., 2020, "Sport in the face of the COVID-pandemic: Towards an agenda for research in the sociology of sport", *European Journal for Sport and Society*, pp. 1-11

Forbes (available at: https://www.forbes.com/athletes/#2113b4d655ae)

Frank, R. and Cook, P. (1995) *The winner-take-all society: How more and more Americans compete for ever fewer and bigger prizes, encouraging economic waste, income inequality, and an impoverished cultural life*, Simon and Schuster, Free Press, Martin Kessler Books: New York, London and Toronto

Frick, B. and Simmons, R., 2007, "The allocation of rewards in athletic contests", *Lancester University Management School Working Paper 2007/046*

Garcia-del-Barrio, P. and Pujol, F., 2011, "Prize money and media value in tennis: who leads the spectacle?", (available at https://archivo.alde.es/encuentros.alde.es/anteriores/xiveea/trabajos/g/pdf/122.pdf)

Goldin, I. and Muggah, R., 2020, "COVID-19 is increasing multiple kinds of inequality. Here's what we can do about it", *World Economic Forum*, https://www.weforum.org/agenda/2020/10/covid-19-is-increasing-multiple-kinds-of-inequality-here-s-what-we-can-do-about-it

IMF World Economic Outlook, 2020, *Tentative stabilization, sluggish recovery?*, January 2020

ITF Tour – International Tennis Federation (available at: https://www.itftennis.com/en/)

Ivankovic, M., 2007, "The tournament model: an empirical investigation of the ATP Tour", *Zbornik radova Ekonomskog fakulteta u Rijeci*, 25, 1, pp. 83-111

Koronios, K., Psiloutsikou, M., Kriemadis, A. and Kolovos, P., 2016, "The effect of perceived motivation of sports sponsorship: Evidence from basketball fans", *International Journal of Business and Economic Sciences Applied Research*, 9, 2, pp. 33–45

Rosen, S., 1981, "The economics of superstars", *American Economic Review*, 71(5), pp. 845-858

Stiglitz, J., 2020, "Conquering the Great Divide", *Finance and Development*, September, pp. 17-19

World Bank, 2021, *Global Economic Prospects*, January 2021

World Health Organization (available at: https://www.who.int/)

The Effect of Income Smoothing and CSR Disclosure
on Market Performance

Inten Meutia[†], Devia Septyani, Mohamad Adam

Faculty of Economics and Accounting, Sriwijaya University, Indonesia

ARTICLE INFO	ABSTRACT
Article History Received 20 December 2020; Accepted 7 June 2021 *JEL Classifications* G32, L25, L30, O34 **Keywords:** Income Smoothing, CSR Disclosure, Market Response, Market Risk, Market Value.	**Purpose**: The main aim of the study was to determine the effect of income smoothing and CSR disclosure whether it affects market performance which is divided into 3 aspects, namely market response (CAR), market risk (SD), market value (MVE) in manufacturing companies in Indonesia. This study uses a basic theory, namely agency and signals are used to explain how the income smoothing company that makes CSR disclosures affects market performance. **Design/methodology/approach:** This study uses secondary data, namely financial reports that was accessed through the Indonesian Stock Exchange page. The sample in this study was 37 manufacturing companies listed on the Indonesia Stock Exchange for the period 2014 - 2019. The research hypothesis was tested using multiple linear analysis with the SPSS test tool. **Findings:** This study found that companies that perform income smoothing have an effect on market response (CAR) and market risk (SD), while CSR disclosure has an effect on market performance, which is calculated through 3 aspects CAR, SD, and MVE. **Research limitations/implications:** One of the problems in this research is the calculation of the abnormal return value in only 30 days due to the limitations of the research. This research is for companies in order to reduce income smoothing actions because it has a negative correlation to market reactions and companies can increase CSR disclosure because it will have a positive value for the company. **Originality/value:** This study contributes to the theory of empirical testing regarding the effect of income smoothing practices and CSR disclosure on market performance. This study also adds new variables and extends the time span for calculating abnormal returns from related studies. Further studies can add variables that have a positive correlation to market performance and extend the range of calculating the abnormal return value.

1. Introduction

Market performance is a concept to measure the company's performance on what has been done. Market performance is very important because it is needed to demonstrate the effectiveness of competition, the ability to achieve product profits and business efficiency through sales. Sudana (2011) market performance is a reference that is considered as an assessment of the extent to which a company can increase the value of company shares that are already traded in the capital market.

Informed announcements will automatically cause the market to react. The market reaction is indicated by changes in stock prices in the market, the response given by the market to published financial reports is indicated by the value of Cumulative Abnormal Return (CAR). In making a decision to invest, of course, investors will think about how much risk that will be borne in investing. Risk and return have a positive and unidirectional relationship, where the greater the risk borne, the greater the return will be compensated. Investors will pay attention to the company's stock price trends to assess the company's performance. Investors can judge whether a company is good or bad

through the company's market value. Harrison (2012) said "market value varies depending on the net income earned by the company, financial position, and the company's prospects in the future, as well as economic conditions. Market value is the overall value that occurs in the stock market in a certain period of time" (Ratnasari et al., 2014). Prices will reflect market players' expectations of market value.

According to agency theory, one way that is expected to be in accordance with the objectives of Principals and Agents is through reporting Luayyi (2012). Management realizes the importance of information regarding earnings, resulting in an attitude or behavior that should not be carried out by management, namely by performing income smoothing to overcome various problems that arise between management and various parties who have interests in the company. The attention of investors tends to pay attention only to the profit figures in the financial statements without considering the process that the company undertakes in creating that profit Algery (2013). Apriwandi and Pratama (2014), Dewi et al. (2018) the studies provides evidence that income smoothing has a effect on market reactions. Sjafrudin Redjab et al. (2014) gave different results where these two studies showed that the income smoothing action had no effect on market performance through stock market risk which was proxied by standard deviation (SD).

In signal theory, the positive things that are given by the company make investors interested in investing their capital, because this positive information indicates that the company has good performance in the future. Managers are generally motivated to convey good information to the market, and directly the market will react to good information conveyed. Vladu (2013) shows that users of financial statements today tend to rely on income statements, especially to assess the success of companies. In line with Hessayri and Saihi (2015) it is stated that accounting profit is a major concern for shareholders because it is a reflection of company performance. CSR disclosure is indicated to affect market performance. Research conducted on the European market found that corporate involvement in CSR disclosure has a positive impact on the company's stock price Cellier and Chollet (2011). The more companies disclose their CSR, the more investors will be interested in investing in the company. Cheng and Christiawan (2011), Miller and Wikstrom (2016), Ender and Brinckmann (2019), investors tend to react positively to disclosures related to society and the environment. Haryono and Rusdiah (2015), Thanaya and Widanaputra (2019) state that CSR disclosure has a significant effect on corporate risk (SD) in the mining sector.

Because not many studies have been conducted using 3 aspects in calculating market performance, the researchers are interested in using these three aspects in this study to calculate market performance. Different from previous research conducted by Dewi et al. (2018), this study adds a CSR disclosure variable as an independent variable because information about CSR disclosure carried out by companies contains information that is indicated to react to market performance. In this study, market performance is divided into 3 aspects, namely: market response (CAR), market risk (SD), and market value (MVE). This research also adds to the observation period of the cumulative abnormal value of the 30-day span to calculate the abnormal return value, with the object of research being manufacturing companies. Manufacturing companies were chosen because researchers also wanted to see whether income smoothing had an effect on market performance as calculated by SD in manufacturing sector companies where previous studies of Haryono and Rusdiah (2015) Thanaya and Widanaputra (2019) stated that CSR disclosure has a significant effect on market risk (SD) in the mining sector.

2. Review of Literature

2.1 Theoretical Review
Earnings management arises as a result of the impact of an agency problem that occurs because there is a misalignment of interests between the principal and the agent which is called the agency problem. Agency problems arise when the principal has difficulty ensuring that the agent acts to maximize the principal's welfare Yushita (2010). The topic of income smoothing is closely related with the concept of earnings management, just like earnings management, the income smoothing concept also uses agency theory approach. According to agency theory, one way that is expected to be in accordance with the objectives of Principals and Agents is through reporting Luayyi (2012). Management realizes the importance of information regarding earnings, resulting in an attitude or behavior that should not be carried out by management, namely by performing income smoothing to overcome various problems that arise between management and various parties who have interests in the company.

The positive thing about signalling theory is that it can differentiate companies that have good information/news from companies that have bad news. Godfrey et al. (2009) signal theory talks about managers who use accounts in financial statements to provide signals for future purposes. According to Hartono (2010), information published as an announcement will provide a signal for investors to make investment decisions. The announcement contains a good signal (good news), the market is expected to react to the large number of investors investing, but on the other hand, if the signal is (bad news), investors will not investing. Apriwandi and Pratama (2011) stated that the expectation of CSR disclosure can increase the market value and reputation of the company by increasing share prices.

2.2 Previous studies
Research on the effect of income smoothing on market performance and the effect of CSR disclosure on market performance has been carried out by several previous researchers including research conducted by Apriwandi and Pratama (2014), Paramita (2017) providing evidence that income smoothing has a positive effect on market reactions that are proxied by cumulative abnormalities. return (CAR), the results of this study are different from the results of research conducted by Dewi et al. (2018), Alwiyah and Solihin (2015), Istifirda (2015) and Aflatooni and Nikbakht (2009) proving that income smoothing has an effect negative to CAR.

Research conducted by Setiadi, Purnamasari, and Setiany (2015), Indriani and Harnovinsah (2015), Yulianti and Sapta (2016), Fumami and Moghadam (2015), which gave results that income smoothing had no effect on Cumulative Abnormal Return (CAR), this research uses the calculation of the CAR value of less than 30 days. Sjafrudin Redjab et al. (2014) conducted a study with the result that market reaction (CAR) was not related to earnings management which was proxied by income smoothing. Putra and Wiwin (2013) provide results that stock market risk has differences between income smoothing companies and companies that are not income smoothing. Research by Dewi et al. (2018) and Sjafrudin Redjab et al. (2014) gave different results where these two studies gave results that the income smoothing action had no effect on stock market risk which was proxied through standard deviation (SD). Khotimah, Warsini and Nuraeni (2012), the results of the research prove that earnings management has a positive effect on MVE, inversely proportional to the research conducted by (Dewi et al. 2018).

Previous research on the topic of the effect of disclosure of corporate social responsibility on market performance was carried out by Astuti and Nugrahanti (2015), Maturbongsi and Budiharta (2016), showing that CSR disclosure has no effect on market reactions proxied by CAR. Miller and Wikstrom (2016), the results of their research prove that CSR disclosure has a positive effect on CAR, this research is supported by research conducted by Ender and Brinckmann (2019), Cheng and Christiawan (2011), Darmadi and Gunawan (2013).

Previous research on market performance represented by aspects of market risk (SD) was conducted by Sjafrudin Redjab et al. (2014) the results of the study showed that market reactions were not related to earnings management. Research by Haryono and Rusdiah (2015), Thanaya and Widanaputra (2019), these two researchers gave the same results where CSR disclosure has a significant effect on firm risk (SD) in the mining company, this research had different company with Sjafrudin Redjab et al. (2014). Previous research on market performance proxied by the aspect of market value (MVE) was carried out by Suhardjanto, Nugraheni, and Accounting (2012), the results of the study showed that CSR disclosure had a positive effect on MVE, this result was supported by research conducted by Husser and Evraert-Bardinet (2015) and Reverte (2016), Corporate social responsibility disclosure and market valuation: evidence from Spanish listed firms. Based on the description above, the hypotheses that can be formulated are:

H1a: Income smoothing has a positive effect on market performance as proxied by market response (CAR).
H1b: Income smoothing has a positive effect on market performance, which is proxied by market risk (SD).
H1c: Income smoothing has a positive effect on market performance, which is proxied by market value (MVE)
H2a: CSR disclosure has a positive effect on market performance as proxied by market response (CAR).
H2b: CSR disclosure has a positive effect on market performance, which is proxied by market risk (SD).
H2c: CSR disclosure has a positive effect on market performance, which is proxied by market value (MVE).

3. Methodology

This research means quantitative research. This study uses secondary data, namely financial reports that was accessed through the Indonesian Stock Exchange (IDX) page. The data used in this study were obtained through the website www.idx.co.id. The sample in this study consisted of 37 Manufacturing companies on the Indonesian Stock Exchange (IDX) for the 2014-2019 period. In this study, income smoothing becomes the independent variable (X1), the disclosure of corporate social responsibility (CSR) becomes the independent variable (X2) and the dependent variable, namely Market Performance (Y). The research hypothesis was tested using multiple linear analysis and test tool used a statistical analysis program, namely SPSS. The population in this study were all manufacturing companies listed on the Indonesia Stock Exchange for the period 2014–2019, the sampling method used was purposive sampling. Purposive sampling criteria in this study are:

Tabel. 1 Sample Selection Criteria

Sample Selection Criteria	Jumlah
Manufacturing companies listed on the Indonesia Stock Exchange for the period 2014-2019.	169 companies
Companies that have not published financial statements in a row for 6 years	(7 companies)
The company has negative profits	(80 companies)
Initial Samples	**82 companies**
Companies non-smoother	45 companies
Number of Research Samples	**37 companies**

This study uses an initial sample of 82 companies, companies that are sampled are companies selected based on the criteria that have been made as shown in the table above. In this study, the sample was divided into two categories, namely smoother and non-smoother companies. A more refined company is a company that practices income smoothing in its financial reporting. Manufacturing company was chosen as the initial population because previous research proved that IS was mostly done by manufacturing companies. Of the 82 companies that were the initial samples, there were 37 companies that carried out income smoothing actions. So that the final sample in this study amounted to 37 income smoothing companies which became the final sample in this study.

3.1 Measurement of Study Variables

3.1.1 Dependent Variable

This study is a replica study of previous research conducted by Dewi et al. (2018) where market performance in this study is categorized into three aspects, namely market response, market risk, and market value. Calculating the value of market performance is divided into 3 aspects, namely:

Market Response is chosen as one of the market performance measures because of the stability of market response marks the stability of the business, in the perspective of today's investors means stable earnings per share and stable capital gains.

$$CAR = \sum_t AR_t$$

Information: CAR = Cumulative Abnormal Return, AR = Abnormal return in day t.

To find AR, the following formula is used:

$$AR_t = \left(1 - \frac{SP_1}{SP_{t-1}}\right) - \beta \left(1 - \frac{IHSG_1}{IHSG_{t-1}}\right)$$

Information : AR = Abnormal Return, SP = The share price of the company, IHSG = Indonesian stock price index, B = stock beta

Market Risk, selected as one aspect of market performance, (from the perspective of potential investors) because it is diprospective investor's perspective, and risk is one of the most factored into their decision. a company can yield a return or loss for their investment is determined by their view on said company's market response.

$$SD = \sqrt{\sum \frac{(X_1 - X)^2}{n}}$$

Information: SD = Standard deviation, Xi = stock return of each company in the observed period, X = estimated stock returns, which is the average stock turnover during the observed period, n: The number of days in the observed period. Standart deviation of stock return is chosen to be the proxy of market risk because it is the most common method to me a sure stock risk.

Market Value, is chosen to be a measure of market performance from a management perspective. The reason is because market value is seen as an incentive for management to increase by smoothing income because it is based on an increase or decreasing the company's market value, management will get a good performance report. Market value equity was chosen because the study model wanted to see the company value in the market aspect.

$$MVE_{c.t} = Ln\left(P_{c.t} \cdot X \cdot N_{c.t}\right)$$

Information : MVE = Market value of equity, average share price during the observed period , N = The number of stock issued, c = company ,t =years

3.1.2 Independent Variables

Companies will be classified into groups of companies that carry out income smoothing practices and do not perform income smoothing practices, using the Eckel Index (1981). The Eckel index for companies that practice income smoothing is <1, while companies that do not practice income smoothing are 1 (Eckel, 1981).

$$\text{Eckel Indeks} = \frac{CV\,\Delta I}{CV\,\Delta S}$$

Information: I = Change in profit in one period, S Change in sales in one period, CV = The coefficient of variation (standard deviation/expected value).

The disclosure of Corporate Social Responsibility in this study uses 6 indicators based on the Global Reporting Initiative (GRI) by grouping CSR information into 6 indicators, namely: economy, environment, labor practices, human rights, society, and product responsibility. Furthermore, to calculate CSRI, this study uses a dichotomy approach, where each CSR item in the research instrument is given a value of 1 if the company makes disclosures, and a value of 0 if the company does not disclose. The CSRI disclosure calculation formula is as follows:

$$CSRDI = \sum \frac{Xij}{nj}$$

Information: CSRlj = The company's Corporate Social Responsibility disclosure index j, Nj = Number of items for the company j, nj ≤ 79, Xlj = Dummy variabel: 1= if item i make disclosure: 0 = if item i did not make disclosure.

3.2 Analytical models

The equation model in this study:

Equation I	: CAR: a + β 1income smoothing + β 2 CSRD + e	(1)
Equation II	: SD: a + β 1income smoothing + β 2 CSRD + e .	(2)
Equation III	: MVE: a + β 1income smoothing + β 2 CSRD + e	(3)

4. Results

This section presents the empirical findings and interpretations of the research.

4.1 Multiple Linear Regression Analysis

In this study, there are 3 methods used in calculating market performance (Y) so that there are 3 regression model equations:

Tabel. 2 Multiple Linear Regression Analysis Equation I

Coefficients^a

Model		Unstandardized Coefficients B	Std. Error	Standardized Coefficients Beta	t	Sig.
1	(Constant)	-.042	.024		-1.733	.085
	PL	-1.417	.000	-.329	-4.691	.000
	CSRDI	.075	.045	.118	1.677	.005

a. Dependent Variable: CAR

Source: processed data (2020)

The output results above are entered into the following equation:

CAR: -,041 -1,417*Income Smoothing + 0,75*CSRDI + e. The above equation can be considered as follows:

If other variables are constant, CAR value will change by itself at a constant value, namely -,041.

If other variables are constant, CAR value will change by -1,417 for each income smoothing.

If other variables are constant, CAR value will change by 0,75 for each CSRDI.

Tabel. 3 Multiple Linear Regression Analysis Equation II

Coefficients^a

Model		Unstandardized Coefficients B	Std. Error	Standardized Coefficients Beta	t	Sig.
1	(Constant)	.200	.056		3.598	.000
	PL	5.631	.000	.061	.808	.020
	CSRDI	.014	.103	.010	.134	.014

a. Dependent Variable: SD

Source: processed data (2020)

The output results above are entered into the following equation:

SD : 0,200 + 5,631*Income Smoothing + 0,014* CSRDI + e. The above equation can be considered as follows:

If other variables are constant, SD value will change by itself at a constant value, namely 0,200.

If other variables are constant, SD value will change by 5,631 for each income smoothing.

If other variables are constant, SD value will change by 0,014 for each CSRDI.

Tabel. 4 Multiple Linear Regression Analysis Equation III

Coefficients^a

Model		Unstandardized Coefficients B	Std. Error	Standardized Coefficients Beta	t	Sig.
1	(Constant)	2538.649	67.672		37.514	.000
	PL	2.095	.000	.184	2.471	.064
	CSRDI	135.399	125.008	.081	1.083	.028

a. Dependent Variable: MVE

Source: processed data (2020)

The output results above are entered into the following equation:

MVE : 2538,649 + 2,095*Income Smoothing + 135,399*CSRD + e. The above equation can be considered as follows:

If other variables are constant, MVE value will change by itself at a constant value, namely 2538,649.

If other variables are constant, MVE value will change by 2,095 for each income smoothing.

If other variables are constant, MVE value will change by 135,399 for each CSRDI.

4.2 Simultaneous Test Results (Test f)

This test is also carried out to support the model in which it is appropriate or feasible so that the results of the statistical analysis test are not biased. The real level used in the F test is 5% (0.05). The results of the simultaneous test (f test) in this study are as follows:

Tabel. 5 Simultaneous Test of Equation I

ANOVA[a]

	Model	Sum of Squares	df	Mean Square	F	Sig.
1	Regression	.156	2	.078	14.546	.000[b]
	Residual	.975	182	.005		
	Total	1.131	184			

a. Dependent Variable: CAR

b. Predictors: (Constant), CSRDI, PL

Source: processed data (2020)

From the results of the table output above, it can be seen that the significance value in the table above is 0.000 <0.05, so it can be concluded that the estimated linear regression model I is suitable for explaining the influence between variables.

Tabel. 6 Simultaneous Test of Equation II

ANOVA[a]

	Model	Sum of Squares	df	Mean Square	F	Sig.
1	Regression	.019	2	.009	.327	.022[b]
	Residual	5.190	182	.029		
	Total	5.209	184			

a. Dependent Variable: SD
b. Predictors: (Constant), CSRDI, PL
Source: processed data

From the results of the table output above, it can be seen that the significance value in the table above is 0.022 <0.05, so it can be concluded that the estimated linear regression model II is appropriate to use to explain the influence between variables.

Tabel. 7 Simultaneous Test of Equation III

ANOVA[a]

	Model	Sum of Squares	df	Mean Square	F	Sig.
1	Regression	273013.983	2	136506.992	3.235	.042[b]
	Residual	7679003.855	182	42192.329		
	Total	7952017.838	184			

a. Dependent Variable: MVE
b. Predictors: (Constant), CSRDI, PL
Source: processed data

From the results of the table output above, it can be seen that the significance value in the table above is 0.042 <0.05, so it can be concluded that the equation model III linear regression is estimated to be suitable to explain the influence between variables.

4.3 Hypothesis Test Results (t test)

Partial test (t test) which was carried out gave results, the significance level used in this test is 5% (0.05), which means that: Significant value <5%, meaning that there is effect. Significant value> 5%, meaning that there is no effect.

Based on Table 1 regression equation model I, it can be seen that the income smoothing variable has a regression coefficient value of -1.417 with a significance level of 0.000<0.05. This proves that the income smoothing variable has a negative effect on market response, which is proxied by means of Cumulative Abnormal Return (CAR). H1a is rejected.

Based on Table 2 regression equation model II, it can be seen that the income smoothing variable has a regression coefficient value of 5.631 and with a significance level of 0.020<0.05. This proves that the income smoothing variable has a positive effect on market risk, which is proxied by Standard Deviation (SD). H1b accepted.

Based on Table 3 regression equation model III, it can be seen that the income smoothing variable has a regression coefficient value of 2.095 and with a significance level of 0.064>0.05. This proves that the income smoothing variable has no effect on market value, which is proxied by Market Value Equity (MVE). H1c is rejected.

Based on Table 1, regression equation model I, the CSRDI variable has a coefficient value of 0.075 and with a significance level of 0.005<0.05. This proves that the CSR disclosure variable (CSRDI) has a positive effect on market response, which is proxied by Cumulative Abnormal Return (CAR). H2a is accepted.

Based on Table 2 regression equation model II, the CSRDI variable has a coefficient value of 0.014 and with a significance level of 0.014<0.05. This proves that the CSR disclosure variable (CSRDI) has a positive effect on market risk, which is proxied by Standard Deviation (SD). H2b is accepted.

Based on Table 3 regression equation model III, the CSRDI variable has a coefficient value of 135.399 and with a significance level of 0.028<0.05. This proves that the CSR disclosure variable (CSRDI) has a positive effect on market value, which is proxied by Market Value Equity (MVE). H2c is accepted.

4.3.1 Determination Coefficient Test Results

The results of the coefficient of determination in this study are as follows:

Tabel.8 The coefficient of determination (R square) of Equation I
Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.371[a]	.138	.128	.07319407

a. Predictors: (Constant), CSRDI, PL
b. Dependent Variable: CAR
Source: processed data

The regression equation model I shows that the adjusted R-square value is 0.128. This explains that the independent variables, namely income smoothing (X1) and CSR disclosure (X2), are able to influence the dependent variable, namely market response (Y1) of 12.8% while the remaining 87.2% is influenced by other factors outside of this study.

Tabel. 9 The coefficient of determination (R square) of Equation II
Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.182[a]	.161	.106	.16887070

a. Predictors: (Constant), CSRDI, PL
b. Dependent Variable: SD
Source: processed data

The regression equation model II shows that the adjusted R-square value is 0.106. This explains that the independent variables, namely income smoothing (X1) and CSR disclosure (X2) are able to influence the dependent variable, namely market risk (Y2) of 10.6%, while the remaining 89.4% is influenced by other factors outside of this study.

Tabel.10 The coefficient of determination (R square) of Equation III
Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.185[a]	.034	.024	205.40771380

a. Predictors: (Constant), CSRDI, PL
b. Dependent Variable: MVE
Source: processed data

The regression equation model III shows that the adjusted R-square value is 0.024. This explains that the independent variables, namely income smoothing (X1) and CSR disclosure (X2) are able to have an influence on the dependent variable, namely the market value (Y3) of 2.4% while the remaining 97.6% is influenced by other factors outside of this study.

4.3.2 Discussion

The results of the H1a hypothesis research prove that the income smoothing variable has a significant negative effect on market response, which is proxied by Cumulative Abnormal Return (CAR). This study proves that the market will provide a negative value to companies that carry out income smoothing actions. So that the higher the company takes income smoothing action, the lower the market reacts. The results of this study support agency theory, according to agency theory, one way that is expected to be in accordance with the principal and agency goals is through a reporting mechanism (Luayyi, 2012). The importance of information regarding earnings is very well recognized by management, so that (behavior) emerges inappropriate attitudes or behaviors carried out by management, namely by smoothing income to overcome various problems that arise between management and various parties who have interests in the company.

The results of this study are in line with research conducted by Dewi *et al.* (2018), Alwiyah and Solihin (2015) Aflatooni and Nikbakht (2009) which prove that income smoothing has a negative effect on Cumulative Abnormal Return (CAR). The results of the study are not in line with research conducted by Setiadi, Purnamasari and Setiany (2015), Indriani and Harnovinsah (2015), Yulianti and Sapta (2016), Fumami and Moghadam (2015), which give results that income smoothing has no effect on cumulative abnormalities. Return (CAR).

The results of the H1b hypothesis research prove that the income smoothing variable has a significant positive effect on market risk, which is proxied by Standard Deviation (SD). The results of this study prove that investors prefer if management reports stable earnings, companies that have a high level of earnings variability are indicated to be prone to bankruptcy risk. The results of this study are in line with research conducted by Suzanti (2001), Pirmaningsih (2003), Martinez and Castro (2011), Iñiguez and Poveda (2004), Putra and Wiwin (2013) showing empirical evidence that the level of risk is lower for companies that practice income smoothing. Information asymmetry between agent and principal in agency theory can be detrimental to both parties. One of the efforts to minimize this agency problem, management is doing income smoothing. Michelson *et al.* (1995) stated that companies that do income smoothing have a significantly lower beta (risk) when compared to companies that do not do income smoothing. The results of this study are not in line with the research conducted by Dewi *et al.* (2018) and Sjafrudin Redjab *et al.* (2014) giving different results where these two studies provide results that income smoothing action has no effect on stock market risk. proxies through standard deviation (SD).

The results of the H1c hypothesis research prove that income smoothing has no effect on market value as proxied by Market Value Equity (MVE). The results of this study support research conducted by Ustman, Subekti, and Ghofar (2016), and research by Dewi *et al.* (2018) providing empirical evidence that income smoothing has no effect on market value. The results of this study prove that income smoothing action is not the main factor affecting market value. The results of this study do not support signal theory, management that performs income smoothing is expected to provide a positive signal to the market so that the company's image becomes good in the eyes of investors. The results of this study are not in line with research conducted by Khotimah, Warsini and Nuraeni (2012), Herman and Purwanto (2015) the results of this study prove that earnings management has a positive effect on market value (MVE).

The results of the H2a hypothesis research prove that the CSR disclosure variable (CSRDI) has a positive effect on market response, which is proxied by Cumulative Abnormal Return (CAR). These results prove that the company's CSR disclosure is well responded to by investors as indicated by the value of Cumulative Abnormal Return (CAR). The results of this study are in line with signal theory, based on signaling theory, the disclosure of social activities carried out by companies in the sustainability report provides investors with information about the prospects for substantial future returns. With the disclosure of CSR, investors will give more appreciation for the company. The form of appreciation given by investors can be measured by Abnormal Return (Jogiyanto, 2015). The results of this study are in line with research conducted by Cheng and Christiawan (2011), Carnevale and Mazzuca (2014), Miller and Wikstrom (2016), Ender and Brinckmann (2019), their research results prove that CSR disclosure has a positive effect on CAR. This research is not in line with research conducted by Astuti and Nugrahanti (2015), Maturbongsi and Budiharta (2016), where CAR is not influenced by CSR disclosure.

The results of the H2b hypothesis study prove that the CSR disclosure variable (CSRDI) has a positive effect on market risk, which is proxied by Standard Deviation (SD). The results of this study prove that investors and potential investors have used CSR disclosure information to consider the ups and downs of market risk. Cheng and Christiawan (2011) stated that the disclosure of corporate activities related to CSR can send a positive signal to the market and company stakeholders regarding the prospects for the company's future sustainability. The results of this study are

supported by research conducted by Sun, Salama, Hussainey and Habbash (2010), Jo, Kim and Park, (2016), Lins, Servaes and Tamayo (2017), Haryono and Rusdiah (2015) and Thanaya and Widanaputra (2019); the last research gives the same results where CSR disclosure has a significant effect on firm risk (SD) in mining companies on the Indonesia Stock Exchange. The results of this study are not in line with the research conducted by Tumurin and Kusuma (2003), where CSR disclosure by companies does not affect market risk.

The results of the H2c hypothesis research prove that the CSR disclosure variable (CSRDI) has a positive effect on market value as proxied by Market Value Equity (MVE). The results of this study prove that the higher the disclosure of CSR, the more the company value is increased. Firm value reflects the market value of the company's stock. Kapita and Suardana (2018) state that the better the disclosure of social responsibility in the company will tend to increase the company's reputation. The results of this study are in line with signal theory. Appropriate and appropriate disclosure of CSR is a signal of good news given by the company to the public and shows that the company has good prospects in the future. Research conducted by Nakao et al. (2007), Guenster et al. (2011), Husser and Evraert-Bardinet (2015), Reverte (2016), and Sopian, Mulya and Mulya (2018), show the results that CSR disclosure has a positive effect on market value equity (MVE). The results of this study are not in line with research conducted by Barnett and Salomon (2012), Cho *et al.* (2013), Cahan *et al.* (2016), Riaz *et al.* (2020), their findings show a negative correlation between the market value of companies and the publication of sustainability reports.

5. Conclusion and Recommendations

The results showed that the income smoothing variable had a significant negative effect, while the CSR disclosure variable (CSRDI) had a positive effect on market response (CAR). The income smoothing variable has a significant positive effect, while the CSR disclosure variable (CSRDI) has a positive effect on market risk (SD). The income smoothing variable has no effect on market value, while the CSR disclosure variable (CSRDI) has a positive effect on market value (MVE). Further research can carry out a comparative analysis between developed and developing countries on the relevance of income smoothing measures and CSR disclosure, for now the results of this study only imply relevance for companies in Indonesia. Future studies can calculate the abnormal return value within 100 days. Further research can carry out a comparative analysis between developed and developing countries on the relevance of income smoothing measures and CSR disclosure, for now the results of this study only imply relevance for companies in Indonesia.

5.1 Managerial implication

This research is for companies in order to reduce income smoothing actions because it has a negative correlation to market reactions and companies can increase CSR disclosure because it will have a positive value for the company. The implication in this research is for companies to reduce the practice of income smoothing, because the research results have a negative correlation with market reactions as measured by cumulative abnormal returns. CSR disclosure by companies is a positive thing that companies must do to increase the company's positive image.

5.2 Theoretical implication

This study contributes to the literature on market performance by providing empirical evidence on the effect of income smoothing and CSR disclosure on market performance. This research supports the agency theory and signal theory used. This study is expected to expand the research literature.

References

Aflatooni, A., and Nikbakht, Z. (2009). Income smoothing, real eranings management andling-run stock returns. *Business Intelligence Journal.*

Algery, A. (2013). Pengaruh Profitabilitas, Financial Leverage, dan Harga Saham Terhadap Praktek Perataan Laba Pada Perusahaan Manufaktur Yang Terdaftar Di Bursa Efek Indonesia. *Program penelitian Akuntansi Fakultas Ekonomi Universitas Negeri Padang.*

Alwiyah, and Solihin, C. (2015). P*engaruh Income Smoothing terhadap Earning Response pada Perusahaan Manufaktur yang Listing Di BEI.*

Apriwandi, and Pratama, R . 2011. Pengaruh Perataan Laba danCorporate Social Responsibility (CSR) Disclosure Terhadap Reaksi Pasar(penelitian Empiris pada Perushaan Manufaktur yang Terdaftar di BursaEfekIndonesia), *Universitas Widyatama yang tidak dipublikasikan.*

Astuti, C. W., and Nugrahanti, Y. W. (2015). Pengaruh Pengungkapan Corporate Social Responsibility Terhadap Reaksi Pasar. *Dinamika Akuntansi, Keuangan, Dan Perbankan.*

Barnett, M. L., and Salomon, R. M. (2012). Does it pay to be really good? addressing the shape of the relationship between social and financial performance. *Strategic Management Journal.*

Cahan, S. F., De Villiers, C., Jeter, D. C., Naiker, V., and Van Staden, C. J. (2016). Are CSR Disclosures Value Relevant? Cross-Country Evidence. *European Accounting Review.*

Carnevale, C., and Mazzuca, M. (2014). Sustainability report and bank valuation: Evidence from European stock markets. *Business Ethics.*

Cellier, A., and Chollet, P. (2011). The Impact of Corporate Social Responsibility Rating Announcement on Stock Prices: An Event Study on European Markets. International Journal of Business and Social Science.

Cheng, M., and Christiawan, Y. J. (2011). Pengaruh Pengungkapan Corporate Social Responsibility Terhadap

Abnormal Return. *Jurnal Akuntansi Dan Keuangan.*

Cho, S. Y., Lee, C., and Pfeiffer, R. J. (2013). Corporate social responsibility performance and information asymmetry. *Journal of Accounting and Public Policy.*

Darmadi, S., and Gunawan, R. (2013). Underpricing, board structure, and ownership: An empirical examination of Indonesian IPO firms. *Managerial Finance.*

Dewi, K., Mukhtaruddin, and Prayudha, I. A. (2018). Income smoothing and market performance: Empirical study on manufacturing companies listed in Indonesia stock exchange. *Investment Management and Financial Innovations.*

Ender, M., and Brinckmann, F. (2019). Impact of CSR-Relevant news on stock prices of companies listed in the austrian traded index (atx). *International Journal of Financial penelitianes.*

Fumami, M., and Moghadam, A. (2015). The Effect of Capital Structure on Firm Value, The Rate of Return on Equity and Earnings Per Share of Listed Companies in Tehran Stock Exchange. *Research Journal of Finance and AccountingOnline).*

Godfrey, P. C., Merrill, C. B., and Hansen, J. M. (2009). The relationship betweencorporate social responsibility and shareholder value: An empirical test of the risk management hypothesis. *Strategic Management Journal.*

Guenster, N., Bauer, R., Derwall, J., and Koedijk, K. (2011). The Economic Value of Corporate Eco-Efficiency. *European Financial Management*

Hartono, J. (2010). Hubungan Teori Signalling dengan Underpricing Saham Perdana diBursa Efek Jakarta.*Jurnal Bisnis dan Manajemen. 5* (1), hal. 35-50

Haryono, U., and Rusdiah, I. (2015). Corporate Social Performance and Firm Value. *SocialResponsibility Journal.*

Herman, M.B., and Purwanto, A. (2015). Pengaruh Manajemen Laba, Risiko Pasar, Komite Audit, Audit Eksternal, Dan Struktur Kepemilikan Terhadap Nilai Pasar (Studi Empiris Pada Perusahaan Manufaktur yang Terdaftar di Bursa Efek Indonesia Tahun 2011-2013). (2015). *Diponegoro Journal of Accounting.*

Hessayri, M., and Saihi, M. (2015). Monitoring earnings management in emerging markets. *Journal of Economic and Administrative Sciences.*

Husser, J., and Evraert-Bardinet, F. (2015). The effect of social and environmental disclosure on companies' market value. *Management International.*

Indriani, P., and Harnovinsah. (2015). The Market Reaction and Income Smoothing (Case Study on Listed Company in LQ 45 Indonesian Stock Exchange). *Research Journal of Finance and Accounting.*

Iñiguez, R., and Poveda, F. (2004). Long-run abnormal returns and income smoothing in the Spanish stock market. *European Accounting Review.*

Jo, H., Kim, H., and Park, K. (2016). Controversial Industries, Regional Differences, and Risk: Role of CSR. *Korean Financial Society Conference, 27 Mei 2016.*

Jogiyanto, Hartono. 2015. *Teori Portofolio dan Analisis Investasi.* Edisi 10 Cetakan 1.Yogyakarta: BPFE.

Kapita, Y., and Suardana, K. A. (2018). Pengaruh Pengungkapan Corporate Social Responsibility dan Good Corporate Governance Pada Reputasi Perusahaan Manufaktur. *E-Jurnal Akuntansi.*

Khotimah, H., Warsini, S., and Nuraeni, Y. (2012). Pengaruh Manajemen Laba, Risiko Pasar dan Struktur Kepemilikan Terhadap Nilai Pasar. *Jurnal Ekonomi and Bisnis.*

Lins, K. V., Servaes, H., and Tamayo, A. (2017). Social Capital, Trust, and Firm Performance: The Value of Corporate Social Responsibility during the Financial Crisis. *Journal of Finance.*

Martinez, A. L., and Castro, M. A. R. (2011). The smoothing hypothesis, Stock Returns and Risk in Brazil. *BAR - Brazilian Administration Review.*

Maturbongs, Plautilda. D. dan BudihartaPratiwi. (2016). The Impact CSR Disclosure To Market Reaction With Profitability As Moderating Variable.*International Financial Accounting Program.*

Michelson, Stuart E., James ~ordan- Wagner, dan Charles W. Wootton, 1995, A Market Based Analysis of Income Smoothing, *Journal of Business Finance andAccounting,* Desember: 11, pp. 79- 1193.

Miller, Linnea and Wikstrom, Matilda. (2016). Corporate Social Responsibility And Its Effect On Stock Price. *Master of Science in Business and Economics.*

Nakao, Y., Amano, A., Matsumura, K., Genba, K., and Nakano, M. (2007). Relationship between environmental performance and financial performance: An empirical analysis of Japanese corporations. *Business Strategy and the Environment.*

Paramita, R. W. D. (2017). Refleksi Perataan Laba terhadap Respon Pasar. *Journal of Research and Applications: Accounting and Management.*

Pirmaningsih, Lilik (2003), Analisis Pengaruh Perataan Laba Terhadap Kinerja Dan Risiko SahamPerusahaan Publik Di BursaEfek Jakarta (BEJ)", *Jurnal Ekonomi–Manajemen–Akuntansi, Vol. 1.*

Putra Dwi RA and Wiwin R. 2013. Return dan Risiko Saham pada Perusahaan Perata Laba dan Bukan Perata Laba. *Jurnal Dinamika Akuntansi.* Yogyakarta. Universitas Gadjah Mada.

Ratnasari, Desy dan Astuti, Dewi. (2014). "Pengaruh Bid-Ask Spread, Market Value, dan Variance Returnterhadap Holding Period". *Finesta.*(Vol 2, No. 1 tahun 2014). Hlm. 99-102.

Rehman, R., Riaz, Z., Cullinan, C., Zhang, J., and Wang, F. (2020). Institutional ownership and value relevance of corporate social responsibility disclosure: Empirical evidence from China. *Sustainability (Switzerland).*

Reverte, C. (2016). Corporate social responsibility disclosure and market valuation: evidence from Spanish listed firms. *Review of Managerial Science.*

Setiadi, I., Purnamasari, S., and Setiany, E. (2015). Market reaction on income smoothing in the Indonesian manufacturing industry. *International Journal of Monetary Economics and Finance*.

Sjafrudin Redjab, Santoso, B., and Fitriah, N. (2014). penelitian Tentang Analisis Reaksi Pasar dan Risiko Investasi pada Perusahaan Manufaktur yang Melakukan Manajemen Laba: penelitian di Bursa Efek Indonesia. *Jurnal InFestasi*.

Sopian, A., Mulya, H., and Mulya, H. (2018). The Impact of Corporate Social Responsibility Disclosure on Firm Value. *International Journal of Scientific Research and Management*.

Sudana, I. M. (2011). Manajemen Keuangan Perusahaan Teori and Praktik. In *ErlaFngga*.

Suhardjanto, D., Nugraheni, S., & Akuntansi, J. (2012). Pengaruh Corporate Social Responsibility (CSR) Disclosure Terhadap Nilai Perusahaan. In *Jurnal Akuntansi*.

Sun, N., Salama, A., Hussainey, K., and Habbash, M. (2010). Corporateenvironmental disclosure, corporate governance and earnings management. *Managerial Auditing Journal*.

Suzanti, Anna (2001) Analisis Pengaruh Perataan Laba Terhadap Return Saham Dan Risiko Pasar Saham Perusahaan - Perusahaan Publik Di Bursa Efek Jakarta. *Masters Thesis*, Program Pascasarjana Universitas Diponegoro.

Thanaya A, Sayuand Widanaputra A.A.G.P (2019). The Effect Of CSR Disclosure On Firm Risk In Mining Companies Listed. *E-Jurnal Akuntansi*.

Tumirin, and Kusuma, I. W. (2003). Analisis variabel akuntansi kuartalan, variabel pasar, dan arus kas operasi yang mempengaruhi bid-ask spread. *Jurnal Akuntansi and Auditing Indonesia*, *9(1)*.

Ustman, Subekti, I., and Ghofar, A. (2016). Analisis Pengaruh Manajemen Laba Terhadap Nilai Perusahaan Sebelum Dan Saat Implementasi IFRS. *Jurnal Ekonomi Dan Bisnis*

Vladu. (2013). Smoothing Behavior Of Firms In Times Of Crisis: Empirical Evidence From The Spanish Economic Environment. *Annales Universitatis Apulensis Series Oeconomica*.

Walter T. Harrison Jr, D. (2012). Akuntansi Keuangan: International financial Reporting Standars-IFRS 2. In *Akuntansi Keuangan*.

Yuniarto, S. Arif and Yulianti (2016). Income Smoothing, Managerial Ownership and Quality Of Auditors To Market Reaction.*Jurnal Bisnis dan Ekonomi*.

Yushita, A. N. (2010). Earning Management dalam Hubungan Keagenan. *Jurnal Pendidikan Akuntansi Indonesia*.

Modelling the Australasian Financial Cycle: A Markov-Regime Switching Approach

Milan Christian de Wet
University of Johannesburg

ARTICLE INFO	ABSTRACT
	Purpose: The importance of the financial cycle has become a central point of consideration for policymakers since the 2007-08 financial crisis. This study aimed to construct and characterize the aggregate Australasian financial cycle. **Design/methodology/approach:** To construct the aggregate cycle, a dynamic factor model is employed, based on credit aggregates and aggregate property prices in Australia and New Zealand. To extract the aggregate Australasian financial cycle, the Christiano-Fitzgerald bandpass filter is implemented. Also, a Markov-Regime Switching Autoregressive model is employed to model, characterize and identify asymmetries in the aggregate Australasian financial cycle. **Findings:** The results indicate that Australian credit conditions are the prominent underlying driver of the aggregate Australasian financial cycle. The aggregate Australasian financial cycle exhibits a typical duration of 45 quarters, with expansions typically lasting 25 quarters and contractions lasting 20 quarters. Australasian financial cycles thus typically last longer than business cycles. The results also provide evidence that contractions in the aggregate Australasian financial cycle are typically shorter but harsher and more volatile than cyclical expansions, and that a level of linear persistence exists in the cycle.
	Research limitations/implications: A limitation of this study is that full data sets for all the variables that constitute the aggregate Australasian financial cycle is only available from 1978Q1. Therefore, the time horizon of the study starts at this point. However, given the long typical long duration of financial cycles, it would be ideal to have a time horizon of about 100 years. The implications of asymmetry in the aggregate cycle have several policy implications. Asymmetries might necessitate different policy strategies, as well as influence the timing of implementing policies during different financial cycle phases. The durational asymmetry in the aggregate financial cycle, whereby expansions in the aggregate financial cycle are typically longer than contractions, indicates that the employment of restrictive monetary and macroprudential policies should be implemented for longer periods than accommodative policies. Also, given that contractions in the aggregate financial cycle are steeper than expansions, policy response should be quicker and should be stronger with accommodative monetary policies once the aggregate financial cycle is in a contraction phase, relative to restrictive monetary policies during an expansion phase. **Originality/value:**The construction of a single aggregate measure that encapsulates the cyclical behaviour of a range of financial variables aids as a solution to simplify the study of aggregate financial cycles. In this light, this study contributes to the body of empirical literature on Australasian economic cycles by providing a single aggregate Australasian financial cycle measure that encapsulates the cyclical behaviour of several financial variables from two of the biggest economies in this region. This will provide policymakers with a single measure to consider the cyclical state of financial aggregates in Australasia. This study further contributes by establishing cyclical durations and identifying asymmetries in the cycle. Such an analysis aid in gaining a deeper understanding of the aggregate Australasian financial cycle and provide a means to improve the accuracy of predicting future movements in the financial cycle. This, in turn, could aid policymakers to manage fluctuations in the aggregate financial cycle and thereby reduce the potentially adverse effect of financial cycle fluctuations.

[†]Corresponding Author: Milan Christian de Wet
Email: miland@uj.ac.za

1. Introduction

Financial conditions are playing an increasingly important role in the economy, as a result, financial instability and aggregate financial cyclicality have emerged as a key economic concept since the 2007/08 financial crisis. However, before the 2007/08 financial crisis, policymakers and researchers largely neglected to consider the role of financial cyclicality on the economy, considering the role played by the business cycle far more important. Therefore, knowledge and understanding of business cycles are far more extensive than on financial cycles, resulting in several knowledge gaps. Ng (2011) and Borio (2014) propose a definition for aggregate financial cycles, suggesting that they are self-reinforcing, reflecting the ebb and flow of aggregate value, risk sentiment and funding availabilities, often driven by changes in credit levels and asset prices. This, in turn, typically result in periods of financial expansion, followed by financial contraction. This necessitates the need to correctly identify the current financial cycle regime, in order to identify prevailing financial market risks such as excessive leverage induced asset price appreciations. As argued by Strohsal, Proaño and Wolters (2019), our understanding of the nature of the financial cycle provides the ability to anticipate future cyclical movements in this cycle and can help predict crises.

Since the financial crisis, characterising aggregate financial cycles have become a key focus of central banks and economic cycle research, in order to improve the understanding of such cycles (Strohsal et al., 2019). Timely and effective policy implementation, with the aim to manage destructive financial cycles, rely on the accurate modelling and identification of the cycle. A number of methods have been implemented in this regard, Pontines (2017), de Wet and Botha (2019) and Strohsal et al. (2019) utilise a spectral density analysis, Claessens, Kose and Terrones (2012) and Drehmann, Borio and Tsatsaronis (2012) implement a turning-point analysis and Aikman, Haldane and Nelson (2015) use Frequency-based band-pass filters. In this regard, empirical literature largely focuses on identifying the properties of financial cycles. The main findings are that financial cycles typically exhibits longer durations and larger amplitudes than the business cycle (Borio, 2014; Aikman et al., 2015 and Strohsal et al., 2019). Strohsal et al. (2019) argue that the relatively longer duration reflects the unsustainable build-up of macro-financial instabilities over an extended period of time, which then ends in a severe financial contraction with potentially disruptive economic implications. This emphasises the importance to effectively manage the financial cycle by means of timely and effective policies.

Despite the growing body of literature on financial cycles, financial cycles are far less researched and understood than the traditional business cycle, leaving a number of research gaps. Two research gaps will be considered in this study. Firstly, financial cycle research focuses largely on the financial cycle of the United States of America, the United Kingdom and the European Union. Such results can not necessarily be generalised and applied to other financial cycles, requiring research to extend to the financial cycle on a broader range of economies (Pontines, 2017). Secondly, existing research does not formally consider cyclical asymmetries in financial cycles. Cyclical asymmetries prove to exist in business cycles, with several policy implications, rendering this a key topic in business cycle research. Financial cycles could exhibit similar cyclical asymmetries, necessitating research in this regard.

The main aim of this study was to construct, model and characterise the aggregate Australasian financial cycle. The multiple dimensional aspects of financial cycles in an economy make the study and analysis of Aggregate financial cycles complex. This, in turn, complexifies policy making related to aggregate financial cycles. The construction of a single aggregate measure that encapsulates the cyclical behaviour of a range of financial variables aids as a solution to simplify the study of aggregate financial cycles. In this light, this study contributes to the body of empirical literature on Australasian economic cycles by providing a single aggregate Australasian financial cycle measure that encapsulates the cyclical behaviour of a number of financial variables from two of the biggest economies in this region. This will provide policymakers with a single measure to consider the cyclical state of financial aggregates in Australasia. This study further contributes by modelling the aggregate Australasian financial cycle with a non-linear Markov-regime switching model and thereby establishing cyclical durations, identifying asymmetries in the cycle and identifying whether cyclical persistence exists in the cycle. Such an analysis aid in gaining a deeper understanding of the aggregate Australasian financial cycle and provide a means to improve the accuracy of predicting future movements in the financial cycle. This, in turn, could aid policymakers to manage fluctuations in the aggregate financial cycle and thereby reduce the potentially adverse effect of financial cycle fluctuations. Additionally, such information can aid in the decision-making process of economic participants, such as asset managers, risk managers and business managers, who are exposed to Australasian financial cycle fluctuations.

2. Review of Literature

Provided the definition by Ng (2011) and Borio (2014), a single variable can not sufficiently be utilised to reflect aggregate financial cycle conditions. Thus, in literature, an aggregate financial cycle measure typically comprises of several variables, see for example, Claessens, et al. (2012), Borio (2014), Aikman et al. (2015), Schüler, Hiebert and Peltonen (2015), Farrell and Kemp (2020), Menden and Proano (2017) and Strohsal et al. (2019). The debate is around which variables to include in an aggregate financial cycle measure. A number of researchers, such as Claessens, et al. (2012), Borio (2014), Aikman et al. (2015), Pontines (2017) and Farrell and Kemp (2020), indicate that aggregate financial cycles are effectively proxied by property prices and credit aggregates.

Property prices reflect information about the interplay between perceived value and risk sentiment in the economy. On the other hand, credit aggregates reflect funding availabilities and often prove to be at the core of

financial crises (Aikman et al., 2013 and Schüler et al., 2015). As argued by Aikman et al. (2013), credit expansions often result in asset price inflation and multiple expansions, whereby increases in asset prices, i.e. aggregate equity prices, diverge from their underlying fundamentals. In tandem, Farrell and Kemp (2020) write that credit aggregates and property prices create a mutually reinforcing feedback effect, whereby an expansion in credit typically result in higher property prices, and higher property prices offer higher collateral levels, which in turn typically stimulate a further credit expansion. Historically, this feedback process has resulted in some of the most serious financial build-ups and financial instabilities. In addition, evidence indicates that property price booms and credit expansions often precedes financial crises (Pontines, 2017). Therefore, jointly these two variables proxies aggregate financial cyclicality.

Aggregate equity prices are often considered as a third variable to capture perceived value and risk sentiment. However, Claessens, et al. (2012) and Drehmann et al. (2012) provide evidence that equity prices can distort the financial cycle due to their short term volatility characteristics. Therefore, this study will construct the aggregate Australasian financial cycle by means of credit aggregates and property prices. Given that an aggregate financial cycle typically comprises of more than one variable, it's necessary to aggregate these variables into a single cyclical measure. To this end, dimension reduction techniques are the most common aggregation technique implemented in financial cycle literature. Such techniques include principal component analysis (PCA) and dynamic factor modelling (DFM), see for example; Stock and Watson (2011), Stock and Watson (2011), Farrell and Kemp (2020), Adarov (2018) and Strohsal et al. (2019). A DFM model will be implemented in this study, given the ability of the DFM to incorporate lag dynamics between variables.

The body of literature on financial cycles largely focus on the properties of financial cycles. Ng (2011), Claessens, et al. (2012), Borio (2014), Aikman et al. (2015), Pontines (2017) and Farrell and Kemp (2020) consider the properties of credit, property and equity cycles, providing evidence that credit cycles and property price cycles tend to be significantly more severe and longer than the traditional business cycle. Furthermore, Claessens, et al. (2012) provide evidence that booms are driven by credit expansions typically result in relatively deeper contractions and slower recoveries. Schularick and Taylor (2012) and Jorda, Schularick and Taylor (2016) provide similar evidence.

An important consideration in economic cycle literature is economic cycle asymmetries. In this regard, research primarily focuses on business cycles where a number of researchers, such as Goodwin (1993), Layton and Katsuura (2001), Chauvet and Hamilton (2006), Tastan and Yildirim (2008), Narayan and Pop (2009) and Breitung and Eickmeier (2015), provide evidence that business cycles often exhibit asymmetries. Empirical evidence primarily indicates that cyclical contractions are typically shorter but more volatile and steeper than expanding cycles (McQueen and Thorley, 1993; Tastan and Yildirim, 2008 and Breitung and Eickmeier, 2015). Furthermore, evidence indicates that cyclical troughs are deeper than cyclical peaks (Tastan and Yildirim, 2008 and Breitung and Eickmeier, 2015).

Financial cycles might exhibit similar asymmetries, which could have both policy and modelling implications. Yet, very limited to no research has been done on financial cycle asymmetries. The identification of such asymmetries could enhance the understanding of financial cycles and thereby make a significant policy contribution as well as enhance the modelling process of financial cycles. For example, symmetric policies measures across the financial cycle might render subpar results given cyclical asymmetries. Thus, as argued by Tastan and Yildirim (2008), the presence of cyclical asymmetries could require different policy measures and magnitudes, as well as timing adjustments during different cyclical regimes (Tastan and Yildirim, 2008).

Furthermore, by definition, linear modelling procedures are unable to identify cyclical asymmetries and are therefore unable to account for such asymmetries. Therefore, modelling financial cycles with linear models might provide sub-par results (Bouali, Nasr, and Trabelsi, 2016). Hence the argument by researchers, such as Tastan and Yildirim (2008), Sarbijan (2014) and Bouali et al. (2016), to employ non-linear methods to model cycles. The Markov regime-switching model, proposed by Hamilton (1989), is widely implemented in this regard, see, for example, Simpson, Osborn and Senier (2001), Moolman (2004), Tastan and Yildirim (2008) and Bouali et al. (2016). There are four common types of asymmetries identified in cyclical research namely: asymmetry in the steepness; asymmetry in the deepness; asymmetry in the sharpness; and asymmetry in the duration of a given cyclical measure (Tastan and Yildirim, 2008). This will further be discussed in the methodology section.

The body of literature on the business cycle of Australia and New Zealand are rich. See for example Layton (1997), Crosby (2002) and Cashin and Ouliaris (2004) on the Australian business cycle and Kim, Buckle, and Hall (1994 and 1995), Hall and McDermott (2009), Chetwin (2012) and Hall, Thomson and McKelvie (2017) on the New Zealand business cycle. However, financial cycles of these countries are far less researched. To the best of my knowledge, the only published work in this regard is the work by Davies and Gai (2020) who identified the characteristics of the New Zealand financial cycle by means of a Spectral density analysis. The findings by Davies and Gai (2020) indicate that the. New Zealand financial cycle has a duration of approximately 8 years. The paper by Davies and Gai (2020) focus only on the financial cycle of New Zealand, and does not consider any cyclical asymmetries, nor does the paper estimate the financial cycle with a model that allows for a formal hypothesis testing procedure. This study aims to extend the knowledge on Australasian financial cycles.

3. Data Discussion

As discussed previously, this article will consider property prices and credit aggregates as financial cycle constituents. The real long-series property price index from the Bank of International Settlements is used as a property price proxy for both Australia and New Zealand. Furthermore, total non-financial credit is used as a credit aggregate proxy for

both Australia and New Zealand, also sourced from the Bank of International Settlements. The data frequency is quarterly and the timestamp range from 1978Q1 to 2018Q3. These measures will be aggregated into a single Australasian financial conditions index from which cycles will be extracted to represent the aggregate Australasian financial cycle.

To ensure that there are no bias loadings due to non-stationarity, the variables subjected to the DFM will be tested for unit roots by means of an Augmented Dickey-Fuller unit root test and the series will be differenced where necessary to ensure that each variable is stationary when applying the DFM (Stock and Watson, 2011). Furthermore, variables modelled with the MS-AR model will also be tested for stationarity to ensure no spurious regression. Research has shown that the standard augmented Dickey-Fuller unit root test is often sub-par when working with a time series that exhibits cycles and regime-switching properties (Nelson, Piger and Zivot, 2000). Nelson et al. (2000) suggest using the Phillips-Perron unit root test or a breakpoint augmented Dickey-Fuller unit root test, which allows for endogenous probabilistic trend fluctuations in a series when testing a cyclical series for stationarity. Therefore, a Phillips-Perron unit root test and breakpoint augmented Dickey-Fuller unit root test will be used to test the level of integration of cyclical variables to be modelled with the MS-AR model.

4. Methodology

This study will implement a dynamic factor model to aggregate the various variables into a single variable that will serve as an Australasian financial conditions index. A Christiano-Fitzgerald (CF) bandpass filter will then be implemented to extract cycles from the Australasian financial conditions index. The extracted cycle will then be modelled by means of a Markov-regime Switching autoregressive MS-AR model. Within the MS-AR model, Wald's hypothesis testing process will be implemented to test for various cyclical asymmetries, as suggested by Clements and Krolzig (2003).

4.1 The dynamic factor model

In accordance with the specification by Stock and Watson (2011), the static DFM model is specified as follows:

$$X_t = \lambda(L)f_t + e_t \quad (1)$$
$$f_t = \delta(L)f_{t-1} + v_t \quad (2)$$

Where there are N series, so X_t and e_t are (N x 1) vectors of the observable variables in the model and errors respectively. There are q dynamic factors, so f_t and v_t are (q x 1) vectors of dynamic factors and idiosyncratic disturbances, respectively. It is assumed that both e_t and v_t are uncorrelated with the factors in the model at each lead and lag innovation.

Furthermore, L is the lagged operator, and the lag polynomial matrices $\lambda(L)$ and $\delta(L)$ are (N x q) and (q x q) lag polynomial matrices, respectively. A shortcoming of the static dynamic factor model is that f_t are not directly estimated, limiting the practical usage of the results (Stock and Watson, 2011). Hence, in literature, the DFM is commonly estimated within a state-space and the Kalman filter is implemented to determine the Gaussian likelihood and identify the parameters by means of maximum likelihood (Stock and Watson, 2011). A state-space DFM model can be specified by adjusting the DFM specification in equations 1 and 2 as follow. Let p be the degree of the lag polynomial matrix $\lambda(L)$, let $F_t = \left(f_t', f_{t-1}', \ldots, f_{t-p}'\right)'$ denote an r x 1 vector, and let $\Lambda = (\lambda_0, \lambda_1, \ldots, \lambda_p)$, where λ_i is the N x q matrix of coefficients on the ith lag in $\lambda(L)$. Also, let (L) be the matrix consisting of 1's and 0's, and the element of $\breve{u}$ (L) such that the static model in equations 1 and 2 is rewritten in terms of F_t

$$X_t = \Lambda F_t + e_t \quad (3)$$
$$\breve{u}(L)F_t = Gv_t \quad (4)$$

Where G is a matrix of 1's and 0's selected so that equation 2 and 4 are equal. Furthermore, it is assumed that e_t follow the following process:

$$d_i(L)e_t = \zeta_{it}, i = 1, \ldots, N. \quad (5)$$

With the assumption that ζ_{it} is independent and indirectly distributed, $N(0, \sigma_{\zeta_i}^2)$, $i = 1, \ldots, N$ and v_t is independent and indirectly distributed, $N(0, \sigma_{v_j}^2)$, $j = 1, \ldots, q$ and $\{\zeta_t\}$ and $\{v_t\}$ are independent. Given these parameters, the Kalman filter can be used to compute the maximum likelihood and to estimate the filtered values of F_t and f_t.

The Kalman filter is a recursive process constructed on the error z_t^* and factor matrix f_t^* over time. This is done by systematically updating the mean's conditional distribution $\alpha_t | F_t \sim N(a_{t|t}, P_{t|t})$ and the conditional distribution of variances $\alpha_{t+1} | F_t \sim N(a_{t+1|t}, P_{t+1|t})$ depicted in the following process as shown in the paper by Katzfuss (2016):

$$a_{t|t} = a_{t|t-1} + P_{t|t-1}H'_t F_t^{-1}v_t, \quad (6)$$
$$P_{t|t} = P_{t|t-1} + P_{t|t-1}H'_t F_t^{-1}H_t P_t, \quad (7)$$
$$a_{t+1|t} = T_t a_{t|t}, \quad (8)$$
$$P_{t+1|t} = T_t P_{t|t}T'_t + R_t \sum_\eta R'_t. \quad (9)$$

Where H_t is a (N x k) probabilistic time-varying matrix, and T_t is a (k x k) probabilistic time-varying matrix, these are also known as transition matrices. The filtered estimate of α_t is depicted in terms of $a_{t|t}$ and $a_{t+1|t}$ is the one period ahead forecast of α_t. $P_{t|t}$ shows the covariance matrix of each corresponding predicted value $a_{t|t}$. This recursive process will allow the coefficient estimations of $T_t, H_t, \sum \epsilon$ and $\sum \eta$ by means of the log-likelihood function inbuilt into the Kalman filter (Harvey, 1989). To ensure that there are no bias loadings due to non-stationarity, the variables

subjected to the DFM will be differenced where necessary to ensure that each variable is stationary (Stock and Watson, 2011). Brooks (2019) suggests that only factors with eigenvalues larger than one are worthwhile considering. The reasoning behind this is that components with eigenvalues larger than one encapsulate information of more than one variable. Hence, only common factors larger than one will be considered

As suggested by Chao and Wu (2017), the Eigenvalues and factor loadings will be used to determine the weights of each constituent towards the final Australasian financial conditions index. If there's only one factor with an Eigenvalue larger than one, the weightings will be calculated as follows (Chao and Wu, 2017):

$$W_X = \left(\frac{L_X}{\sum L_{i>0.4}}\right) * 100 \ (10)$$

Where L_X represents the factor loading exhibited by variable X_i and $\sum L_i$ is the sum of the factor loadings of all the variables with an absolute loading value greater than 0.4. The Australasian financial conditions index will then be calculated as follows:

$$Index_{AFCI} = \sum X_i (W_X) \ (11)$$

Where $Index_{AFCI}$ is the Australasian financial conditions index. The Christiano Fitzgerald Band-pass filter will be implemented to extract cycles from the Australasian financial conditions index.

4.2 Christiano Fitzgerald Band-pass filter:
The CF Band-pass filter are calculated as follows (Christiano and Fitzerald, 2003):

$$c_t = B_0 y_t + B_1 y_{t+1} + \cdots + B_{T-1-t} y_{T-1} + \tilde{B}_{T-t} y_T + B_1 y_{t-1} \ldots + B_{t-2} y_2 + \tilde{B}_{t-1} y_1 \ (12)$$

where,

$$B_j = \frac{\sin(jb) - \sin(ja)}{\pi j}, j \geq 1, and B_0 = \frac{b-a}{\pi}, a = \frac{2\pi}{p_u}, b = \frac{2\pi}{p_l}, \ (13)$$

$$\tilde{B}_k = -\frac{1}{2} B_0 - \sum_{j=1}^{k-1} B_j \ (14)$$

p_u is the lower limit of the cyclical duration and p_l depicts is the upper limit of the cyclical duration. The bandpass will range from two years to 32 years. Thus the CF filters will isolate and extract aggregate Australasian financial cycles with durations ranging from two years to 32 years. Two years is chosen as a lower band in case the aggregate Australasian financial cycle have similar durations than a typical business cycle, which typically range from two to eight years (Botha, 2006). On the other hand, empirical evidence shows that financial cycles can last up to 32 years, hence 32 years as an upper limit (Claessens et al., 2012). Cyclical movements with a duration lower than two years will be eliminated by the filters to eliminate any potential short-term noise.

4.3 Markov-regime switching autoregressive model
In literature, MS-AR models are often categorised by means of their regime dependent parameters (Bouali et al., 2016 and Tastan and Yildrim, 2008). The base model assumes that the mean and the variance are non-regime dependent. Such a model in this study has the following specification (Kim, 1994 and Hamilton, 1989):

$$y_t = \beta_{s1}(y_{t-1} + y_{t-2} + \cdots + y_{t-k} + x_t) + \beta_{s2}(y_{t-1} + y_{t-2} + \cdots + y_{t-k} + x_t) + \varepsilon_t \ (15)$$

Where $s_t \in \{1,2\}$ shows the regime state under consideration, k shows the optimal lag length, ε_t is a non-state dependent error term, and x_t is a vector of explanatory variables. To allow for a regime-switching mean, equation 15 can be restated as follows (Bouali et al., 2016 and Tastan and Yildrim, 2008):

$$y_t = c_{ts} + \beta_{s1}(y_{t-1} + y_{t-2} + \cdots + y_{t-k} + x_t) + \beta_{s2}(y_{t-1} + y_{t-2} + \cdots + y_{t-k} + x_t) + \varepsilon_t \ (16)$$

Where C_{ts} is a state-dependent intercept. Lastly, equation 15 can be restated to account for both a regime-switching mean and a regime-switching variance:

$$y_t - \mu_{st} = c_{ts} + \beta_{s1}(y_{t-1} + y_{t-2} + \cdots + y_{t-k} + x_t - \mu_{st-1}) + \beta_{s2}(y_{t-1} + y_{t-2} + \cdots + y_{t-k} + x_t - \mu_{st-2}) + \varepsilon_t$$
$$(17)$$

Assuming that S_t is a first-order Markov process, as done by Hamilton (1989), indicating that the current regime is a function of the previous regime S_{t-1}, then the transition probabilities of progressing from one regime to another regime can be stated as (Tastan and Yildrim, 2008):

$$p_{ij} = Pr(S_t = j | S_{t-1} = i), \sum_{j=1}^{n} p_{ij} = 1, \forall i, j \in \{1, 2, \ldots, n\} \ (18)$$

5. Results and findings
The first section will consider the characteristics of the Australian and New Zealand credit and property cycle. These measures are then aggregated and discussed. Figure 1 depicts the Australian and New Zealand property and credit cycles.

Figure 1: Australian and New Zealand property and credit cycles

Source: Author's construction

Table 1 depicts the MS-AR results for the various cyclical aggregate Australasian financial cycle factors. The regime-dependent means of both regimes, μ_{s1} and μ_{s2}, for all four cyclical measures are statistically significant at a 99% confidence level and have opposite signs. This indicates that the point estimates of the mean in each regime differ significantly from each other, supporting the assumption that each one of these cyclical measures is characterised by two distinct regimes (Li, Lin and Hsiu-Hua, 2005 and Layton and Katsuura, 2001). This provides justification for the implementation of non-linear techniques to estimate these cycles. Provided that $\mu_{s1} > \mu_{s2}$, whereby μ_{s1} is positive and μ_{s2} is negative, regime one can be interpreted as the growth or expanding regime of these cycles and regime two as the corrective or contracting regime (Tastan and Yildirim, 2008).

Table 1: Estimation outputs for Australian and New Zealand credit and property cycles

Variable	Australian credit cycle	Australian property cycle	New Zealand credit cycle	New Zealand property cycle
μ_{s1}	0.038***	0.053***	0.155***	0.085***
μ_{s2}	−0.049***	−0.070***	−0.222***	−0.077***
$\beta_{1s1t-1}\text{AR}(1)$	1.006***	1.495***	1.633***	1.531***
$\beta_{2s1}\text{AR}(2)$	0.746***	1.174***	−0.979**	1.134***
$\beta_{3s1}\text{AR}(3)$		−0.977**		−1.177***
$\beta_{1s2}\text{AR}(1)$	1.538***	0.865**	1.048**	2.038***
$\beta_{2s2}\text{AR}(2)$	0.965***	−0.642**	0.489**	0.748**
$\beta_{3s2}\text{AR}(3)$	−0.665**	0.977**		−0.827**
σ_{s1}	−7.076***	−7.831***	−6.034***	−3.523***
σ_{s2}	−7.455***	−8.198***	−6.919***	−2.764***
Transition Matrix Parameters				
P11-C	2.583***	3.508***	3.174***	2.751***
P21-C	−2.908***	−3.014***	−2.594***	−2.858***
Typical duration (in quarters)				
Regime 1	31.620	28.382	24.910	16.662
Regime 2	29.514	21.359	14.380	18.429

Full cyclical duration	60.710	49.740	39.290	35.091
Transition probabilities				
p_{11}	0.930	0.971	0.959	0.939
p_{12}	0.070	0.029	0.042	0.060
p_{22}	0.948	0.953	0.930	0.946
p_{21}	0.052	0.047	0.070	0.054

, and * denote statistical significance at a 95%, and 99% confidence level, respectively, based on p-values.
Source: Author's calculation

Furthermore, the variance parameters, σ_{s1} and σ_{s2} of all four cycles are statistically significant with varying magnitudes across regimes. In absolute terms, the variance parameters of the Australian and New Zealand credit cycle, as well as the Australian property cycle prove to be larger during a contraction relative to an expansion. Thus indicating that contractions in these cycles are more volatile than expansions. In contrast, the New Zealand property cycle proves to be more volatile during an expansion relative to a contraction given that $\sigma_{s1} < \sigma_{s2}$ in absolute terms (Kuan, 2002).

Statistically significant AR terms for all four cycles provide evidence that preceding periods in these cycle significantly affect the current state of these cycles. This is the case for both expanding and contracting regimes. Positive AR terms, particularly AR(1) terms, suggests that a level of linear presence exist in these cycles from one quarter to the next (Kuan, 2002). This corresponds to the transition probabilities, p_{11} and p_{22}, which provide evidence that the conditional probability of remaining in either an expansion or contracting regime is larger than transitioning to another regime, reflected by p_{12} and p_{21}.

Furthermore, the results indicate that an expansion in the Australian credit cycle typically lasts 31.2 quarters and a contraction lasts 29.51 quarters. Thus, a full cycle lasts an estimated 60.71 quarters. An expansion in the Australian property cycle typically lasts 28.38 quarters and a contraction lasts 21.36 quarters. Thus, a full cycle lasts an estimated 49.74 quarters. An expansion in the New Zealand credit cycle typically lasts 24.91 quarters and a contraction lasts 14.38 quarters. Thus, a full cycle lasts an estimated 39.29 quarters. An expansion in the New Zealand property cycle typically lasts 16.66 quarters and a contraction lasts 18.43 quarters. Thus, a full cycle lasts an estimated 35.09 quarters.

The results indicate that, with the exception of the New Zealand property cycle, expansions typically last longer than contractions in these cycles. Furthermore, the Australian credit cycle proves to exhibit the longest cyclical durations, where a full cycle typically lasts 60.71 quarters, or 15 years and 2 months. This is longer than the typical business cycle, aligning with the findings by Claessens, et al. (2012), Borio (2014), Aikman et al. (2015), Pontines (2017) and Farrell and Kemp (2020).

5.1 The aggregate Australasian financial cycle
Table 2 depicts the outputs rendered by the dynamic factor model. The results indicate that only the first factor has an Eigenvalue larger than 1, therefore, only the factor loadings onto factor one will be considered. The first factor captures about 69% of the variance between the various aggregate Australasian financial Measures. This is in line with the suggested appropriate level of 50% by Breitung and Eickmeier (2005), and the suggested level of 55% by Ng (2011). This provides evidence that there is a significant portion of the fluctuations between the various financial components that are systemic or syncretic. Thus, these variables can be well represented by a single measure, for example, an index.

Table 2: Dynamic factor outputs

Eigenvalues of factors			
Factor one	**Factor two**	**Variance explained by factor one**	
3.165	0.951	69.146%	
Factor loadings			
Variable	**Loading**	**Weighting**	
Australian credit measure	0.753	30.810%	
New Zealand credit measure	0.642	26.268%	
Australian property measure	0.575	23.527%	
New Zealand property measure	0.474	19.394%	

Source: Author's calculation

Furthermore, the results indicate that the Australian credit measure has the largest factor loading and will constitute 30.81% towards the Australasian financial conditions index, which is the largest contribution towards this index. This is

followed by the New Zealand credit measure which contributes 26.268% towards the index. Australian credit levels are thus the strongest underlying driver of the Australasian financial conditions index, and ultimately the strongest driver of the aggregate Australasian financial cycle. Figure 2 depicts the Australasian financial cycle.

Figure 2: the Australasian financial cycle

Australasian financial cycle
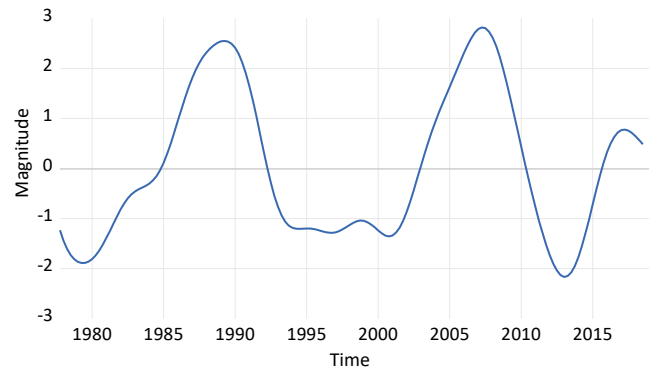
Source: Author's construction

Table 3 depicts the estimated MS-AR outputs for the Australasian financial cycle. The significant difference in the mean and variance across regimes justifies the use of a non-linear model. Similar to the other cyclical measures considered previously, given that $\mu_{s1} > \mu_{s2}$, regime one represents a growth or expanding regime in the aggregate Australasian financial cycle and regime two represents a corrective or contracting regime (Tastan and Yildirim, 2008). The results also indicate that a contracting regime is slightly more volatile than an expanding regime, given that $\sigma_{s1} < \sigma_{s2}$ in absolute terms. Therefore, similar to the research on business cycles, such as the findings by McQueen and Thorley (1993), Tastan and Yildirim (2008) and Breitung and Eickmeier (2015), contractions in the Australasian financial cycle prove to be more volatile than expansions.

Table 3: MS-AR estimation output for the Australasian financial cycle

Variable	The aggregate Australasian financial cycle		
μ_{s1}	0.019		
μ_{s2}	−0.014		
$\beta_{1s1t-1}\text{AR}(1)$	1.450		
$\beta_{2s1}\text{AR}(2)$	0.965		
$\beta_{1s2}\text{AR}(1)$	1.519		
$\beta_{2s2}\text{AR}(2)$	0.935		
σ_{s1}	−4.022		
σ_{s2}	−4.739		
Transition Matrix Parameters			
P11-C	2.928		
P21-C	-2.709		
Typical duration (in quarters)			
Regime 1	24.835		
Regime 2	19.700		
Full cyclical duration	44.535		
Transition probabilities			
p_{11}	0.949		
p_{12}	0.041		
p_{22}	0.938		
p_{21}	0.073		
Wald hypothesis testing asymmetry results			
Asymmetry	**Sign**	**Null hypothesis**	**P-value**

Sharpness	N/A	$H_0: p_{12} = p_{21}$	0.031**
Deepness	Positive	H_0: Non-deepness	0.002***
Steepness	Negative	H_0: Non-steepness	0.071*

, and * denote statistical significance at a 95%, and 99% confidence level, respectively, based on p-values.
Source: Author's calculation

The results further provide evidence of linear persistence in both regimes, given the positive and significant autoregressive terms. Thus, a positive movement in either regime will typically result in positive movements in the proceeding two quarters. This is substantiated by the transition probabilities, p_{11} and p_{22}, which provide evidence that the conditional probability of remaining in either an expansion or contracting regime is larger than transitioning to another regime, reflected by p_{12} and p_{21}. This shows that self-reinforcing forces exist in the cycle. The results indicate that expansions in the aggregate Australasian financial cycle typically exhibit a duration of 24.835 quarters, or 6 years and 3 months, and contractions a duration of 19.700 quarters, or 4 years and 11 months. Thus, the typical duration of an entire cycle from peak to peak or trough to trough is 44.535 quarters, or 11 years and 2 months.

The Australasian financial cycle typically exhibits a duration longer than the business cycle, where the duration of business cycles typically range from two to eight years (Strohsal et al., 2019 and Schüler et al., 2019). This corresponds with findings in the literature that financial cycles typically have longer durations than business cycles, see for example Ng (2011), Claessens, et al. (2012), Borio (2014), Aikman et al. (2015), Pontines (2017) and Farrell and Kemp (2020). It also shows that the duration of expansions in the cycle typically has a duration that is one year and four months longer than contractions. The Australasian financial cycle thus exhibits a level of cyclical duration asymmetry and corresponds with literature that provides evidence that cyclical expansions last longer than contractions, see for example McQueen and Thorley (1993), Tastan and Yildirim (2008) and Breitung and Eickmeier (2015).

Furthermore, the bottom part of Table 3 depicts the results from the Wald hypothesis testing process conducted in the MS-AR model, to test for Sharpness, deepness and steepness asymmetries in the aggregate Australasian financial cycle. This is done in accordance with Clements and Krolzig (2003). Firstly, the non-sharpness test provided a p-value of 0.031, the null hypothesis is therefore rejected at a 95% confidence level. Therefore $p_{12} \neq p_{21}$ and the probability of moving from a contraction to an expansion, with a 7.3% probability, is larger than moving from an expansion to a contraction, with a 4.1% probability. A sharpness asymmetry thus exists in the aggregate Australasian financial cycle.

Secondly, the non-deepness test has a p-value of 0.002 with positive skewness, thus, the null hypothesis of non-deepness are rejected at a 99% confidence level. This provides evidence that peaks in the aggregate Australasian financial cycle are typically higher than troughs. This finding contrasts the general findings in business cycle literature which suggests that troughs are deeper than peaks (McQueen and Thorley, 1993; Tastan and Yildirim, 2008 and Breitung and Eickmeier, 2015). This could be due to the extended duration of financial cycles relative to business cycles. Lastly, the non-steepness test has a p-value of 0.071 with a negative skewness, thus, the null hypothesis of non-steepness are rejected at a 90% confidence level. Therefore, the slope of contractions in the aggregate Australasian financial cycle is typically steeper than the slope of expansions.

6. Conclusion
This study aimed to construct and characterise the aggregate Australasian financial cycle. To this end, a dynamic factor model and a Markov-regime switching model were implemented. This study contributes by providing a single aggregate financial cycle measure that could be used to simplify the analysis of Australasian financial cycles. Furthermore, this study contributes by being the first academic study to construct and holistically analyse both the financial cycle of Australia and New Zealand, adding to the current understanding of financial cycles. In addition, this study contributes by modelling the Australasian financial cycle with a non-linear Markov Regime-Switching model. This provides a formal econometric approach to characterise the cycle and identifying asymmetries in the cycle.

The main findings in this study are that levels of Australian credit aggregates, followed by New Zealand credit aggregates, are the primary underlying driver of aggregate Australasian financial conditions. The Australian credit cycle exhibits the longest duration, followed by the Australian property cycle, the New Zealand credit cycle and lastly, the New Zealand property cycle, with typical durations of 61 quarters, 50 quarters, 39 quarters and 35 quarters respectively. The typical duration of a full cyclical movement in the aggregate Australasian financial cycle is about 45 quarters, with expansions typically exhibiting durations of 25 quarters and contractions typically exhibiting durations of 20 quarters. Contractions in the aggregate Australasian financial cycle tends to be more volatile, with steeper slopes than expansions. Furthermore, expansions tend to have a larger magnitude than contractions.

From these findings, several policy recommendations can be derived. Firstly, given that Australian credit levels are the primary underlying driver of financial conditions in this economic area, policymakers should pay particular attention to the Australian credit cycle. This cyclical measure, in correspondence with its characteristics, could be utilised to identify potential financial build-ups. Secondly, given the relatively longer durations exhibited by the aggregate Australasian financial cycle, policies targeted at financial cycle control, such as macroprudential policies,

should adjust less frequently than policies aimed at business cycle control. Thirdly, asymmetries in the aggregate Australasian financial cycle require adjusted policy strategies, as well as adjustments in the timing of policy implementations during different cyclical regimes.

The asymmetrical duration in the aggregate Australasian financial cycle requires restrictive cyclical policies to be employed for longer periods than accommodative policies. Steeper contractions relative to expansions, accompanied by more volatility, necessitates a relatively quicker and stronger expansionary policy response during a contracting regime relative to restrictive policies during an expansion. This is due to the harshness and speed of a contraction. The deepness asymmetry in the aggregate Australasian financial cycle, whereby peaks exhibit a larger magnitude than troughs, could indicate that policymakers allow financial expansions to go too far. This, in turn, might partly contribute to the relatively harsh contractions exhibited by the cycle. Policymakers should consider implementing restrictive policies sooner in the expansion phase in order to limit unsustainable build-ups and thereby reducing the harshness of a contraction.

References

Adarov, A. (2018). Financial Cycles Around the World. Working paper 145, Vienna Institute of International Economic Studies.

Aikman, D., Haldane, A.G, & Nelson, B.D. (2015). Curbing the Credit Cycle. The Economic Journal, 125(85), pp. 1072-1109.

Borio, C. (2014). The Financial Cycle and Macroeconomics: What have we Learnt? Journal of Banking and Finance, 45, pp.182-198.

Bouali, M., Nasr, A.B. & Trabelsi, A. (2016). A Nonlinear Approach for Modelling and Forecasting US Business Cycles. International Economic Journal, 30, pp. 39-74.

Breitung, J. & Eickmeier, S. (2016). Analyzing international Business and Financial Cycles Using Multi-Level Factor Models: A Comparison of Alternative Approaches. Advances in Econometrics, 35, pp. 177-214.

Brooks, C. (2019). Introductory Econometrics for Finance, 4th edition. Cambridge University Press, Cambridge.

Cashin, P & Ouliaris, S. (2004). Key features of Australian business cycles. Australian Economic Papers, 43, pp. 39-58.

Chao, Y. & Wu, C. (2017). Principal Component-Based Weighted Indices and a Framework to Evaluate Indices: Results from the Medical Expenditure Panel Survey 1996 to 2011. PLOS One, 12(9), pp. 1-20.

Chauvet, M. & Hamilton, J. (2006). Dating business cycle turning points. Milas, C., Rothman, P. and van Dijk, D., Nonlinear Time Series Analysis of Business Cycles, Elsevier, Amsterdam, pp. 1-53.

Chetwin, W. (2012). Business cycle review, 1998-2011. Reserve Bank of New Zealand Bulletin, 75, pp. 14-27.

Christiano, L. & Fitzerald, T. (2003). The Band-Pass Filter. International Economic Review, 44(2), pp. 435-465.

Claessens, S., Kose, M.A. & Terrones, M.E. (2012). How do Business Cycles and Financial Cycles Interact", Journal of International Economics, 87, pp. 178-190.

Clements, M.P. & Krolzig, H.M. (2003). Business cycle asymmetries: Characterization and testing based on Markov-switching autoregressions, Journal of Business and Economic Statistics, 21, pp. 196-211.

Crosby, M. (2002). The Australian Business Cycle: Joe Palooka or Dead Cat Bounce. Australian Economic Papers, 41, pp. 191−207

De Wet, M.C. & Botha, I. (2019). Characterising cycles exhibited by important financial sections in the South African economy. Journal of Economic and Financial Sciences, 12, a433. https://doi.org/ 10.4102/jef.v12i1.433

Drehmann, M., Borio, C. & Tsatsaronis, K. (2012). Characterising the Financial Cycle: Don't Lose Sight of the Medium Term. Working Paper: BIS, Monetary and Economics Department, No. 360.

English, W., Tsatsaronis, K. & Zoli, E. (2005). Assessing the predictive power of measures of financial conditions for macroeconomic variables. BIS Papers 22, pp. 228−252.

Farrell, G. & Kemp, E. (2020). Measuring the Financial Cycle in South Africa. South African Journal of Economics, 88, 2, pp. 123-144

Goodwin, T. (1993). Business-cycle analysis with a Markov-switching model. Journal of Business Economics and Statistics, 11(3), pp. 331−339.

Hall, V.B., & McDermott, C.J. (2009). The New Zealand business cycle. Econometric Theory, 25(4), pp. 1050-1069

Hamilton, J. D. (1989). A new approach to the economic analysis of nonstationary time series and the business cycle. Econometrica, 57, pp. 357-384.

Harvey, A.C. (1989). Forecasting, Structural Time Series Models and the Kalman Filter. Cambridge University Press: Cambridge.

Jorda, O., Schularick, M & Taylor, A. (2016). The great mortgaging: housing finance, crises and business cycles. Economic Policy, 85(31), pp. 107-152.

Katzfuss, M. (2016). Understanding the Ensemble Kalman Filter. The American Statistician, 70(4), pp. 350-357.

Kim, K., Buckle, R.A., & Hall, V.B. (1994). Key Features of New Zealand business cycles. Economic Record, 70(20), pp. 56-72.

Kim, K., Buckle, R.A., & Hall, V.B. (1995). Dating New Zealand business cycles. New Zealand Economic Papers, 29, pp. 143-171.

Korinek, A. (2017). Regulating Capital Flows to Emerging Markets: An Externality View. Journal of International Economics, 111, pp. 61-80.

Layton, A.P. & Katsuura, M. (2001). A New Turning Point Signaling System Using the Markov Switching Model with Application to Japan, the USA and Australia. Applied Economics, 33, pp. 59-70.

Layton, A.P. (1997). A New Approach to Dating and Predicting Australian Business Cycle Phase Changes, Applied Economics, 29, pp. 861−868.

Li, M.L., Lin, H.W. & Hsiu-Hua. (2005). The Performance of the Markov-Switching Model on Business Cycles Identification Revised, Applied Economic Letters, 12, pp. 513-520.

McQueen, G., & Thorley, S. (1993). Asymmetric business cycle turning points, Journal of Monetary Economics, 31, pp. 341−62.

Menden, C. & Proano, C.R. (2017). Dissecting the Financial Cycle with Dynamic Factor Models, working paper 183, Monetary Policy Institute, University of Bamberg.

Moolman, E. (2004). A Markov Switching Regime Model of the South-African Business Cycle, Economic Modelling, 21, pp. 631-646.

Narayan, P.K. & Pop, S. (2009). Investigating Business Cycle Asymmetries for the G7 Countries: Evidence from Over a Century of Data. International Review of Economics and Finance, 18, pp. 583-591.

Ng, T. (2011). The predictive content of financial cycle measures for output fluctuations, Bank for International Settlements, quarterly bulletin.

Pontines, V. (2017). The Financial Cycle in Four East Asian Economies, Economic Modelling, 65, pp. 51-66.

Sarbijan, M.S. (2014). Modelling Business Cycles with Markov Switching ARMA (Ms-Arma) Model: An Application on Iranian Business Cycles, International Journal of Management, Accounting and Economics, 3, pp. 201-214.

Schularick, M. & Taylor, A. (2012). Credit booms gone bust: monetary policy, leverage cycles and financial crisis, 1870-2008. American Economic Review, 102(2), pp. 1029-1061.

Schüler, Y.S., Hiebert, P.P. & Peltonen, T.A. (2015). Characterising the Financial Cycle: a Multivariate and Time-Varying Approach, working paper 1846. European Central Bank.

Simpson, P.W., Osborn, D.R. & Senier, M. (2001). Modelling Business Cycle Movements in the UK Economy, Economica, 69, pp. 243-267.

Stock, J. & Watson, M.W. (2011). Dynamic Factor Models, Clements, M.P.and Hendry, D.F. Oxford Handbook on Economic Forecasting, Oxford University Press, Oxford.

Strohsal, T., Proaño, C.R. & Wolters, J. (2019). Characterizing the Financial Cycle: Evidence from a Frequency Domain Analysis, Journal of Banking and Finance, 106, pp. 568-591.

Tastan, H. & Yildirim, N. (2008). Business cycle asymmetries in Turkey: an application of Markov-switching autoregressions, International Economic Journal, 22(3), pp. 315–333.

Corporate Governance, CEO Compensation and accounting conservatism

Pakamas Srichoke [2], Georgios Georgakopoulos [3], Alexandros Sikalidis[1,2,4], Athina Sotiropoulou [5]

[2] *University of Amsterdam, Amsterdam Business School, Plantage Muidergracht 12, 1018 TV, Netherlands*
[3] *Agricultural University of Athens, Iera Odos 75, Athens 118 55, Greece*
[4] *International Hellenic University, 14th km Thessaloniki- Nea Moudania 57001, Greece*
[5] *University of Patras, University Campus, 26504 Rio Achaia, Greece*

ARTICLE INFO	ABSTRACT
Article History Received 22 April 2021; Accepted 19 July 2021 *JEL Classifications* G3, M12, M4	**Purpose**: This study examines the moderating impact of corporate governance quality on the relation between CEO bonus compensation and accounting conservatism. **Design/methodology/approach:** We use market-based and accrual-based measures to estimate accounting conservatism. According to prior literature (Core, Holthausen and Larcker, 1999; Bhojraj and Sengupta, 2003; Rees and Rodionova, 2015), agency and managerial self-interest theory state that corporate governance strength can mitigate the negative relation between CEO bonus compensation and accounting conservatism. **Finding:** Our sample consists of S&P 500 companies while our empirical findings suggest that CEO bonus compensation and accounting conservatism are positively associated. **Research limitations/implications:** Thus, our results do not provide clear evidence about the direction of the effect of strong corporate governance. Both measures of accounting conservatism do not give significant relations, therefore the results about corporate governance strength are contradicting. The results hold the same after controlling for industry-specific effects. **Originality/value:** The purpose of this study is to shed light to the literature of accounting conservatism, corporate governance and CEO compensation. Furthermore, this research examines the current situation of corporate governance and motivates future improvement of corporate governance mechanisms.

1. Introduction

The role of corporate governance is very important and it includes the monitoring of managers' behavior and the protection of shareholders' interests to maximize their profit (Bhojray & Sengupta, 2003; Luo & Salterio, 2014). Nevertheless, existing literature criticizes the implementation of corporate governance in organizations as the current corporate governance mechanisms lack effectiveness and efficiency (Shleifer & Vishny, 1997; Luo & Salterio, 2014). The agency theory states that managers make decisions motivated by their own motives and they do not take into account shareholders' interests due to information asymmetry. We have to examine the effectiveness of strong corporate governance on moderating the incentives that managers have to increase their own wealth (Watts & Zimmerman, 1978).

Givoly and Hayn (2000) state that accounting conservatism and financial reporting are increasing over time. Basu (1997) examines conservatism in earnings and his primary goal is to shed light to accounting accruals. His results suggest that the sensitivity of earnings is two to six times higher to negative returns than to positive returns. Prior literature indicates the differences in international level of corporate governance and the association with conservative reporting (e.g. Ball, Kothari & Robin, 2000).

Prior research also examines the association between corporate ownership structure and the information that earnings provide (Fan & Wong, 2002). Core et al. (1999) analyze the effect of corporate governance structure on CEO compensation and firm performance. Their results indicate that organizations with weaker corporate governance face greater agency problems, higher levels of CEO compensation and their performance is relatively poor. This study examines the impact of corporate governance strength on the relation between accounting conservatism and CEO compensation. The contribution of this study concerns accounting conservatism, CEO compensation and corporate governance.

Building on existing literature, the agency theory (Jensen & Meckling, 1976; Bris & Cantale; 2004) and the managerial self-interest assumption (Watts & Zimmerman, 1978; Guth & MacMillan; 1986), a negative relationship is expected between earnings-based CEO compensation and accounting conservatism. CEOs have motives to over value firm's value to receive a higher bonus due to the fact that their compensation is earnings-based. Overvaluation of net asset or net income has negative impact on firms as it can possibly reduce stock price. The contribution of corporate governance is very important because it can moderate agency problems and reduce agency costs for the organization (Core et al., 1999; Bhojraj & Sengupta, 2003; Rees & Rodionova, 2015). Thus, we hypothesize that the stronger the corporate governance strength, the smaller the agency problem. The measure of corporate governance strength is corporate governance pillar scores from the Thomson Reuters ASSET4 ESG. The agency conflict of this study is captured by the negative relation between earnings-based CEO compensation and accounting conservatism.

During the past years financial crisis and scandals of international companies (Enron, WorldCom) resulted to increased attention to corporate governance and CEO compensation. Agrawal and Chadha (2005) examine the relation between corporate governance features and the likelihood of organizational restatement of earnings. Berry, Fields and Wilkens (2006) examine several functions of corporate governance and specifically they focus on the interaction between insider ownership, board composition, organizational compensation structure and unaffiliated block ownership. Prior research indicates that accounting conservatism is increasing through the years (Givoly and Hayn, 2000) while extensive literature examines the factors that have an impact on conservative reporting in accounting (e.g. Watts, 2003; Ball et al., 2000).

The contribution of this study is multiple. First of all, this empirical research contributes to the academic literature as it examines the mitigating impact of corporate governance strength on the relation between earnings-based CEO compensation and accounting conservatism. Second, this study contributes from a societal point of view. We examine the impact of current state of corporate governance on the relation between accounting conservatism and CEO compensation and its implications on future improvement of corporate governance. Corporate governance reform attracted global attention during the previous years (Porta, Lopez-de-Silanes, Shleifer, & Vishny, 2000). According to Kirkpatrick (2009) financial crisis provides plenty information to analyze the dysfunctions of corporate governance. Financial crisis of 2008, corporate failures and scandals have changed the financial market significantly. Therefore, the attention on corporate governance mechanisms and corporate governance reform has increased. For this reason, Matsumura and Shin (2005) suggest future research about CEO compensation reform and the related corporate governance reform. Third, from an organizational and shareholder point of view, shareholders may invest more on corporate governance reform in case that the empirical results indicate that the current form of corporate governance has several dysfunctions. The reason why shareholders may invest on corporate governance reform is that they intend to protect their interests and they want higher levels of market performance (Tuschke & Sanders, 2003). Fourth, from a debtholders perspective, the awareness of low quality corporate governance could lead to very thorough examination of the company before they make an investment decision to avoid 'bad' investment decisions.

Overall, the contribution of this research is the critical evaluation of corporate governance mechanisms and the stimulation of future improvements in the characteristics of corporate governance.

2. Literature review

2.1 Accounting Conservatism

Prior research indicates the continuous increase of accounting conservatism (Givoly and Hayn, 2000). Managers, investors and accountants prefer measurement errors that are due to understatements rather than overstatements of organization's net asset and net income (FASB Statement of Concepts No.2). In the empirical research there is not a common definition of accounting conservatism. A "classic" definition of the accounting conservatism is; "anticipating no profit, but anticipate all losses" (Bliss, in Watts, 2003, p. 208). FASB in the Statement of Concepts No. 2 defines accounting conservatism as; "a prudent reaction to uncertainty to try to ensure that uncertainty and risk inherent in business situation are adequately considered". The academic literature often uses the following definition for accounting conservatism; "the accountant's tendency to require a higher degree of verification for recognizing good news than bad news in financial statements" (Basu, 1997, p. 4). According to Guay and Verrecchia (2006) accounting conservatism is defined as; "more timely recognition of losses than gains as a result of the costs and benefits of reporting verifiable information by managers and/or firms being asymmetric" (p. 149).

Watts (2003) indicates four explanations for conservatism that are confirmed by Bushman and Piotroski (2006). First, the *contracting explanation* states that accounting conservatism is used to face moral hazard problems in a company. Information asymmetry, asymmetric pay-offs, limited ability and limited horizon between several parties in the company generate these

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problems. The compensation contract belongs in this type of problems (Watts, 2003). Watts, 2003 indicates that managers are less probable to over value net income and net assets for their own interests.

The *litigation explanation* is based on the litigation cost that managers face if they over value earnings and assets. Therefore, managers tend to understate net income to avoid high litigation costs. Thirdly, the *income tax explanation*, focuses on the association between reporting income and taxable income since the higher the reporting income, the higher the taxable income. Accounting conservatism in financial reporting results in reduced income and thus, to lower taxes. According to Watts (2003) the *regulation explanation* indicates that losses from overvaluation tend to be more noticeable from political processes than gains from underestimation. Therefore, regulators and standard setters tend to make decisions taking into account accounting conservatism. On the other hand, according to Ahmed, Billings, Morton, and Stanford-Harris, (2002) accounting conservatism enables company to reduce debt costs. Furthermore, it has a moderating role in the dividend policy conflict between bondholder and shareholders. Firms that implement accounting conservatism have better cash flows in case that their management makes overconfident decisions (Hsu, Novoselov & Wang, 2017).

2.2 CEO Compensation
There is a lot of controversy concerning relatively high CEO compensation. Specifically, high CEO compensation raises concerns about ethical issues and the accountability of a firm. Regulators, corporate governance and society examine thoroughly CEO compensation. The Sarbanes Oxley Act (SOX) that was implemented in 2002 is an effort to diminish these concerns. The period after the implementation of SOX is characterized by lower incentive compensation and decisions that include risk (Cohen, Dey & Lys, 2004).

In U.S, the compensation of managers is a result of negotiations with the CEO (Bushman, Indjejikian & Smith, 1996). The negotiations concern the incentive and the salary of the manager. The incentive that depends on CEO performance has two factors: a bonus that is received on annual basis and a long-term plan. Existing literature suggests that corporate performance and CEO compensation are positively related, and vice versa (Smirnova & Zavertiaeva, 2017). According to Healy (1985) earnings-based bonus schemes is a very important means of reward for firms' executives. Companies can achieve several goals by using compensation. Compensation mitigates the conflict of interests between shareholders and executive managers (Gillan, 2006). Nevertheless, stock options (equity-based compensation) are often associated with fraud in companies (Denis, Hanouna, & Sarin, 2006). Furthermore, managers overestimate net income of the company to achieve the annual bonus. Prior research indicates that more powerful CEOs receive higher ex-ante bonus and they achieve greater amount of non-financial performance targets (Bachmann, Loyeung, Matolcsy & Spiropoulos, 2019).

2.3 Relation of CEO earnings-based bonus compensation and accounting conservatism

2.3.1 Agency Theory
The agency problem in a company is a result of information asymmetry. Bris and Cantale (2004) indicate the internal and external view of the agency problem. The external view focuses on the different interests of regulators and shareholders. The internal view analyzes the dispute between executives and shareholders. In their research, Larcker and Tayan (2011) present a similar opinion: the stakeholder and shareholder perspective. The stakeholder viewpoint focuses on the social responsibility that the managers, the company and the employees have. The shareholder viewpoint indicates that the main purpose of the firm is the maximization of shareholder's value. In this study we analyze the internal/shareholder perspective of the agency theory.

2.3.2 Managerial self-interest
Executive managers make decisions about investments, finance and operations of a company. Furthermore, they have the authorization to select accounting methods (Larcker & Tayan, 2011). Managers can provide unbiased accounting by reporting the actual performance of the company and in that way they maximize the efficiency of their contract in the company. In contrast, management executives can provide biased accounting by reporting earnings in firm's financial statements that do not capture company's actual performance. Their motive is to maximize their own wealth.

Prior literature indicates that individuals act for their own interests. Managers would lobby for accounting standards based on their own interests (Watts & Zimmerman, 1978). The results of Guth and MacMillan (1986) focus on the decisions that managers make to sabotage, change, delay or decrease the quality of organization's strategy to maximize their own wealth. The optimal contracting theory is in line with these results as well suggesting that the primary goal of management is not to achieve the maximization of shareholders' value (Bebchuk & Fried, 2003).

2.4 Corporate governance
Media's attention on corporate governance is increased during the past years due to organizations' fraudulent behavior, scandals, outrageously high management compensations and inside trading (Larcker & Tayan, 2011). The results of these companies' failures are resignation of executives, lawsuits and bankruptcy of the firm. Corporate governance can prevent these events in case that it is implemented effectively. Inadequate corporate governance raises international concerns (Khanchel, 2007). During the past decade events as Enron, WorldCom and Arthur Anderson scandals as well as SOX implementation indicate the significance of corporate governance.

According to Larcker and Tayan (2011) the responsibility of corporate governance mechanisms are to control managers' behavior, protect shareholders and diminish cost of agency. The amount of the agency costs, the ability for the control mechanism and the implementation cost of control mechanisms define whether a control mechanism is necessary or not.

Better quality of corporate governance results in better market valuation and operating performance (Klapper & Love, 2004). Effective implementation of corporate governance reduces the risk for investors and provides reasonable return to their investment (Shleifer & Vishny, 1997). Corporate governance improves the agency problem and has a positive impact on firm value (Renders & Gaeremynck, 2012).

3. Hypotheses development

3.1 CEO compensation and accounting conservatism

According to the agency theory CEOs are motivated by their own interests and therefore they make decisions to increase their wealth. CEOs tend to implement accounting practices such as overvaluation of net income and net asset to increase their earnings-based compensation. Shalev, Zhang and Zhang (2013) argue that in case that CEOs compensation is based more on earnings-based bonuses, they tend to over allocate the purchase price to goodwill when an acquisition occurs. Since amortization is not implemented in goodwill the over allocation of goodwill will result to higher post-acquisition earnings and therefore managers will receive higher bonus.

Healy (1985) examines the impact of bonus schemes on the decisions that managers make about accounting policies. Managers are motivated to make certain accounting decisions about firm's policy and accruals to receive higher compensation. Executives use accruals both for the increase of income and for the decrease of income (big bath case) as well (Healy, 1985). The use of income-decreasing accruals indicates that earnings-based component (bonus) in a CEO's compensation and accounting conservatism in financial statements are negatively associated. In contrast, income-increasing accruals indicate lower compensation for the manager. Moreover, managers tend to be less conservative in case that their compensation is mainly earnings − based (Shalev et al., 2013). Thus, they will try to get their bonus target and higher earnings-based compensation. However, literature suggests that in many cases there is positive relation between high CEO compensation and high level of accounting conservatism. Organizations adopt conservative accounting practices to inform adequately the investors and diminish the litigation risk due to recent financial crisis. Furthermore, companies could report conservatively to prevent the overvaluation that will attract government's attention. This is in line with the regulation explanation for accounting conservatism (Watts, 2003). Managers often ignore the litigation and regulation risk while they tend to make riskier decisions than other individuals in an organization (Kamalanabhan & Sunder, 1999). Making decisions that include risk is considered an important component of managerial behavior (Kamalanabhan & Sunder, 1999). March and Shapira (1987) argue that there are three conditions that encourage managers to make riskier decisions and one of them is concerns the achievement of specific performance targets. According to Rappaport (2005), managers focus on earnings in the short-term. Hence, they make decisions that increase short-term earnings based on their own interests or they aim to over value earnings in order to achieve higher short-term bonus (Watts & Zimmerman, 1978; Guth & MacMillan, 1986). According to the managerial self-interest theory (Watts & Zimmerman, 1978; Guth & MacMillan, 1986), managerial risky decisions (Kamalanabhan & Sunders, 1999; March & Shapira, 1987) and their focus on short-term earnings (Rappaport, 2005) suggest a negative relation between earnings-based CEO compensation and accounting conservatism. Therefore, we form the first hypothesis:

H_1: *Earnings-based component in a manager's compensation is negatively related with accounting conservatism.*

This phenomenon can be characterized as the agency problem. Prior literature examines CEOs compensation as a means to diminish agency problems (Bebchuk & Fried, 2003). The decision of executives to over value net income and net asset to achieve their target bonus and as a result to maximize their own wealth is in conflict with the interest of shareholders. Intentional or unintentional disclosure of overvaluation information reduces firm's share price. Therefore, it is expected to have a negative impact on the company value and shareholders.

3.2 Corporate governance and agency theory

Financial statements inform investors about firm's performance and they have a strong impact on investors' asset allocation decisions. Consequently, manager's performance and its disclosure in financial statements affect their compensation. Therefore, CEOs have the incentive to manipulate accounting numbers in financial disclosures and this leads to significant agency costs. Agency problems could be diminished with the implementation of strong corporate governance. Core et al. (1999) argue that organizations with weaker corporate governance tend to deal with agency problems. They also indicate that in companies with high manager's compensation, greater agency problems occur. Bhojraj and Sengupta (2003) find that corporate governance reduces agency costs, monitors managerial behavior and solves information asymmetry problem between the organization and lenders. Thus, company's default risk is reduced. According to Rees and Rodionova (2015) effective corporate governance mechanisms protect stakeholders' interests by mitigating agency problems and decreasing extremely high CEOs compensations. Bebchuk and Fried (2003) argue that executives receive higher compensation when CEOs are more powerful than the corporate board.

Prior research indicates that effective corporate governance is able to reduce agency problems and subsequent costs. Therefore, stronger corporate governance can mitigate the negative relation between earnings-based CEO compensation and accounting conservatism. Corporate governance strength is expected to reduce the impact of executives' compensation on

accounting conservatism. The moderating impact of corporate governance strength is positively associated with accounting conservatism. Therefore, we form the second hypothesis:

H_2: *The negative relationship between earnings-based managers' compensation and accounting conservatism is expected to be less pronounced at the presence of a high level of corporate governance.*

Stronger corporate governance mechanisms are more effective to mitigate organizations' agency problems (Bhojraj & Sengupta, 2003; Rees & Rodionova, 2015; Leventis, Dimitropoulos & Owusu-Ansah, 2013). The stronger the corporate governance mechanisms, the stronger the mitigating impact on the negative effect of CEOs earnings-based compensation on accounting conservatism. Thus, accounting conservatism increases due to the reduction of the impact of earnings-based component in a CEO's compensation on conservatism.

4. Methodology and data selection

4.1 Data selection

Archival research is used to investigate the research question and hypotheses. We use several databases to collect the data. We derive data about earnings-based CEO compensation (bonus) from ExecuComp. Compustat and Datastream databases are used to obtain data concerning accounting conservatism. Corporate governance data are extracted from ASSET4 ESG. Database research is the most appropriate methodology for this study due to the adequacy of data. The use of secondary data is very time-consuming concerning data analysis and interpretation (Saunders, Lewis & Thornhill, 2009).

The sample consists of U.S companies (S&P 500) during the years 2008 to 2013. This study examines years 2008 to 2013 to investigate the impact of the current form of corporate governance on the agency problem. The financial crisis of 2008 has attracted significant attention to the implementation of corporate governance and executive remuneration systems. The financial crisis enables the researchers to investigate the weaknesses and inefficiencies of corporate governance. This is the reason why the sample includes the year 2008.

Table 1. Sample mutations

	Firm years
Collected firm years	3000
After deleting missing values of corporate governance data	2863
After merging with financial data	2045
After merging with CEO compensation data	1865
After deleting financial institutions	1717
Total firm years for sample	1717

Table 1 presents the firm-years that are included in the sample which consists of 1717 firm year observations. Table 2 provides an overview of the industry distribution of the sample. The majority of the firms are in manufacturing followed by transportation and public utilities while the smallest amount of observations of our sample is in the mining and construction industry.

Table 2. Observations per industry

Industry	SIC	Observations	%
Mining and Construction	1000 − 1999	94	5.5%
Manufacturing	2000 − 3999	896	52.2%
Transportation and Public Utilities	4000 − 4999	277	16.1%
Wholesale Trade and Retail Trade	5000 − 5999	211	12.3%
Services	7000 − 8999	239	13.9%
Total observations		1717	100%

4.2 Empirical design

According to literature the most common measure for accounting conservatism are: the accrual-based measure (Ahmed et al., 2002; Givoly & Hayn, 2000; Ball & Shivakumar, 2005) and market-based measure (Ahmed et al., 2002; Beaver & Ryan, 2000). In this study both the accrual-based measure and the market-based measure are used to enhance the credibility of the research.

The accrual-based proxy of conservatism is *CON-ACC*. Prior literature is used to construct the measure (Givoly & Hayn, 2000; Ahmed et al., 2002). They suggest the sign and magnitude of accumulated accruals during a period of time as a proxy for accounting conservatism. Unbiased accounting procedures tend to result in net accumulative accruals with a value equal approximately to zero in the long term period. Conservatism in accounting introduces bias and therefore different

acknowledgment of gains and losses occurs. Givoly and Hayn (2000) argue that this results in persistence of negative accruals over time. Cash flows from operations exceed organization's net income. Consequently, the magnitude of negative accruals is associated with the level of accounting conservatism. Bissessur (2008) associates asymmetric recognition of gains and losses with asymmetric accruals due to the fact that future losses are completely accrued. On the contrary future profits have a higher level of recognition.

We estimate *CON-ACC* based on Ahmed et al. (2002) as following: net income before extraordinary items plus depreciation expense minus cash flows from operations deflated by average total assets. The proxy is multiplied by -1 to achieve simultaneous increase of conservatism and negative accruals. Positive *CON-ACC* indicates accounting conservatism. The relation between *CON-ACC* and accounting conservatism is positive.

The market-based proxy of conservatism is *CON-BTM (*book value divided by the market value of the company multiplied by -1*)*. The book-to-market ratio contains bias in accounting recognition and lagged accounting recognition (Beaver & Ryan, 2000). Conservative accounting results to difference between the book and market value in the biased accounting component of the ratio (Ahmed et al., 2002). Market value is consistently higher than book value due to conservatism (Beaver & Ryan, 2000). *CON-BTM* is the book value of the company divided by the market value and then multiplied by -1 (Ahmed et al., 2002). Thus, the higher the accounting conservatism is, the higher the value of the proxy is expected.

In this study we use as an independent variable the earnings-based CEO compensation, *BONUS*. This variable is measured by the bonus intensity of the compensation and it is estimated by dividing the ratio of bonus components by the total CEO compensation. Managers tend to disclose higher degree of earnings to receive higher bonus. Thus, when the *BONUS* proxy increases, the accounting conservatism is expected to decrease.

Rating and ranking companies have a significant impact on consumer, sell-side analysts and investors' behavior (Ioannou & Serafeim, 2010). Investors rely on information provided by independent companies concerning corporate governance of organizations. Corporate governance scores have a significant impact on stakeholders' perspectives about corporate governance strength and performance. To measure corporate governance strength we use corporate governance scores from Thomson Reuters ASSET4 ESG through Datastream. The moderating variable corporate governance strength is referred to as *CGSTRENGTH*. Data for more than 4000 international companies are available since 2002. These data contain environmental, social and governance (ESG) information for the companies. ESG criteria are used to rank companies by ASSET4 and are normalized using z-score into 0%-100% interval, which provides more than 1000 data items. In this study, we use the overall score concerning the pillar of corporate governance where the higher the ASSET4 values, the stronger the corporate governance strength of firms.

In this study we include several variables that can influence the relation between CEO compensation and accounting conservatism as control variables. First, we use organization's size *(SIZE:* the natural log of firm's total assets*)*. Larger firms provide more and better quality of information. Therefore, information asymmetry is relatively lower and accounting conservatism is not that necessary (Khan & Watts, 2009). However, litigation risks are higher for larger companies thus the demand for conservative accounting is increased (Khan & Watts, 2009). According to prior research of Zmijewski and Hagerman (1981) organizations' size has an impact on their accounting strategies. Sanders and Carpenter (1998) argue that size of the firm and CEO compensation are associated. Secondly, we use growth of sales *(SALESGROWTH:* the percentage of annual change of firm sales) as control variable. Agency costs and growth options are expected to have a positive relationship (Smith & Watts, In Khan & Watts, 2009). Higher sales growth indicates higher level of accounting conservatism. Prior research states that sales growth influences firm's accruals and future growth of market and this affects the conservatism measure of firm's market-to-book ratio. Murphy (1985) argues that CEO compensation has a positive association with company's performance measured by sales growth. Thirdly, leverage *(LEV:* long-term debt over total assets*)* is used as control variable. Leverage and conflicts of shareholders and debtholders interests are positively associated due to their asymmetric risk appetite (Watts, 2003). Moreover, leverage and director cash compensation are expected to be positively related (Brick, Palmon & Wald, 2006). A fourth control variable is return on assets *(ROA)* based on prior research of Ahmed et al. (2002). ROA is used to control for conservatism costs. Firms with high level of profits can afford conservative accounting more easily than firms that are not so profitable. Thus, firms with higher ROA tend to make more conservative disclosures. The last control variable that we use is litigation risk *(LITIGATIONRISK)*. Companies are expected to adopt accounting conservatism in case that they face higher litigation risk and thus, higher litigation costs (Watts, 2003). We create a dummy variable for organizations with high litigation risk. Prior research indicates that firms with the following SIC codes: 2833–2836, 3570–3577, 7370–7374, 3600–3674, and 5200–5961 have high litigation risk (Francis, Hasan, Park & Wu, 2009). According to Francis et al. (2009) an appropriate measure of litigation risk is whether an industry had plenty litigation incidences during the prior years.

4.3 Hypothesis testing

We use the following model to investigate the impact of CEO bonus compensation on accounting conservatism (H_1):

$$CON\text{-}ACC_i / CON\text{-}BTM_i = \alpha_0 + \alpha_1 BONUS_i + \alpha_2 SIZE_i + \alpha_3 SALESGROWTH_i + \alpha_4 LEV_i + \alpha_5 ROA_i + \alpha_6 LITIGATIONRISK_i + \varepsilon_i$$

We use the following model to examine the mitigating effect of corporate governance strength on the association between CEO bonus compensation and accounting conservatism (H_2):

$$CON\text{-}ACC_i / CON\text{-}BTM_i = \alpha_0 + \alpha_1 BONUS_i + \alpha_2 BONUS_i * CGSTRENGTH_i + \alpha_3 CGSTRENGTH_i + \alpha_4 SIZE_i + \alpha_5 SALESGROWTH_i + \alpha_6 LEV_i + \alpha_7 ROA_i + \alpha_8 LITIGATIONRISK_i + \varepsilon_i$$

CEO compensation and accounting conservatism are negatively related in case that the coefficient of *BONUS* (α_1) is negative. The first hypothesis is not rejected if the results are significant. The relation between CEO bonus compensation and accounting conservatism is relatively small when corporate governance strength takes high values in case that the coefficient for the interaction term *BONUS*CGSTRENGTH* (α_2) is positive. This result would indicate that accounting conservatism and corporate governance strength are positively related. If the results are significant the second hypothesis is not rejected.

5. Empirical analysis

5.1 Descriptive statistics
Table 3 shows the descriptive statistics of all the variables of our sample.
The value of mean for the variable *CON-ACC* that measures accounting conservatism is positive (.022). This is in line with the literature (Ahmed et al., 2002). A positive mean value of *CON-ACC* indicates accounting conservatism.
The value of mean of *CON-BTM* is negative (-.399) which also indicates accounting conservatism. Therefore, both variables that measure accounting conservatism provide evidence for conservatism in the sample.

Table 3. Descriptive Statistics

Variable	Mean	Median	Std. Dev.	Minimum	Maximum
CON-ACC*	0.022	0.017	0.047	-0.096	0.246
CON-BTM*	-0.399	-0.345	0.274	-1.363	0.180
BONUS	0.024	0.000	0.074	0.000	0.440
CGSTRENGTH	79.210	82.690	13.888	27.860	96.080
SIZE	23.160	23.039	1.141	20.960	26.250
SALESGROWTH	0.074	0.060	0.016	-0.357	0.675
LEV	0.226	0.212	0.154	0.000	0.750
ROA	0.076	0.070	0.068	-0.167	0.284
LITIGATIONRISK	0.260	0.000	0.441	0.000	1.000

*: numbers adjusted by the "-1" factor

The value of the average bonus component related to total CEO compensation is relatively low (2.4%). This could be due to the fact that for many years CEO compensation was zero, and this resulted to a decrease of the average rate in the sample. The average corporate governance strength is 79.210 estimated in a scale from 0-100. Corporate governance mechanisms in the companies of the sample are strong. The average annual sales growth is approximately 7.4 percent and the average return on assets is 7.6 percent. 26 percent of the companies of the sample have high litigation risk.

5.2 Pearson Correlation Matrix
We use Pearson correlation matrix to check for multicollinearity in the data. Correlations greater than .9 are multicollinearity indicators (Field, 2000). Table 4 presents the 2-tailed Pearson correlation matrix of the variables. The results in Table 4 suggest that there is no multicollinearity in our sample as all correlation values are below .9.

There is a negative correlation between *CON-ACC* and *CON-BTM*, however the relation is not significant. There is a positive correlation between the independent variable *BONUS* and *CON-ACC*. *BONUS* and *CON-BTM* are negatively correlated and their relation is significant in 0.01 level. There is a negative relation between *CGSTRENGTH* and *CON-ACC* which is significant at the 0.01 level. Furthermore, *CGSTRENGTH* is negatively related with *CON-BTM* (significant at 0.05 level) and *BONUS*, as we expected (significant at 0.01 level). The negative correlation between *CGSTRENGTH* and both conservatism measures (*CON-ACC* and *CON-BTM*) is not line with expectations. According to literature strong corporate governance mechanisms result in conservative accounting methods, however the results of correlation matrix contradict prior research. There is a negative correlation between *BONUS*CGSTRENGTH* and conservatism measures. However, the relations are not significant. On the contrary, *LITIGATIONRISK* is positively correlated with *CON-ACC* and *CON-BTM* (significant at the 0.01 level). This result is in line with prior literature suggesting that organizations with high litigation risk tend to report more conservative.

Table 4. Correlation matrix between dependent, independent and control variables

Variable	CON-ACC	CON-BTM	BONUS	CGSTRENGTH	BONUS* CGSTRENGTH	SIZE	SALES GROWTH	LEV	ROA	LITIGATION-RISK
CON-ACC	1.000									
CON-BTM	-0.020	1.000								
	0.410									
BONUS	0.050**	-0.067***	1.000							
	0.039	0.006								
STRENGTH	-0.066***	-0.050**	0.066***	1.000						
	0.006	0.039	0.006							
BONUS* CGSTRENGTH	-0.038	-0.011	-0.099***	0.153***	1.000					
	0.112	0.660	0.000	0.000						
SIZE	-0.056**	-0.277***	0.106***	0.305***	0.104***	1.000				
	0.021	0.000	0.000	0.000	0.000					
SALES GROWTH	-0.117***	0.069***	-0.013	-0.172***	0.018	-0.077***	1.000			
	0.000	0.004	0.599	0.000	0.462	0.001				
LEV	0.034	0.095***	0.000	-0.075***	-0.048**	0.111***	-0.148***	1.000		
	0.154	0.000	0.986	0.002	0.046	0.000	0.000			
ROA	-0.415***	0.463***	-0.054**	-060**	0.057**	-0.281***	0.225***	-0.249***	1.000	
	0.000	0.000	0.025	0.012	0.018	0.000	0.000	0.000		
LITIGATION-RISK	0.123***	0.113***	-0.016	0.034	0.042	-0.049**	0.101***	-0228***	0.150***	1.000
	0.000	0.000	0.508	0.162	0.085	0.041	0.000	0.000	0.000	

/**/*** Significant at 0.10/0.05/0.01 level

5.3 Regression analysis

5.3.1 Accounting conservatism and CEO bonus compensation

First hypothesis examines the relation between CEO bonus compensation and accounting conservatism measured with two methods: accrual-based method *(CON-ACC)* and market-based measure *(CON-BTM)*.

Table 5 presents the results of linear regression between accounting conservatism using the accrual-based measure and managers' bonus compensation.

We perform two multiple linear regressions presented as model I and model II. Model I performs regression only with the control variables while model II contains also the independent variable *BONUS*.

Table 5. Regression of the accounting conservatism measure CON-ACC on CEO bonus compensation

	Expectations	Model I			Model II		
		B	**Beta**	**Sig.**	**B**	**Beta**	**Sig.**
Intercept	?	0.222		(0.000)***	0.227		(0.000)***
BONUS	(-)				0.002	0.046	(0.031)**
Control variables							
SIZE	(+/-)	-0.008	-0.184	(0.000)***	-0.008	-0.189	(0.000)***
SALESGROWTH	(+)	0.000	-0.043	(0.047)**	0.000	-0.043	(0.046)**
LEV	?	-0.010	-0.032	(0.150)	-0.010	-0.031	(0.162)
ROA	(+)	-0.344	-0.492	(0.000)***	-0.343	-0.491	(0.000)***
LITIGATIONRISK	(+)	0.020	0.184	0(.000)***	0.020	0.185	(0.000)***
R²		0.241			0.243		

*/**/*** Significant at 0.10/0.05/0.01 level

In model I R² is .241 which means that control variables can explain 24% of the variance of the dependent variable (*CON-ACC*). In model II we include the independent variable *BONUS* resulting in a slightly improved R² (.243). Model II has a stronger relation to the accrual-based measure for conservative accounting than model I.

The unstandardized coefficient (β) of *BONUS* is positive and significant at the 0.05 level. This indicates that an increase in CEO bonus compensation will result in a small increase in accounting conservatism. This result is not in line with prior literature. Moreover, there is a negative relation between firm's size *(SIZE)* and accounting conservatism which is significant at the level 0.01. Therefore, an increase in firm's size will lead to a decrease in conservative reporting. Prior research also suggests that larger firms have higher quality of information environment with small degree of information asymmetry and as a result it is not necessary to implement conservative accounting to improve the information that they provide (Khan & Watts, 2009). In both models the relation between leverage and accounting conservatism is negative but not significant. Prior literature does not provide clear indications for the direction of the relationship between leverage and accounting conservatism. In both model I and model II the unstandardized coefficients for *ROA* are negative and significant at 0.01 level indicating that an increase in ROA results in a decrease of the level of accounting conservatism. This is not in line with prior literature (Ahmed et al., 2002) that argues that more profitable firms can afford the costs of the implementation of conservative accounting. In both models coefficients of *LITIGATIONRISK* are positive and significant at 0.01 level. This is in line with prior findings that indicate a positive relation between litigation risk and conservative accounting. Finally, in both models *SALESGROWTH* has a positive and significant relation with accounting conservatism. Comparing the standardized coefficients (β) of the independent variables with a significant relation it could be stated the *ROA* (β=-.491) has the strongest influence and *SALESGROWTH* (β=-.043) has the weakest influence on *CON-ACC*. To summarize, regression results do not support the first hypothesis as the relation between accounting conservatism (measured by accrual-based method) and CEO bonus compensation is positive and that contradicts our expectations.

We perform a second test to examine hypothesis 1 using the market-based measure *CON-BTM* for accounting conservatism. The results of the linear regressions are presented in table 6. We also implement two models, the first one contains only the control variables while the second contains the independent variable *BONUS* as well.

Table 6. Regression of the accounting conservatism measure CON-BTM on CEO bonus compensation

	Expectations	Model I			Model II		
		B	Beta	Sig.	B	Beta	Sig.
Intercept	?	0.291		(0.015)**	0.227		(0.021)**
BONUS	(-)				-0.006	-0.022	(0.270)
Control variables							
SIZE	(+/-)	-0.041	-0.170	(0.000)***	-0.040	-0.168	(0.000)***
SALESGROWTH	(+)	0.000	-0.022	(0.289)	0.000	-0.022	(0.289)
LEV	?	0.443	0.248	(0.000)***	0.442	0.248	(0.000)***
ROA	(+)	1.898	0.468	(0.000)***	1.895	0.467	(0.000)***
LITIGATIONRISK	(+)	0.058	0.093	0(.000)***	0.058	0.093	(0.000)***
R^2		0.296			0.297		

*/**/*** Significant at 0.10/0.05/0.01 level

In model I R^2 is .296 which means that control variables can explain 29.6% of the variance of the dependent variable (*CON-BTM*). In model II we include the independent variable *BONUS* resulting in a relatively small increase in R^2 (.297) that does not indicate a significant improvement. However, comparing the results of this regression with the regression that we used the accrual-based measure of accounting conservatism we notice an improvement of R^2 of 24%. The model using the market-based measure of conservatism has a better fitting line (goodness-of-fit) with the dataset than the model with the accrual-based measure.

The relation between CEO bonus compensation and accounting conservatism is negative but not significant. The coefficient of *SIZE* is negative and significant at 0.01 level indicating that larger firms demand lower levels of accounting conservatism. This is in line with prior literature. The relation between litigation risk and market-based measure of accounting conservatism is positive and significant as expected. The regression results for coefficients of *SIZE* and *LITIGATIONRISK* with the market-based measure of conservatism are in line with the regression results with these control variables with the accrual-based measure of conservatism. However, the coefficients of *SIZE* and *LITIGATIONRISK* are much larger when they are regressed with the market-based measure suggesting the greater impact of these control variables on market-based measure of conservatism in comparison with the accrual-based measure.

We find a positive and significant relation between accounting conservatism and both ROA as well as leverage of the firm. These results are not in line with the regression results with the accrual-based measure. The positive relation between leverage and accounting conservatism can be explained by the fact that when the leverage of a firm is increased this results to increased risk. As a result, managers decide to increase conservatism to avoid potential damages in case of an economic turndown. The positive relation between ROA and accounting conservatism is in line with the literature. Comparing the strength of the independent variables based on the significant standardized coefficients (β), it could be stated that *ROA* (β=.467) has the strongest impact and *LITIGATIONRISK* (β=.093) the weakest impact on *CON-BTM*.

To summarize, regression results do not support the first hypothesis as the relation between *BONUS* and conservatism is not significant. Regressions with market-based measure for accounting conservatism have a better fitting line with the dataset compared to the regressions with accrual-based measure for accounting conservatism. However, both regressions fail to provide evidence that there is a negative relation between conservative accounting and CEO bonus compensation. Using the accrual-based measure results in a positive relation between bonus and conservatism while using the market-based measure results in a negative however not significant relation. Therefore, we reject the first hypothesis.

5.3.2 The effect of corporate governance strength on the association between CEO bonus and accounting conservatism

To examine hypothesis 2, we use both conservatism measures, the accrual-based measure and the market-based measure. First, we conduct three multiple linear regressions by using the accrual-based measure. Table 7 reports the results of the three models. Model I contains the control variables. Model II uses the independent variables *BONUS* and *CGSTRENGTH* and model III contains also the moderating variable *BONUS*CGSTRENGTH*. The variable *BONUS*CGSTRENGTH* is the interaction term of centered variables *BONUS* and *CGSTRENGTH*. We intend to decrease multicollinearity and improve interpretation of the results by centering the variables. R^2 is .241 for the first model and .246 for the second and the third model. This indicates that in the first model around 24 percent of the variance of the dependent variable is explained by our model. Including independent variables and the moderating variable in model 2 and 3 improves slightly the results and increases the goodness-of-fit.

Model II and model III have similar results, therefore we focus on model three that contains the moderating variable. The unstandardized coefficient of *BONUS* is positive and significant at 0.10 level. This is in line with the result of table 5, which

indicates that an increase in CEO bonus will increase accounting conservatism. However, this result contradicts prior literature. Corporate governance strength (*CGSTRENGTH*) has a negative and significant relationship (0.01 level) with conservatism. The moderating variable *BONUS*CGSTRENGTH* has not a significant relation with the dependent variable. The results of control variables do not differ from these of the analysis of the first hypothesis. However, there is a change in the leverage variable. In table 5 the relation between leverage and accounting conservatism is not significant. In table 7 model III indicates that when we include the moderating variable in the regression, the relation between leverage and conservatism is negative and significant at 0.10 level. Among the independent variables with significant relation, ROA has the strongest influence on accounting conservatism (β=-.490) and leverage has the weakest influence on accounting conservatism (β=-.038). Overall, our regression results do not support hypothesis 2. Moderating variable (*BONUS*CGSTRENGTH*) and accounting conservatism are positively related, as expected, however their relation is not significant.

Table 7. Regression of the moderating variable CGSTRENGTH on CON-ACC and CEO bonus compensation

	Expectations	Model I			Model II			Model III		
		B	Beta	Sig.	B	Beta	Sig.	B	Beta	Sig.
Intercept	?	0.222		(0.000)***	0.209		(0.000)***		0.210	(0.000)***
BONUS	(-)				0.002	0.040	(0.061)*	0.002	0.041	(0.055)*
CGSTRENGTH	(+)				0.003	-0.060	(0.009)***	0.003	-0.061	(0.008)***
BONUS* CGSTRENGTH	(+)							0.000	0.012	(0.573)
Control variables										
SIZE	(+/-)	-0.008	-0.184	(0.000)***	-0.007	-0.170	(0.000)***	-0.007	-0.171	(0.000)***
SALESGROWTH	(+)	0.000	-0.043	(0.047)**	0.000	-0.054	(0.289)	0.000	-0.054	(0.014)
LEV	?	-0.010	-0.032	(0.000)***	-0.012	-0.038	(0.000)***	-0.012	-0.038	(0.089)*
ROA	(+)	-0.344	-0.492	(0.000)***	-0.341	-0.489	(0.000)***	-0.342	-0.490	(0.000)***
LITIGATIONRISK	(+)	0.020	0.184	(0.000)***	0.020	0.187	(0.000)***	0.020	0.187	(0.000)***
R²		0.241			0.246			0.246		

*/**/*** Significant at 0.10/0.05/0.01 level

We conduct a second test for the second hypothesis using as measure of accounting conservatism the market-based measure (*CON-BTM*). Again, we run three multiple linear regressions and the results are presented in models I, II, III in table 8. Model I includes the control variables, model II includes the independent variables and model III contains also the moderating variable *BONUS*CGSTRENGTH*. R² has similar values in the three models (296, .299 and .299) which implies that approximately 30 percent of the variance of the dependent variable is explained by the statistical model. R² is improved in models II and III indicating better fit of the model in the dataset when including the independent variables and the moderating variable. *BONUS* and *CON-BTM* are negatively related as we expected (β=-.005) however their relation is not significant. Corporate governance strength is positively related with conservatism (β=.013) and their relation is significant at 0.05 level. Therefore, the results of regression using the market-based measure of accounting conservatism are in line with expectations indicating that an increase in corporate governance strength increases accounting conservatism. There is a negative relation between the moderating variable *BONUS*CGSTRENGTH* and accounting conservatism (β=-.004) which is not significant. The control variables *LEV*, *ROA* and *LITIGATIONRISK* have a positive relation with *CON-BTM* at 0.01 significance level. Higher values of leverage, ROA and litigation risk result in higher degree of conservatism as we expected. Size of the company has a negative relation with conservatism (β=-.043) at a significant level at 0.01. As a result, larger firms implement lower levels of accounting conservatism. This is in line with what we expected. *SALESGROWTH* has not a significant relation with the dependent variable. With respect to the strength of the independent variables with a significant relation, ROA has the strongest impact on *CON-BTM* (β=.468) and *CGSTRENGTH* has the weakest impact on *CON-BTM* (β=.049). To summarize our results, using market-based measure of accounting conservatism do not support hypothesis 2. Moderating variable (*BONUS*CGSTRENGTH*) is negatively related with *CON-BTM* but the relation is not significant.

Table 8. Regression of the moderating variable CGSTRENGTH on CON-ACC and CEO bonus compensation

	Expectations	Model I			Model II			Model III		
		B	Beta	Sig.	B	Beta	Sig.	B	Beta	Sig.
Intercept	?	0.291		(0.015)*	0.360		(0.004)***		0.348	(0.006)***
BONUS	(-)				-0.005	-0.018	(0.385)	-0.005	-0.020	(0.339)
CGSTRENGTH	(+)				0.013	-0.046	(0.034)**	0.013	-0.049	(0.027)**
BONUS* CGSTRENGTH	(+)							-0.004	-0.019	(0.352)
Control variables										
SIZE	(+/-)	-0.041	-0.170	(0.000)***	-0.044	-0.183	(0.000)***	-0.043	-0.181	(0.000)***
SALESGROWTH	(+)	0.000	-0.022	(0.289)	0.000	-0.014	(0.509)	0.000	-0.014	(0.523)
LEV	?	0.443	0.248	(0.000)***	0.452	0.253	(0.000)***	0.451	0.253	(0.000)***
ROA	(+)	1.898	0.468	(0.000)***	1.889	0.466	(0.000)***	1.895	0.468	(0.000)***
LITIGATIONRISK	(+)	0.058	0.093	(0.000)***	0.057	0.091	(0.000)***	0.057	0.092	(0.000)***
R²			0.296			0.299			0.299	

*/**/*** Significant at 0.10/0.05/0.01 level

Hypothesis 2 examines the mitigating effect of strong corporate governance to the negative relation between CEO compensation and accounting conservatism resulting in higher degree of conservatism. Hypothesis 2 suggests a positive influence of corporate governance strength to accounting conservatism. To test this hypothesis we performed regressions using both the accrual-based measure and the market-based measure of accounting conservatism. Both measures have not significant relation with corporate governance strength. Accounting conservatism measured by the accrual-based measure is positively associated with conservatism yet the relation is insignificant. Accounting conservatism measured by the market-based measure is negatively associated with conservatism but the relation is also insignificant. As a result, we reject hypothesis 2.

5.4 Additional analysis

We perform robustness tests to our findings for hypotheses 1 and 2. Conservative reporting and CEO compensation vary across industries, which could have an impact on our results. Therefore we perform tests for industry-specific effects by estimating all variables as deviations from the industry mean (Ahmed et al., 2002). We do not use the dummy variable *LITIGATIONRISK* in our additional analysis. We classify industries according to their four-digit SIC codes. We perform within the variables industry classification. First, we calculate the mean industry for every industry in the variable. Then we estimate the variables which are adjusted for industry-effects by calculating the deviation from the industry mean. Ahmed et al. (2002) argue that variables that are adjusted for industry-specific effects improve the research concerning economic characteristics and GAAP-mandated conservatism.

The results of the additional analysis of hypothesis 1 are present in table 9. Table 9 contains both the accrual-based measure for conservatism and the market-based measure. We show the regular results next to the industry-specific results to facilitate the comparison. R² does not alter when using the accrual-based measure of conservatism. However, when we use the market-based measure of conservatism there is a minor decrease in R² (from R²= .299 to R²=.265).

The conclusions of the adjusted results are the same for the variables *BONUS, SIZE, SALESGROWTH* and *ROA*. We notice some changes in intercepts, *LEV* and *LITIGATIONRISK*. The value of intercept for both measures reverses from positive to negative after the adjustments for industry-specific effects. Therefore, accounting conservatism is negative when the value of all independent variables is zero for both measures adjusted for industry-effects. The adjusted intercept with the accrual-based measure is significant at 0.01 level and under the market-based measure is not significant.

Table 9. Additional analysis of accounting conservatism and CEO bonus compensation- Hypothesis 1

	CON-ACC		CON-BTM	
	Findings	Adj. for industry	Findings	Industry Adj.
Intercept	0.227	-0.005	0.279	-0.006
	(0.000)***	(0.000)***	(0.021)**	(0.338)
BONUS	0.002	0.002	-0.006	-0.004
	(0.031)**	(0.048)**	(0.270)	(0.492)
Control variables				
SIZE	-0.008	-0.007	-0.040	-0.034
	(0.000)***	(0.000)***	(0.000)***	(0.000)***
SALESGROWTH	0.000	0.000	0.000	0.000
	(0.046)**	(0.022)**	(0.289)	(0.592)
LEV	-0.010	-0.014	0.442	0.455
	(0.162)	(0.040) **	(0.000)***	(0.000)***
ROA	-0.343	-0.338	1.895	1.792
	(0.000)***	(0.000)***	(0.000)***	(0.000)***
LITIGATIONRISK	0.020	0.019	0.058	0.023
	(0.000)***	(0.000)***	(0.000)***	(0.065)**
R²	0.243	0.243	0.297	0.263

*/**/*** Significant at 0.10/0.05/0.01 level

When we use the accrual-based measure, the result for leverage is negative and insignificant. However, this relation is reversed to significant at the 0.05 level with the use of industry-adjusted variables. The unstandardized coefficient of litigation risk decreases from .058 to .023 indicating that when we include industry-adjusted variables the relation between *LITIGATIONRISK* and *CON-BTM* is weaker. Furthermore, the significance level of this relation also dropped the 0.01 level to the 0.05 level. The results of the additional analysis are in line with the first test conducted for hypothesis 1. The values of intercept, leverage and litigation risk have changed however there are not any changes in the variable for bonus. The results of industry-adjusted variables reject the first hypothesis as well.

Table 10 presents the results of additional analysis for hypothesis 2. After controlling for industry-specific effects we get the same results for the variables *BONUS, BONUS*CGSTRENGTH, SIZE* and *ROA*. However, the values of intercepts have changed as they reversed to negative under both measures of conservatism. When we use the market-based measure for accounting conservatism the significance level of corporate governance strength is decreased (from 0.05 to 0.10 level). Furthermore, the significance level of litigation risk under the *CON-BTM* measure decreases from 0.01 to 0.10. When we use the accrual-based measure leverage and sales growth maintain the direction of the relation however their significance level is changed. For the variable *SALESGROWTH* the significance increases from 0.05 to 0.01 level. The significance level of leverage changes from the 0.10 level to the 0.05. However, the additional analysis does not change the significance of the moderating variable *BONUS*CGSTRENGTH* to support hypothesis 2. The findings of additional analysis are in line with our initial test for hypothesis 2, so we reject H2.

Table 10. Additional analysis of moderating effect of corporate governance strength- Hypothesis 2

	CON-ACC		CON-BTM	
	Findings	Adj. for industry	Findings	Industry Adj.
Intercept	0.210	-0.005	0.348	-0.006
	(0.000)***	(0.000)***	(0.006)***	(0.349)
BONUS	0.002	0.002	-0.005	-0.003
	(0.055)*	(0.082)*	(0.339)	(0.533)
CGSTRENGTH	-0.003	-0.003	0.013	0.011
	(0.008)***	(0.009)***	(0.027)**	(0.072)*
BONUS* CGSTRENGTH	0.000	0.000	-0.004	-0.005
	(0.573)	(0.716)	(0.352)	(0.246)
Control variables				
SIZE	-0.007	-0.007	-0.043	-0.036
	(0.000)***	(0.000)***	(0.000)***	(0.000)***
SALESGROWTH	0.000	0.000	0.000	0.000
	(0.014)**	(0.007)***	(0.523)	(0.837)
LEV	-0.012	-0.016	0.451	0.462
	(0.089)*	(0.019)**	(0.000)***	(0.000)***
ROA	-0.342	-0.338	1.895	1.798
	(0.000)***	(0.000)***	(0.000)***	(0.000)***
LITIGATIONRISK	0.020	0.019	0.057	0.023
	(0.000)***	(0.000)***	(0.000)***	(0.071)*
R^2	0.246	0.246	0.299	0.265

*/**/*** Significant at 0.10/0.05/0.01 level

To summarize the results of our additional analysis after controlling for industry-specific effects we conclude that our hypotheses are rejected. The regressions with industry-adjusted variables result in a reverse in intercept values from positive to negative. We also notice changes in the significance level of several independent variables. There is a slight deviation of unstandardized coefficients of some variables from the first regression. Even though we maintain our conclusions for the hypotheses of our study, the results are not entirely robust in another setting.

6. Conclusions, limitations and recommendations

The recent economic crisis, scandals and corporate failures like these of Enron and WorldCom drew global attention to the implementation of corporate governance. Corporate governance mechanisms aim to monitor management's behavior, protect the interests of shareholders and diminish agency problems. Prior literature argues that strong corporate governance has a moderating effect on agency problems. However, there are conflicts about effectiveness and efficiency of current corporate governance systems. A worldwide concern is expressed about corporate governance (Khanchel, 2007).

The purpose of this paper is to examine the mitigating impact of corporate governance strength on the agency problem. The form of the agency problem that we investigate is the relation between CEO bonus compensation and conservative accounting. Our sample contains S&P 500 firms for the years 2008-2013 to analyze the impact of strong corporate governance on the association between CEO bonus compensation and accounting conservatism. We use two proxies to measure accounting conservatism: the accrual-based measure and the market-based measure. First, we examine the relation between CEO bonus compensation and accounting conservatism. Taking into account the agency theory and the managerial self-interest theory a negative relation is expected. Information asymmetry in a company enables managers to make decisions for their own interest. Therefore, managers prefer to over value net income or net assets and make decisions that include more risk to receive higher bonus. However, our results do not indicate that CEO bonus compensation and accounting conservatism related negatively. Furthermore, our findings do not imply a significant relation. In contrast, when we use the accrual-based measure for accounting conservatism we find a significant yet positive relation between CEO bonus compensation and accounting conservatism. The use of market-based measure for accounting conservatism indicates a negative but insignificant relation

between CEO bonus compensation and accounting conservatism. Our findings are not in line with the managerial self-interest theory and the agency theory.

Subsequently, we examine the influence of corporate governance strength on the relation between CEO bonus compensation and accounting conservatism. A positive moderating impact of corporate governance strength on the relation between CEO bonus compensation and accounting conservatism was expected. However, our results are not in line with the existing literature and do not provide evidence to support this hypothesis. Our findings based on the accrual-based measure for conservatism suggest an insignificant positive relation while the results under the market-based measure suggest an insignificant negative relation. The results under both measures are insignificant indicating that we cannot a find a strong evidence for the moderating effect of corporate governance strength on the agency problem.

We further test the robustness of our results in another setting by performing additional analysis. We adjust all the variables to control for industry-specific effects. The results of additional analysis provided negative intercept values and changes in the significance level of independent variables. We conclude that our results are not absolutely robust in another setting, however additional analysis provides the same conclusions.

A limitation of this paper is that we do not find evidence supporting the hypothesis that strong corporate governance can moderate the negative relation between CEO compensation and accounting conservatism. Our results provide insignificant relation of contradictory direction, as a result we cannot make conclusions regarding the moderating effect of strong corporate governance. Another limitation of this paper is that the findings cannot be generalized through settings with smaller (national) companies. We measure corporate governance strength by obtaining data from the Thomson Reuters ASSET4 ESG database which provides scores for large international firms. Future research may provide solutions and overcome these limitations. Future studies could also focus on corporate governance mechanisms before and after the implementation of the Sarbanes-Oxley Act in 2002. Future research could examine the improvement of the financial reporting quality and consequently the quality of corporate governance.

References

Agrawal, A., and Chadha, S. (2005). Corporate Governance and Accounting Scandals. *Journal of Law and Economics*. 48(2): 371-406.

Ahmed, S., Billings, B.K., Morton, R.M., and Stanford-Harris, M. (2002). The Role of Accounting Conservatism in Mitigating Bondholder-Shareholder Conflicts over Dividend Policy and in Reducing Debt Costs. *The Accounting Review*. 77(4): 867-890.

Bachmann, L., R., Loyeung, A., Matolcsy, P., Z. and Spiropoulos, H. (2019). Powerful CEOs, cash bonus contracts and firm performance. *Journal of Business Finance and Accounting*. 47(1-2): 100-131.

Ball, R., Kothari, S.P., and Robin, A. (2000). The effect of international institutional factors on properties of accounting earnings. *Journal of Accounting and Economics*. 29: 1-51.

Ball, R., and Shivakumar, L. (2005). Earnings quality in UK private firms: comparative loss recognition timeliness. *Journal of Accounting and Economics*. 39: 83–128.

Basu, S. (1997). The conservatism principle and the asymmetric timeliness of earnings. *Journal of Accounting & Economics*. 24: 3-37.

Beaver, W.H., and Ryan, S.G. (2000). Chicago Biases and Lags in Book Value and Their Effects on the Ability of the Book-to-Market Ratio to Predict Book Return on Equity. *Journal of Accounting Research*. 38(1): 127-148.

Bebchuk, L.A., and Fried, J.M. (2003). Executive compensation as an agency problem. *Journal of Economic Perspectives*. 17(3): 71–92.

Berry, T.K., Fields, L.P., and Wilkins, M.S. (2006). The interaction among multiple governance mechanisms in young newly public firms. *Journal of Corporate Finance*. 12: 449– 466.

Bhojray, S., and Sengupta, P. (2003). Effect of Corporate Governance on Bond Ratings and Yields: The Role of Institutional Investors and Outside Directors. *Journal of Business*. 76(3): 455-475.

Bissessur, S.W. (2008). *Earnings quality and earnings management: the role of accounting accruals* (academic thesis). University of Amsterdam, Amsterdam, The Netherlands

Brick, I.E., Palmon, O., and Wald, J.K. (2006). CEO compensation, director compensation, and firm performance: Evidence of cronyism? *Journal of Corporate Finance*. 12: 403– 423.

Bris, A., and Cantale, S. (2004). Bank capital requirements and managerial self-interest. *The Quarterly Review of Economics and Finance*. 44: 77-101.

Bushman, R.M., Indjejikian, R.J., and Smith, A. (1996). CEO compensation: The role of individual performance evaluation. *Journal of Accounting and Economics*. 21: 161-193

Bushman, R.M., and Piotroski, J.D. (2006). Financial reporting incentives for conservative accounting: The influence of legal and political institutions. *Journal of Accounting and Economics*. 42: 107–148.

Cohen, D.A., Dey, A., and Lys, T.Z. (2004). *The Sarbanes Oxley Act of 2002: Implications for Compensation Structure and Risk-Taking Incentives of CEOs* (Working paper). Retrieved from: http://leeds-faculty.colorado.edu/bhagat/SOX-CEO-Compensation-Investment.pdf

Core, J.E., Holthausen, R.W., and Larcker, D.F. (1999). Corporate governance, chief executive officer compensation, and firm performance. *Journal of Financial Economics*. 51: 371-406.

Dechow, P.M., and Ge, W. (2006). The persistence of earnings and cash flows and the role of special items: Implications for the accrual anomaly. *Review of Accounting Studies*. 11(2): 253-296.

Denis, D.J., Hanouna, P., and Sarin, A. (2006). Is there a dark side to incentive compensation? *Journal of Corporate Finance*. 12: 467–488.

Fan, J.P.H., and Wong, T.J. (2002). Corporate ownership structure and the informativeness of accounting earnings in East Asia. *Journal of Accounting and Economics.* 33: 401–425.

Field, A. (2000). *Discovering Statistics Using SPSS.* London: SAGE Publications Ltd.

Francis, B., Hasan, I., Park, J.C., and Wu, Q. (2009). *Gender Differences in Financial Reporting Decision Making: Evidence from Accounting Conservatism* (Working paper). Retrieved from the Social Science Research Network: http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1471059

Gillan, S.L. (2006). Recent Developments in Corporate Governance: An Overview. *Journal of Corporate Finance.* 12: 381– 402.

Givoly, D., and Hayn, C. (2000). The changing time-series properties of earnings, cash flows and accruals: Has financial reporting become more conservative? *Journal*

Guay, W., and Verrecchia, R. (2006). Discussion of an economic framework for conservative accounting and Bushman and Piotroski (2006). *Journal of Accounting and Economics.* 42: 149–165.

Guth, W.D., and MacMillan, I.C. (1986). Strategy Implementation Versus Middle Management Self-Interest. *Strategic Management Journal.* 7(4): 313-327.

Healy, P.M. (1985). The effect of bonus schemes on accounting decisions. *Journal of Accounting and Economics.* 7: 85-107.

Hsu, C., Novoselov, E., K., and Wang, R. (2017). Does accounting conservatism mitigate the shortcomings of CEO overconfidence? *The Accounting Review.* 92(6): 77-101.

Ioannou, I., and Serafeim, G. (2010). *What Drives Corporate Social Performance? International Evidence from Social, Environmental and Governance Scores* (working paper). Retrieved from: http://www.hbs.edu/faculty/Publication%20Files/11-016.pdf

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

Kamalanabhan, T.J. and Sunder, D.L. (1999). Managerial risk-taking: An empirical study. *Social Behavior and Personality: an international journal.* 27(4): 421-429.

Khan, M., and Watts, R.L. (2009). Estimation and empirical properties of a firm-year measure of accounting conservatism. *Journal of Accounting and Economics.* 48: 132-150.

Khanchel, I. (2007). Corporate governance: measurement and determinant analysis. *Managerial Auditing Journal.* 22(8): 740-760.

Kirkpatrick, G. (2009). The corporate governance lessons from the financial crisis. *OECD Journal: Financial Market Trends.* 2009(1): 61-87.

Klapper, L.F., and Love, I. (2004). Corporate governance, investor protection, and performance in emerging markets. *Journal of Corporate Finance.* 10: 703-728.

Larcker, D., and Tayan, B. (2011). *Corporate Governance Matters.* United States of America: Pearson Education.

Leventis, S., Dimitropoulos, P., and Owusu-Ansah, S. (2013). Corporate Governance and Accounting Conservatism: Evidence from the Banking Industry. *Corporate Governance: An International Review.* 21(3): 264–286.

Luo, Y., and Salterio, S.E. (2014). Governance Quality in a "Comply or Explain" Governance Disclosure Regime. *Corporate Governance: An International Review.* 22(6): 460–481.

March, J.G., and Shapira, Z. (1987). Managerial Perspectives on Risk and Risk Taking. *Management Science.* 33(11): 1404-1418.

Matsumura, E.M., and Shin, J.Y. (2005). Corporate Governance Reform and CEO Compensation: Intended and Unintended Consequences. *Journal of Business Ethics.* 62: 101–113.

Murphy, K.J. (1985). Corporate performance and managerial remuneration. *Journal of Accounting and Economics.* 7: 11-42.

Rappaport, A. (2005). The economics of short-term performance obsession. *Financial Analysts Journal.* 61(3): 65-79.

Rees, W., and Rodionova, T. (2015). The Influence of Family Ownership on Corporate Social Responsibility: An International Analysis of Publicly Listed Companies. *Corporate Governance: An International Review.* 23(3): 184-202.

Renders, A., and Gaeremynck, A. (2012). Corporate Governance, Principal-Principal Agency Conflicts, and Firm Value in European Listed Companies. *Corporate Governance: An International Review.* 20(2): 125–143.

Porta, R.L., Lopez-de-Silanes, F., Shleifer, A., and Vishny, R. (2000). Investor protection and corporate governance. *Journal of Financial Economics.* 58: 3-27.

Sanders, W.M.G., and Carpenter, M.A. (1998). Internationalization and Firm Governance: The Roles of CEO Compensation, Top Team Composition, and Board Structure. *The Academy of Management Journal.* 41(2): 158-178.

Saunders, M., Lewis, P., and Thornhill, A. (2009). *Research Methods for Business Students.* England: Prentice Hall.

Shalev, R., Zhang, I.X., and Zhang, Y. (2013). CEO Compensation and Fair Value Accounting: Evidence from Purchase Price Allocation. *Journal of Accounting Research.* 51(4): 819-854.

Shleifer, A., and Vishny, R.W. (1997). A Survey of Corporate Governance. *The Journal of Finance.* 52(2): 737-783.

Smirnova, S., A., and Zavertiaeva, A., M. (2017). Which came first, CEO compensation or firm performance? The causality dilemma in European companies. *Research in International Business and Finance.* 42: 658-673.

Smith, C.W., and Watts, R.L. (1992). The investment opportunity set and corporate financing, dividend, and compensation policies. *Journal of Financial Economics.* 32: 263-192.

Tuschke, A., and Sanders, W.M.G. (2003). Antecedents and Consequences of Corporate Governance Reform: The Case of Germany. *Strategic Management Journal.* 24(7): 631-649.

Watts, R.L. (2003). Conservatism in Accounting Part I: Explanations and Implications. *Accounting Horizons.* 17(3): 207-221.

Watts, R.L., and Zimmerman, J.L. (1978). Towards a Positive Theory of the Determination of Accounting Standards. *The Accounting Review.* 53(1): 112-134.

Zmijewski, M.E., and Hagerman, R.L. (1981). An income strategy approach to the positive theory of accounting standard setting/choice. *Journal of Accounting and Economics.* 3: 129-149.