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Evidência Internacional sobre Lucros Não-GAAP: Uma Investigação Entre Países

International Evidence on Non-GAAP Earnings: A Cross-Country Investigation

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Tese apresentada ao Programa de Pós-Graduação em Controladoria e Contabilidade do Departamento de Contabilidade da Faculdade de Economia, Administração, Contabilidade e Atuária da Universidade de São Paulo, como requisito parcial para a obtenção do título de Doutora em Ciências.

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Aos meus pais Marco Tullio e Ana Lúcia
Ao meu esposo Fernando
Aos meus filhos Ana Laura e Marco Antônio

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“Is it too much to say that professional accountants have persisted throughout the past one hundred years in their efforts to reduce the tendency of some people to try to make inanimate account data show what the human being wished to see?” Littleton (1956)

RESUMO

O reporte de lucros não-GAAP é uma prática de reporte financeiro relativamente nova que está desafiando o *status quo* do resultado contábil. Se elas são ou não práticas geralmente informativas ainda se trata de um "céu cinzento". Para esclarecer este debate e ajudar a explicar os motivos do aumento repentino de medidas não-GAAP, eu foco em dados internacionais. Eu examino (i) se fatores institucionais moldam a escolha de reporte de lucros não-GAAP em um ambiente transnacional e (ii) se o comportamento de divulgações non-GAAP está condicionado ao canal de reporte em um ambiente de dupla listagem. Também forneço um estudo atualizado de quase 40 anos no campo de pesquisa não-GAAP com base nas abordagens de bibliometria e análise de conteúdo. Os resultados da amostra transnacional sugerem que empresas de países que estão sob os mesmos incentivos de reporte que os vivenciados por empresas nos EUA tem maior probabilidade de reportar lucros não-GAAP. Os resultados da amostra de empresas com dupla listagem nos EUA sugerem que os fatores institucionais de seus países de origem não influenciam, significativamente, seus incentivos de reporte para divulgar lucros não-GAAP de uma forma diferente nos seus relatórios anuais locais, quando comparados com as divulgações no 20-F. Outros resultados mostram que (i) empresas com dupla listagem que adotam o U.S. GAAP estão mais associadas a altos valores de ajustes e também que (ii) elas fornecem ajustes frequentes de forma semelhante aos descritos na literatura anterior: impairment, investimentos líquidos no PL de outras sociedades e despesas com opções de ações e remuneração baseada em ações. Eu contribuo para a literatura não-GAAP com uma abordagem inovadora, mostrando que ambientes com fatores institucionais mais fortes moldam os incentivos das empresas para divulgar medidas de desempenho não-GAAP pois enfrentam maior pressão para não gerenciar os lucros de acordo com o GAAP.

Palavras-chave: Medida não-GAAP; Lucro não-GAAP; EBITDA; EBITDA Ajustado.

ABSTRACT

Non-GAAP earnings (NGE) reporting is a relatively new financial reporting practice that is challenging accounting earnings *status quo*. Whether they are an overall informative practice is still a "gray sky". As to enlighten the debate and help explain the motives behind the sudden increase in non-GAAP earnings measures, I focus on international data. I examine (i) whether institutional factors shape non-GAAP earnings reporting choice in a cross-country setting and (ii) whether NGE disclosures behavior is conditional on the reporting channel in a cross-listing setting. I also provide an up-to-date study on nearly 40 years of research in the field based on bibliometric and content analysis approach. Results from the cross-country sample suggest that international firms under the same reporting incentives as those placed on U.S. firms are more likely to report NGE. Results from the U.S. cross-listed sample suggest that home-countries institutional factors do not significantly influence firm's reporting incentives to disclose non-GAAP earnings in a different way in their local annual reports, when compared to Form 20-F disclosures. Other results show that (i) cross-listed firms adopting U.S. GAAP are more highly associated with high adjustments values and (ii) that they provide frequent adjustments that are commonly described in the past literature: impairment, net equity investment, stock option and share-based compensation expenses. I contribute to the non-GAAP literature with a novel cross-country approach, showing that settings with stronger institutional factors shape firms reporting incentives to report non-GAAP performance metrics as they face more pressure to not engage in GAAP earnings management.

Keywords: Non-GAAP measure; Non-GAAP earnings; EBITDA; Adjusted EBITDA.

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LIST OF ACRONYMS AND ABBREVIATIONS

CVM - Comissão de Valores Mobiliários

EBITDA - Earnings Before Interest, Tax, Depreciation and Amortization

EPS - Earnings Per Share

ESMA - European Securities and Markets Authority

FTSE - Financial Times Stock Exchange

GAAP - Generally Accepted Accounting Principles

IASB - International Accounting Standards Board

IFRS - International Financial Reporting Standards

IOSCO - International Organization of Securities Commissions

NASDAQ - National Association of Securities Dealers Automated Quotations

NGE - Non-GAAP earnings

NGM - Non-GAAP measures

NYZE - New York Stock Exchange

SEC - Securities and Exchange Commission

SUMMARY

1 INTRODUCTION

1.1 Contextualization and relevance

My overall research purpose is to examine in a cross-country setting whether institutional factors affect the disclosure choice and behavior of non-GAAP earnings (NGE).

My proposed thesis is: *If reporting incentives faced by international firms are equal to those placed on U.S. firms, the more pressure they face to disclose non-GAAP earnings.*

I complement extant research by examining (i) the association between five institutional factors and non-GAAP earnings reporting choice of an international sample; (ii) whether NGE disclosures of U.S. cross-listed firms reported on Form-20F differ from local NGE disclosures reported on annual report (i.e., are NGE disclosures conditional on the reporting channel?); and (iii) the association between a firm's home-country and three qualitative proxies for non-GAAP emphasis and magnitude.

An explicit contribution of my study is due because I conduct a broader investigation on non-GAAP earnings measures, considering countries and contexts are less investigated or even never investigated before (to the best of my knowledge).

I also conduct a bibliometric and content analysis approach over the non-GAAP literature and contribute to the field by providing new insights on almost 40 years of non-GAAP research.

Non-GAAP measures (NGM) research is experiencing a "boom". Practioners, regulators, accounting scholars and bodies are all interested in debating and intervening in the topic, as it produces not so clear outcomes for the corporate market and for each of them.

A growing body of literature has so far demonstrated not only the relevance of non-GAAP measures investigation nowadays, but in what "stage of the art" we find ourselves. How can we contribute theoretically to an emerging topic? How can our results help to put together scientific pieces not yet tied, solving financial reporting puzzles?

Pragmatic – but also philosophical – contextualization is necessary when building a thesis because the degree of innovation depends on what *already exists*, with the understanding that new ideas are born by deepening past evidence and providing improvements. With this mindset on, I start this section by bringing a personal and wide view on the topic.

NGM[1] are metrics that do not meet accounting principles as their calculation disregards accounting rules established by IFRS – or any another accounting framework – when making voluntary adjustments to accounting statutory numbers.

Usually, they adjust earnings, like adjusted EPS, adjusted net profit or EBITDA[2]. Leung and Veenman (2017) illustrate non-GAAP earnings as:

GAAP earnings = Non-GAAP earnings (+/-) Adjusted items,

where GAAP earnings is decomposed between non-GAAP earnings and adjusted items through non-GAAP measures disclosures.

In a simple way, adjusted earnings is nothing more than the statutory profit – the one that follows Generally Accepted Accounting Principles (GAAP) – adjusted for economic effects. Adjusted items might be *literally* anything that managers understand not to be representative of a firm's performance. Magical terms such as "unusual", "non-operational", "non-cash", "non-recurring", "extraordinary" and "special" are often used to label those economic effects and to justify NGE adjustments.

To exemplify, below is the FY2022 Adjusted EBITDA reconciliation board for TOTVS S.A., a brazilian public company listed on B3 under the ticker TOTS3:

[1] NGM can be financial or non-financial metrics and refer to a very broad set of metrics. This research relates only to one financial non-GAAP measure: non-GAAP earnings.

[2] Some of the literature do not consider that EB measures (EBITDA, Adjusted EBITDA) are non-GAAP measures. I disagree with them. Although EBITDA is a frequently reported metric, such presentation is not required by IAS 1 – Presentation of Financial Statements. EBIT is commonly reported in the face of financial statements, but EBITDA and Adjusted EBITDA adjustments are not required or even permitted under the IFRS framework. Those EB measures are reported voluntarily by firms.

Figure 1 - NGE disclosure example

Reconciliação EBITDA e Lucro Líquido

Em conformidade com a Resolução CVM 156/22, apresentamos a reconciliação entre as métricas de Lucro Líquido, EBITDA e EBITDA Ajustado.

Em R$ mil	2022	2021	Δ
Lucro Líquido Consolidado	**523.301**	**374.037**	**39,9%**
Margem Líquida	*13,0%*	*11,8%*	*120 pb*
Lucro (Prejuízo) da Dimensão Techfin	(2.910)	20.682	(114,1%)
Depreciação e Amortização	236.129	199.184	18,5%
Resultado Financeiro	(20.520)	54.204	(137,9%)
Imp. de Renda e Contrib. Social	141.204	84.806	66,5%
EBITDA	**877.204**	**732.913**	**19,7%**
Margem EBITDA	*23,1%*	*24,6%*	*-150 pb*
EBITDA Dimensão Techfin	**50.440**	**47.786**	**5,6%**
Itens Extraordinários	**31.912**	**8.324**	**283,4%**
Ajuste de M&A a Valor Justo	28.668	18.109	58,3%
Perda (Ganho) na Baixa de Ativos	4.689	(1.156)	(505,6%)
Gastos com Transações de M&A	15.163	10.567	43,5%
Crédito Tributário	(16.608)	(19.196)	(13,5%)
EBITDA Ajustado	**959.556**	**789.023**	**21,6%**
Margem EBITDA Ajustada	*23,8%*	*24,8%*	*-100 pb*

Comissão de Valores Mobiliários (CVM).

In the fiscal year 2022 TOTVS presented a (i) 523.301 statutory earnings; a (ii) 877.204 EBITDA and a (iii) 959.556 Adjusted EBITDA, when considered some "extraordinary items". Non-GAAP measures are usually reported on firm's periodic reports such as annual and interim reports and are usually located on management's report[3].

It can be said the practice of reporting adjusted accounting numbers is relatively recent (about 30 years). However, it has intensified in the last decade and some descriptive evidence indicates there is now a proliferation of adjusted accounting measures in corporate reports. As a result, a central question arose: Should we be concerned about this?

The first thing to understand is that accounting numbers are *constructed* numbers. When we consider a specific number from the balance sheet or the statement of profit or loss, we are looking at "one" materialization of an economic effect. Imagine that this effect is materialized through an accounting process, which is guided by a "magnifying glass". Also, consider there

[3] Non-GAAP measures may or not be regulated. In Brazil, for example, we have since 2012 one specific regulation on EBITDA and Adjusted EBITDA disclosures, emanated by our local securities and exchange commission. Firms that voluntarily disclose those EB measures must follow the rules established under "Instrução CVM 516/2022" (that replaced nº 527/2012). The reconciliation board, as presented in Figure 1, is one of the requirements firms must follow, for example. Note that this kind of regulation is country-specific.

are many magnifying glasses, from different countries and different sizes, leading to different viewing of the same accounting process to account for a specific economic effect.

Note that the economic effect is unique; the accounting process steps are unique; but the existence of different "magnifying glasses" over those unique items generate different numbers in nature. Magnifying glasses is just a simple analogy of the well-known "Generally Accepted Accounting Principles (GAAP)". The word "generally" is not a coincidence in this sentence; it implies that those principles are not accepted by everyone and/or at all times.

There was and there is disagreement over accounting principles. Accountancy bodies may disagree about how accounting phenomena are measured, recognized, presented and disclosed in financial reporting. Divergence is naturally expected from a social science point of view, as accounting evolves with society evolution and its impacts, and indeed we have different GAAPs coexisting (such as the major accounting frameworks IFRS and U.S. GAAP).

Naturally, before international accounting even existed financial reporting was there, so each country had (or still has) its own "way" to account for the same economic effects – the so called "local GAAP". The adoption of the International Financial Reporting Standards (IFRS) by more than 100 countries around the world (IFRS, 2022a) mitigates the existence of many "magnifying glasses" that generate accounting disparities, but the level of compliance with such framework may vary from country to country, and because of many institutional factors – like language, enforcement and policy options (Nobes, 2013) – accounting differences will probably ever exist.

That reasoning is important in the understanding of what constitutes non-GAAP numbers because GAAP numbers are still an ample ground for debate; actually, they are fated for an everlasting change. But considering normative boundaries, GAAP numbers are "confined" in such frameworks. On the contrary, non-GAAP numbers can only exist *after* GAAP numbers are statutorily defined – they are free of judgments or limitations. They are free from GAAP.

So, imagine that after so many years of accounting evolution, debates and improvements, there is an accepted accounting framework that establishes how accounting phenomena should be recognized and disclosed, and after so much effort for preparers to follow such framework, and for auditors to audit accounting numbers based on such framework, someone thinks that statutory net income needs to be adjusted for "unusual items" because business performance is better represented that way. This is the core NGE background.

Note there is no limitation over adjustment types. If it is being done outside accounting standards boundaries, there is no problem *a priori*, right? Remember we are talking about a new

measure that is "competing" with an official and audited accounting measure. Also, we need to consider that those metrics are being disclosed *voluntarily* by firms. This signals something.

Accountants need to consider such signal and try to understand why non-GAAP measures arose and how our current financial reporting is impacting market participants. Also, we need to acknowledge that the practical reasons that usually justify non-GAAP numbers seem to be homogeneous in different scenarios.

In my opinion the relevance of NGM research begins with the fact that practice *demands* adjusted numbers. This behavior and its impacts should be examined because firms and analysts provide them for one (or more) reason(s). I assume they use expertise and some level of rational thinking when adjusting and disclosing accounting numbers, in average[4].

In my reasoning one of the main questions relative to market's recent focus on non-GAAP measures is: are non-GAAP measures correcting GAAP for something that current accounting frameworks do not capture? Are non-GAAP numbers somehow *better* than GAAP numbers?

Another relevance sign of NGM topic is its "age": researchers are able to analyze a brand-new corporate reporting practice. By looking into the literature, we can affirm it has around 30 years of existence, but only recently evolved and spread in financial reports[5]. In this sense there are several avenues of research to explore (Herr, Lorson and Pilhofer, 2022). I document some literature gaps when documenting past evidence in section 3.

Many studies are describing the proliferation of non-GAAP measures on firms' financial reporting, especially in the last two decades (Marques, 2017; Black, Christensen, Ciesielski, & Whipple, 2018). Given the significant increase and emphasis on the disclosure of such metrics at an international level, mainly through press releases and annual reports, accounting practice and academia began to investigate this behavior frequently in order to understand the behavior of data and conclude on the harmful or beneficial nature of non-GAAP measures.

Bloomberg (2020) points to a recent and greater attention given by accounting standard setters to non-GAAP measures, saying that "global accounting standard setters are turning their attention to the inconsistent and unregulated financial information that investors rely upon but which auditors ignore, a major change in direction for the international authorities after a decade mending problems highlighted by the financial crisis".

The systematic literature review from Arena, Catuogno and Moscariello (2020) points to an increase of scientific publications on non-GAAP topic from 2010 onwards, reaching the peak

[4] I do not expect market participants to be completely rational in economic decisions. I follow Hirshleifer and Teoh (2003) limited attention and processing power premise.
[5] Note that the expressive increase in NGM disclosures matches the technology revolution the world is facing.

in 2017, which is in line with my own content analysis (see section 3). A more recent literature review conducted by Herr et al. (2022) confirms that there is a significant trend of increasing new literature since 2010, which is getting highly concentrated from 2020 on.

This new body of literature is a consequence of the practice itself. When firms began to make use of non-GAAP measures more frequently it naturally raised a red flag about what was going on. There is a known released survey from Audit Analytics (2018) that documented non-GAAP measures disclosed in quarterly reports from S&P 500 firms. Results confirmed a new wave of voluntary financial disclosure was coming in (and to stay): at 1996 59% of S&P firms disclosed at least one non-GAAP measure; this percentage jumped to 76% in 2006, and in 2016 practically all companies released at least one non-GAAP metric, reaching 96% of total firms.

Additionally, many researchers found out this is not and exclusively U.S. phenomenon: Deloitte (2016) analyzed 2015 annual reports of UK FTSE firms, finding 83% of them disclosed at least one non-GAAP measure as a key performance indicator (KPI). Malone, Tarca and Wee (2016) conclude that 64% of australian ASX 200 firms released non-GAAP metrics in different corporate media between 2008 and 2010, and that 89% of them were concentrated in the annual report. In the brazilian scenario there are descriptive results showing that over 70% of IBrX 100 firms disclosed non-GAAP measures in periodic reports (press releases and annual reports) on 2014 and 2015 (Andrade & Murcia, 2022).

Herr et al. (2022) resumes that besides North America, which is by far the most analyzed region of the non-GAAP literature and represents 60.2% of the author's sample, Europe comes next comprising 22.2% of all papers. More than 80% of all papers analyses EUA and European samples, so one can indeed affirm that there is limited evidence on many international settings. I clearly document and conclude that in section 3.

With regards to the brazilian environment, Herr et al. (2022) highlight only two papers on NGM: Alcalde, Fávero and Takamatsu (2013), which tests if EBITDA is useful when comparing firms from the same and different sectors, and Andrade and Murcia (2019), which describes the main adjustments made through Adjusted EBITDA disclosures and analyses the "fitness" of those adjustments based on a critical perspective of their economic nature. Besides those, there is another study (Andrade & Murcia, 2022) that addresses the determinant factors of EBITDA disclosures in Brazil[6].

[6] Probably Andrade & Murcia (2022) was not included in Herr et al. (2022) review because it was published just one month before the acceptation of cited literature review.

Based on previous literature reviews (Young, 2014; Marques, 2017; Black et al., 2017; Arena et al., 2020; Herr et al., 2022) it is more than reasonable to say that NGM research has a gap to be filled regarding evidence from firms in settings where such phenomenon is happening. In this sense, I state another relevant factor that justifies my research: the clear lack of previous evidence from firms in countries other than USA and Europe.

Black et al. (2018) affirm that "a large body of research on countries outside of the US enhance our understanding of non-GAAP disclosure and its use worldwide." (p. 3). I add new international evidence from jurisdictions that we do not know anything or much about NGM disclosure and behavior, enhancing such discussion based on new empirical evidence in a cross-country and cross-listing settings.

By studying past evidence and looking into their research focus, there is a sharp division between two assumptions about NGM reporting motives. It is well known that the central issue surrounding non-GAAP numbers is to unravel management intentions by analyzing disclosures and its economic consequences.

Past studies mainly test if non-GAAP disclosures are done to (i) manipulate investors' perceptions about firms' business performance, or to (ii) inform them about firms' real business performance. Herr et al. (2022) came to the same conclusion, saying previous papers gives two alternative explanations for NGM reporting: "information motive" and "strategic motive".

Curtis, Mcvay and Whipple (2014), for example, focus on transitory gains to test whether managers intent to inform or mislead investors, finding managers motivated to inform investors will exclude gains from non-GAAP earnings, but also managers motivated to mislead investors will obscure the transitory nature of gain by focusing on GAAP earnings. Marques (2017) also highlights that scientific studies in different settings suggest that non-GAAP measures are more informative than their comparative GAAP measures, but also that in certain circumstances such disclosures can be misleading by changing investors' perceptions.

One of the most documented outcome of NGM "freedom" is they tend to be higher than their GAAP comparative measures (Webber, Nichols, Street, & Cereola, 2013; Deloitte, 2017). This tendency is generally attributed to the strategic use of non-GAAP measures, which has the potential to divert the attention of investors from the economic reality in which a company is, thus affecting its decision-making processes. Previous evidence have shown that investors tend to trust non-GAAP numbers, especially those "unsophisticated" (Brown, 2020).

Opportunistic evidence show managers uses non-GAAP numbers to meet or beat earnings benchmarks (Walker & Louvari, 2003; Black & Christensen, 2009) and that they emphasizes non-GAAP metrics when accounting earnings do not reach the expected level (Marques, 2010).

Black, Christensen, Kiosse and Steffen (2017) points out that companies tend to adjust negative items (increasing non-GAAP numbers), disregarding classifying possible items of revenues and gains as “unusual”, “non-recurring” or similar concepts. Barth, Gow and Taylor (2012) suggest that firms exclude expenses in an opportunistically way to smooth earnings.

Arena et al. (2020) also mention some practical cases on the strategic use of non-GAAP numbers, mentioning the case of LinkedIn Corp., which removed from earnings “depreciation, amortization and stock-based compensation charges in order to turn a GAAP loss of 180 US million dollars into an adjusted EBITDA of 1.37 US billion dollars” (p. 656).

On the other hand, many results also suggest the informative role of non-GAAP numbers. Entwistle, Feltham and Mbagwu (2010), for example, test the informativeness of three earnings measures: pro forma earnings, GAAP earnings and I/B/E/S earnings. The results show that the most value relevant measure is pro forma earnings, followed by I/B/E/S earnings and then by GAAP earnings. Mey and Lamprecht (2020) conclude on the usefulness of EBITDA because EBITDA reporting is associated with providing higher quality reconciliations. The results from Bhattacharya, Black, Christensen and Larson (2003) shows non-GAAP forecast errors are more correlated with abnormal returns around earnings announcements than GAAP forecast errors, which means they are more informative and permanent than GAAP operating earnings. Lougee and Marquardt (2004) also test investor response to pro forma earnings and conclude pro forma numbers have greater information content when GAAP earnings informativeness is low.

As contradictory evidence coexists (see section 3 for details), there is no consensus over the main motive to explain NGM reporting and, thus, no consensus about the *real* management intentions behind non-GAAP numbers reporting.

In order to end this discussion properly, it is necessary to deepen a few more issues about NGM. The regulatory issue is one of the most investigated issue because, in general, problems reported by academic literature refer to the relative freedom that managers have in disclosing NGM, as they are voluntary metrics. The lack of regulation or poor regulation/oversight is one suggested source for strategic non-GAAP earnings reporting. Brown (2020), for example, recall that most jurisdictions do not have mandatory guidelines or rules over NGM.

Furthermore, since each jurisdiction has its own rules (or the absence of them) regarding NGM reporting, types of used measures and the disclosure characteristics vary widely. This customization is not a problem *per si*, but it opens opportunities for bad intentioned managers to disseminate an improved image of firm’s business performance. In addition to that, the lack of minimal standardization between disclosures can create difficulties for investors to compare the performance of several companies.

It is well documented that the most regulated setting with regards to NGM is the United States. U.S. public firms and also cross-listed foreign firms must follow stricter reporting rules mandated by the Securities and Exchange Commission (SEC) through Regulation G[7] when disclosing non-GAAP measures in any public disclosures.

As Brown (2020) explains,

> The general mandates of Regulation G prohibit the public disclosure of non-GAAP information that could be perceived as misleading based on untrue or omitted facts and require companies to present the most directly comparable GAAP metric along with a quantitative reconciliation of the differences between the non-GAAP and GAAP metrics (p. 147)

A significant portion of past research focus on the consequences of Regulation G to NGM reporting behavior and on market reaction (Marques, 2006; Heflin & Hsu, 2008; Jennings & Marques, 2011; Baumker, Biggs, Mcvay, & Pierce, 2014; Black et al., 2017). Herr et al. (2022) explain that these studies examine how disclosure characteristics (such as frequency, quality of adjustments) and market perception are changed after regulatory interventions.

Exploring the relation between NGM reporting and regulation is very promising because as non-GAAP measures are voluntary metrics, regulation works as a control to diminish their potential strategic use[8]. As NGM behavior may be influenced by regulation or guidance (and by the absence of them) more empirical and descriptive evidence is necessary in international settings.

Apart from regulation, there is one last topic that I consider very relevant when discussing NGM: the general relevance of earnings. One can easily state that earnings is the most important output from the financial accounting system. Dichev and Tang (2008), for example, state that earnings "is the most widely used accounting variable" (p. 1453).

Young (2014, p. 455) points to the relevance of earnings for the legitimacy of financial reporting when he explains:

> Earnings as a construct owes its pre-eminent position in financial analysis and contracting to rules and assurance systems designed to uphold faithful representation, reliability, comparability and timeliness. High-information costs render earnings a trusted and valued brand in the corporate information environment.

[7] Regulation G was promulgated in 2003 as a result of the Sarbanes-Oxley Act of 2002. Despite the existence of such guidance and rules, there is still "degrees of freedom" for companies to decide which non-GAAP measure to disclose, where and how to disclose them, in the sense of what kind of adjustments will be made.

[8] South Africa is the only country where disclosure of a non-GAAP measure is mandatory. "Headline earnings", a type of adjusted earnings per share, is mandatory for listed companies since 2000.

Despite that, non-GAAP earnings seems to be also a widely used variable as an input to investors decisions process. The issue about that is explained by Ijiri (1976) when he linked the functional fixation – a cognitive bias – with a change in the accounting process.

He posits that there's a fixation effect on earnings and that such effect influence investor's decisions:

> Once an accounting measurement system, or, more broadly, an accounting language, is accepted by a decision maker as a means of organizing his decision process, his behavior can be influenced by a change in the accounting method. Psychologists have found so-called functional fixation in most human behavior, in which a person attaches a meaning to a title or, more generally, a surrogate, and is unable to see alternative meanings or uses. (p. 160)

And he continues:

> If the outputs from different accounting methods have the same names, such as profit, cost, people who do not understand accounting will tend to neglect the fact that alternative methods may have been used to prepare the outputs. In such cases, a change in the accounting process clearly influences the decisions. (p. 160)

Although Ijiri (1976) is not referring to non-GAAP numbers, but to a change in GAAP, the rational remains the same. Following that reasoning, if there's two earnings figures reported in the same periodic report, investors may not fully understand what non-GAAP earnings truly represents because they recognize it as the same earnings as they had past experienced. They may not account for the difference in the methods that generated both earnings measures.

Sadique and Rahman (2013) cite the previous work of Hand (1990) when explaining the functional fixation hypothesis: "individual investors do not consider the quality of earnings" (p. 52). They use the limited attention premise to explain that this bias makes investors pay less attention to the appropriateness of the accounting procedures that produce accounting numbers.

Hirshleifer and Teoh (2003) use the Theory of Bounded Rationality to explain the effect of the limited attention and processing power premise on financial reporting and takes pro forma earnings as one application to understand how pro forma earnings disclosures affect market prices. Considering earnings fixation effect on investors and that they have limited attention and processing power, two earnings measures may alter business performance perceptions.

I do agree with Young (2014) view when he affirms that "non-GAAP disclosures threaten the credibility and integrity of the reporting system in a way that customization practices in other domains do not." (p. 455) because the issue of NGM proliferation is related to the *risk* they introduce to the financial accounting system.

Finally, the IASB directed part of its efforts on debates to include NGM in the financial statements through "Primary Financial Statements" project (IFRS, 2022b). IASB discussed feedback on the Exposure Draft ED/2019/7 – General Presentation and Disclosures between 2020 and 2021 and plans to replace IAS 1 – Presentation of Financial Statements with that new proposal[9], IFRS 18 - Presentation and Disclosure in Financial Statements, in which some non-GAAP measures will be located in a single explanatory note in the financial statement and must be audited.

The Exposure Draft includes proposals to improve how information is communicated in the financial statements. The four key proposals are (Deloitte, 2019):

1. The introduction of defined subtotals and categories in the statement of profit or loss aims at additional relevant information and a P&L structure that is more comparable between entities;
2. The introduction of requirements to improve aggregation and disaggregation aims at additional relevant information and ensuring that material information is not being obscured;
3. The introduction of Management Performance Measures (MPMs) and accompanying disclosures in the financial statements aims at transparency and discipline in the use of such measures and disclosures in a single location; and
4. The introduction of targeted improvements to the statement of cash flows aims to improve comparability between entities.

The main outcome for NGM is that if one measure fits the definition of "management performance measures (MPM)",

> Subtotals of income and expenses that are used in public communications outside financial statements, complement totals or subtotals specified by IFRS standards and communicate to users of financial statements management's view of an aspect of an entity's financial performance,

it must be located (*presentation*) in the financial statements with specific descriptions and other requirements (*disclosure*).

This recent movement from IASB by itself demonstrates to a large extent the relevance of non-GAAP measures nowadays, not only for the role that such entity play, but also because

[9] As of December 2023, the current stage of the project is: "The International Accounting Standards Board (IASB) has completed redeliberations of the proposals in the Exposure Draft General Presentation and Disclosures published in December 2019. The IASB expects to publish the new IFRS Accounting Standard in H1 2024 after completing the balloting process. The objective of the new IFRS Accounting Standard is to improve how information is communicated in the financial statements, with a focus on information in the statement of profit or loss.".

the opinion of market participants is considered in their decision processes. Accounting changes follow social changes in market's needs and behavior, and it's not different in relation to NGM. As quoted by Ijiri (1976): "Just as culture affects and is affected by language, business affects and is affected by accounting" (p. 164).

Based on the brief discussion presented, this thesis has one overall objective, which is to provide new evidence on NGE reporting by examining in a cross-country setting whether and how institutional factors affect the disclosure choice and behavior of non-GAAP earnings.

I describe the analytical research objectives of Essays 1, 2 and 3 in section 1.2.

This thesis is organized as follows: Section 2 presents the theoretical background. Section 3 presents past evidence on non-GAAP earnings. Section 4 and Section 5 present the empirical and descriptive analysis, and Section 6 presents final considerations.

1.2 Research objectives

I considered the accounting process to elaborate my research objectives:

Figure 2 - The accounting process

Prepared by the author.

I focus my research objectives in the fourth step because the reporting choice and factors that are associated with that choice are still not fully addressed in the literature, as I describe in each Essay, and also because the reporting choice raises a "red flag" about managers intentions with regards to the users of information.

Before defining research objectives for Essay 2 and Essay 3, I conducted a bibliometric and content analysis approach over NGM topic. That resulted in Essay 1 – Non-GAAP Earnings Prior Evidence: A Bibliometric and Content Analysis Approach.

(i) Research objective Essay 1 – Apply bibliometric and literature review techniques over past evidence on non-GAAP measures as to understand scientific production on the topic and build the research design for Essays 2 and 3.

In Essay 2 – The Relation Between Institutional Factors and the Reporting Choice of Non-GAAP Earnings in a Cross-Country Setting, I examine the role of institutional factors on non-GAAP earnings disclosure choice in a cross-country setting.

(ii) Research objective Essay 2 – Examine the relation between institutional factors and non-GAAP earnings reporting choice in a cross-country setting.

In Essay 3 – Non-GAAP Earnings Disclosures From U.S. Cross-Listed Firms, I examine non-GAAP earnings disclosures of foreign firms cross-listed in the USA by addressing the following research objectives:

(iii) Research objective Essay 3 – Examine whether NGE disclosures of U.S. cross-listed firms reported on Form-20F differ from local NGE disclosures reported on annual report for the same firms; and Investigate the association between a firm's home-country and three qualitative variables that represent non-GAAP emphasis and magnitude.

With those research objectives I seek to contribute to the current literature on the use and existing incentives that underlies non-GAAP earnings disclosures.

Although there is a significant increase in scientific research on NGM, there is still room for new and complementary research on the topic since regulatory and accounting uncertainties surrounding it exist.

This thesis contributes to the academic and practical debate on the dissemination of non-GAAP earnings measures at an international level.

2 THEORETICAL BACKGROUND

2.1 Underlying theories and premises

From a theoretical perspective one has to consider that non-GAAP measures is a recent topic on the accounting literature. Academic research on the matter is still crawling – as I use to say. Developing research that connects empirical data to theoretical foundations is necessary for the evolution of NGM knowledge.

There is no unique or established theoretical framework that guides scholars. Indeed, what I have noticed is that most of the empirical research doesn't even mention theories or at least theoretical premises to support their hypotheses and objectives.

Previous evidence on non-GAAP measures lacks the explanation of theories and premises to support their hypotheses, in general. Young (2014, p. 450), affirms there's an "absent clear theoretical or practical guidance on managers' dominant reporting motives". Past researchers then "have sought to test whether non-GAAP disclosures are driven by opportunism or a desire to provide incremental information on permanent earnings".

Black et al. (2018) highlights they are only aware of one theory that specifically addresses NGM reporting, which is the "limited attention theory" as given by Hirshleifer and Teoh (2003). They also affirm that "core earnings" and labels as "transitory", "special" and similar concepts are very important to understand the "reason for being" of non-GAAP numbers.

In this section I bring together some key foundations about general existing premises that may be linked to non-GAAP measures literature and what are my expectations.

2.1.1 Origin of non-GAAP information

One may think: "How non-GAAP information is generated?". To answer that we need to consider why there's a *demand* for non-GAAP numbers.

Young (2014) indicate the origin of that demand: "by limiting reporting practices, GAAP impose a degree of uniformity on entities whose operations and policies are characterized by substantial heterogeneity", as a result, "where earnings fail to capture important firm-specific aspects of performance, demand arises for customized measures of periodic performance." (p. 444).

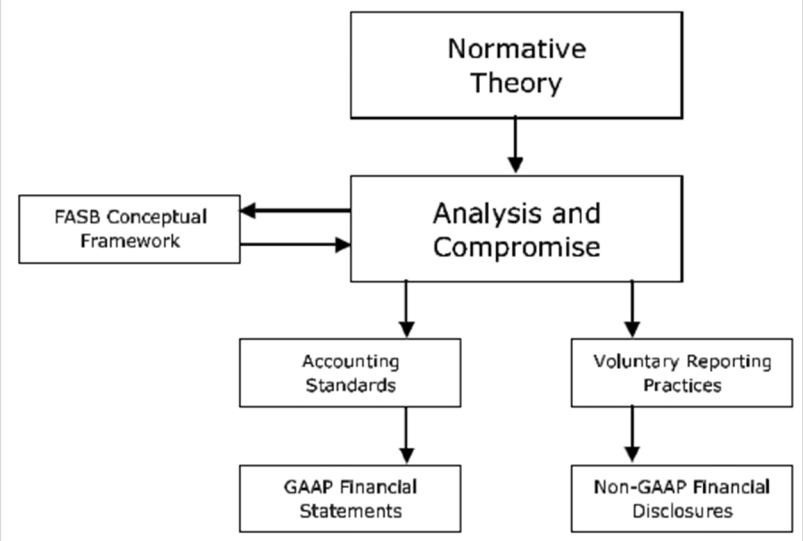
Miller and Bahnson (2010) try to explain such question by drawing how normative theory guides financial accounting and its reporting practices by illustrating the functional role of normative theory in shaping financial accounting practice.

This view is very interesting because it explains the origin of non-GAAP disclosures as a natural result of normative accounting theory influenced by pragmatic issues. In their reasoning, normative theory helps policy makers in creating minimum financial accounting and reporting standards and also helps other market participants in creating voluntary reporting practices that, theoretically, would enhance financial reporting quality.

As they explain,

> Emerging from the box is the lower left arrow representing the normative theory's filtered effect on accounting standards, which, in turn, establish the contents of financial statements prepared in accordance with generally accepted accounting principles (GAAP). Another arrow emerges down and to the right, representing the theory's filtered influence on managers who choose to provide additional information different from, and presumably more useful than, the contents of GAAP financial statements. (p. 422)

Figure 3 - Origin of non-GAAP financial disclosures



Prepared by the author.

This means that managerial incentives that result in the construction of GAAP and non-GAAP numbers disclosures have the same root. This idea is validated by Dye (1986) when he states that any voluntary disclosure is a result of managerial incentives, regardless of the amount of regulated information. Dye (1986) states that, contrary to the logic that with more regulated information (mandatory reporting practices) there will be less voluntary disclosure, voluntary disclosure is affected by mandatory disclosure.

He also argues the following (1986, p. 353):

> Accounting standards might depend on what disclosures firms make voluntarily, and it is unclear a priori whether increases in voluntary disclosures induce more or less mandatory reporting requirements (a lack of voluntary disclosures could generate a demand for additional information through compulsory disclosures; the existence of many voluntary disclosures of a similar nature could generate a demand for codification).

This reasoning demonstrates that regulation can standardize an existing reporting practice – induced by the market itself – and complement the existing reporting practice by adding other requirements that go beyond common voluntary action. This is the case of IASB's project that I mentioned before, as IASB has established some existing disclosures as compulsory.

2.1.2 Disclosure premises and non-GAAP reporting choices

If GAAP information is standardized through accounting frameworks, the next question to ask is: "How non-GAAP information *should be*?".

Normative accounting theory is worried about what accounting practices *should be*. It has a prescriptive nature (Miller & Bahnson, 2010) based on premises:

> A prescriptive theory might hold that useful information must be unbiased. In contrast, current practice includes various situations in which asset value impairments are reported while value increments are not. The prescriptive theory would suggest that this approach to providing information should not be applied because its results are biased and therefore not useful. (p. 420)

Note this is one central debate over NGM: firms disclose complementary information in the *premise* that they are providing more useful information (Frankel, Mcvay, & Soliman, 2011) but practice has been evidencing the "duality role" of non-GAAP numbers based on empirical and descriptive data.

To theoretically discuss such duality, it is necessary to look to theories that could explain managerial choices regarding voluntary disclosures, as this is one fundamental issue of non-GAAP information: the relative freedom managers face when elaborating non-GAAP numbers.

As voluntary disclosures hide management intentions, one can only observe their choice but not the intentions behind that choice. That is, we can't assess directly if managers are acting opportunistically in relation to non-GAAP adjustments and general disclosure. At the same time the disclosure itself has informational content about the quality of management intentions.

On the one hand, we have the informative premise of voluntary disclosures. This premise can be understood from Signaling Theory (Spence, 1973) perspective. Signaling Theory explain managerial choices[10] and voluntary disclosure practices.

Alberti-Alhtaybat, Hutaibat and Al-Htaybat (2012) state "Signalling theory is a further explanatory theory of information asymmetry" and indeed they are strongly connected. In this sense, Frankel, Mcvay and Soliman (2011) states "corporate transparency provides a mean of reducing agency costs", linking managerial choices, such as the disclosure of non-GAAP operating earnings, to Agency Theory premises (Jensen & Meckling, 1976).

The principal assumption of Signaling Theory is that companies will use disclosure as a mechanism to send signals to investors to show they are "better" than other companies. In this theory, voluntary disclosure practices are viewed as a tool to differentiate the quality of firms, which means these disclosures are credible because only "good" firms would adhere to do that (Morris, 1987).

Morris (1987) examines the logical relationship between signaling and agency theories and argues that communication – signaling – acts as a prediction of superior quality, so when companies use voluntary disclosures, they send "signals" to the market that communicate their higher quality in relation to other firms. Also, those disclosures are credible because the market can more easily check the quality of these signals later and then compromise the credibility of companies in the case of sending wrong signals. Thus, organizational and managerial reputation can be a limiting factor for good companies to act opportunistically in non-GAAP disclosures.

On the other hand, we have the opportunistic premise of voluntary disclosures. Regarding that, the central premise of Theory of Voluntary Disclosure is as follows (Dye, 2001):

> Any entity contemplating making a disclosure will disclose information that is favorable to the entity, and will not disclose information unfavorable to the entity. Moreover, in order to interpret sensibly the remarks of the entity making - or not making - a disclosure, one should anticipate the entity's incentives to behave in the preceding fashion.

Dye (1986, p. 333) exemplifies that premise by affirming: "A value- maximizing manager will be unlikely to make potentially damaging disclosures, even regarding nonproprietary data, unless the effect of the disclosure on the firm's value is dramatic.". So as to interpret voluntary disclosure we have to understand the incentives behind that disclosure, which, by premise, will benefit the reporting entity.

[10] Ross (1977) applied the logic of Spence (1973) and developed an incentive-signaling model to provide a theory for the determination of the financial structure of the firm considering managerial incentives.

Note that I present at least two conflicting theories over broad voluntary disclosures that could ground two conflicting premises about the NGM voluntary disclosure choice.

In the next section I discuss some GAAP premises that may help to understand non-GAAP measures role in financial reporting.

2.1.3 GAAP premises and non-GAAP information quality

The purpose of GAAP is to facilitate the efficient allocation of capital within an economy (Kothari, Ramanna, & Skinner, 2010). This theoretical view of GAAP is due to assumptions made by the Theory of the Firm (Coase, 1937), which postulates that "firms are solutions to contracting problems" and that, therefore, accounting and external auditing are institutional phenomena that exist and are determined considering the efficiency of contracts (Ball, 1989).

In this sense, Ball (1989) states that "accounting and auditing practices, including the concept of GAAP and its specific composition, are also viewed as components of an efficient institutional solution to a contracting-cost problem" (p. 4).

The Theory of GAAP assumes that GAAP "refers to the set of accounting principles that govern the preparation of audited financial statements" (Kothari et al., 2010, p. 249). Under this view, regulated standard setting is not necessary for the existence of GAAP because GAAP can arise from "best practices". However, although the regulation of GAAP is not theoretically required for its existence, the regulation of financial information comes into existence with the main purpose of protecting unsophisticated investors (Kothari et al., 2010).

This "protection" refers to protection from market failures. Regulation Theory states that regulation is an economic response to correct possible identified market failures, which may be natural monopolies, externalities, information asymmetry and excess competition. As Alberti-Alhtaybat et al. (2012) explains, the regulation of accounting information is a market's reaction to reduce information asymmetry and externalities and, therefore, to protect ordinary investors[11].

Under the Theory of Bounded Rationality on average investors have limited attention and processing power (Simon, 1959; Hirshleifer & Teoh, 2003). Assuming investors are imperfect processors of publicly available information, contrary to the traditional economic thinking that

[11] Dye (2001) states, critically, that "the presence of an inefficiency or market failure does not necessarily signal the desirability of regulatory intervention, as whatever led to the market failure may also lead to regulatory failure." (p. 230). However, this statement does not imply regulation is unnecessary; it only presumes that regulation may not always be the best solution to address all sources of market failures.

investors are rational, managers can take advantage of this endogenous factor when designing non-GAAP measures, making only adjustments upwards.

In this sense, Hirshleifer and Teoh (2003) analytical work proposes many assumptions on *pro forma* numbers voluntary disclosure. They argue that "stronger incentives for managers to manipulate investor perceptions, and more credulous (inattentive) investors increase the likelihood of inappropriate upward *pro forma* disclosure" (p. 24).

After all the regulatory effort on GAAP (which includes auditing), one question that arises is "non-GAAP measures should remain unregulated?". This question gets more "unclear" when dealing with non-GAAP earnings, due to the fact that "the primary role of the income statement is to provide information useful for managerial performance evaluation" (Kothari et al., 2010, p. 260). "Useful" refers to the qualities financial accounting information *should* have, i.e., the fundamental and desirable qualities needed to qualify accounting information as "informative" (IFRS, 2018b).

Given that, by premise, GAAP must contain those useful properties in the context of the efficient contracting theory to help addressing agency problems in the capital market (Kothari et al., 2010), I state that non-GAAP financial information *should* contain these properties too, in order to remain informative. For example, NGM should respect the consistency principle the same way GAAP numbers must do.

The brief conclusion so far is: non-GAAP information can facilitate (i.e., be informative) or not facilitate (i.e., be opportunistic) the efficient allocation of capital within an economy. If the premise is that GAAP is *always* informative, non-GAAP measures should not "undo" this role by introducing noise into the market. One main question that arose from this reasoning is: Is there any scenario where GAAP information is *not* being informative?

It is known that performance measures cannot address all aspects of business performance following strictly GAAP structure (IFRS, 2018b). The ongoing debate that financial accounting is losing its relevance is a strong possible explanation for non-GAAP proliferation. Accounting literature has suggested that the current accounting model for measuring business performance is losing relevance as the world is turning digital.

Lev (2018) argue that there is a "deterioration in financial information relevance" because accounting standard setters apply an asset valuation model for firms that create value through intangible assets, resulting in a mismatch between revenues and expenses, and also the absence of intangible resources from the balance sheet.

Dichev and Tang (2008) explain the poor matching effect between revenues and expenses on the informativeness of earnings. They argue that the increase role of technology is difficult

to capture in the traditional financial reporting model and it results that "matching has become worse over time and earnings have become more volatile and less persistent" (p. 1453). They give some practical implications of that effect by quoting the massive use pro forma earnings in the 1990s as an "attempt to provide the important distinction between persistent and recurring components of earnings from sporadic and non-recurring components" (p. 1453).

Considering we are moving from an "industrial world" to an "digital world", it is expected that accounting relevance will decrease over time since the fundamentals of digital firms (there is no unique definition, but one can say that the concept is related to "hi-tech" firms or "asset light" firms, for example) are not adequately addressed by the balance sheet approach[12].

Govindarajan, Rajgopal and Srivastava (2018) answer a crucial question about that: "Why do investors react negatively to financial statement losses for an industrial firm but disregard such losses for a digital firm?". They say that current accounting model cannot capture the value for them, as it is driven by intangible investments that are not capitalized as assets: "accounting earnings are practically irrelevant for digital companies". For that reason, investors disregard accounting earnings in their decisions. Bc and Liu (2022), for example, cite some studies that argument hi-tech firms could benefit from non-GAAP measures reporting as GAAP earnings tend to be less informative for them.

In this scenario, non-GAAP earnings may have their utility increased by conveying the actual or more accurate firms' performance for investors and other market participants. By that I expect like past scholars that some (not all) NGE preparers have a *need* to use such alternative measures to portray firms' performance in a better or even correct way.

I present final premises and my overall expectation on NGE reporting in the next section.

2.1.4 Conditional nature of non-GAAP information

[12] When I first conceived this investigation, my goal was to conduct an industry-based research focusing on "digital firms", but after trying in many ways to operationalize this broad concept, there was no reliable variable or ranking that I could use (in my opinion). Is also important to state that I do not agree with an existing approach of selecting firms from specific industries, such as "Information Technology", as proxy for "digital firms" or similar constructs, as these firms can operate in various business models. Although non-GAAP earnings metrics could be more useful for hi-tech or intensive intangible firms, I chose to select firms of all industries starting from a larger and diversified sample to avoid misclassification of the "digital firms" construct.

The economic consequences of regulation[13] over financial reporting disclosure is an "old but gold" issue. Healy and Palepu (2001) suggest that regulated financial information provides valuable information to investors, but that the economic rationale that justifies such regulation is a "long-standing research question".

Leuz and Verrechia (2000, p. 91) argue that "a major link between economic theory and contemporary accounting thought is the notion that a firm's commitment to *greater* disclosure should lower costs of capital that arise from information asymmetries".

The idea of "greater" disclosure – and hence of disclosure *levels* – naturally depends on various institutional forces, such as enforcement of the law and accounting frameworks, which impose mandatory practices. Financial reporting outcomes, however, shape and are shaped by individuals' incentives (Holthausen, 2009). Understanding management incentives is important because of the credibility issue related to voluntary disclosures (Healy & Palepu, 2001).

The interaction between mandatory (i.e., regulated) and voluntary disclosures depends on managers' incentives over reporting choices (Dye, 1986). He states that "increasing mandatory reporting requirements increases the *incentives* for voluntary disclosure" (p. 332).

Moreover, managers' incentives that drive voluntary disclosure on nonproprietary data[14], like annual earnings' forecasts, are conflicting. He explains that managers have "incentives to disclose information that reveals both their own and their firm's performance" and "incentives to avoid the adverse reactions of parties external to the firm induced by disclosures" (p. 353). So, whenever managers disclose any voluntary information, one can presume that incentives to disclose such information are higher than the not reporting incentives.

Non-GAAP earnings measures are a type of voluntary financial measure widely reported. As to understand management's intentions related to that reporting choice, past research have been testing potential incentives that refer to opportunistic or informative roles, as of managers' incentives to meet or beat strategic numbers (Black & Christensen, 2009) and to provide a more precise measure of performance (Curtis, McVay, & Whipple, 2014), for example.

Yet, Choi and Young (2015) hold the view that both reporting motives coexist as they are conditional on reporting incentives that are contradictory. Taking past empirical and descriptive evidence on the motives for NGM reporting (Herr et al., 2022) so far (se also section 3), I also agree with that expectation.

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[13] By "regulation" I mean not only government intervention, but more generally rules made and maintained by an authority body.

[14] Dye (1985) explain "what constitutes nonproprietary information must be defined in reference to a particular set of expectations about a particular firm's future earnings".

I state, following past scholars, that there's a group of firms who *may* be better represented by non-GAAP earnings than by GAAP earnings. As a result, I do not agree with the notion that non-GAAP reporting is a binary phenomenon – "useful or not useful"; it certainly is conditional on many factors, as firms' specific attributes and managerial incentives (Choi & Young, 2015).

Considering the limited attention and processing power premise discussed, I conjecture that non-GAAP financial measures tend to be *more* opportunistic than informative by nature (holding institutional and economic factors constant). Research on the effects of those factors over non-GAAP reporting choices and characteristics may help to understand what drives the underlying nature of non-GAAP measures disclosures to change.

In summary: (i) as the "bottom line" is still a key information for investors to evaluate managerial performance and for efficient contracting; (ii) that on average investors are fixated on earnings, inattentive and tend to trust non-GAAP numbers; and (iii) that non-GAAP earnings tend to be higher than GAAP earnings, thus suggesting a managerial bias for opportunistic behavior, this study states that the regulation of non-GAAP earnings metrics may be a solution so that income statement properties – necessary for efficient contracting – are maintained. The regulation of non-GAAP financial measures can be a way to inhibit or mitigate the possibility of inappropriate use of this type of voluntary disclosure.

In general, I expect that aggregate evidence on managerial choices relative to non-GAAP measures are mixed, coexisting informative and opportunistic measures in financial reporting, and that is why there's no consensus relative to NGM findings (Young, 2014).

3 ESSAY 1 – Non-GAAP Earnings Prior Evidence: A Bibliometric and Content Analysis Approach

3.1 Introduction

In order to identify, read and analyze past academic evidence on non-GAAP measures I use a bibliometric approach. Bibliometric research allows researchers to understand in greater depth any topic under scientific investigation. It is a powerful technique that forces researchers to "reason the whole" of their research area, contributing to the domain of any knowledge.

Bibliometric research is the starting point before literature review procedures because it identifies all available documents by source (papers, books and others) related to the topic under investigation by using keywords in international databases that grab them together, like Scopus and Web of Science. The main product of this search gives the researcher, at the same time, one "specific library" – based on the topic of interest –, and the "widest possible library" – which is based on the totality of identified documents.

I use bibliometric techniques as a research tool based on the systemic approach proposed by General Systems Theory (Bertalanffy, 1977). Instead of focusing on a specific and analytic research question, systemic approach induces a logical reflection on the *system* that surrounds the research topic. In a practical manner, bibliometric research induces researchers to reflect on crucial issues, such as:

1. When was the first time the topic appeared in the literature?
2. What is the behavior of publications over time and what insights can be drawn by that?
3. Who are the main researchers in this research area?
4. What international journals have published on my topic?
5. What are the main publications (most cited and influential papers)?
6. What is the gap in this research area/topic?

In this Essay I answer these questions to better understand and explain the phenomenon of non-GAAP earnings measures use and reporting.

Non-GAAP is, indeed, a hot topic for accounting research (Black, 2016). It is a pragmatic area and a recent phenomenon with several gaps that are of interest of academics, practioners, regulators and accounting bodies (Barth et al., 2012; IFRS, 2019; Deloitte, 2023).

Not surprisingly, past literature review has shown the undeniable and increasing interest in comprehending non-GAAP disclosures and its impacts on overall financial reporting (Arena et al., 2020). Business performance is being "translated" into numbers that better represent

firm's core earnings, and by doing so managers apply discretionary reasoning to "tell a story". The main issue is related to the concept of trust: is that story reliable?

As non-GAAP earnings measures are voluntarily disclosed by firms and one can only assess management's intentions *indirectly*, the motives behind that reporting choice are of great interest for academics (Herr et al., 2022).

Previous research has identified basically two motives for non-GAAP reporting: (i) non-GAAP measures are opportunistic because they improve or mask GAAP measures of business performance; and (b) non-GAAP measures are informative because they complement or replace GAAP measures of business performance. The "duality role" of non-GAAP measures is being unravel, for example, based on the study of non-GAAP disclosures patterns and behavior, which are management choices and, therefore, proxy for their intentions (Walker and Louvari, 2003).

In summary, by using a bibliometric approach, I identify an accounting body of literature that revealed the major characteristics of non-GAAP measures and what can be said about their use in financial reporting. In this sense, I start my investigation over non-GAAP measures topic by searching for all published papers on "non-GAAP earnings" topic at Scopus database (see next section for procedures).

I then conduct a content analysis by applying qualitative filters to select papers that feat my research objectives (see Table 1), considering the contexts of Essay 2 and Essay 3. I follow Arena et al. (2020) and Vasconcelos and Hadad Junior (2022) to conduct bibliometric analysis and content analysis.

Since I have identified five literature review papers before mine (Young, 2014; Marques, 2017; Black et al. 2018; Arena et al., 2020; Herr et al., 2022), I first describe their work.

First of all, it is fundamental to say that any literature review has some kind of bias that is introduced through methodological choices. For example, one may select Web of Science or Scopus as a starting point to search for papers; one may apply different keywords or strings for the search; one may consider a longer or shorter period as a cutoff date; the approach to papers under review may focus on different contents; and so on. Different choices may lead to different amounts and types of data.

One contribution of my review is the extension of the search for non-GAAP measures evidence until December 31, 2022. As depicted in Figure 4, 2022 witnessed the highest number of publications, accounting for 16.1% of all the papers included. By comparing my cutoff date

with the latest literature review conducted by Herr et al. (2022), I have incorporated at least one and a half years of additional research for analysis[15].

Based on my bibliometric results, Young (2014) is the first author to conduct a literature review over non-GAAP measures topic. He explores the causes, consequences, and policy implications of non-GAAP earnings disclosures, analyzing academic and professional literature in four groups: (i) what is the descriptive evidence so far; (ii) what are the reporting motives related to the disclosures; (iii) if there are investor consequences; and (iv) what is the existing regulatory considerations. Although he cites many past studies, he doesn't indicate how he identified past evidence (i.e., criteria followed to include them in the review) to review such literature and what were his methodological choices for the analysis. Finally, he describes that he uses "the label 'non-GAAP earnings' as an umbrella term for any form of GAAP-adjusted earnings number reported by management." (p. 446).

Marques (2017), second published literature review paper, also doesn't indicate how the existing research was selected for reviewing. She conducted such review by identifying factors related to non-GAAP disclosure and organizing them into four categories: country-level factors, factors related to capital markets, industry-level and firm-level factors. The major contribution of her review is because it contains international evidence, not only U.S. non-GAAP data. She apparently also focuses on any kind of "non-GAAP earnings" when reviewing past research.

Black et al. (2017) affirm that "a review of the academic literature is necessary to provide insights on what we have learned after nearly two decades of research" (p. 2). Their review includes all non-GAAP earnings figures explored until then, and, like me, they conduct a broad review, looking for "every known research paper on the topic of non-GAAP reporting, both published and at the working paper stage" (p. 7). Finally, they also present their results in categories, focusing on the most common questions examined before, like "who uses non-GAAP information" or "what are the commonly non-GAAP adjustments".

Arena et al. (2020) do a systematic review by following a four-step methodology as proposed by Fink, Fink, Grullon and Weston (2010), so it is the first structured literature review I identified. They give a comprehensive overview of the non-GAAP literature by following a review protocol: they start with 85 published papers for bibliometric purposes, analyzing: (i) distribution per year; (ii) distribution per journal; and (iii) distribution per authors. Next, they highlight the content of 75 empirical papers on non-GAAP reporting, focusing on (i) the main research topic; (ii) the purpose of non-GAAP reporting; and (iii) the setting and type of non-

[15] The paper was received on 30 June 2021.

GAAP measure. My methodological choices are close to Arena et al. (2020), but I divide past literature into three distinct and novel categories to analyze data.

The more recent literature review is from Herr et al. (2022). They conduct a broad review on what they call "alternative performance measures (APM) research" by analyzing more than 400 academic and non-academic papers following a structured literature review methodology. Their work is the most complete non-GAAP review, contributing to non-GAAP field by adding information about non-peer-reviewed publications and also by focusing on new subjects, such as research location and accounting regimes. Their review follows a 10-step research protocol based on Massaro, Dumay and Garlatti (2015).

Although there are recent and interesting literature reviews over non-GAAP measures, I decided to go on with my own content analysis to avoid bias from past methodological choices and also to bring additional knowledge over the non-GAAP debate.

This paper is organized as follows: Section 3.2 presents the methodological procedures applied to do a systematic overview in the field of non-GAAP earnings measures. Section 3.3 presents the bibliometric results. Section 3.4 presents the content analysis results, and Section 3.5 presents the final remarks.

3.2 Methodology and procedures

All bibliometric and content analysis procedures followed two fresh reviews, one related to the non-GAAP topic and other not related to it, to avoid procedural bias in my research topic (Arena et al., 2020; Vasconcelos & Hadad Junior, 2022).

This bibliometric research over non-GAAP earnings measures was carried out in Scopus database and includes all published papers[16] in international journals from the first publication available, from before 1960, until December 31, 2022.

The key term for the search is a compound term, that is, it is not limited to one keyword. Following Arena et al. (2020), I selected keywords that involve the terms "non-GAAP" and "pro forma", since these are the two most used words to refer to the topic of non-GAAP measures. However, as my research is focused on non-GAAP *earnings*, I defined the search based on the following keywords, after testing Scopus database: "non-GAAP", "non-GAAP earnings" and "pro forma earnings".

[16] Limitation: the search is restricted to scientific articles published at international academic journals. Other types of documents such as books, thesis and dissertations related to non-GAAP topic are not included.

By applying the search string "'non-GAAP' OR 'non-GAAP earnings' OR 'pro forma earnings'" with the "search within" tab marked as "Article title, Abstract, Keywords", Scopus returned 229 documents. By limiting the document type for "Articles" and the subject area for "Business, Management and Accounting", "Economics, Econometrics and Finance", "Social Sciences" and "Decision Sciences", the final result was 192 articles.

From 192 articles: (i) 03 were not in english; (ii) 11 didn't have open access[17]; (iii) 04 documents were not articles; (iv) 05 were discussion papers; (v) 05 were literature review papers (I included them in the Introduction section); (vi) 23 were excluded because they do not fit my research objectives (were analytical, case study, descriptive, interview or experimental papers); and (vii) 61 were excluded after title and abstract deepening (i.e., topics that relate non-GAAP disclosure with, for example, "M&A deals", "auditing", "REITs adjustments", "board diversity", "executive compensation", "earnings management", and others).

Thus, 112 documents were excluded resulting in 80 papers for literature review purposes. The following table summarizes all exclusion criteria:

Table 1 - Paper's selection criteria

Subtotal 1 – Result without filters	**192**
Excluded – Non-English language	(3)
Excluded – Not accessible papers	(11)
Excluded – Other documents	(4)
Excluded – Discussion papers	(5)
Excluded – Literature review papers	(5)
Excluded – Other research methods	(23)
Excluded – Other topics	(61)
Subtotal 2 – Result after filters	**80**

Prepared by the author.

In short, bibliometric analysis considers all 192 articles and the content analysis considers 80 papers. I use VOS Viewer bibliometric software 1.6.13 to generate network maps and Excel 2019 to generate the figures of this section.

To explain how data was generated from Scopus database, I document the steps taken to allow bibliometric analysis using VOS Viewer and Excel: (i) I accessed Scopus website (https://www.scopus.com/search/form.uri?display=basic#basic) and applied the search string and filters written above; (ii) based on the results (192 articles), I selected the "Export" button; (iii) I selected all available information for bibliometric purposes, such as "citation information" and "bibliographical information"; (iv) Then I chose two methods of export, which were "CSV

[17] Using USP signature.

Excel" and "RIS Format" (VOS Viewer input). Finally, I apply some bibliometric techniques to analyze data.

Then I carried out an in-depth literature review of 80 papers (see section 3.2.4). My goal was to identify specific information of each paper that would help me to understand their main research objectives and how they addressed them. This analysis focused mainly on:

1. Research focus;
2. Research objectives;
3. Measure type (EPS, EBITDA, adjusted profit, etc.);
4. Proxy for non-GAAP earnings;
5. Countries in sample selection (investigation setting);
6. Number of observations (final sample);
7. Period covered by the research;
8. Dependent and independent variables.

From that I elaborated Table 53 and Table 54 (see Appendix), following Vasconcelos and Hadad Junior (2022).

Additionally, I discuss in detail all papers objectives and results by dividing the literature into two periods and classifying each paper into categories. Finally, by looking to the aggregate data I comment the research location and types of measures chosen by past scholars.

3.3 Bibliometrics results and analysis

Table below presents the bibliometric aspects mapped in this study:

Table 2 - Bibliometric analysis by type

Distribution of scientific production	Distribution per year
	Distribution per journal
	Distribution per authors
Citation analysis	Most cited articles
	Co-citation network
Keywords analysis	Keyword co-occurrences

Adapted from Vasconcelos and Hadad Junior (2022).

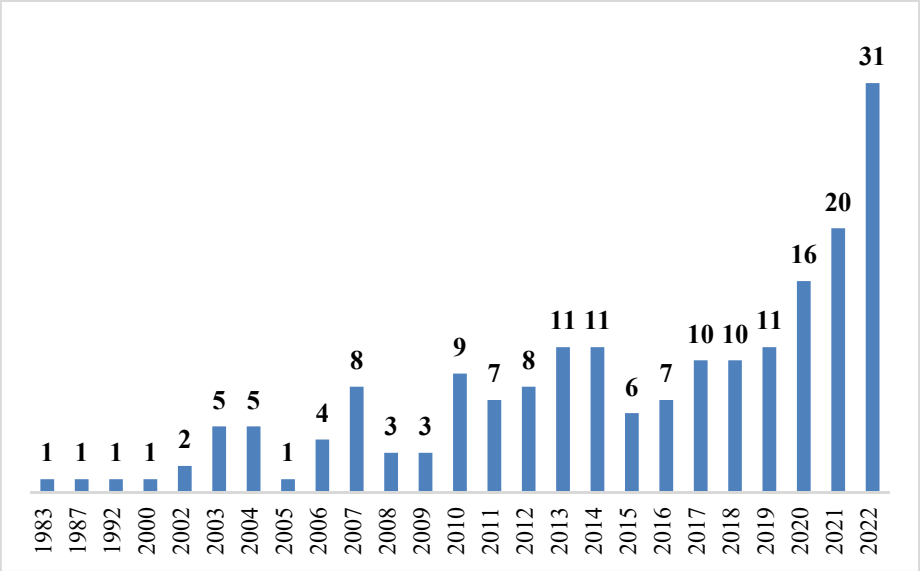
Figure 4 indicates annual distribution of all publications over non-GAAP measures from 1983, year of the first published article, until December 31, 2022.

As can be seen below, between 1983 and 2002 non-GAAP research was "shy", but from 2003 on there is at least one publication per year, with highest concentrations between 2010-2014 and 2017-2022.

2003 and 2004 is the first period where non-GAAP topic has shown potential as a research area, as we have 10 published papers in these two subsequent years. But it seems that only from 2010 on non-GAAP research has confirmed to be a promising area for accounting investigation.

The most recent five years (2018-2022), for example, concentrates 45.8% of all published articles and 2022 represents 16.1% of all papers.

Figure 4 - Publications per year



Prepared by the author.

It is important to note that non-GAAP as a *concept* has changed since the first publication. Initial research on the topic, such as "An economic analysis of participation in the municipal finance officers association certificate of conformance program" by Evans and Patton (1983), mentions the keyword "non-GAAP" but with a different connotation from the current meaning about what's "non-GAAP measures". Nowadays non-GAAP financial[18] measures are known as "alternative performance measures". "Alternative" because they do not include measures "that are required to be disclosed by GAAP", as explained by SEC's interpretations (SEC, 2022).

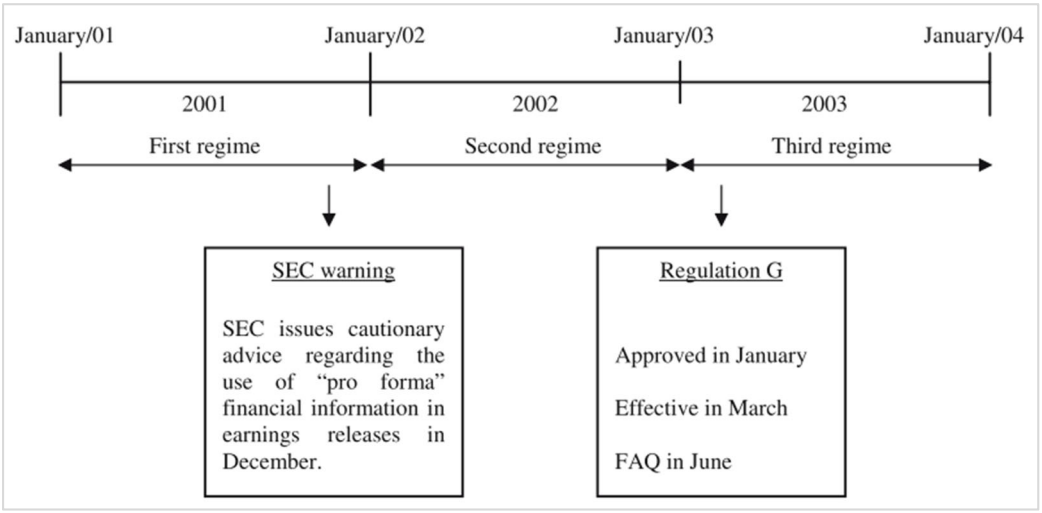
Evans and Patton (1983) goal was to find the determinants of voluntary participation by municipalities in the american government's financial reporting compliance program between 1976 and 1980. The authors hypothesize that municipalities with "GAAP financial reporting

[18] There are also non-financial non-GAAP metrics, but this investigation doesn't cover them.

practices" would be more likely to participate and earn the program's certificate of compliance when compared to municipalities that have "non-GAAP financial reporting practices". Thus, "non-GAAP" for them has a broader meaning, while nowadays we usually refer to non-GAAP measures as managerial performance metrics voluntary reported by firms (Herr et al., 2022).

As of 2003 there has been an increase in the number of publications. This increase can be explained because until 2003 non-GAAP measures were not under any kind of regulation in the United States (Brown, 2020). Although the Securities and Exchange Commission (SEC) issued an advertence in 2001 to warn investors about the risks of trusting non-GAAP numbers, it was only in 2003 that the first regulatory intervention was introduced by SEC regarding the use and disclosure of non-GAAP measures for public companies, as shown by Marques (2006):

Figure 5 - SEC interventions between 2001 and 2003



Marques (2006).

SEC's intervention was the result of corporate fraud scandals that occurred in the United States in the early 2000s, and a set of rules called "Regulation G" was instituted by Sarbanes Oxley Act, promulgated in 2002. An example of a requirement that emerged with Regulation G is that companies are obligated to present a reconciliation between the number disclosed as a non-GAAP metric and the most directly comparable GAAP number. Note that Regulation G rules applies to all U.S. public firms including cross-listed firms and private firms underdoing IPO (Brown, 2020).

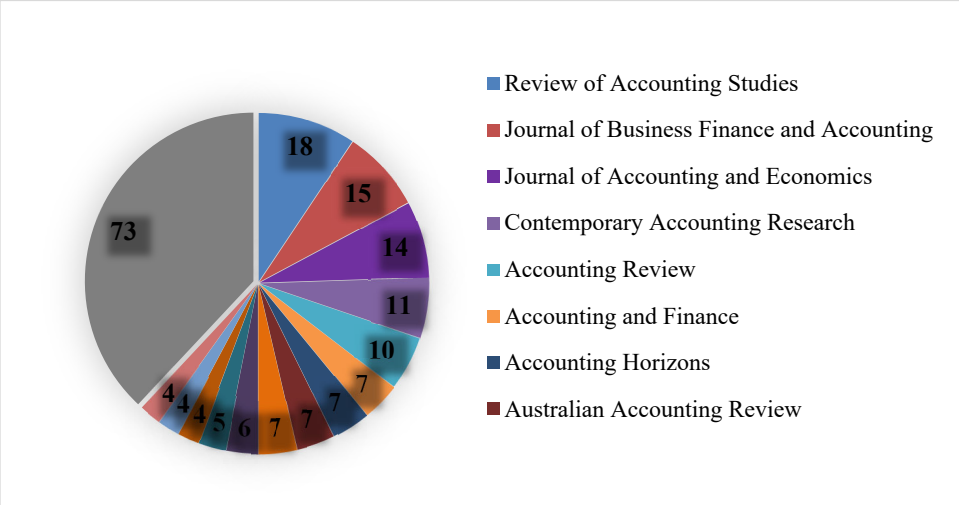
Probably the advent of regulatory requirements over non-GAAP measures has prompted academic research to investigate the effects of regulation on these voluntary disclosures in those subsequent years. Between 2003 and 2009, for example, 29 documents were published and 06 (20.7%) of them are "Regulation G studies" on non-GAAP measures.

Later in 2010 the SEC issued the "Compliance and Disclosure Interpretations", known as C&DIs (Brown, 2020), non-mandatory guidelines that aim to clarify aspects of compliance and disclosure for non-GAAP measure preparers (last updated December, 2022[19]). Marques (2017) points out that previous evidence indicates that non-GAAP measures phenomenon intensified after such change in SEC's regulation.

As pointed out before, 2010 seems to be a watershed in non-GAAP investigation. There has been a significant shift in the number of publications on this topic. In addition, considering the last 5 years (2018-2022), 88 documents were published, representing 45.8% of the entire period. 2022 concentrate more than 16% published documents: this fact indicates an upward trend on the topic, suggesting there is a genuine and recent interest over the non-GAAP measures by academic scholars and international journals.

It is also interesting to note that from 2010 on there are 13 "Regulation G studies", which highlight the role of regulation over the number of published non-GAAP research. Based on such impact we can expect a growth trend on the graph of Figure 4 given the recent debates about non-GAAP earnings measures in academia and practice, but in particular by the recent discussion of accounting standardization for some non-GAAP measures by IASB (IFRS, 2019). Such intervention will prompt academic research as we need to investigate their consequences on reporting behavior and other related phenomena.

Figure 6 - Publications by journal



Prepared by the author.

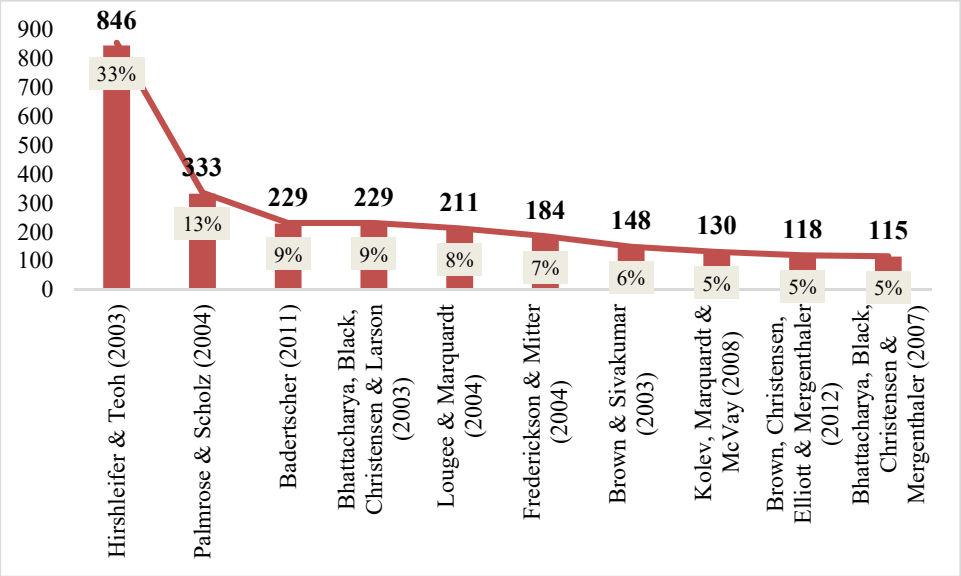
[19] The SEC issued the first set of Compliance and Disclosure Interpretations (C&DIs) on non-GAAP measures in 2010, and subsequent updates occurred in 2011, 2016, 2017, 2018 and 2022 (SEC, 2022).

Figure 6 points out journals that concentrate publications on non-GAAP measures topic. This information is important so that researchers can see the level of international acceptance of their investigated topic and possibilities for future publications.

This is also a clear indicator of research relevance. Based on Figure 6 one can see that the non-GAAP measures topic is accepted in relevant accounting journals around the world. The main journals are (24.5%): (i) Review of Accounting Studies; (ii) Journal of Business, Finance and Accounting; and (iii) Journal of Accounting and Economics. Both Review of Accounting Studies and Journal of Accounting and Economics are classified as the best scientific journals in the accounting field by the latest ranking of Financial Times (McMaster University, 2022).

Other journals listed and that are relevant in number of publications on non-GAAP topic are Contemporary Accounting Research and Accounting Review, which concentrate 21 papers that represent 10.9% of all published documents. Thus, the first five journals hold 35.4% of all publications.

Figure 7 - Publications by citation



Prepared by the author.

Figure 7 shows the first 10 papers with the highest number of citations. Together they concentrate 46.0% of 5.530 citations from all 192 articles.

The article with the highest number of citations is from Hirshleifer and Teoh (2003) under the title “Limited attention, information disclosure, and financial reporting”. It is an analytical article where the authors model firm’s choices in different situations (one of them is pro forma earnings disclosure) regarding the presentation of information and its effects on stock prices, considering that investors have limited attention and processing power. It was published in the

Journal of Accounting and Economics and represents 33% of most cited papers and 15% of all citations.

The second one is from Palmrose and Scholz (2004). This article has 333 citations, having been published in Contemporary Accounting Research journal as “The circumstances and legal consequences of non-GAAP reporting: evidence from restatements”. Such paper examines the circumstances of non-GAAP financial reporting in U.S. scenario by companies that announced restatements, focusing on occurrence and resolution of litigation over restatements that involves accounting misstatements.

Together, Hirshleifer and Teoh (2003) and Palmrose and Scholz (2004) concentrate 21% of all 5.530 citations and 46.4% of most cited papers.

Se below detailed information about the top 10 cited articles:

Table 3 - 10 most cited papers

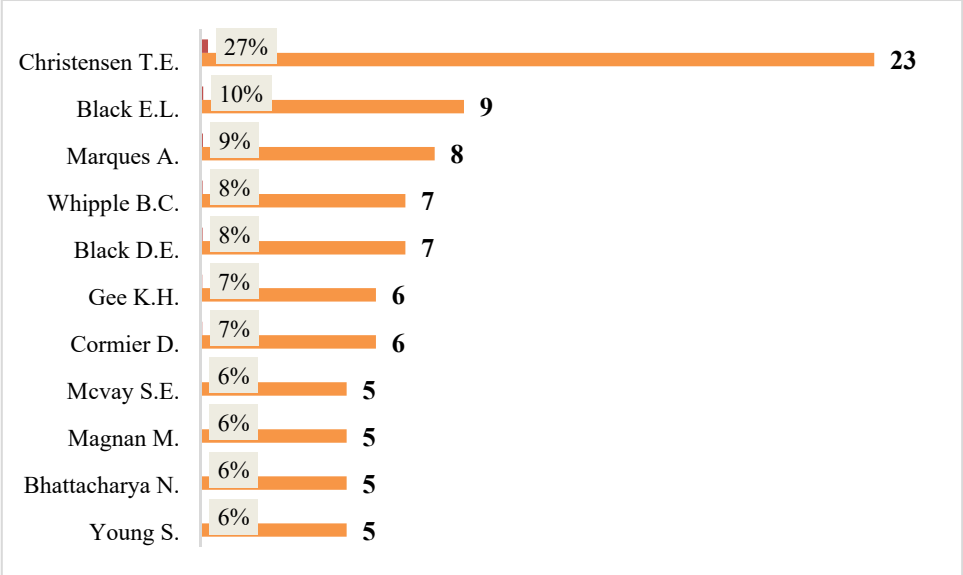
Authors	Year	Title	Journal	Citations	JIF[20] 2021
Hirshleifer and Teoh	2003	Limited attention, information disclosure, and financial reporting.	Journal of Accounting and Economics	846	7.293
Palmrose and Scholz	2004	The circumstances and legal consequences of non-GAAP reporting: evidence from restatements.	Contemporary Accounting Research	333	4.041
Bhattacharya, Black, Christensen and Larson	2003	Assessing the relative informativeness and permanence of pro forma earnings and GAAP operating earnings.	Accounting Review	229	5.182
Lougee and Marquardt	2004	Earnings informativeness and strategic disclosure: An empirical examination of 'pro forma' earnings.	Journal of Accounting and Economics	229	7.293
Badertscher	2011	Overvaluation and the choice of alternative earnings management mechanisms.	Accounting Review	211	5.182
Frederickson and Miller	2004	The effects of pro forma earnings disclosures on analysts and nonprofessional investors equity valuation judgments.	Accounting Review	184	5.182
Brown and Sivakumar	2003	Comparing the value relevance of two operating income measures.	Review of Accounting Studies	148	4.011
Kolev, Marquardt and McVay	2008	SEC Scrutiny and the evolution of non-GAAP reporting.	Accounting Review	130	5.182
Bhattacharya, Black, Christensen and Mergenthaler	2007	Who trades on pro forma earnings information?.	Journal of Accounting Research	118	4.446
Black and Christensen	2009	US managers' use of 'pro forma' adjustments to meet strategic earnings targets.	Accounting Review	115	5.182

Adapted from Vasconcelos and Hadad Junior (2022).

Note that 50% of the most cited papers are published at Accounting Review journal (American Accounting Association journal), the fourth on the list of Financial Times' Research Rank.

[20] I use Journal Citation Reports (JCR) from Clarivate Analytics to grab the Journal Impact Factor (JIF) - It is a measure of the number of times an average paper in a particular journal is cited during the preceding two years (Clarivate, 2023).

Figure 8 - Publications by authors



Prepared by the author.

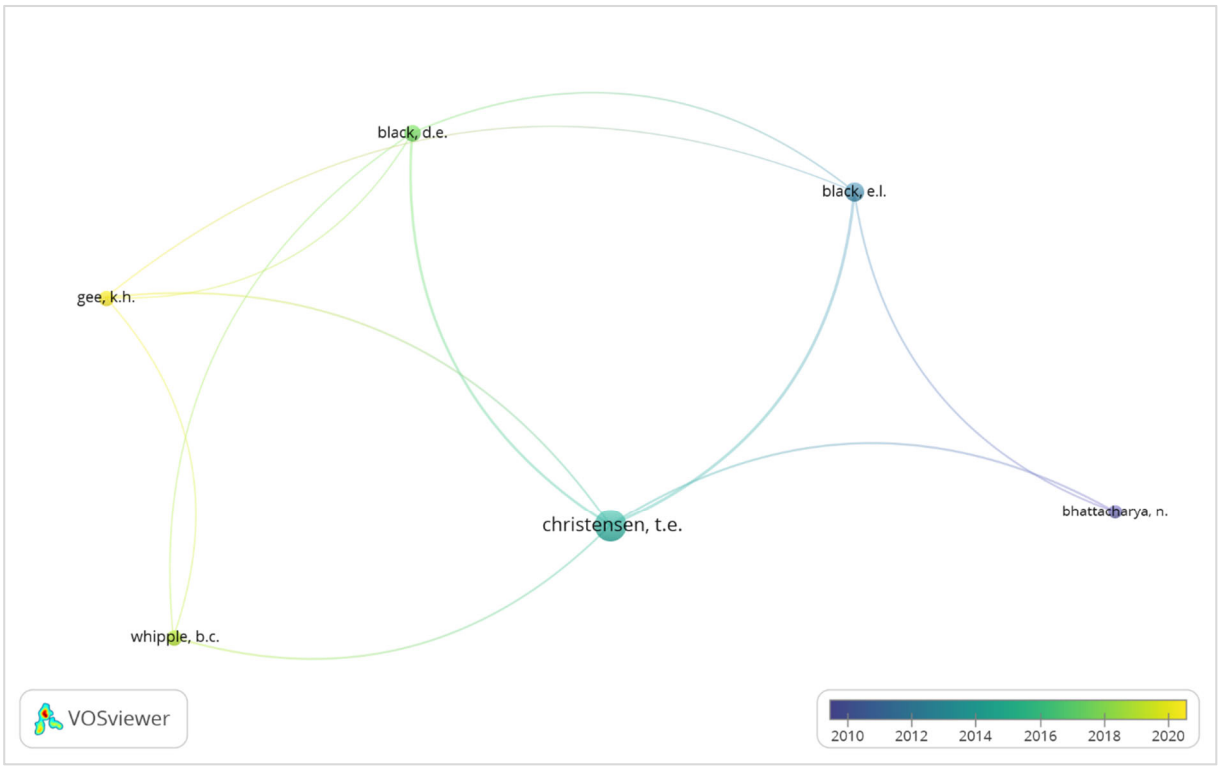
Figure 8 shows eleven authors with the greatest number of published articles (considering first and other authors of each paper). From 345 identified authors out of 192 papers, the figure above focuses on authors that contain at least 04 publications on "non-GAAP" topic since the first publication (2003-2022).

The three authors with the highest number of publications are: (i) Theodore Christensen (University of Georgia), (ii) Ervin Black (University of Oklahoma), and (iii) Ana Marques (University of East Anglia). Their research comprises 20.8% of all published papers. Following them, other eight authors concentrate 46 publications (24.0%).

This analysis is interesting as one can understand the leaders of non-GAAP research and, consequently, what are the main universities developing such research. By analyzing country's affiliation of each author above, the conclusion is that USA has the dominance in publications, but also appear as relevant countries (by publications): UK, Canada, Portugal and Australia.

In Figure 9 I use VOS Viewer to generate the co-authorship map, where the relatedness of items is determined based on their number of co-authored documents.

Figure 9 - Co-authorship analysis

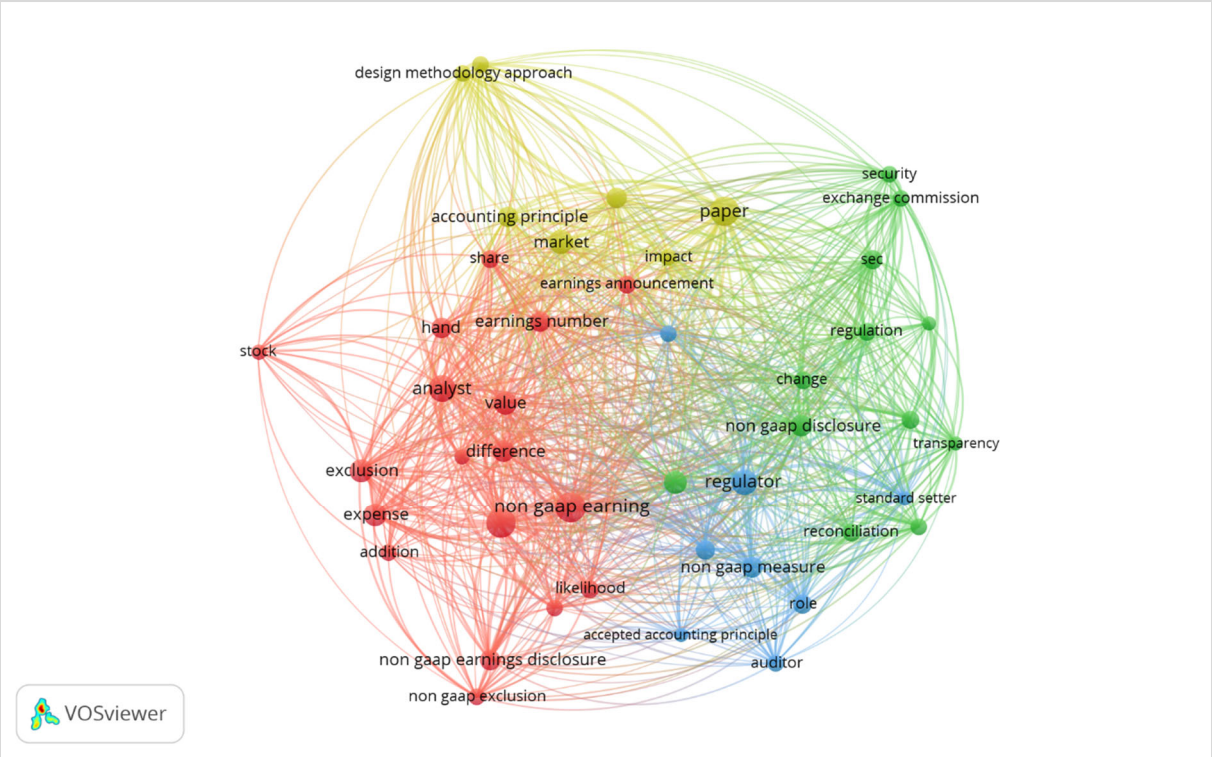


Prepared by the author.

It can be seen that in non-GAAP literature there is six authors that are producing research together, five of them connected through “christensen, t.e.”, who is the most productive author, as seen before. The authors “gee, k.h.” and “ whipple, b.c.” are related to more recent research, as “black, e.l.” and “bhattacharya, n.” to less recent research.

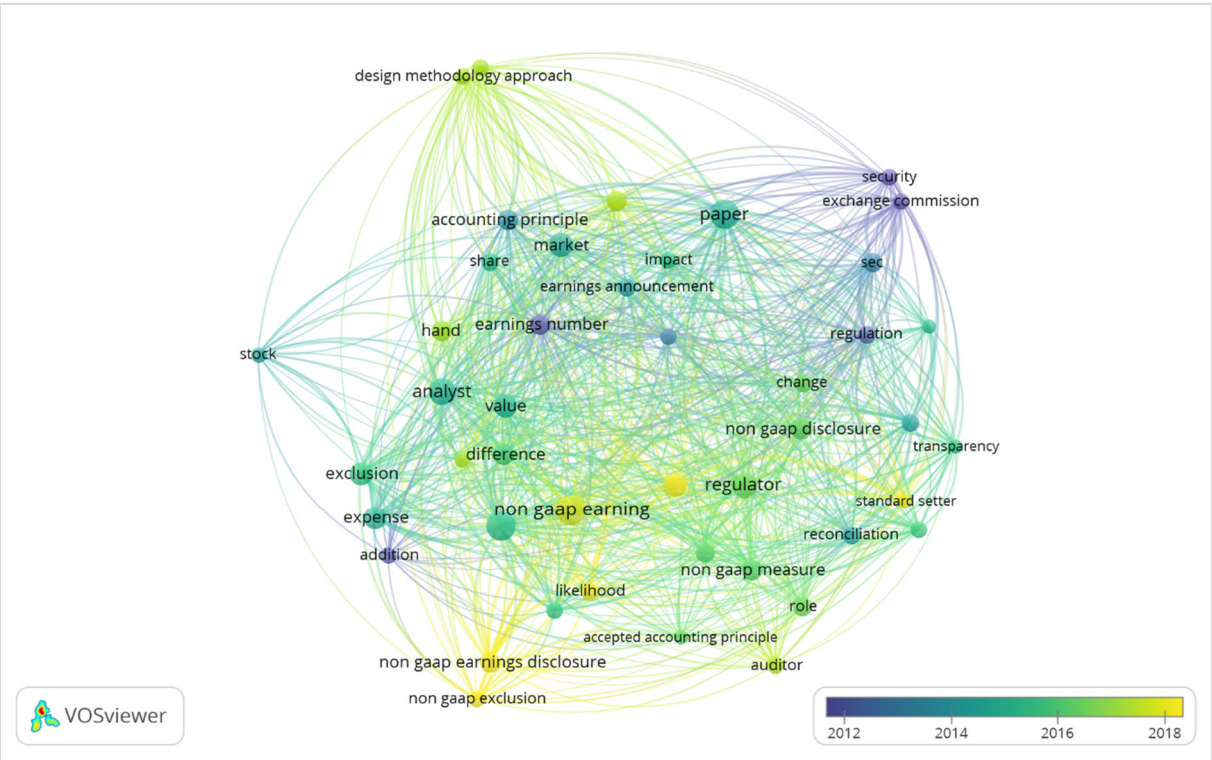
Finally, using VOS Viewer I generate two network maps based on text data that indicates which terms are most used based on abstract data from 192 papers (considering words repeated at least 10 times), see Figure **10**10 and Figure 11 below:

Figure 10 - Text data by abstract (network visualization)



Prepared by the author.

Figure 11 - Text data by abstract (overlay visualization)



Prepared by the author.

Figure 10 illustrates the connection of commonly used terms in non-GAAP research. We can see four different colors that indicate four patterns of definitions and concepts. Connections between them can give us a clue about the main discussed issues on non-GAAP literature and how can we refer to non-GAAP phenomena.

Note that central terms in each cluster (red, yellow, green and blue) are represented by the size of the circles. The red cluster contains some of the largest circles, such as “non-GAAP earnings”, “exclusion”, “expense”, and “analyst”. Next the green cluster contains central terms such as “non-GAAP disclosure” and “SEC”. The blue cluster indicates “regulator” and “non-GAAP measure” and the yellow cluster shows “accounting principle” as their central terms.

Figure 11 enables us to observe how the most frequently used terms have changed over time, providing us with clues about the main topics investigated during different periods.

For example, terms such as “SEC”, “exchange commission”, and “regulation” can be associated with “Regulation G studies” mentioned before, and this type of research was being published before and around 2012. It can be supposed that the research focus at the time was to understand the impacts of SEC’s regulation over non-GAAP measures and that later such focus has changed.

“Earnings announcement”, “expense”, and “analyst” terms are more related to the interval between 2014 and 2016, and terms such as “non-gaap earning”, “non-gaap earnings disclosure” and “non-GAAP earnings disclosure” are more related to the period of 2016-2018. Note that the last three terms focus on “non-GAAP earnings”, showing that the recent literature includes research that investigates adjusted earnings and not any type of non-GAAP measures.

Taken together, bibliometric results indicate clearly that scientific production on “non-GAAP earnings measures” is characterized by the following:

(i) Dispersed in the number of authors;

(ii) Concentrated from 2010 onwards;

(iii) Focused on U.S. firms and the U.S. business environment;

(iv) More frequently published by Theodore Christensen, Ervin Black and Ana Marques;

(v) Accepted in several relevant accounting journals; and

(vi) The most cited paper in this field is Hirshleifer and Teoh's (2003) study.

3.4 Literature review results and analysis

From 192 papers I select 80 for an in-depth literature review considering, primarily, their research objectives and related topics as selection criteria (see Table 1).

My content analysis was carried out by (i) summarizing essential data from past evidence (Table 53 and Table 54) and (ii) summarizing research objectives and authors' conclusions (see below). This helped me to: (i) understand current gaps in NGE literature; (ii) confirm the duality over the topic (i.e., NGE opportunistic or informative role); and (iii) compare results properly.

In a recent study, Herr et al. (2022) concluded that the primary focus of research on non-GAAP measures lies in understanding the motives for reporting them. To mirror the ongoing debate on the motives behind non-GAAP earnings (NGE) disclosure, I classified all 80 papers into three categories[21]: (i) papers concluding that NGE is informative, (ii) papers concluding that NGE is opportunistic, and (iii) papers concluding that both motives coexist.

This classification considers the evidence provided by the overall results of the papers:

Table 4 - Prior evidence on the informative role of NGE

Nº	Author(s)	Underlying conclusion
1	Bhattacharya, Black, Christensen and Larson (2003)	NGM are informative
2	Brown and Sivakumar (2003)	NGM are informative
3	Lougee and Marquardt (2004)	NGM are informative
4	Marques (2006)	NGM are informative
5	Landsman, Miller and Yeh (2007)	NGM are informative
6	Choi, Lin, Walker and Young (2007)	NGM are informative
7	Koning, Mertens and Roosenboom (2010)	NGM are informative
8	Entwistle, Feltham and Mbagwu (2010)	NGM are informative
9	Campbell and López (2010)	NGM are informative
10	Black, Black, Christensen and Heninger (2012)	NGM are informative
11	Entwistle, Feltham and Mbagwu (2012)	NGM are informative
12	Sadique and Rahman (2013)	NGM are informative
13	Venter, Cahan and Emanuel (2013)	NGM are informative
14	Curtis, Mcvay and Whipple (2014)	NGM are informative
15	Venter, Emanuel and Cahan (2014)	NGM are informative
16	Rainsbury, Hart and Buranavityawut (2015)	NGM are informative
17	Malone, Tarca and Wee (2016)	NGM are informative
18	Huang and Skantz (2016)	NGM are informative
19	Cormier, Demaria and Magnan (2017)	NGM are informative
20	Leung and Veenman (2017)	NGM are informative
21	Bradshaw, Christensen, Gee and Whipple (2018)	NGM are informative
22	Charitou, Floropoulos, Karamanou and Loizides (2018)	NGM are informative
23	Ribeiro, Shan and Taylor (2019)	NGM are informative
24	Henry, Hu and Jiang (2020)	NGM are informative
25	Mey and Lamprecht (2020)	NGM are informative
26	Black, Christensen, Ciesielski and Whipple (2021)	NGM are informative

[21] Few authors do not explicit conclude on that, but I analyzed conclusions and also the underlying assumptions of the final remarks of each paper to classify each paper in such way.

27	Chen, Gee and Neilson (2021)	NGM are informative
28	Hribar, Mergenthaler, Roeschley, Young and Zhao (2022)	NGM are informative
29	Heflin, Kolev and Whipple (2022)	NGM are informative

Prepared by the author.

Table 5 - Prior evidence on the opportunistic role of NGE

Nº	**Author(s)**	**Underlying conclusion**
1	Coté and Qi (2005)	NGM are opportunistic
2	Kolev, Marquardt and McVay (2008)	NGM are opportunistic
3	Heflin and Hsu (2008)	NGM are opportunistic
4	Black and Christensen (2009)	NGM are opportunistic
5	Chen (2010)	NGM are opportunistic
6	Marques (2010)	NGM are opportunistic
7	Zhang and Zheng (2011)	NGM are opportunistic
8	Frankel, Mcvay and Soliman (2011)	NGM are opportunistic
9	Brown, Christensen and Elliott (2012)	NGM are opportunistic
10	Doyle, Jennings and Soliman (2013)	NGM are opportunistic
11	Isidro and Marques (2013)	NGM are opportunistic
12	Aubert and Grudnitski (2014)	NGM are opportunistic
13	Baumker, Biggs, Mcvay and Pierce (2014)	NGM are opportunistic
14	Isidro and Marques (2015)	NGM are opportunistic
15	Solsma and Wilder (2015)	NGM are opportunistic
16	Shiah-Hou and Teng (2016)	NGM are opportunistic
17	Black, Christensen, Kiosse and Steffen (2017)	NGM are opportunistic
18	Bond, Czernkowski and Loyeung (2017)	NGM are opportunistic
19	He (2018)	NGM are opportunistic
20	Yang (2018)	NGM are opportunistic
21	Kim and Yoon (2019)	NGM are opportunistic
22	Kyung, Lee and Marquardt (2019)	NGM are opportunistic
23	Taylor and Tong (2019)	NGM are opportunistic
24	Thielemann and Dinh (2019)	NGM are opportunistic
25	Cain, Kolev and Mcvay (2020)	NGM are opportunistic
26	Lin, Xia and Ryabova (2020)	NGM are opportunistic
27	Christensen, Gomez, Ma and Pan (2021)	NGM are opportunistic
28	Bc and Liu (2022)	NGM are opportunistic

Prepared by the author.

Table 6 - Prior evidence on the dual role of NGE

Nº	**Author(s)**	**Underlying conclusion**
1	Jennings and Marques (2011)	NGM are opportunistic and informative
2	Barth, Gow and Taylor (2012)	NGM are opportunistic and informative
3	Christensen, Drake and Thornock (2014)	NGM are opportunistic and informative
4	Choi (2015)	NGM are opportunistic and informative
5	Choi and Young (2015)	NGM are opportunistic and informative
6	Guillamon-Saorin and Isidro (2017)	NGM are opportunistic and informative

7	Sinnewe, Harrison and Wijeweera (2017)	NGM are opportunistic and informative
8	Bentley, Christensen, Gee and Whipple (2018)	NGM are opportunistic and informative
9	Christensen, Pei, Pierce and Tan (2019)	NGM are opportunistic and informative
10	Isidro and Marques (2020)	NGM are opportunistic and informative
11	Visani, Di Lascio and Gargini (2020)	NGM are opportunistic and informative
12	Sang, Alam and Hinkel (2022)	NGM are opportunistic and informative
13	Chen, Medinets and Palmon (2022)	NGM are opportunistic and informative
14	Black, Black, Christensen and Gee (2022)	NGM are opportunistic and informative
15	Cormier, Demaria and Magnan (2022)	NGM are opportunistic and informative

Prepared by the author.

The remaining 08 papers either do not provide relevant information regarding the duality debate or their objectives do not address this particular aspect. They are: (i) Gu and Li (2003); (ii) Palmrose and Scholz (2004); (iii) Bhattacharya, Black, Christensen and Mergenthaler (2007); (iv) Laurion (2020); (v) Chen, Lee, Lo and Yu (2021); (vi) Griffin and Lont (2021); (vii) Carvajal, Lont and Scott (2022); and (viii) Clinch, Tarca and Wee (2022). Such papers are reviewed separately at section 3.2.4.4.

Based on that classification, I conducted an analysis of each category by dividing the time interval (2003-2022) into two periods, following a similar approach to Arena et al. (2020): (i) 2003-2012 and (ii) 2013-2022. Subsequently, I organized and provided comments on the past literature based on: (i) the sample country – U.S. environment *versus* international environment; (ii) the types of NGE measures; and (iii) the research focus.

Regarding research focus, I represent their underlying objectives into seven categories:

(a) Information content (informativeness);

(b) Predictive ability (persistence);

(c) Determinants (propensity);

(d) Earnings attributes (earnings quality) and disclosure quality;

(e) Regulation impacts;

(f) Meet-or-beat earnings benchmark; and

(g) Prominence of disclosure.

From that classification and hand-collected data from all 80 papers I elaborated Table 53 and Table 54. As I have highlighted the most important data in a tabular format, below I focus the content analysis on describing, by chronological order, their research objectives and results.

3.4.1 Evidence on the informative role of non-GAAP measures

3.4.1.1 First period (2003-2012)

Bhattacharya et al. (2003) test the informativeness and persistence of pro forma earnings (EPS figure) compared to GAAP earnings (I/B/E/S operating earnings). Their results indicated a trend in concentration of non-GAAP numbers on high-tech firms that report losses. Also, they applied a short-window analysis and forecast data to address their objectives, concluding that pro forma earnings are more value relevant than GAAP operating earnings.

Brown and Sivakumar (2003) criticize past evidence that bases their empirical conclusion on the comparison between GAAP net income and operating earnings derived from financial statements. To indicate a better non-GAAP measure for empirical analysis, they compare the value relevance of two other operating earnings measures and show adjusted measures reported by managers and analysts are more value relevant than GAAP operating measures reported by firms.

Lougee and Marquardt (2004) provide evidence on: (a) the characteristics of non-GAAP issuers; (b) the value relevance of non-GAAP numbers; and (c) the contribution of non-GAAP earnings to market efficiency or mispricing. Their results indicate that firms that disclose pro forma earnings have low GAAP earnings informativeness, suggesting that non-GAAP numbers are useful, but could not conclude if market reaction over non-GAAP earnings contributes to market efficiency. Finally, their evidence shows that non-GAAP earnings are concentrated in high-technology industry and have greater sales growth and earnings variability.

Marques (2006) investigates the probability of U.S. firms disclosing non-GAAP measures under three regimes of SEC interventions. She also tested, for all three regimes, the market reaction to the presence of non-GAAP earnings in earnings announcements and the magnitude and direction of adjustments made by firms (EPS minus non-GAAP EPS). Her results indicate that investors react positively to non-GAAP earnings and that they react to adjustments made by analysts (I/B/E/S), but do not react to incremental adjustments made by firms.

Landsman et al. (2007) investigate three types of adjustments from pro forma earnings by testing their relevance and persistence. In general, they conclude that “total exclusions” and “special items” are value relevant but mispriced by the market participants, regardless if they are positive or negative exclusions to GAAP earnings.

Choi et al. (2007) examine the persistence of earnings components made by analysts and by management, focusing on their disagreement over adjusted items. They find that “aggregate management exclusions are value and forecast irrelevant”, which means that insiders may have more ability to identify items that do not reflect firm’s performance, compared to analysts. They

conclude that, on average, managers correctly classify earnings components, evidence that is consistent with the usefulness of non-GAAP numbers.

Koning et al. (2010) study the role of negative media attention over non-GAAP reporting for Dutch scenario, where there is no regulatory intervention on the matter. Their objective is to analyze reporting practices before and after a peak in negative media attention, finding that companies changed their behavior in relation to non-GAAP reporting by reducing the amount of adjusted items, for example. They also tested the informativeness of non-GAAP earnings as compared to GAAP earnings and find that non-GAAP earnings is more value relevant than the operating GAAP earnings measure.

Entwistle et al. (2010) focus on the test of informativeness (i.e., value relevance) of three earnings measures: pro forma earnings, GAAP earnings and I/B/E/S earnings. The results show that the most value relevant measure is pro forma earnings, followed by I/B/E/S earnings and then by GAAP earnings.

Campbell and López (2010), similar to Marques (2010), investigate the emphasis placed on non-GAAP measures focusing on their determinants. They find that firms emphasize non-GAAP measures when GAAP earnings are less value relevant and when their shares are owned mostly by institutional investors.

Black, Black, Christensen and Heninger (2012) explore the impact of Regulation G over investors' perceptions of pro forma earnings before and after such regulation. They find that investors paid more attention to pro forma numbers after Regulation G, showing that in average regulation has increased the quality of non-GAAP numbers disclosures.

Entwistle, Feltham and Mbagwu (2012) test if firms with four credibility attributes, which are corporate governance, higher-quality auditors and higher historical information quality will be perceived as providing more credible exclusions in investors' perceptions, finding that the market reaction to non-GAAP earnings exclusions of firms with stronger credibility attributes will be greater when compared to firms with weaker attributes. In this sense they show evidence of the overall impact of governance quality in the disclosure quality of non-GAAP numbers.

3.4.1.2 Second period (2013-2022)

Sadique and Rahman (2013) test the value relevance of pro forma earnings to american firms. They find that investors respond more to pro forma earnings than to GAAP earnings and that they also respond to an emphasis on pro forma earnings.

Venter, Cahan and Emanuel (2013) use South African data where the separate disclosure of non-recurring items from earnings is mandated since 2000 to analyze if there is a mispricing of earnings components, finding that only the cash flow component reflects mispricing but also that mispricing disappears when explanatory variables are included. The results suggest that when the disclosure of non-recurring items is mandated, investors are able to price earnings components consistently.

Curtis, Mcvay and Whipple (2014) look into press releases that contain transitory gains to investigate non-GAAP earnings reporting primary motivation, finding non-GAAP earnings are more informative than GAAP earnings even though they are lower than GAAP earnings. Likely to Baumker et al. (2014), they find that firms vary widely in disclosing non-GAAP earnings in the presence of transitory gains but conclude that the primary motivation behind those disclosures is to inform investors.

Venter, Emanuel and Cahan (2014) examine the value relevance of non-GAAP earnings in a setting where they are mandatory, testing incremental and relative value relevance. Their results show that non-GAAP earnings are more value relevant than GAAP earnings because managerial motivations are minimized by the obligation to report those numbers.

Rainsbury, Hart and Buranavityawut (2015) provide evidence of the motivations behind the disclosure of non-GAAP earnings by New Zealand firms, non-GAAP numbers were more value relevante and provide a better predictor of future performance when compared to GAAP, showing that managers desire to report a better indicator of permanent earnings to the market.

Malone, Tarca and Wee (2016) examine non-GAAP earnings disclosures for australian listed firms, focusing on earnings adjustments for fair value remeasurements made by them and also by analysts. They found that firms disclosing these type of earnings adjustment are more likely to have higher incidence and magnitude of items related to asset remeasurements and the impact of impairment in their statement of profit or loss. Also, when analysts adjust for those items, they have lower forecast error and dispersion in the following year, suggesting the utility of forecasting using non-GAAP earnings.

Huang and Skantz (2016) analyze both managers and analysts' disclosures of non-GAAP earnings focusing on the evidence of reduction in information asymmetry before and after non-GAAP disclosures in earnings announcements. Their results suggest higher earnings precision at earnings announcements when non-GAAP earnings are disclosed, compared to when they are not. They found that the reduction of information asymmetry after announcements is greater when the magnitude of non-GAAP adjustments is larger.

Cormier, Demaria and Magnan (2017) provide evidence over the value relevance and the predictive ability of earnings by focusing on the disclosure of EBITDA, investigating if these disclosure reduces information asymmetry between firms and investors. Their results support the disclosure of EBITDA by showing that it is associated with less information asymmetry and that it enhances the positive relationship between earnings and stock pricing and earnings and future cash flows, among other results.

Leung and Veenman (2018) focus on loss firms to analyze if non-GAAP earnings are informative about their performance relative to GAAP earnings, finding that adjustments help to balance for the low informativeness of GAAP losses for forecasting and valuation. Also, they suggest that investors understand the utility of non-GAAP exclusions for loss firms and ignore expenses excluded from GAAP earnings.

Bradshaw, Christensen, Gee and Whipple (2018) analyze if investors prefer GAAP or non-GAAP earnings and provide evidence of their preference over non-GAAP numbers. After correcting measurement error in analysts GAAP earnings forecasts, they conclude that investors respond more strongly to non-GAAP earnings relative to GAAP earnings. Finally, they point that a common mechanism for firms to meet or beat strategic earnings is to exclude transitory items when calculating non-GAAP numbers.

Charitou, Floropoulos, Karamanou and Loizides (2018) focus on UK environment, which has a particularity relative to the disclosure of non-GAAP earnings on the U.S. setting: firms are allowed to disclose an additional version of EPS (i.e., adjusted EPS number) on the face of the income statement by FRS 3. They examine, in such context, whether financial and corporate governance characteristics are associated with the decision to disclose such metrics, showing that better governed, less profitable and higher leveraged firms are more likely to disclose non-GAAP earnings. They also find that disclosing non-GAAP earnings in the face of the income statement is associated with lower information asymmetry.

Ribeiro, Shan and Taylor (2019) compare, in Australia scenario, some attributes of non-GAAP earnings with their closest GAAP measure and find that, on average, that non-GAAP earnings are more value relevant, more persistent, smoother and have higher predictive power in relation to their closest GAAP metric. But they also find that non-GAAP numbers are less conservative and less timely than GAAP numbers, indicating that there's a trade-off between the valuation and stewardship roles of accounting when using non-GAAP earnings measures.

Henry, Hu and Jiang (2020) use textual analysis to investigate if there is emphasis placed on non-GAAP earnings in the earnings announcements conference calls. Their results suggest that firms place greater emphasis on non-GAAP earnings relative to GAAP earnings and also

that when non-GAAP earnings exceed the GAAP earnings firms disclose more information about the adjusted metric. They resume that "we find somewhat weak evidence that impression-management motivation is the dominant explanation for greater relative emphasis on non-GAAP earnings but not for general non-GAAP content." (p. 169).

Mey and Lamprecht (2020) analyze the association between EBITDA reconciliations and factors associated with opportunistic behavior, such as emphasis and meet-or-beat behavior, for listed firms in South Africa. The results show that managers disclose EBITDA for informational purposes by providing higher quality reconciliations and not opportunistic reasons.

Black, Christensen, Ciesielski and Whipple (2021) examine across-time consistency and comparability of non-GAAP earnings using adjustments of S&P 500 firms from 2009 to 2014. They find that the majority of firms maintain their adjustments choices relative to the prior year, which suggests firms are being consistent in their calculations. Regarding comparability, they conclude that non-GAAP earnings are more comparable than GAAP earnings over time because it excludes nonrecurring items. Their results support the premise that managers use discretion in non-GAAP calculations to enhance earnings information about operating performance.

Chen, Gee and Neilson (2021) look over the prominence of non-GAAP EPS figures in earnings announcements. Their results indicate that in scenarios where such prominence is not regulated investors perceive non-GAAP reporting as containing higher quality information, suggesting that firms are informing investors about their performance.

Hribar, Mergenthaler, Roeschley, Young and Zhao (2022) test whether managers provide more voluntary disclosures (including non-GAAP numbers) when GAAP limits their reporting discretion. They examine the role of accounting standards on the disclosure of NGE, finding that there are more non-GAAP Adjustments, such as goodwill, when the standard permits less disclosure discretion. Results suggest that firms convey additional information via voluntary disclosure when GAAP limits their ability to recognize information in financial statements.

Heflin, Kolev and Whipple (2022) study the relation between risk and relevance of non-GAAP earnings, following FASB's conceptual framework guidance on the matter. Their results suggest non-GAAP earnings isolate the more risk-relevant components of earnings, so NGE are more risk-focused than GAAP earnings, and also that they are more informative about risk when used together with GAAP earnings.

3.4.2 Evidence on the opportunistic role of non-GAAP measures

3.4.2.1 First period (2003-2012)

Coté and Qi (2005) created a “Honest EPS” measure to test if firms are opportunistically inflating their pro forma earnings in relation to GAAP EPS. They search for abnormal returns to a stock’s Honest EPS and show that firms with low Honest EPS consistently inflate their pro forma numbers, which is a signal for lower earnings quality. This evidence can be applied as a strategy for investing in stocks that present higher Honest EPS, as the probability for these stocks of having subsequent negative earnings surprise decreases.

Kolev et al. (2008) examines the effects of SEC’s regulation over adjusted items (earnings exclusions) from non-GAAP reporting. They find a trace of opportunistic behavior by firms as after SEC’s intervention firms classified with lower quality exclusions stopped reporting non-GAAP measures. In addition, their findings show that firms adapted their disclosures by shifting recurring items from “other exclusions” to “special items”, which signs opportunistic behavior of firms with regards to SEC’s regulations.

Heflin and Hsu (2008) also investigated the impact of SEC’s regulation over non-GAAP disclosures of american firms. Their objective is to identify the changes in non-GAAP reporting after 2003 new rules implementation, finding declines both in the disclosure frequency and in the exclusion magnitude of adjusted items. This evidence suggests, on average, that in the pre-regulation period those disclosures were being used opportunistically to portray a better picture of a firm’s performance.

Black and Christensen (2009) also documents opportunistic behavior by firms when using non-GAAP numbers. They investigate what are the types of adjustments managers do and how they are used to meet strategic earnings benchmarks, finding that managers adjust earnings for recurring items (such as R&D and depreciation). In sum, they conclude that “while managers may use many types of adjustments to meet strategic earnings benchmarks, they are more likely to exclude recurring items to meet strategic earnings targets than they are to exclude infrequent items.” (p. 318).

Chen (2010) analyzes the relation between the impact of Regulation G and the persistence of adjusted items trough street earnings by investigating if the market (investors and analysts) understands the persistence of adjusted items when the street earnings meet-or-beat analysts’ consensus forecast of earnings. His results indicate that SEC’s regulation was effective because it constrained the practice of excluding recurring items from street earnings.

Marques (2010) investigates the prominence of non-GAAP measures in press releases. She analyzes the emphasis placed in non-GAAP numbers when they meet or beat strategic earnings targets, “replacing” GAAP numbers that do not. The results suggest that managers

strategically place more emphasis on non-GAAP numbers to reach or approach the earnings benchmark.

Zhang and Zheng (2011) examine Regulation G consequences of reconciliations imposed by the SEC. They analyze the relation between reconciliations quality and the mispricing of pro forma earnings, finding for both pre and post period to the regulation, that only firms with low reconciliation quality were contributing pro forma earnings mispricing. Their results show that SEC's scrutiny improves the quality of non-GAAP disclosures and helps firms to contain opportunistic behavior, thus reducing mispricing of earnings.

Frankel, Mcvay and Soliman (2011) explore the association of board independence, one feature of corporate governance, and the persistence of non-GAAP earnings. The findings show that managers in firms with fewer independent directors on the board have an opportunistic behavior as their earnings adjustments are correlated with future GAAP earnings and operating earnings. They also find that after Regulation G that association declines.

Brown, Christensen and Elliott (2012) provide evidence on the relation between earnings announcement timing and the manipulation of reported earnings. They show that managers, in average, accelerate the timing of earnings announcements in quarters that adjusted numbers are reported. Also, their findings suggest that that acceleration increases with the level of recurring expenses and their use of less transparent reconciliation formats, which indicates opportunistic behavior.

3.4.2.2 Second period (2013-2022)

Doyle, Jennings and Soliman (2013) study the relation between non-GAAP exclusions, benchmark beating and earnings management. They found that managers tend to adjust non-GAAP earnings in order to meet or beat analysts' expectations, but that the market partially understands the opportunistic nature of those exclusions.

Isidro and Marques (2013) analyze the impact of compensation and board quality on the disclosure of non-GAAP earnings, finding opportunistic behaviors in relation to adjustments, reconciliations and emphasis of non-GAAP figures in press releases. Their results suggest that to contain such behaviors an efficient governance structure of the board of directors would be necessary.

Aubert and Grudnitski (2014) investigate the relationship between market mispricing of pro forma earnings and the degree to which those earnings are reconciled with GAAP numbers.

For a sample of European firms, their results show that a high-quality reconciliation is important in reducing market mispricing, in line with previous studies.

Baumker, Biggs, Mcvay and Pierce (2014) investigate the disclosure of one-time gains in press releases following Regulation G. They analyze two types of gains, legal settlements and insurance recoveries, and find that there is a large amount of variation in the detail about those gains. They show few firms report non-GAAP earnings explicitly excluding transitory gains in the post-Regulation G period.

Isidro and Marques (2015) investigate the influence of institutional and economic factors on non-GAAP earnings measures considering a sample of European firms. They find that firms are more likely to engage in opportunistic behavior by using non-GAAP numbers to meet or beat earnings benchmarks in countries with developed institutional and economic conditions. This results suggest that in environments where there is less opportunity to manipulate GAAP earnings, managers use non-GAAP disclosures to meet the earnings benchmarks by excluding recurring expenses.

Solsma and Wilder (2015) look into US-listed foreign firms that apply IFRS and seek to investigate the effect of reporting standard on pro forma disclosure frequency, characteristics and benchmarking. Their results show that US-listed foreign firms applying IFRS report non-GAAP numbers more frequently than firms applying US GAAP, but less opportunistically. The results taken together show that accounting reporting standards impact the behavior of non-GAAP disclosures.

Shiah-Hou and Teng (2016) investigate if investor perceptions may be misled by non-GAAP earnings after Regulation G. Analyzing earnings adjustments of S&P 1500 firms, they found that managers appear to manipulate non-GAAP disclosures by excluding recurring items from earnings even after SEC intervention.

Black, Christensen, Kiosse and Steffen (2017) investigate non-GAAP disclosure in the regulated setting of U.S., testing to what extent SEC's interventions restricted misleading non-GAAP reporting. The results show that managers changed their behavior in disclosing adjusted earnings metrics to "more cautiously" disclosures after the regulatory intervention of SOX by excluding fewer recurring items, for example.

Bond, Czernkowski and Loyeung (2017) also explore non-GAAP reporting environment considering the impact of Regulation G over U.S. firms. They find that this regulation helped increase the quality of earnings exclusions and also decrease the total amount of adjustments that were used to meet or beat analysts' forecasts.

He (2018) investigates the rounding phenomenon in non-GAAP earnings, which states that managers tend to round upwards their earnings and revenues to achieve reference targets. The author looks into profitable U.S. firms to investigate if managers engage opportunistically in rounding manipulation of earnings, suggesting that they do and that on reported non-GAAP earnings it is more severe when compared to GAAP earnings.

Yang (2018) tests the relation between aggressive non-GAAP earnings and intellectual capital disclosure. Using an australian sample of firms, Yang investigates how the market reacts to aggressive pro forma earnings and also whether aggressive reporting firms have difficulty signalling sufficient intellectual capital. The results point out that low-quality-reporting firms engage in aggressive pro forma earnings to influence investors' perceptions. At the same time, the results show that investors react positively to those non-GAAP earnings, suggesting that firms take advantage of that bias to shape investors' perceptions about their performance.

Kim and Yoo (2019) examine the incremental value relevance of additional (non-GAAP) loan-losses adjustments required in the Korean banking industry. Their results do not indicate incremental value-relevance over GAAP net income, and also do not find difference between the location of the non-GAAP disclosure, which can be on the face of the financial statements or in the notes.

Kyung, Lee and Marquardt (2019) analyze the effect of voluntary adoption of clawback provisions on non-GAAP earnings disclosures. The overall results suggest an opportunistic behavior of non-GAAP reporting as after a clawback adoption the frequency of reporting those metrics increases but the adjustments quality decreases.

Taylor and Tong (2019) focus on testing the earnings information flow timeliness in the Australian context. Although non-GAAP earnings are not the central issue of the paper, they investigate the timeliness of bad news for companies where analysts appear to forecast non-GAAP earnings rather than GAAP earnings. Their results suggest that accounting information is more efficient for negative operating outcomes when compared to negative outcomes reflecting unusual items.

Thielemann and Dinh (2019) analyze, before and after the Regulation G, to what extent firms only disclose adjustments to GAAP earnings instead of a whole disclosure of the non-GAAP measure, this is, an entire figure reconciled to the closest GAAP measure. They find that such reporting practice was much higher among firms that firms that started disclosing non-GAAP earnings only after the regulatory intervention. They also state that this kind of reporting is associated with meet or beat analyst earnings forecasts and with firms reporting losses.

Cain, Kolev and Mcvay (2020) investigate the misclassification of special items reported by firms by proposing a method for identifying the predicted level of special items a firm would have, so that any excess is related to opportunistic behavior. Their results show that there is a portion of special items that is associated with lower future earnings, cash flows and returns, indicating that it contains misclassified recurring expenses.

Lin, Xia and Ryabova (2020) investigate the classification shifting phenomenon on non-GAAP earnings measures. They focus on analysts' GAAP earnings forecasts data related to the period after Regulation G intervention to test if analysts help to mitigate opportunistic behavior of managers when making non-GAAP exclusions. They find that analysts' GAAP forecast play a significant role in mitigating classification shifting through non-GAAP measures by bringing more transparency to non-GAAP exclusions.

Christensen, Gomez, Ma and Pan (2021) conduct a natural experiment to examine how exogenous changes in analyst coverage affect the likelihood of disclosing non-GAAP measures and the relative quality of such disclosures. They find that following an unexpected decrease in analyst coverage managers are more likely to disclose non-GAAP EPS measures and that the quality of the adjustments decreases, suggesting that analyst coverage play a role in monitoring non-GAAP disclosures.

Bc and Liu (2022) investigate non-GAAP disclosures by high-tech initial public offering (IPO), finding a negative association between non-GAAP measures and post-lockup expiration stock performance. This indicates that managers are "optimistic" about firm's prospects. They also find a positive association between non-GAAP measures disclosure and insider trading.

3.4.3 Evidence on the dual role of non-GAAP measures

3.4.3.1 First period (2003-2012)

Jennings and Marques (2011) provide evidence of SEC's regulation over non-GAAP earnings disclosure of U.S. firms. They look into the joint effects of governance and regulation before and after Regulation G and found that prior to that regulation investors were misled by non-GAAP numbers but only for firms with weaker corporate governance and that after it there is no evidence that investors are being misled. Their results indicate that both regulation and corporate governance plays important roles in mitigating opportunistic behavior of managers in reporting non-GAAP numbers.

Barth, Gow and Taylor (2012) look over one type of exclusion, stock-based compensation expense, to examine how managers and analysts to SFAS 123R requirement recognize it. They find that for managers the adjustment of such expense results in the increase or smoothing of earnings, or in meeting earnings benchmarks, but for analysts they find the adjustment increases earnings ability to predict future performance, which is not an opportunistic behavior.

3.4.3.2 Second period (2013-2022)

Christensen, Drake and Thornock (2014) investigate how short sellers exploit investors' failure to understand the implications or recurring exclusions in non-GAAP numbers. The point is to examine if "well informed investors" takes advantage of "less sophisticated" investors in relation to the informativeness of pro forma disclosures. They find that sophisticated investors view pro forma earnings as informative and that they trade on negative information (aggressive adjustments, such as stock-based compensation).

Choi (2015) examine if there is an opportunistic incentive associated with the first non-GAAP number disclosed by investigating the relative sensitivity of operating and non-operating transitory items on the duration and as the probability of non-GAAP disclosures. He finds that UK firms begin to report non-GAAP information with good intentions, but also that subsequent disclosures become more opportunistic later on.

Choi and Young (2015) test the association between non-GAAP earnings and transitory items in GAAP earnings to find if non-GAAP numbers are an informative or an opportunistic information. Their evidence shows that both disclosure behaviors coexist in the throughout the period analyzed, depending if the non-GAAP number beat or not beat market expectations.

Guillamon-Saorin and Isidro (2017) look over the relation between non-GAAP earnings measures and constructed score that captures some techniques used by management to influence investors' perceptions of a firm's performance. For large European firms they find that non-GAAP measures are informative to investors and that non-GAAP adjustments of lower quality are related to higher levels of impression management.

Sinnewe, Harrison and Wijeweera (2017) examine if non-GAAP earnings are informative to investors by using data from large Australian firms. They test informativeness of pro forma earnings in three periods, covering the global financial crisis of 2008, and show that non-GAAP adjustments are positively correlated with future operating cash flows, i.e., are transitory items. However, this results holds for the crisis and pre-crisis period only (years 2006-2009).

Bentley, Christensen, Gee and Whipple (2018) compare managers non-GAAP earnings numbers to analyst forecast data providers (I/B/E/S). They find that they differ systematically because I/B/E/S provide more exclusions and also provide higher quality non-GAAP measures, when compared to managers' disclosures.

Christensen, Pei, Pierce and Tan (2019) investigate the relationship between non-GAAP reporting and debt covenant violations by looking into behavior practices before and after those violations. They find that after debt covenant violations the likelihood of disclosing non-GAAP earnings decreases and the quality of non-GAAP reporting improves, as investors demand for disclosure increases following a covenant violation.

Isidro and Marques (2020) look over the relation between industry competition pressure and firms' decision to disclose non-GAAP figures, finding that strong competition stimulates firms to disclose higher non-GAAP earnings and that it has a positive influence on the quality of non-GAAP disclosures, as firms tend to provide reconciliations and are less likely to exclude recurring items.

Visani, Di Lascio and Gargini (2020) focus on institutional and cultural factors that could affect the propensity to disclose non-GAAP measures and also materiality and transparency of the adjustments. They conduct an industry-based research by studying specifically the global Oil and Gas industry and find that the propensity to disclose non-GAAP measures is reduced by a strong institutional system and increased by the existence of a regulation over non-GAAP disclosure and the adoption of IFRS. In general, their results show that cultural factors play a less relevant role in the disclosure over non-GAAP measures in relation to institutional factors.

Sang, Alam and Hinkel (2022) examine and compare the association between segment earnings and managerial incentives of cross-listed firms in U.S. exchanges and U.S. firms using a matched sample. The overall results provide evidence that U.S. and cross-listed firms do not behave in the same way regarding segment earnings reporting, and that cross-listed firms from weak investor protection countries with agency cost motives are more likely to manipulate segment earnings when compared to firms from strong ROL countries.

Chen, Medinets and Palmon (2022), in line with past evidence on U.S. regulation, study the effect of Regulation G on analysts' information environment for non-GAAP reporting firms. They find that Regulation G is "associated with increased accuracy, decreased optimistic bias, and decreased dispersion of analysts' earnings forecasts for non-GAAP reporters." (p. 1.040). Findings suggest that Regulation G is effective because it makes non-GAAP disclosures more transparent and analysts more accurate.

Black, Black, Christensen and Gee (2022) compare non-GAAP earnings (EPS) of U.S. firms from (i) firms' annual earnings announcements and (ii) proxy statements. They find that variables the reflect contracting incentives are more highly associated with the likelihood of non-GAAP disclosure in annual earnings announcements when compared to proxy statements. This result suggests that the disclosure of NGE is associated with valuation motives. Also, they find that the exclusion of non-recurring items is more likely to occur when managers disclose NGE in both analyzed reports.

Cormier, Demaria and Magnan (2022) examine if the voluntary reporting of EBITDA has effects on information asymmetry and value relevance of French and Canadian firms, finding that Canadian firms are much more likely to report adjusted EBITDA when compared to French firms. They also find that adjusted EBITDA, for both French and Canadian firms, is associated with lower information asymmetry and higher market-to-book and returns, suggesting value relevance. Yet the results also indicate that investors view non-GAAP adjustments as not value relevant, so this would contribute to increase information asymmetry.

3.4.4 Non-GAAP measures role not addressed

Gu and Li (2003) investigate how innovation in hi-tech industries affects the disclosure of non-GAAP earnings. They find that in the context were earnings are less informative, firms increase disclosures of innovation to convey value relevant information, and also that disclosure of innovation are positively associated with firm's sales growth, profitability and stock returns.

Palmrose and Scholz (2004) investigate the relation between non-GAAP reporting and announced restatements by U.S. firms. As shown in Figure 7, it is the second most cited article of my bibliometric research. What calls attention is that this article does not investigate a non-GAAP measure specifically, but rather considers that the act of reporting restatements by firms makes prior disclosure of financial statements "non-GAAP".

Bhattacharya et al. (2007) identifies what kind of investor relies on pro forma information by analyzing investors transactions (i.e., trades) around earnings announcements that contain pro forma earnings (EPS figure). Their results suggest that less sophisticated investors tend to trust non-GAAP earnings because their trading is associated with the magnitude and direction of the earnings surprise based on pro forma earnings.

Laurion (2020) argue that firms where non-GAAP earnings reporting is highly persistent and with consistent adjustments, such as acquisition and restructuring expenses, amortization

of intangibles and impairment, managers engage in real activities and accounting choices with the preconceived plan to exclude these effects through non-GAAP earnings. By doing so, in the practice of managing they place less weight on accounting expenses because of the practice of excluding them period by period on non-GAAP disclosures.

Chen, Lee, Lo and Yu (2021) analyze the relation between 12 qualitative characteristics of non-GAAP earnings measures and the quality of the metric. They show that more transparent qualitative information is associated with transitory exclusions and with a lower likelihood that managers exclude expenses to meet or beat analysts' forecasts.

Griffin and Lont (2021) explore the trend in earnings surprises over time, finding a steady increasing tendency in positive street earnings surprises over the last two decades. Such result is explained by analysts increasing the inclusion of positive adjustments in EPS street earnings through greater use of non-GAAP adjustments.

Carvajal, Lont and Scott (2022) study non-GAAP reporting in New Zealand setting. They find a positive trend in the disclosures until 2012, peaking at 59% of firms and then falling to around 46%. This trend varies with the size of the firms as they find smaller firms disclose non-GAAP earnings at a much lower frequency. Their descriptive evidence shows evidence on the types of adjustments, frequency of reported metrics and magnitude of adjustments.

Clinch, Tarca and Wee (2022) explore the relation between non-GAAP disclosures and institutional factors and firm's characteristics from eight countries: Australia, France, Germany, Hong Kong, Italy, Singapore, Sweden, and the UK. Their findings suggest different national approaches to non-GAAP reporting prior to the adoption of IFRS affects such disclosures and observe that "country differences and firm characteristics such as size, leverage and volatility of income are the key factors explaining non-IFRS reporting practice." (p. 27).

3.5 Final remarks

In this section I comment on the overall literature review results taken together.

Based on my three categories, (i) papers that conclude on NGE as being informative; (ii) papers that conclude on NGE as being opportunistic; and (iii) papers that conclude both motives co-existing, I found that past evidence show a well-divided literature with regards to the motives underlying non-GAAP measures disclosures.

As for whether these motives are mostly "good" or "bad", it cannot be definitively stated yet. Findings indicate that 36.3% of past studies indicate non-GAAP earnings as informative,

while 35.0% state non-GAAP earnings as opportunistic. Other 18.8% conclude that non-GAAP earnings can be both informative and opportunistic, depending on various factors.

This trend holds when examining the period of analysis by interval: on the first period the opportunistic role is little less evident: 11 papers indicate the informative role while 09 indicate the contrary, and only 02 the co-existing motives. Papers classified in the third category (i.e., both motives co-existing) are concentrated between 2013 and 2022, which suggests most recent empirical and descriptive evidence on NGE are divided.

Although there is a growing number of evidence on non-GAAP measures, past evidence is basically limited to the north-american context, focusing on U.S. firms and environment. This happens mostly because of the singularity of SEC's rules over non-GAAP measures reporters, associated with the different periods such rules were implemented (SEC, 2022), which creates a specific scenario for empirical testing and analysis.

There are few investigations in other settings, as also indicated by past literature reviews (Arena et al., 2020; Heer et al., 2022). Herr et al. (2022) repeatedly mention that U.S. firms and context are investigated extensively: "the phenomenon of voluntary reporting APMs has been the subject of numerous research articles in academic journals as well as professional journals, with a focus on U.S. GAAP data in the North American region ('U.S. setting')." (p. 393). Considering not academic papers, U.S. data represents 62% of all 410 articles analyzed by them.

I found that 66.3% (53) papers focus on U.S. firms and environment. Studies that analyze European and Australian firms concentrates 5 papers each, representing 12.5%. There are also 4 papers that considers the UK setting (5.0%); 3 considers the South Africa setting (3.8%); and 2 considers Canada and New Zealand environment (2.5% each). In a less extent (1 paper each) Germany, French and Korea are also investigated.

Regarding European samples, Visani et al. (2020) observes "There is only a limited amount of research, and it focuses either on individual European Union (EU) member countries (Aubert, 2010; Hitz, 2010) or on the EU area as a whole".

There are only few international studies on non-GAAP disclosures that analyzes a group of countries besides Europe (with U.S. included or not). The sample from Visani et al. (2020), for example, contains global data from 23 countries (U.S., Europe, Canada, Australia, Brazil, China, Colombia, Hong Kong, India, Japan, South Africa). Solsma and Wilder (2015) and Sang et al. (2022) focus on U.S. cross-listed firms. I follow such previous work to justify my sample of cross-listed firms from G20 countries (see section 5).

The literature gap considering the "research region" is very clear. USA has the strongest regulation over non-GAAP measures and holds other institutional factors, like stronger investor

protection, that makes the U.S. setting very interesting to investigate. But note the opposite is also very true: in settings without any regulation, for example, what should researchers expect about non-GAAP disclosures and their impacts?

Also, to comprehend non-GAAP phenomena in a broader sense we need to understand its behavior and characteristics anywhere it occurs significantly; other jurisdictions (Marques, 2017) show financial reporting is full of non-GAAP measures. In this sense, my Essays brings evidence from dual-listed foreign firms (known as "FPIs") from many jurisdictions to help fill such literature gap.

Considering the two periods of analysis, U.S. research remains of much interest: 43.4% of papers studying U.S. firms were published between 2003-2012 and 56.6% were published from 2013 until 2022. Only one paper, Koning et al. (2010), investigates NGE in a different setting, focusing on German firms. Non-U.S. studies basically are concentrated at the second period, therefore the most "up to date" evidence contain the result of international settings.

Note that by linking the conclusion that non-U.S. studies are concentrated between 2013 and 2022 with the conclusion that such period concentrates evidence of co-existing motives for NGE reporting, there's an association between international setting and the dual-role of NGE.

The following table indicates paper's research focus:

Table 7 - Research focus

Categories	**Papers**[22]
Information content (informativeness)	38
Determinants (propensity)	25
Predictive ability (persistence)	21
Regulation impacts	10
Meet-or-beat earnings benchmark	6
Earnings attributes (earnings quality) and disclosure quality	3
Prominence of disclosure	3

Prepared by the author.

Considering all 53 "U.S. setting" papers: (i) 24 (45.2%) include the "information content (informativeness)" objective; (ii) 16 (30.19%) the "Determinants (propensity)" objective; (iii) 15 (28.30%) the "Predictive ability (persistence)"; (iv) 10 (18.87%) the "Regulation impacts" objective; (v) 4 (7.55%) the Meet-or-beat earnings benchmark; (vi) 2 (3.77%) the Prominence of disclosure; and (vii) 1 (1.89%) the "Earnings attributes (earnings quality) and disclosure quality" objective.

[22] Papers can have more than one research objective and therefore the sum does not match the number of reviewed papers.

Non-U.S. research, comprised by 27 papers, also focus more on the "information content (informativeness)" (58.1%) and "Determinants (propensity)" (33.3%) objectives. 22.2% focus on the "Predictive ability (persistence)" objective.

Analyzing all papers, 47.5% indicate the "information content (informativeness)" as their main research objective. This categorization suggests that the majority of past studies wanted to test whether or to what extent non-GAAP earnings are value relevant to market participants.

Also, to understand the drivers of NGE disclosure is another major objective documented, as past scholars tested many factors that could be associated with the propensity of non-GAAP disclosures and the motives behind such disclosures. The "Determinants (propensity)" objective is contained in 31.5% papers.

Herr et al. (2022) show that the most frequently analyzed individual NGE metric is "EB measures" (EBIT, EBITDA, etc). Although researchers such as Bhattacharya et al. (2003) do not consider EB measures as NGE, justifying things like "we do not include EBITDA since this was a commonly reported figure long before the pro forma reporting trend began in the mid-1990s.", I do not completely agree with that reasoning because the adjustments made to reach EBITDA number are mandatory when calculating GAAP net income.

Malone et al. (2016) also affirm "Although some of the literature refers to these metrics as non-GAAP, their disclosure is permitted under IAS 1 Presentation of Financial Statements." (p. 66). I also do not agree with that because EBITDA is not a measure extracted directly from the face of financial statements – if one has to calculate such measure it cannot be considered a reported number, and it is still a voluntary metric mainly disclosed separately from the audited financial statements. Finally, considering especially the "adjusted EBITDA" measure, in which each firm decides what adjustments to exclude, it turns out to be a clear example of non-GAAP earnings definition.

The majority of past studies examine several different NGE measures. Guillamon-Saorin and Isidro (2017), for example, identifies 05 types of NGE: "(i) non-GAAP earnings per share, (ii) non-GAAP from continuing operations per share, (iii) non-GAAP net income, (iv) non-GAAP income from continuing operations, and (v) adjusted versions of EBITDA and EBIT." (p. 12). But EB and EPS measures are the most frequently analyzed NGE metrics (Herr et al., 2022).

With regards to EPS measures there's a "red flag" we need to discuss: many past studies (Brown & Sivakumar, 2003; Heflin & Hsu, 2008; Chen, 2010; Doyle, Jennings, & Soliman, 2013; Taylor & Tong (2019); Henry, Hu, & Jiang, 2020) that use "street earnings" as a proxy

for non-GAAP earnings *as reported* by managers. Street earnings are data provided by forecast tracking services (Black, Black, Christensen, & Heninger, 2012) such as I/B/E/S.

Herr et al. (2022) explains why researchers may be using street earnings – provided by analysts – as a proxy for manager-reported non-GAAP earnings: "street earnings are an easy-to-access, machine-readable dataset provided by analyst databases (e.g., Thomson Reuters' I/B/E/S or First Call Research Data) in a timely and cost-saving manner, allowing for the analysis of large samples" (p. 430). I understand the justifications yet I agree with Lougee and Marquardt (2004) when they say that firms included in forecast databases may not be *de facto* reporters.

Naturally using non-GAAP earnings as reported by managers results in a "significantly smaller sample" (Lougee & Marquardt, 2004, p. 772), but non-GAAP earnings as reported are necessary for researchers to explore any relation with the *actual* decision to release and also the decision to what release, where to release it, etc. Black, Black, Christensen and Heninger (2012, p. 880) affirms that "the use of street earnings data could lead to erroneous inferences regarding investor reliance on pro forma earnings and manager motivation.".

Marques (2010, p. 121) also points out evidence from Bhattacharya et al. (2003) where they find "a statistically significant mean difference of approximately 4 cents per share between non-GAAP earnings disclosed in press releases and the numbers reported in I/B/E/S as actual earnings", suggesting that managers exclude more expense items when compared to analysts.

Bentley et al. (2018) also documented that I/B/E/S earnings contain more exclusions and also provide higher quality non-GAAP measures when compared to actual reported non-GAAP numbers.

In this sense, after reviewing all papers chosen measures and the discussions around them, I stick to the fact that I needed to use non-GAAP earnings number *as reported* by firms, even if it is (i) much more costly to obtain and (ii) leads to less data to analyze. I explain my sample selection procedures each Essay.

In summary, I find that most of past evidence: (i) is focused on the U.S. setting; (ii) focus their procedures to explain the motives underlying non-GAAP disclosures; (iii) centers their research focus on the value relevance and determinants of NGE; (iv) uses many different NGE proxies, but EB and EPS measures are the most frequently used; and (v) it still cannot conclude on the dual-role of NGE measures. These results suggest more evidence on the matter is needed.

4 ESSAY 2 – The Relation Between Institutional Factors and the Reporting Choice of Non-GAAP Earnings in a Cross-Country Setting

4.1 Introduction

In this paper I investigate the association of main institutional factors over the reporting decision of non-GAAP earnings for an international sample, examining jurisdictions that we do not know nothing or almost nothing about the non-GAAP phenomena.

I add to the literature by addressing Herr et al. (2022) research call and examine the role of institutional factors on non-GAAP earnings reporting choice in a cross-country setting. This is the third paper to address non-GAAP earnings determinants for an international sample.

Non-GAAP earnings (hereon, "NGE") measures have been extensively investigated in the U.S. setting. Most of the previous evidence focus on U.S. firms and environment (Herr et al., 2022). Still, non-GAAP earnings are widespread reported in many other jurisdictions, like Australia, Brazil, Canada, France, Germany, UK (Choi et al. 2007; Koning et al., 2010; Andrade & Murcia, 2019; Ribeiro et al., 2019; Cormier et al., 2022) and European countries (Isidro & Marques, 2013; Guillamon-Saorin et al., 2017).

There is a claim for new evidence to enhance the current debate on the reporting motives and economic consequences of NGE measures in other settings (Herr et al., 2022), particularly where institutional factors differ from the ones documented in previous literature because the reporting choices are conditional on the incentives managers face (Lougee & Marquardt, 2004; Choi & Young, 2015).

Institutional factors are country-level aspects that impose pressures on firms. Regarding disclosure practices, those factors are associated with changes in disclosure characteristics and behavior. Accordingly, a firm's reporting incentives are shaped by its institutional factors and economic environment (Healy & Palepu, 2001; Holthausen, 2009; Nobes, 2013).

Isidro and Marques (2015) launched the research agenda on the role of country-level and economic factors over NGE for an international sample. They provide the very first empirical evidence on the impact of law, enforcement of the law, investor protection, development of financial markets and good communication and dissemination of information, over non-GAAP reporting choice strategies of European firms from 21 countries.

They found that firms in countries with more developed financial markets, efficient laws and law enforcement, stronger investor protection, good communication and dissemination of information, are more likely to disclose non-GAAP numbers to meet or beat earnings targets.

These findings suggest that in countries where managers have lower reporting incentives to manage GAAP earnings, they use alternative ways, like NGE, to produce more "aggressive" information on business performance.

Besides Isidro and Marques (2015) there is only one study on NGE that focuses on the role of institutional factors over non-GAAP reporting considering international data.

Visani et al. (2020) examine institutional and cultural factors that may affect the reporting choice of non-GAAP measures considering the global Oil and Gas industry, which includes 23 countries. They add to the literature by investigating whether cultural values, the presence of regulation and accounting regimes do play a role in the disclosure of non-GAAP measures.

They find that non-GAAP reporting choice is reduced by firms in countries with strong institutional system, unlike Isidro and Marques (2015) findings, and increased by the existence of a regulation over non-GAAP disclosure and the adoption of IFRS. Cultural factors, however, were not relevant to explain firm's choice to report non-GAAP measures.

Besides those studies, there are other four that investigates country-level effects on NGE reporting choice considering specifics setting: Koning et al. (2010) studies a Germany sample; Charitou et al. (2018) a UK sample; and Cormier et al. (2022) a Canada and French samples.

Koning et al. (2010) results suggest that non-GAAP reporting is associated with poor economic conditions (based on gross domestic product - GDP growth) and when firms reported a GAAP loss. Charitou et al. (2018) find that non-GAAP reporters are larger firms that exhibit better corporate governance quality. Cormier et al. (2022) argue that countries with weaker country-level factors (like code law legal origin, less investor protection and regulation) are less likely to disclose non-GAAP measures because there is less pressure upon managers to provide voluntary disclosure.

Most countries in my sample do not have any regulation or guidance on the matter, which enriches the literature on the role of such key factor on the decision and practices of non-GAAP measures (Young, 2014). Isidro and Marques (2013), for example, explain that the European scenario regarding non-GAAP metrics is very different from the U.S. setting as there is absence of regulation, thus, "the lack of strict rules on non-GAAP reporting in Europe puts the European capital markets environment at a high risk for opportunistic use of non-GAAP information" (p. 291).

Clinch et al. (2022) described there are some international frameworks that could impact non-GAAP disclosures[23]. The International Organization of Securities Commissions (IOSCO), for instance, issued guidance that states reporting firms should provide investors with additional and transparent information about how they calculated non-GAAP numbers and explain such metrics.

My results confirms previous empirical evidence (Isidro & Marques, 2015; Koning et al., 2010; Charitou et al., 2018) that countries with better economic conditions and under a high-quality reporting scenario put pressure on firms to provide additional performance measures as they have stronger incentives to not manage GAAP earnings (Isidro & Marques, 2015; Cormier et al., 2022).

In summary, results suggest that companies (i) from countries with non-GAAP measures regulation or guidance; (ii) with more developed equity markets; (iii) with higher investor protection, and (iv) with a common law legal system origin, are *more* likely to disclose non-GAAP earnings, suggesting management's intentions when disclosing NGE voluntarily are to provide a strategic performance measure. Results *do not* confirm that accounting regime (H2) plays a role in shaping NGE reporting.

I complement previous research on the matter by providing (i) new results from empirical data from jurisdictions not investigated until now; (ii) insights on existing research, which are few; and (iii) evidence to discuss existing contradictory results. This paper contributes to both non-GAAP literature and cross-listing literature by providing evidence that institutional factors do play a role in the reporting decision of non-GAAP earnings measures.

This paper is organized as follows: Section 4.2 discusses non-GAAP reporting incentives in a cross-country setting. Section 4.3 presents sample selection and data collection procedures. Section 4.4 explains research design, and Section 4.5 provides descriptive evidence, empirical results and final remarks.

4.2 Cross-country setting and non-GAAP reporting incentives

My overall hypothesis is: *Firms in countries with institutional factors that are equal to the ones U.S. firms face are more likely to disclose non-GAAP earnings.* This premise is based

[23] Refer to their work to see the current regulatory scenario for Australia, France, Germany, Hong Kong, Italy, Singapore, Sweden and UK. In section 4.3.3.2 I resume other research on the matter, including my own.

on past empirical results, and I test whether each of the main institutional factor affects a firms' non-GAAP earnings reporting decision.

Non-GAAP reporting incentives in a cross-country view must considers whether relevant specific elements at a country-level interacts with non-GAAP reporting practices. In this section I comment on the relation between them and the likelihood of firms providing NGE disclosures.

Healy and Palepu (2001) state that regulation plays a central role on disclosure. Previous literature on financial disclosure concludes that regulatory interventions are expected to change firms' disclosure strategies in financial reporting (Leuz & Wysocki, 2016).

In this sense, the absence or differences in regulation may affect differently the process of reporting voluntary disclosures, like non-GAAP measures. Young (2014, p. 448) affirms that "cross-country differences in non-GAAP earnings regulation raise important policy questions" because regulation on non-GAAP measures is related with enhanced transparency and reduced mispricing, depending on the extent of existing rules.

However, "international securities regulations do not typically place restrictions on non-GAAP disclosures presented in communications with investors" Young (2014, p. 448), and this remains true nowadays.

Empirical evidence suggests to some extent that the presence of a regulation or guidance impacts the frequency and characteristics of non-GAAP measures disclosures (Marques, 2006; Heflin & Hsu, 2008; Kolev et al., 2008; Jennings & Marques, 2011; Black et al., 2012; Bond et al., 2017; Chen et al., 2022; Malone et al., 2016; Clinch et al., 2022).

Entwistle, Feltham and Mbagwu (2006), for example, examine whether U.S. firms change their NGE reporting practice in response to SEC's regulation between 2001 and 2003, finding (i) a decline in non-GAAP reporters and (ii) a less opportunistic use of non-GAAP numbers in relation to some characteristics, such as magnitude, emphasis and quality.

Marques (2006) also examines how SEC's interventions on U.S. firms affects firm's non-GAAP measures reporting decision choice. Results show that "the probability of disclosing non-GAAP earnings was stable in 2001 and 2002 and decreased in 2003 (after the approval of Regulation G)" (p. 573) and that for NGM other than earnings measures there is an accelerating decline in the probability of disclosures. Such decrease in the reporting pattern is due to the fact that "SEC signaled its intent to decrease the frequency of potentially misleading disclosures by increasing the pressure on managers to avoid misleading investors." (Marques, 2010, p. 130).

Heflin and Hsu (2008) also document a moderate decrease in NGM disclosure frequency, but there's also evidence indicating that NGM continued to increase even after the impacts of

Regulation G on U.S. firms (Black et al., 2012)[24]. Bond et al. (2017), like Heflin and Hsu (2008), conclude that after regulation G there was a decrease in the amount of adjustments used to meet or beat analysts' forecasts. Black et al. (2012) suggest that, in general, regulation G is associated with an increase in NGE disclosure quality, as shown in other studies (Kolev et al., 2008; Zhang & Zheng, 2011; Chen et al., 2022).

Finally, evidence on non-GAAP measures guidelines (i.e., not mandatory) introduced by market's regulators to improve firm's disclosures practices (Rainsbury, 2017) indicates despite not being imposed rules, guidelines are changing disclosure behavior of non-GAAP measures. Results suggest that after the guidelines introduction, New Zealand firms improved the way in which they disclose NGE and reduced NGE emphasis. Also, Clinch et al. (2022, p.5) suggest that guidance may influence practice by "'encouraging' a practice that was already underway".

Clinch et al. (2022) find that the incidence of non-GAAP disclosures is higher in UK and France but lower in Hong Kong, Germany and Singapore.

Visani et al. (2020) find that the presence of a regulation increases the propensity of non-GAAP measures disclosure because it "reduces uncertainty and provides legitimization for the use of non-GAAP financial measures." (p. 2). I follow Visani et al. (2020) and include a similar variable that identifies if countries are under the presence of a regulation or guidance[25] on non-GAAP measures.

Considering past empirical results, I expect that companies in environments where there's absence or lack of regulation or guidance over non-GAAP measures have lower propensity to disclosure non-GAAP earnings. This leads to my first hypothesis:

H1 *Firms from countries with non-GAAP measures regulation or guidance are more likely to disclose non-GAAP earnings than those without such regulations.*

Accounting regimes are expected to influence financial reporting outcomes (Holthausen, 2009; Miller and Bahnson, 2010). Solsma and Wider (2015) indicates that disclosure behavior of non-GAAP measures is conditional on the adopted accounting framework.

[24] These and other conflicting evidence can be explained by the period covered in the analysis and in light of the proxies used for the non-GAAP measures. Heflin and Hsu (2008), for example, uses I/B/E/S EPS, while Black et al. (2012) hand-collected non-GAAP earnings.

[25] In my investigation, "presence of a regulation or guidance" means that there are specific requirements on non-GAAP measures issued by regulators (mandatory or not mandatory).

They show disclosure characteristics for foreign firms applying IFRS, such as adjustment magnitude, is less aggressive than the disclosure of firms applying U.S. GAAP, and that IFRS adopters are less likely to meet or beat earnings targets.

Empirical results on the effects of accounting regimes on non-GAAP reporting choice are few. Isidro and Marques (2015) found a negative relation between IFRS accounting regime and non-GAAP earnings, indicating that IFRS adopters are less likely to report NGE. Visani et al. (2020) results, on the other hand, conclude that applying IFRS increases the disclosure of non-GAAP measures.

Considering that U.S. GAAP adopters are under stricter regulation rules over non-GAAP measures, I expect that firms applying U.S. GAAP regime have higher propensity to disclose non-GAAP earnings, leading to my second hypothesis:

H2 *Firms adopting the U.S. GAAP regime are more likely to disclose non-GAAP earnings compared to those using other GAAP.*

It is expected that financial reporting outcomes are shaped by the development of equity markets and countries. Financial reporting quality relates to the attributes, like transparency and reliability, of information produced by firms. Information produced in settings more financially developed where there is, for example, more investor demand for information, access to capital, increased scrunity and regulatory frameworks, are expected to be of higher quality.

Isidro and Marques (2015) identified that managers in developed environments face more pressure to achieve earnings benchmarks, using non-GAAP earnings to meet or beat earnings targets, while Visani et al. (2010) concluded developed equity markets constrain the use of non-GAAP measures.

Isidro and Marques (2015) measure equity market development by conducting a principal component analysis that results from the combination of three ratios related to country's GDP and population. Visani et al. (2020) conduct a factor analysis on two indicators (not described) obtained from the "World Development Indicators Database". Evidence from those two studies are contradictory.

One explanation for contradictory results is that using different proxies for equity market development may produce different outcomes. La-Porta, Lopez-de-Silanes and Shleifer (2008) explain that rules and regulations can be measured, but how proxies are measured matters for economic and social outcomes.

Therefore, I expect that firms from countries with more developed financial markets have a higher propensity to disclose non-GAAP earnings. My third hypothesis is as follows:

H3 *Firms from countries with more developed financial markets are more likely to disclose non-GAAP earnings than those in less developed markets.*

Leuz and Wysocki (2016) document that countries with large public equity markets tend to present institutional characteristics such as extensive disclosure regulation, stronger outside investor protection and strong legal enforcement. As La-Porta, Lopez-de-Silanes and Shleifer (2008) propose, "legal protection of outside investors limits the extent of expropriation of such investors by corporate insiders, and thereby promotes financial development." (p. 1).

Zingales (2009) discusses unsophisticated investor protection under the lens of investing in individual stocks. As he argues, "the level of idiosyncratic risk at which an individual can be exposed by buying single stocks is very high and dangerous." (p. 417). Brown (2020) states that unsophisticated investors rely more on non-GAAP measures compared to sophisticated.

Past research has suggested that the level of investor protection of a country influences the risk of investor minority expropriation. Isidro and Marques (2015) discuss, for example, that when investor's rights are strongly protected it reduces managers' opportunistic incentives, but at the same time managers may use more the alternative reporting practices of performance.

Following them, I expect that firms from countries with higher investor protection have higher propensity to disclose non-GAAP earnings, which leads to my fourth hypothesis:

H4 *Firms from countries with higher investor protection are more likely to disclose non-GAAP earnings than those in less protected environments.*

La-Porta, Lopez-de-Silanes and Shleifer (2008) summarize the literature on the economic consequences of legal origins. They show that the background on legal origins matter and play a significant role in shaping legal rules and regulation, and hence financial markets. Also, Hope (2003) shows that legal origin determines the level of disclosure, but also that firms from settings with rich information environment are less affected by them.

Most researchers identify "common law" and "civil law" as two main legal traditions (La-Porta et al., 2008) but "Occasionally, countries adopt some laws from one legal tradition and other laws from another, and researchers need to keep track of such hybrids, but generally a particular tradition dominates in each country." (p. 288).

Visani et al. (2020) references past research that examine the relation between the origin of legal system (common law or civil law) and accounting behavior, finding that a "high-quality legal system" reduces the materiality of non-GAAP adjustments.

Cormier et al. (2022) show that countries with code law legal system, together with other institutional factors, are less likely to report non-GAAP measures.

I expect that firms from countries with common law legal system have higher propensity to disclose non-GAAP earnings. My final hypothesis is:

H5 *Firms from countries with a common law legal system are more likely to disclose non-GAAP earnings, compared to those with other legal systems.*

In the next section I describe sample selection procedures and final sample.

4.3 Methodological procedures

4.3.1 Sample selection approach

Sampling procedures start from all not financial[26] public firms from G20 countries.

G20 setting was selected for several reasons: (i) first, like past scholars, I identified a lack of NGE evidence of firms from countries other than USA, Australia and European countries; (ii) second, by selecting G20 jurisdictions I conduct a broader investigation over NGE and test institutional factors in new and different contexts; (iii) third, G20 countries represent the most relevant economies of the world (G20, 2021).

The following table presents 19 countries under sample selection approach, with Financial Times Stock Exchange (FTSE) classification of equity markets and IFRS jurisdictional profile:

Table 8 - G20 countries, equity markets classification and IFRS profile

Region	Country	FTSE classification of equity markets[27]	IFRS jurisdictional profile[28]
Africa	South Africa	Advanced Emerging	Required
South America	Argentina	Unclassified	IFRSs required for all listed companies except for banks and insurance companies
	Brazil	Advanced Emerging	Required

[26] I excluded non-financial firms because such industry do not use EBITDA as a performance measure.
[27] As of FTSE (2022).
[28] Following Sarquis (2019), I consulted the jurisdictional profile of IFRS adopters available at IFRS Foundation website as of May the 11th, 2023. Note: this profile is valid for the consolidated financial statements.

	Mexico	Advanced Emerging	All listed companies must follow IFRS Standards except for financial institutions and insurance companies, which must follow national standards
North America	Canada	Developed	Required for most listed companies and financial institutions. However, (a) companies also filing in the United States are permitted to apply US GAAP and (b) rate-regulated entities are permitted to apply US GAAP until 2019 even if they do not file in the United States
	United States	Developed	Not permitted for domestic listed companies, but foreign issuers are permitted to use IFRS
Asia	China	Secondary Emerging	Not required
	India	Secondary Emerging	Not required
	Indonesia	Secondary Emerging	Not required
	Japan	Developed	Not required
	South Korea	Developed	IFRS Standards as adopted in Korea (which are IFRS Standards as issued by the IASB Board without modifications) are required for listed companies and financial institutions
	Saudi Arabia	Secondary Emerging	IFRS Standards are required for all listed companies, banks, and insurance companies
	Turkey	Advanced Emerging	Required
Europe	France	Developed	Required
	Germany	Developed	Required
	Italy	Developed	Required
	Russia	Unclassified	Required
	United Kingdom	Developed	Required
Oceania	Australia	Developed	Required

Prepared by the author.

It is necessary to highlight IFRS adoption scenario over the G20 jurisdictions. According to IFRS (2018a) “Fifteen of the G20 have adopted IFRS Standard for all or most companies in their public capital markets”, but: (i) Japan only permits IFRS standards for domestic companies on a voluntary basis; (ii) China, India and Indonesia do not adopt IFRS; and (iii) United States permits IFRS standards for foreign private firms but do not for domestic companies.

I complement past literature on NGE by analyzing whether different accounting regimes do play a role in the disclosure of non-GAAP earnings metrics, see section 4.2.3.2.

With regards to equity markets development, we can observe from Table 8 that the most frequently investigated settings (U.S., Australia and Europe) are developed, but other levels of market development may impact the overall quality of financial reporting.

Drawing the sample in the way presented allows me to investigate NGE under different economic and specific scenarios, adding evidence from an international setting. In section 4.3.2 I explain the sample selection procedures.

4.3.2 Sample selection criteria

I use Capital IQ database screening tool to apply the sampling procedures. The search for "all not financial public firms from G20 countries" resulted in 31.731 firms as of May the 4th, 2023. Then I filtered for firms reporting the "as reported EBITDA" variable (48905) on the last fiscal year (FY 2022), resulting in 4.153 firms (13.0% of all firms).

To the best of my knowledge, Capital IQ and Bloomberg (Cormier et al., 2022) databases are the only ones to provide, in large scale, non-GAAP earnings as reported by firms variables. Capital IQ provides "as reported EBITDA" and Bloomberg "adjusted EBITDA" variables.

Christensen et al. (2014, p. 73), for example, says: "Since no machine-readable database provides manager-adjusted pro forma earnings disclosures, we hand-collect a comprehensive sample of quarterly earnings press releases (…)". From content analysis procedures presented in Essay 1 I identified my work as the second to include as reported NGE to reach a sample of "non-GAAP earnings reporters". The first is Cormier et al. (2022), which collected the adjusted EBITDA variable using Bloomberg database.

Despite EBITDA does not contain discretionary adjustments when compared to adjusted EBITDA, studies have shown that EBITDA reporters are also frequent reporters of the adjusted EBITDA (Isidro and Marques, 2015; Andrade & Murcia, 2019). There is descriptive evidence that all "Earnings Before (EB)" measures are reported by many firms around the world (KPMG, 2016; Rozenbaum, 2019; Andrade & Murcia, 2019; PwC, 2019).

Selecting firms from "a group of reporting firms of non-GAAP earnings" is a less costly, more efficient way to study the determinants of non-GAAP earnings, as those firms are *actual* NGE reporters.

From 4.153 EBITDA reporters, 606 were excluded because they were subsidiaries firms, following Coté and Qi (2005) procedures, leading to 3.547 firms (3.547 firms is the population of non-GAAP earnings reporters). I then require firms to report FY 2022 net income and total assets and, as a result, 14 firms were excluded, remaining 3.533 non-GAAP earnings reporters. Finally, I excluded 32 firms that presented invalid tickers and other 34 that presented negative values for total assets variable. 3.467 firms is the final sample.

Table 9 - Sample selection (Essay 2)

Description	***N***
All not financial public firms from G20 countries	**31.731**

Firms reporting the "as reported EBITDA" variable (48905) on the last fiscal year (FY2022)	**4.153**
Subsidiary firms	(606)
Firms missing data on net income or total assets variables on the last fiscal year (FY2022)	(14)
Invalid tickers (error to download information)	(32)
Firms with negative values for "total assets"	(34)
Final sample	**3.467**

Prepared by the author.

Firms are distributed like shown in Table 10:

Table 10 - Number of firms by country (Essay 2)

Region	**Country**	**Firms**	**%**
Africa	South Africa	58	1.7%
South America	Argentina	1	0.0%
	Brazil	136	3.9%
North America	Canada	197	5.7%
	United States	525	15.1%
	Mexico	35	1.0%
Asia	China	15	0.4%
	India	1.429	41.2%
	Indonesia	86	2.5%
	Japan	4	0.1%
	South Korea	-	-
	Saudi Arabia	4	0.1%
	Turkey	43	1.2%
Europe	France	110	3.2%
	Germany	135	3.9%
	Italy	116	3.3%
	Russia	6	0.2%
	United Kingdom	295	8.5%
Oceania	Australia	272	7.8%
Total		**3.467**	**100%**

Prepared by the author.

Firms in India are the most EBITDA reporters, reaching 41.2% of all reporters. U.S. holds 15.1% of EBITDA reporters and United Kingdom 8.5%. They concentrate 64.9% of all firms. The only country that had no EBITDA reporter is South Korea.

I maintain firms from all industries (except financial sector) because I wanted to provide a broad descriptive evidence over non-GAAP adoption. Black et al. (2018) find, for U.S. firms, "that non-GAAP reporting frequency has increased across all sectors during our sample period, indicating that all sectors are embracing this reporting practice." (p. 3). See descriptive data on section 4.5.1.1 to details.

4.3.3 Data collection

4.3.3.1 Research period and observations

Public firms use periodic reports to disclose non-GAAP numbers, mainly in press releases and annual reports. Past studies documented that non-GAAP disclosures are more concentrated in press releases because they are investor oriented and also not audited.

I use annual data from annual reports because they contain audited financial statements (and consequently, the official earnings number), management commentary and other written communications and independent reports, which may ensure a better level of disclosure when comparing to press releases.

I focus on annual data from fiscal years 2013-2022. I begin with 2013 because this is the first year available to grab information on the "as reported EBITDA" Capital IQ variable, and end with 2022 because this is the last available year with annual reporting data. Also, as NGE measures have recently gained relevance in corporate reporting it is expected that there are more firms in more recent years.

Choosing the last ten consecutive years reaches a recent panel data to analyze an up-to-date information on non-GAAP earnings. Final sample is 30.750 firm-year observations.

With regards to panel data procedures, I chose to not winsorize outliers and no treatment was performed for missing data, except for "investor protection (INVP)", see section 4.3.3.2.

STATA script is presented in the Appendix.

4.3.3.2 Data and variables

Almost all variables were extracted directly from Capital IQ database. Others were hand collected from websites and other sources, following prior research. Financial variables such as "EBITDA", "total assets" and "total revenues" were collected in USD dollars (in millions).

I explain the measurement and source of the dependent variable and all country-level and firm-specific variables included in my model below:

a) <u>Dependent variable</u>

The dependent variable is a dummy variable coded as 1 if firms disclose the "as reported EBITDA" variable extracted from Capital IQ database (48905 variable), zero otherwise.

b) <u>Institutional (country-level) variables</u>

b.1 Presence of a regulation or guidance (REG)

Visani et al. (2020) classify USA, Canada, Australia, New Zealand and Europe as settings under a presence of a regulation. In her review, Marques (2017) identifies past literature has pointed to USA, Australia, UK, French, Germany, Ireland, South Africa and New Zealand as countries with specific regulation or guidance on non-GAAP measures. She also cites countries in Europe under the European Securities and Markets Authority (ESMA). Clinch et al. (2022) indicates France, Germany, Sweden, Italy, UK, Australia and countries in Europe as of having some kind of regulation or guidance.

Based on previous work I classify some countries in my sample as having regulation or guidance, which are: USA, Canada, Australia, French, Germany, Italy, South Africa and UK. I also include Brazil as having the presence of a regulation or guidance based on Instrução CVM nº 516/2022 (that replaced nº 527/2012) issued by the brazilian market regulator Comissão de Valores Mobiliários (CVM, 2022).

Then, as my sample contains countries other than those mentioned in previous literature, I conducted an online search to identify if Japan, India, Indonesia, China, Russia, Saudi Arabia, Turkey, Mexico and Argentina were under the presence of any regulations or guidance. Until May/23 I haven't identified the presence of a regulation or guidance on non-GAAP measures for those countries.

Regarding India and Japan, I found papers that addresses this concern: Narayanaswamy (2022) affirms that "There are no guidelines or regulations on the use of non-GAAP measures in India", and Shibasaki and Toyokura (2020) explains that "Use of non-GAAP measures by Japanese firms in other communication than financial statements are not regulated by specific law or regulation." (p. 48).

In summary: (i) USA, Canada, Australia, French, Germany, Italy, South Africa, UK and Brazil are countries under the presence of a regulation or guidance on non-GAAP measures; and (ii) Japan, India, Indonesia, China, Russia, Saudi Arabia, Turkey, Mexico and Argentina are countries that do not.

b.2 Accounting regime (GAAP)

Herr et al. (2022) indicates that only 6.1% of past literature analyzes non-GAAP measures in national accounting regimes. As explained by Charitou et al. (2018), "Different legal systems and the use of diverse accounting standards internationally provide increased opportunities for non-GAAP disclosure in some countries and less in others." (p.184).

"GAAP" variable is sourced from Capital IQ database (variable 21680) and classified into three categories: (i) IFRS; (ii) US GAAP; or (iii) Local GAAP. The reference group is "US GAAP".

b.3 Development of financial markets (FTSE)

Past research like Sarquis (2019) uses the "economic level of country development" as an institutional factor. However, instead of using such a broad measure to proxy for country development, I use Financial Times Stock Exchange (FTSE) classification of equity markets.

FTSE (2022) affirms their methodology "ensures that FTSE's global benchmarks reflect the most relevant and accurate information about market structures, offering investors risk management insight into the regulatory and trading practices of the markets included in the global and regional indices they track".

"FTSE" variable is defined as: "FTSE equity market classification" sourced from FTSE (2022) categories: (i) Developed; (ii) Advanced Emerging; (iii) Secondary Emerging; and (iv) Unclassified/Frontier. The reference group is "Developed".

b.4 Investor protection (INVP)

Leuz (2006) states there is evidence suggesting that earnings quality is lower for cross-listed firms from countries with weaker local investor protection.

Following Sarquis (2019), I use the "protecting-minority-investors" variable from Doing Business database (The World Bank Database). Doing Business (n.d.) "measures the protection of minority investors from conflicts of interest through one set of indicators and shareholders' rights in corporate governance through another.".

The score is given by the sum of two indexes: conflict of interest regulation index (extent of disclosure, director liability, and shareholder suits sub-indexes) and the extent of shareholder governance index (extent of shareholder rights, ownership and control structures, and corporate transparency sub-indexes). A "100" score indicates the country with the higher level of investor protection (Sarquis, 2019).

Data is available for each year from 2004 until 2020. Observations from years 2021 and 2022 received the same score of the last available year, 2020[29].

"INVP" variable is defined as: "Score from protecting-minority-investors" sourced from Doing Business database (The World Bank Database) and measured between 0-100.

[29] Scores tend to remain the same throughout the panel data.

b.5 Legal system (LEGS)

To classify the strength of the legal system Visani et al. (2020) conduct a factor analysis on five indicators of the Worldwide Governance Indicators. I follow Sarquis (2019) and use a combined legal system classification from La-Porta et al. (1998) and JuriGlobe (n.d.), which ends in four categories for my sample: (i) common law, (ii) civil law, (iii) mixed (common and civil law, for example) and (iv) muslim law (specifically for Saudi Arabia).

Although the origin of legal system is widely used in accounting literature as a country-level variable, this research is the first to include such variable measure by three categories in the non-GAAP literature, as far as I acknowledge.

"LEGS" variable is defined as: "Legal system origin" classified into four categories: (i) Common law; (ii) Civil law; (iii) Mixed law; and (iv) Muslim law. The reference group is "Common law".

c) <u>Firm-specific variables</u>

c.1 Percentage of institutional ownership (INSTO)

More concentrated ownership structure is associated with greater earnings management, as Leuz (2006) suggests. The concentration of institutional investors is a factor that affects NGM disclosures (Marques, 2017). Jennings and Marques (2011) results show lowest percentage of institutional ownership is associated with lowest percentage of opportunistic NGE adjustments.

Isidro e Marques (2013) state past evidence shows that a strong presence of institutional ownership reduces the need for voluntary disclosures and expect a negative association between higher percentages of institutional investor concentration and non-GAAP disclosures. Findings are in line with Jennings and Marques (2011), suggesting higher level of institutional ownership reduce the opportunistic disclosure of non-GAAP measures and with Cormier et al. (2022) that find firms are less likely to report adjusted EBITDA when they concentrate more institutional investors.

Following past studies, I use percentage of institutional ownership to proxy for corporate governance (Jennings & Marques, 2011; Isidro & Marques, 2013; Christensen et al., 2021).

"INSTO" variable is defined as: "Percentage of shares outstanding held by institutional investors" sourced from Capital IQ database (variable from "Ownership Positions" criteria).

c.2 Cross-listing (ADR)

There are few studies that focus the investigation of non-GAAP measures on a U.S. cross-listing scenario or that include a control for cross-listed firms, as these firms are under stricter regulations regarding NGM disclosures under SEC's "Regulation G" (Isidro & Marques, 2013; Isidro & Marques, 2015; Solsma & Wilder, 2015; Malone et al., 2016; Clinch et al., 2022; Sang et al., 2022).

Isidro and Marques (2015) found a positive relation between non-GAAP earnings choice to disclosure and cross-listing in U.S. markets. Following previous work, I include the "ADR" variable to control for any effects of cross-listing in the USA.

"ADR" variable is defined as: "Dummy variable coded as 1 if firms are cross-listed in the U.S. NYSE or NASDAQ markets as American Depositary Receipts (ADR), zero otherwise." and sourced from Capital IQ database (variable from "IPO Exchange" criteria).

c.3 Loss (LOSS)

Past research has pointed that loss firms may be using non-GAAP earnings because net income from GAAP are less informative (Leung and Veenman, 2018), an argument linked to the relevance loss of current accounting frameworks under balance-sheet approach that generate GAAP numbers (Dichev & Tang, 2008; Lev, 2018; Leung & Veenman, 2018; Bc & Liu, 2022). Charitou, Floropoulos, Karamanou, & Loizides (2018) find that non-GAAP earnings reporters are more likely to report GAAP losses. However, there is evidence that suggests loss firms are more opportunistic because they provide lower reconciliation quality (Zhang & Zheng, 2011).

I follow previous work such as Kolev, Marquardt and McVay (2008), Zhang and Zheng (2011), Choi and Young (2015) and Ribeiro, Shan and Taylor (2019) and include a variable to identify loss firms.

Considering the informativeness premise of NGE for GAAP loss firms I expect "LOSS" to be positively associated with the disclosure of non-GAAP earnings.

"LOSS" variable is defined as: Dummy variable coded as 1 if GAAP earnings is negative, and zero otherwise.

c.4 Earnings volatility (EARV)

As Black and Christensen (2009) explain, earnings volatility is a possible explanation for non-GAAP reporting because if a firm "has historically experienced large swings in earnings

(due to frequent 'one-time' income statement items), they may be inclined to remove the effects of these random swings in order to portray a more stable (less risky) earnings stream". (p. 308).

Also, earnings volatility may prompt additional information as there is a specific demand to help investors interpret earnings variability and quality (Lougee & Marquardt, 2004; Lin, Xia & Ryabova, 2020). Therefore, following previous research, I expect a positive association between firms with high earnings volatility and NGE disclosure.

I follow past literature such as Black and Christensen (2009), Isidro and Marques (2013) and Leung and Vennman (2018) and include a variable to proxy for earnings volatility.

"EARV" variable is defined as: The three-year standard deviation of earnings divided by total assets.

c.5 Unusual items (UNU)

There are many labels used by practioners and data providers to refer to "non-recurring" expenses. "Extraordinary items" (Barth et al., 2012) and "special items" (Landsman, Miller, & Yeh, 2007; Kyung, Lee, & Marquardt, 2019) are commonly used to represent effects of non-recurring expenses excluded when calculating non-GAAP earnings. Isidro and Marques (2013) uses "special items" as synonyms of "extraordinary items", and Cain, Kolev and McVay (2020) affirms "special items" are designated as "unusual" or "infrequent" expenses.

Past studies like Isidro and Marques (2015) identify special items reporters using dummy variables. I chose to use the total amount of "unusual items" of each observation to analyze not only the presence of unusual items, but the magnitude and impact of such expenses.

"UNU" variable is defined as: The total amount of 04 Capital IQ financial items: Merger, & Restructuring Charges + Impairment of Goodwill + Gain Loss on Sale of Assets (One Time) + Other Non-Recurring Items, Total, scaled by Total Assets (Total Assets as provided by Capital IQ - 1007).

c.6 AGE (AGE)

Firm age may be related to non-GAAP earnings disclosure choice. Bhattacharya, Black, Christensen and Mergenthaler (2004) find that NGE reporters tend to be "relatively young" and concentrated in the tech and business services industries. Kolev et al. (2008) explain they use such variable to control for any effects of a "firm's maturation process on non-GAAP earnings use". In this sense, I also include AGE as a control variable.

"AGE" variable is defined as: 2022 minus the year founded data, as provided by Capital IQ (variable from "Company Statistics" criteria).

c.7 Size (SIZE)

Visani et al. (2020) cites recent literature (Karim, Pinsker, & Robin, 2013; Choi & Young, 2015) that confirms the positive relationship between size and voluntary disclosure, including non-GAAP disclosures. Carvajal et al. (2022, p. 22) also finds that "smaller firms disclose non-GAAP earnings at a much lower frequency".

Many non-GAAP studies control for firm's size (Zhang & Zheng, 2011; Doyle et al., 2013; Curtis et al., 2014; Black et al., 2017; Cain et al., 2020; Heflin et al., 2022).

"SIZE" variable is defined as: Natural logarithm of Total Assets (Total Assets as provided by Capital IQ - 1007).

c.8 CONTROLS

Other controls include firm attributes that prior research has identified as being related to non-GAAP measures disclosure choice and characteristics.

Sales growth (SALESG) is one-year growth in revenue. ROA (ROA) is return on assets. Book-to-market (BM) is the book-to-market ratio. Leverage (LEV) is the debt-to-equity ratio, Audit quality (BIG4) is a dummy variable equal to 1 if the auditor is a BIG4, 0 otherwise.

Country (REGION) is defined as country of incorporation, Industry (SECTOR) indicates the main sector each firm operates, and Period (PER) refers to annual fiscal years.

Table 11 - Variables information (Essay 2)

Name	Classification	Type	Brief description
Non-GAAP earnings (NGE)	Dependent	Dummy	"As reported EBITDA" equal one, zero otherwise
Presence of a regulation or guidance (REG)	Country-level	Dummy	Presence of a regulation or guidance, zero otherwise
Accounting regime (GAAP)	Country-level	Dummy>2	IFRS, U.S. GAAP or Local GAAP
Development of financial markets (FTSE)	Country-level	Dummy>2	Developed, Advanced Emerging, Secondary Emerging or Unclassified
Investor protection (INVP)	Country-level	Nominal	Score for protecting minority investors
Legal system (LEGS)	Country-level	Dummy>2	Common law, Civil law, Mixed law or Muslim law
Percentage of institutional ownership (INSTO)	Firm-specific	Nominal	Percentage of institutional ownership
Cross-listing (ADR)	Firm-specific	Dummy	Cross-listing in U.S. markets (NYZE and NASDAQ)
Loss (LOSS)	Firm-specific	Dummy	Reported GAAP loss, zero otherwise
Earnings volatility (EARV)	Firm-specific	Nominal	Three-year earnings volatility
Unusual items (UNU)	Firm-specific	Nominal	Total unusual items
Age (AGE)	Firm-specific	Nominal	Years since foundation
Size (SIZE)	Firm-specific	Nominal	Log of total assets
Sales growth (SALESG)	Control	Nominal	One-year growth in revenue

ROA (ROA)	Control	Nominal	Return on assets
Book-to-market (BM)	Control	Nominal	Book-to-market ratio
Leverage (LEV)	Control	Nominal	Debt-to-equity ratio
Audit quality (BIG4)	Control	Dummy	Big4 auditors, zero otherwise
Country (REGION)	Control	Dummy	Country of incorporation
Industry (SECTOR)	Control	Dummy	Industry classification
Period (PER)	Control	Dummy	Fiscal year

Prepared by the author.

4.4 Research design

To test whether institutional (country-level) and firm-specific factors affects non-GAAP earnings reporting choice, I run the logistic regression of Model1 on the full sample[30].

$$P[\text{NGE} = 1] = \alpha_0 + \alpha_1 INSTF + \alpha_2 INSTO + \alpha_3 ADR + \alpha_4 LOSS + \alpha_5 EARV + \alpha_6 UNU + \alpha_7 AGE + \alpha_8 SIZE + \alpha_9 REGION + \alpha_{10} IND + \alpha_{11} PER + CONTROLS + \varepsilon_{it}$$

where,

INSTF represents each of the institutional factors tested individually (REG, GAAP, FTSE, INVP or LEGS).

Then, I run the logistic regression of Model2 on the full sample, considering the effect of all institutional factors concomitantly (REG, GAAP, FTSE, INVP and LEGS):

$$P[\text{NGE} = 1] = \alpha_0 + \alpha_1 REG + \alpha_2 GAAP + \alpha_3 FTSE + \alpha_4 INVP + \alpha_5 LEGS + \alpha_6 INSTO + \alpha_7 ADR + \alpha_8 LOSS + \alpha_9 EARV + \alpha_{10} UNU + \alpha_{11} AGE + \alpha_{12} SIZE + \alpha_{13} REGION + \alpha_{14} IND + \alpha_{15} PER + CONTROLS + \varepsilon_{it}$$

Given that all variables are described in the past section, I present the descriptive statistics for numeric and dummy[31] variables on the full sample.

Table 12 indicates that investor protection variable presents high scores (73.9) and that institutional investors do not hold (less than 5%) a significant percentage of shares outstanding. Firms present, in average, more negative unusual items (expenses or loss) than positive unusual items (revenues or gain).

[30] I use the random effects model. Although the Hausman specification test did not rejected the use of fixed effects, my main explanatory variables would be omitted in the case of using fixed effects because they are time-constant (Fávero, 2015). Smith (2017) explains there is advantages and disadvantages using both models, but that random effects are simpler and lead to more efficient estimates. Also, I control for industry and year effects.

[31] I present descriptive statistics for dummy variables to show how they behave in relation to their categories.

Table 12 - Descriptive statistics (numeric) full sample

Non-GAAP Earnings (0,1)					
Variables	*N*	mean	sd	min	max
INVP	30,750	73.90	7.312	52	86
INSTO	30,750	4.700	8.442	-0.00415	183.1
EARV	28,892	0.134	12.91	3.85e-05	2,147
UNU	30,750	-0.00478	0.0922	-3.759	10.79
AGE	30,116	51.23	42.06	0	506
SIZE	30,750	5.357	2.541	0.000480	13.00
SALESG	30,748	366.6	36,426	-99.98	5.929e+06
ROA	30,750	4.963	8.213	-441.5	159.8
BM	27,116	2.675	169.4	-53.73	20,820
LEV	29,749	149.1	2,084	-0.553	218,603
Number of id	3,228	3,228	3,228	3,228	3,228

Adapted from STATA.

Table 13 indicates that slightly more than half (54%) firms are in countries under some regulation or guidance on non-GAAP measures. Regarding the accounting framework 61% of all firms are IFRS preparers, 16% US GAAP and 23% Local GAAP preparers. Considering their legal system, 45% of all firms are classified as having mixed law origin and 37% are from common law origin. Almost 17% are from the civil law origin and only 0.1% (Saudi Arabia) refers to muslim law origin. Also, only 1% of firms are cross-listed in US exchanges and 17% presents GAAP loss firms.

The majority (48%) of firms are from developed equity markets (United States and United Kingdom are developed equity market countries). 23% are included in the advanced emerging category, like Brazil and South Africa, and also 23% in the secondary emerging category, like China and India.

Table 13 - Descriptive statistics (dummy) full sample

Non-GAAP Earnings (0,1)					
Variables	*N*	freq	mean	min	max
NGE	30,750	100.0%	0.475	0	1
REG	30,750	100.0%	0.538	0	1
GAAP	30,750	100.0%	1.550	1	3
FTSE	30,750	100.0%	2.361	1	4
LEGS	30,750	100.0%	2.290	1	4
ADR	30,750	100.0%	0.0110	0	1
LOSS	30,750	100.0%	0.166	0	1
BIG4	30,326	98.6%	0.425	0	1
REGION	30,750	100.0%	9.618	1	18
SECTOR	30,750	100.0%	5.128	1	10
Number of id	3,228	3,228	3,228	3,228	3,228

Adapted from STATA.

I also present the descriptive statistics considering only the NGE reporters subsample and then the NGE not reporters subsample to compared results for numeric variables, as for dummy variables the statistics do not vary. When comparing Table 13 and Table 14 it can be seen that investor protection mean is almost the same, slightly higher for the NGE reporting subsample. Institutional investors for NGE reporters, however, are more than twice as concentrated as the not reporters. Also, earnings is significantly volatile (22%) for firms not reporting non-GAAP earnings.

Table 14 - Descriptive statistics (numeric) partial sample

	Non-GAAP Earnings (y=1)					Non-GAAP Earnings (y=0)				
Variables	*N*	mean	sd	min	max	*N*	mean	sd	min	max
INVP	14,598	74.421	7.54	56	86	16152	73.438	7.067	52	86
INSTO	14,598	6.524	9.399	-.004	99.248	16152	3.052	7.08	-.001	183.105
EARV	13,881	.041	.138	0	7.474	15011	.22	17.905	0	2147.051
UNU	14,598	-.004	.112	-2.36	10.789	16152	-.006	.069	-3.759	1.412
AGE	14,263	52.723	44.716	0	506	15853	49.889	39.473	2	506
SIZE	14,598	5.948	2.529	0	13.001	16152	4.822	2.431	.002	12.927
SALESG	14,598	79.878	2584.272	-99.523	214394.44	16150	625.733	50200.978	-99.982	5929499.3
ROA	14,598	5.46	6.313	-60.491	132.772	16152	4.514	9.59	-441.537	159.84
BM	13,515	3.911	236.822	-53.726	20820.02	13601	1.446	38.52	-30.136	4481.35
LEV	14,100	162.637	2336.125	0	209045.86	15649	136.818	1827.779	-.553	218602.56
Number of id	3,454	3,454	3,454	3,454	3,454	3,047	3,047	3,047	3,047	3,047

Adapted from STATA.

In the next section I present the sample descriptive evidence and empirical results.

4.5 Results

4.5.1 Descriptive evidence

Tables 15 to 20 report main descriptive evidence of non-GAAP reporting choice by the international full sample[32]. Table 15 illustrates that the reporting choice of EBITDA among the firms in my sample is almost equally divided: 47.5% observations of reporting firms and 52.5% observations of not reporting firms.

Table 15 - Frequency of NGE disclosure

EBITDA reporting	Not reporting	Reporting	Total
N	16,152	14,598	30,750
%	52.5%	47.5%	100.0%

Adapted from STATA.

Table 16 indicates that while 79.0% of the years in which EBITDA was not reported for a given firm presented the same behavior in the following year, 95.9% of the years in which EBITDA was reported for a given firm presented the same behavior in the following year.

This indicates that the reporting EBITDA event was consistent between the observations in the period of ten years of investigation.

Table 16 - Persistence of NGE disclosure

EBITDA	Not reporting	Reporting	Total
Not reporting	79.06	20.94	100.0
Reporting	4.06	95.94	100.0
Total	48.41	51.59	100.0

Adapted from STATA.

Tables 17 and 18 present the distribution of EBITDA reporting by year and the frequency of EBITDA reporting. It can be seen in Table 17 that 80.1% of observations of reporting firms are concentrated from 2019 onwards. Except for the years 2013 and 2014, there's an increasing pattern in the disclosure of such metric. The EBITDA reporting pattern for the firms in my sample is more persistent between three and six periods (76.2%) and only 1.8% disclosed EBITDA in all ten periods under analysis. 30.8% of the firms reported EBITDA in four years.

[32] I follow some Isidro and Marques (2015) ideas on data presentation to make it more comparable.

Table 17 - NGE reporting by year (Essay 2)

EBITDA reporting	*N*	%
FY2013	175	1.2%
FY2014	175	1.2%
FY2015	212	1.5%
FY2016	238	1.6%
FY2017	865	5.9%
FY2018	1,235	8.5%
FY2019	2,396	16.4%
FY2020	2,860	19.6%
FY2021	3,151	21.6%
FY2022	3,291	22.5%
Total	14,598	100.0%

Prepared by the author.

Table 18 - NGE reporting frequency (Essay 2)

EBITDA reporting	%
Firms reporting in all ten years	2.5%
Firms reporting in nine of the ten years	1.8%
Firms reporting in eight of the ten years	1.2%
Firms reporting in seven of the ten years	1.9%
Firms reporting in six of the ten years	14.3%
Firms reporting in five of the ten years	14.1%
Firms reporting in four of the ten years	30.8%
Firms reporting in three of the ten years	17.0%
Firms reporting in two of the ten years	9.4%
Firms reporting only in one year	6.5%
Firm that never report	0.4%
Total	100.0%

Prepared by the author.

Table 19 shows the EBITDA disclosure by country. India and United States holds more than 50% (53.6%) of all firm-year observations. United Kingdom (9.3%) and Australia (8.9%) also present a relevant concentration of NGE reporting when compared to other countries.

Table 19 - NGE reporting by country (Essay 2)

EBITDA reporting	*N* firms	*N* firm-years (NGE reporters)	% firm-years (NGE reporters)
Argentina	1	2	0.0%
Australia	272	1,305	8.9%
Brazil	136	653	4.5%
Canada	197	904	6.2%
China	15	55	0.4%
France	110	521	3.6%
Germany	135	714	4.9%
India	1,429	4,790	32.8%

Indonesia	86	209	1.4%
Italy	116	464	3.2%
Japan	4	9	0.1%
Mexico	35	125	0.9%
Russia	6	23	0.2%
Saudi Arabia	4	17	0.1%
South Africa	58	248	1.7%
Turkey	43	164	1.1%
United Kingdom	295	1,358	9.3%
United States	525	3,037	20.8%
Total	3.467	14.598	100.0%

Prepared by the author.

Table 20 shows the EBITDA disclosure by industry. The majority (43,1%) of firms are concentrated in the Industrials (23.8%) and Consumer Discretionary (19.3%) sectors, followed by Materials (16.4%). Together they concentrate almost 60% of all firms.

Table 20 - NGE reporting by industry (Essay 2)

EBITDA reporting	*N* firms	*N* firm-years (NGE reporters)	% firm-years (NGE reporters)
Industrials	815	3,480	23.8%
Consumer Discretionary	681	2,819	19.3%
Materials	575	2,398	16.4%
Information Technology	315	1,230	8.4%
Consumer Staples	283	1,160	8.0%
Health Care	256	1,101	7.5%
Communication Services	210	966	6.6%
Energy	150	671	4.6%
Real Estate	103	394	2.7%
Utilities	79	378	2.6%
Total	3.467	14.598	100.0%

Prepared by the author.

Empirical results and final remarks are presented and discussed in the following sections.

4.5.2 Empirical results

Table 21 presents the results for the correlation matrix[33]. As can be noted, in general there are no high levels of correlation observed between variables, with few exceptions.

[33] I included dummy variables to investigate correlations between them.

Table 21 - Correlation matrix

Variables	reg	gaap1	ftse1	invp	legs1	insto	adr	loss	earv	unu	age	size	salesg	roa	Bm	lev	big4
(1) reg	1.000																
(2) gaap1	0.052*	1.000															
	(0.000)																
(3) ftse1	-0.809*	0.074*	1.000														
	(0.000)	(0.000)															
(4) invp	-0.257*	-0.115*	0.326*	1.000													
	(0.000)	(0.000)	(0.000)														
(5) legs1	-0.769*	0.133*	0.806*	0.504*	1.000												
	(0.000)	(0.000)	(0.000)	(0.000)													
(6) insto	0.234*	0.104*	-0.215*	-0.020*	-0.137*	1.000											
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)												
(7) adr	0.070*	-0.063*	-0.157*	-0.048*	-0.098*	0.027*	1.000										
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)											
(8) loss	0.102*	0.009	-0.092*	-0.022*	-0.078*	0.019*	-0.009	1.000									
	(0.000)	(0.110)	(0.000)	(0.000)	(0.000)	(0.001)	(0.107)										
(9) earv	0.008	-0.005	-0.005	-0.006	-0.003	-0.004	-0.001	0.018*	1.000								
	(0.199)	(0.368)	(0.417)	(0.286)	(0.582)	(0.520)	(0.903)	(0.003)									
(10) unu	-0.073*	-0.011	0.055*	0.009	0.043*	-0.012*	-0.006	-0.171*	0.001	1.000							
	(0.000)	(0.051)	(0.000)	(0.130)	(0.000)	(0.032)	(0.259)	(0.000)	(0.862)								
(11) age	0.230*	-0.034*	-0.200*	-0.069*	-0.228*	0.084*	0.097*	-0.039*	-0.006	-0.001	1.000						
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.277)	(0.871)							
(12) size	0.494*	0.123*	-0.469*	-0.217*	-0.449*	0.229*	0.184*	-0.035*	-0.014*	-0.026*	0.361*	1.000					
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.019)	(0.000)	(0.000)						
(13) salesg	0.001	-0.006	0.000	-0.005	-0.006	-0.004	-0.001	0.002	0.000	-0.001	-0.008	-0.008	1.000				
	(0.829)	(0.320)	(0.950)	(0.392)	(0.285)	(0.452)	(0.856)	(0.680)	(0.964)	(0.871)	(0.152)	(0.139)					
(14) ROA	-0.048*	0.029*	0.033*	0.036*	0.046*	0.008	0.012*	-0.398*	-0.132*	0.057*	0.014*	0.067*	0.014*	1.000			
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.150)	(0.030)	(0.000)	(0.000)	(0.000)	(0.015)	(0.000)	(0.018)				
(15) bm	0.006	-0.005	-0.017*	-0.013*	-0.013*	0.000	-0.001	-0.001	0.000	0.000	-0.004	-0.002	0.000	-0.004	1.000		
	(0.330)	(0.426)	(0.006)	(0.031)	(0.036)	(0.987)	(0.840)	(0.832)	(0.986)	(0.969)	(0.479)	(0.767)	(0.965)	(0.538)			
(16) lev	0.008	0.020*	-0.005	0.001	-0.006	0.009	-0.003	0.032*	0.000	-0.002	-0.003	0.013*	0.000	-0.005	-0.001	1.000	
	(0.166)	(0.001)	(0.382)	(0.884)	(0.318)	(0.117)	(0.625)	(0.000)	(0.941)	(0.750)	(0.649)	(0.025)	(0.940)	(0.417)	(0.916)		
(17) big4	0.665*	0.087*	-0.573*	-0.162*	-0.506*	0.224*	0.109*	0.039*	-0.006	-0.052*	0.271*	0.607*	-0.009	0.018*	0.007	0.012*	1.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.314)	(0.000)	(0.000)	(0.000)	(0.120)	(0.001)	(0.268)	(0.041)	

REG presents a high correlation with two other institutional factors: FTSE and LEGS. In fact, the chi-squared test between them rejected the H0 that the variables are independent (not related). As it can be seen further, Model REG and Model FTSE (see Tables 22 and 24) present the same results, and that is probably explained due to high correlation between those variables, indicating they may represent the same thing. Besides this, BIG4 also presents a high correlation with REG, FTSE and LEGS.

Next, I present results for Model1. It can be observed from Table 22 to 26 that all factors are statistically significant when isolated from the presence of other concurrent factors[34]:

Table 22 - Logistic regression results for the regulation factor

Variables	Model REG
REG	7.275**
	(2.825)
INSTO	-0.00423
	(0.00578)
ADR	-1.437***
	(0.522)
LOSS	-0.0668
	(0.106)
EARV	-0.531**
	(0.265)
UNU	-0.240
	(0.425)
AGE	-0.00322**
	(0.00142)
SIZE	0.502***
	(0.0315)
Constant	-13.67***
	(2.845)
Panel-level variance	1.717***
Observations	25,084
Number of id	3,228
Firm controls	YES
Country FE	YES
Year FE	YES
Industry FE	YES

Standard errors in parentheses
Statistical significance at 1%, 5% and 10% levels (*** p<0.01, ** p<0.05, * p<0.1)
Results for Model2 are from the random effects logistic regression for panel data:

$$P[\text{NGE} = 1] = \alpha_0 + \alpha_1 REG + \alpha_2 INSTO + \alpha_3 ADR + \alpha_4 LOSS + \alpha_5 EARV + \alpha_6 UNU + \alpha_7 AGE + \alpha_8 SIZE + \alpha_9 REGION + \alpha_{10} IND + \alpha_{11} PER + CONTROLS + \varepsilon_{it}$$

NGE is coded as 1 if firms disclose the "as reported EBITDA", zero otherwise; REG is coded as 1 if firms are under the presence of regulation or guidance on non-GAAP measures, zero otherwise; INSTO is the percentage

[34] The references categories for the dummy>2 variables are: (i) IFRS (GAAP); (ii) Unclassified (FTSE); and (iii) Muslim law (LEGS).

of shares outstanding held by institutional investors; ADR is coded as 1 if firms are cross-listed in the U.S. (NYSE or NASDAQ) as American Depositary Receipts (ADR), zero otherwise; LOSS is coded as 1 if GAAP earnings is negative, and zero otherwise; ERV is the three-year standard deviation of earnings divided by total assets; UNU is the total amount of unusual items scaled by total assets; AGE is the number of years since foundation; and SIZE is the natural logarithm of total assets.

Adapted from STATA.

Table 23 - Logistic regression results for the accounting regime factor

Variables	Model GAAP
U.S. GAAP (GAAP)	0.501
	(0.504)
INSTO	-0.00311
	(0.00575)
ADR	-1.390***
	(0.520)
LOSS	-0.0699
	(0.105)
EARV	-0.531**
	(0.264)
UNU	-0.240
	(0.426)
AGE	-0.00337**
	(0.00142)
SIZE	0.478***
	(0.0317)
Constant	-13.38***
	(2.837)
Panel-level variance	1.711***
Observations	25,084
Number of id	3,228
Firm controls	YES
Country FE	YES
Year FE	YES
Industry FE	YES

Standard errors in parentheses
Statistical significance at 1%, 5% and 10% levels (*** p<0.01, ** p<0.05, * p<0.1)
Results for Model2 are from the random effects logistic regression for panel data:

$$P[\text{NGE} = 1] = \alpha_0 + \alpha_1 GAAP + \alpha_2 INSTO + \alpha_3 ADR + \alpha_4 LOSS + \alpha_5 EARV + \alpha_6 UNU + \alpha_7 AGE + \alpha_8 SIZE + \alpha_9 REGION + \alpha_{10} IND + \alpha_{11} PER + CONTROLS + \varepsilon_{it}$$

NGE is coded as 1 if firms disclose the “as reported EBITDA”, zero otherwise; GAAP indicates the accounting regime of each firm; FTSE indicates the level of equity markets development of a firm’s country; INSTO is the percentage of shares outstanding held by institutional investors; ADR is coded as 1 if firms are cross-listed in the U.S. (NYSE or NASDAQ) as American Depositary Receipts (ADR), zero otherwise; LOSS is coded as 1 if GAAP earnings is negative, and zero otherwise; ERV is the three-year standard deviation of earnings divided by total assets; UNU is the total amount of unusual items scaled by total assets; AGE is the number of years since foundation; and SIZE is the natural logarithm of total assets.

Adapted from STATA.

Table 24 - Logistic regression results for the development of equity market factor

Variables	Model FTSE
DEVELOP (FTSE)	7.275**
	(2.825)
INSTO	-0.00423
	(0.00578)
ADR	-1.437***
	(0.522)
LOSS	-0.0668
	(0.106)
EARV	-0.531**
	(0.265)
UNU	-0.240
	(0.425)
AGE	-0.00322**
	(0.00142)
SIZE	0.502***
	(0.0315)
Constant	-13.67***
	(2.845)
Panel-level variance	1.717***
Observations	25,084
Number of id	3,228
Firm controls	YES
Country FE	YES
Year FE	YES
Industry FE	YES

Standard errors in parentheses
Statistical significance at 1%, 5% and 10% levels (*** p<0.01, ** p<0.05, * p<0.1)
Results for Model2 are from the random effects logistic regression for panel data:

$$P[\text{NGE} = 1] = \alpha_0 + \alpha_1 FTSE + \alpha_2 INSTO + \alpha_3 ADR + \alpha_4 LOSS + \alpha_5 EARV + \alpha_6 UNU + \alpha_7 AGE + \alpha_8 SIZE + \alpha_9 REGION + \alpha_{10} IND + \alpha_{11} PER + CONTROLS + \varepsilon_{it}$$

NGE is coded as 1 if firms disclose the "as reported EBITDA", zero otherwise; FTSE indicates the level of equity markets development of a firm's country; INVP indicates the score from protecting-minority-investors" sourced from Doing Business database (The World Bank Database) and measured between 0-100; LEGS indicates the legal system origin of a firm's country; INSTO is the percentage of shares outstanding held by institutional investors; ADR is coded as 1 if firms are cross-listed in the U.S. (NYSE or NASDAQ) as American Depositary Receipts (ADR), zero otherwise; LOSS is coded as 1 if GAAP earnings is negative, and zero otherwise; ERV is the three-year standard deviation of earnings divided by total assets; UNU is the total amount of unusual items scaled by total assets; AGE is the number of years since foundation; and SIZE is the natural logarithm of total assets.

Adapted from STATA.

Table 25 - Logistic regression results for the investor protection factor

Variables	Model INVP
INVP	0.265***
	(0.0401)
INSTO	-0.00210
	(0.00573)
ADR	-1.459***
	(0.518)
LOSS	-0.0587
	(0.105)
EARV	-0.513**
	(0.261)
UNU	-0.255
	(0.418)
AGE	-0.00335**
	(0.00141)
SIZE	0.507***
	(0.0315)
Constant	-29.74***
	(3.759)
Panel-level variance	1.710***
Observations	25,084
Number of id	3,228
Firm controls	YES
Country FE	YES
Year FE	YES
Industry FE	YES

Standard errors in parentheses
Statistical significance at 1%, 5% and 10% levels (*** p<0.01, ** p<0.05, * p<0.1)
Results for Model2 are from the random effects logistic regression for panel data:

$$P[\text{NGE} = 1] = \alpha_0 + \alpha_1 INVP + \alpha_2 INSTO + \alpha_3 ADR + \alpha_4 LOSS + \alpha_5 EARV + \alpha_6 UNU + \alpha_7 AGE + \alpha_8 SIZE + \alpha_9 REGION + \alpha_{10} IND + \alpha_{11} PER + CONTROLS + \varepsilon_{it}$$

NGE is coded as 1 if firms disclose the "as reported EBITDA", zero otherwise; INVP indicates the score from protecting-minority-investors" sourced from Doing Business database (The World Bank Database) and measured between 0-100; LEGS indicates the legal system origin of a firm's country; INSTO is the percentage of shares outstanding held by institutional investors; ADR is coded as 1 if firms are cross-listed in the U.S. (NYSE or NASDAQ) as American Depositary Receipts (ADR), zero otherwise; LOSS is coded as 1 if GAAP earnings is negative, and zero otherwise; ERV is the three-year standard deviation of earnings divided by total assets; UNU is the total amount of unusual items scaled by total assets; AGE is the number of years since foundation; and SIZE is the natural logarithm of total assets.

Adapted from STATA.

Table 26 - Logistic regression results for the legal system factor

Variables	Model LEGS
COMMON (LEGS)	4.151***
	(1.384)
INSTO	-0.00423
	(0.00578)
ADR	-1.437***
	(0.522)
LOSS	-0.0668
	(0.106)
EARV	-0.531**
	(0.265)
UNU	-0.240
	(0.425)
AGE	-0.00322**
	(0.00142)
SIZE	0.502***
	(0.0315)
Constant	-10.55***
	(1.425)
Panel-level variance	1.717***
Observations	25,084
Number of id	3,228
Firm controls	YES
Country FE	YES
Year FE	YES
Industry FE	YES

Standard errors in parentheses
Statistical significance at 1%, 5% and 10% levels (*** p<0.01, ** p<0.05, * p<0.1)
Results for Model2 are from the random effects logistic regression for panel data:

$$P[\text{NGE} = 1] = \alpha_0 + \alpha_1 LEGS + \alpha_2 INSTO + \alpha_3 ADR + \alpha_4 LOSS + \alpha_5 EARV + \alpha_6 UNU + \alpha_7 AGE + \alpha_8 SIZE + \alpha_9 REGION + \alpha_{10} IND + \alpha_{11} PER + CONTROLS + \varepsilon_{it}$$

NGE is coded as 1 if firms disclose the "as reported EBITDA", zero otherwise; LEGS indicates the legal system origin of a firm's country; INSTO is the percentage of shares outstanding held by institutional investors; ADR is coded as 1 if firms are cross-listed in the U.S. (NYSE or NASDAQ) as American Depositary Receipts (ADR), zero otherwise; LOSS is coded as 1 if GAAP earnings is negative, and zero otherwise; ERV is the three-year standard deviation of earnings divided by total assets; UNU is the total amount of unusual items scaled by total assets; AGE is the number of years since foundation; and SIZE is the natural logarithm of total assets.

Adapted from STATA.

The results from the models above (Table 22 to 26) suggest that (i) firms from countries with non-GAAP measures regulation or guidance; (ii) firms in more developed equity markets; (iii) firms with higher investor protection and (iv) firms in a common law legal system are *more* likely to disclose non-GAAP earnings.

These results confirm all my expectations except for H2. The accounting regime does not seem to play a significant role in shaping NGE reporting choice.

Also, note that SIZE is also a positively associated with the likelihood of firms providing non-GAAP earnings, so bigger firms are *more* likely to disclose non-GAAP earnings. The other variables are all negatively associated with NGE reporting for all tested models. Firms that (i) have more concentrated institutional ownership structure; (ii) are cross-listed in the USA; (iii) present GAAP loss; (iv) present higher earnings volatility; (v) present a higher unusual items amount; and (vi) are older, are *less* likely to disclose non-GAAP earnings.

In percentage terms, Model REG points that being under regulation or guidance increases firm's probability of NGE reporting by 99.9%. Model FTSE suggests that firms from developed equity markets are 99,9% more likely to disclose NGE when compared to firms in less developed equity markets. Model INVP shows that firms from countries presenting higher scores of investor protection are 56,6% more likely to disclose NGE earnings. Model LEGS indicates that firms from countries with a common law legal system origin are 98,4% more likely to engage in NGE reporting when compared to firms from countries with other legal system origin.

I run Model 2 (Table 27) to test whether institutional factors explain non-GAAP earnings reporting choice in the presence of concurrent factors. Model 2.1 do not include either control variables or fixed effects controls. Note that DEVELOP, UNU and EARV are the only variables not significant at the level of 0.05. Almost all variables are significant at the level of 0.01. By adding control variables to Model 2.2 REG gets even more significant and UNU gets significant at the level 0.05. EARV loses significance and DEVELOP still not significant in any level.

In Model 2.3 I add country, year and industry fixed effects. REG, INVP, ADR, AGE and SIZE are significant in all three models and LEGS, EARV and AGE variables at the level of 0.05. Two main explanatory variables, GAAP and DEVELOP, are not significant in any level. INSTO, LOSS and UNU are also not significant in Model 2.3[35].

[35] I could not post estimate either (i) the Hosmer and Lemeshow test (Goodness-of-fit test); (i) the classification table (Confusion matrix); and (iii) ROC curve because STATA commands -stat gof-, -lroc- and -estat class- do not work for painel data logistic regression -xtlogit-.

Table 27 - Logistic regression results for all institutional factors

Variables	Model2.1	Model2.2	Model2.3
REG	0.463**	0.795***	2.677***
	(0.207)	(0.223)	(0.826)
U.S. GAAP (GAAP)	0.310***	0.206**	0.469
	(0.0909)	(0.0959)	(0.501)
DEVELOP (FTSE)	0.495	0.644	1.831
	(0.629)	(0.657)	(2.921)
INVP	0.0510***	0.0407***	0.234***
	(0.00528)	(0.00532)	(0.0442)
COMMON (LEGS)	6.703***	6.397***	3.568**
	(0.818)	(0.828)	(1.803)
INSTO	0.112***	0.103***	-0.00190
	(0.00428)	(0.00438)	(0.00572)
ADR	-0.835***	-0.829***	-1.445***
	(0.260)	(0.270)	(0.518)
LOSS	-0.512***	-0.431***	-0.0604
	(0.0478)	(0.0565)	(0.105)
EARV	-0.166*	-0.139	-0.515**
	(0.0943)	(0.0923)	(0.261)
UNU	0.396	0.640**	-0.253
	(0.247)	(0.314)	(0.421)
AGE	-0.00747***	-0.00696***	-0.00340**
	(0.000713)	(0.000739)	(0.00141)
SIZE	0.225***	0.237***	0.496***
	(0.0150)	(0.0167)	(0.0320)
SALESG	-	-7.35e-06	-1.22e-05
		(7.17e-06)	(1.21e-05)
ROA	-	0.00868***	0.0180***
		(0.00328)	(0.00692)
BM	-	0.0161**	0.0224**
		(0.00731)	(0.0114)
LEV	-	2.94e-06	5.18e-06
		(8.26e-06)	(1.59e-05)
BIG4	-	-0.290***	0.474***
		(0.0695)	(0.143)
Constant	-16.27***	-15.58***	-31.81***
	(1.124)	(1.140)	(4.376)
Panel-level variance[36]	0.405***	0.442***	1.708***
Observations	28,309	25,084	25,084
Number of id	3,363	3,228	3,228
Firm controls	NO	YES	YES
Country FE	NO	NO	YES
Year FE	NO	NO	YES
Industry FE	NO	NO	YES

Standard errors in parentheses
Statistical significance at 1%, 5% and 10% levels (*** p<0.01, ** p<0.05, * p<0.1)
Results for Model2 are from the random effects logistic regression for panel data:

$$P[\text{NGE} = 1] = \alpha_0 + \alpha_1 REG + \alpha_2 GAAP + \alpha_3 FTSE + \alpha_4 INVP + \alpha_5 LEGS + \alpha_6 INSTO + \alpha_7 ADR + \alpha_8 LOSS + \alpha_9 EARV + \alpha_{10} UNU + \alpha_{11} AGE + \alpha_{12} SIZE + \alpha_{13} REGION + \alpha_{14} IND + \alpha_{15} PER + CONTROLS + \varepsilon_{it}$$

NGE is coded as 1 if firms disclose the "as reported EBITDA", zero otherwise; REG is coded as 1 if firms are under the presence of regulation or guidance on non-GAAP measures, zero otherwise; GAAP indicates the accounting regime of each firm; FTSE indicates the level of equity markets development of a firm's country; INVP

[36] The coefficient for the panel-level variance (/lnsig2u) is significant for all Models (Table 22 to 27). Such result indicates there are omitted variables associated with the panel effect (i.e., there are variables omitted from the models that helps to explain NGE reporting choice). I discuss this issue in final remarks, see section 4.5.3.

indicates the score from protecting-minority-investors" sourced from Doing Business database (The World Bank Database) and measured between 0-100; LEGS indicates the legal system origin of a firm's country; INSTO is the percentage of shares outstanding held by institutional investors; ADR is coded as 1 if firms are cross-listed in the U.S. (NYSE or NASDAQ) as American Depositary Receipts (ADR), zero otherwise; LOSS is coded as 1 if GAAP earnings is negative, and zero otherwise; ERV is the three-year standard deviation of earnings divided by total assets; UNU is the total amount of unusual items scaled by total assets; AGE is the number of years since foundation; and SIZE is the natural logarithm of total assets.

Adapted from STATA.

Based on Model 2.3 I conducted an Omnibus test of model coefficients (also known as joint test or global test). Omnibus test is a likelihood-ratio test that indicates if the independent variables collectively contribute to the model. Fernandes, Filho, Rocha and Nascimento (2020) explain that a significant result ($p < 0.05$) suggests an adequate fit of the model and "we should conclude that the independent variables influence the dependent variable's variation". Results for Model 2.3 suggest there is evidence of an overall effect of the independent variables over NGE reporting choice.

I observe that all institutional factors have a positive effect on the reporting choice of non-GAAP earnings and that firm-specific factors are almost all negatively related to the reporting choice of non-GAAP earnings, except for SIZE.

Model 2.3 results suggest that firms from countries (i) with the presence of a regulation or guidance (REG) on non-GAAP measures; (ii) with higher investor protection (INVP); and (iii) with common law legal system (LEGS) are *more* likely to disclose non-GAAP earnings.

In percentage terms, being under regulation or guidance increases firm's probability of NGE reporting by 93.6%. Also, presenting higher scores of investor protection increases firm's probability of NGE reporting by 55.8%. Finally, being from common law legal origin increases firm's probability of NGE reporting by 97.3%.

When looking to firm-specific variables, results suggest that firms (i) cross-listed in U.S. exchanges; (ii) that presented higher earnings volatility and (iii) that are older are *less* likely to disclose non-GAAP earnings. Results show that being cross-listed in the USA decreases firm's probability of reporting NGE by 19.1%. Also, presenting higher earnings volatility decreases firm's probability of reporting NGE by 37.4%. Finally, being older decreases firm's probability of reporting NGE by 49.9%. With regards to the other institutional factors, accounting regime and developed financial markets, I do not find significant effects of both variables on the chance of reporting non-GAAP earnings.

In summary, I find that institutional factors (expect for GAAP) are relevant in explaining NGE reporting choice and that concurrently some of these effects (GAAP and FTSE) are not

identified. Finally, my results indicate that ROA, BM and BIG4 are statistically significant and positively associated with NGE reporting choice, suggesting that firms with higher ROA and Book-to-market ratios and firms audited by one of the BIG4 firms, which are associated with a high audit quality, are *more* likely to disclose NGE measures.

4.5.2.1 Sensitivity analysis

In the Models presented before I chose not to apply any procedure for identified outliers. In this section I conduct a sensitivity analysis that includes the exclusion of extreme values for the variables SALESG, ROA, BM and LEV (see Table 12).

I also substitute AGE variable for life-cycle variable (LCYCLE) to examine if results are or are not significantly affected by a more accurate proxy for firm's life cycles stages. Previous literature (Dickinson, 2011) argues that looking for cash flow components (operating, investing and financing activities) is an organic method to identify firm-level life cycles as it is "the result of firm performance and the allocation of resources" (p. 1970). Dickinson (2011) suggests five life cycle stages to classify firms, which are identified by using the signs of the three components of the statement of cash flows (Oliveira and Girão, 2018).

Table 28 - Life cycle stages

Cash Flows	*Introduction*	*Growth*	*Mature*	*Shake-Out*	*Decline*
Operating activities	(-)	(+)	(+)	(+/-)	(-)
Investing activities	(-)	(-)	(-)	(+/-)	(+)
Financing activities	(+)	(+)	(-)	(+/-)	(+/-)

Adapted from Dickinson (2011) and Oliveira and Girão (2018).

Results for the sensitivity analysis is shown below for Model2:

Table 29 - Logistic regression results for all institutional factors (sensitivity analysis)

Variables	Model2.1.1	Model2.2.1	Model2.3.1
REG	0.381*	0.727***	2.666***
	(0.201)	(0.218)	(0.818)
IFRS (GAAP)	3.526***	3.623***	0.279
	(0.0744)	(0.0813)	(0.192)
DEVELOP (FTSE)	-0.0139	0.0826	1.567
	(0.587)	(0.623)	(2.912)
INVP	0.0458***	0.0370***	0.237***
	(0.00509)	(0.00519)	(0.0440)
COMMON (LEGS)	6.316***	6.040***	3.373*
	(0.795)	(0.813)	(1.791)
INSTO	0.106***	0.0993***	-0.000729
	(0.00409)	(0.00419)	(0.00555)
ADR	-0.900***	-0.868***	-1.321***
	(0.252)	(0.264)	(0.506)
LOSS	-0.515***	-0.436***	-0.0727
	(0.0474)	(0.0558)	(0.104)
EARV	-0.108	-0.0865	-0.283
	(0.0753)	(0.0765)	(0.198)
UNU	0.351	0.577*	-0.215
	(0.242)	(0.306)	(0.430)
GROWTH (LCYCLE)	-0.185***	-0.222***	-0.135*
	(0.0390)	(0.0417)	(0.0800)
SIZE	0.179***	0.202***	0.474***
	(0.0138)	(0.0157)	(0.0307)
Constant	-14.96***	-14.40***	-31.55***
	(1.070)	(1.099)	(4.358)
Panel-level variance	0.356***	0.420***	1.697***
Observations	28,877	25,561	25,561
Number of id	3,431	3,292	3,292
CONTROLS	NO	YES	YES
Country FE	NO	NO	YES
Year FE	NO	NO	YES
Industry FE	NO	NO	YES

Standard errors in parentheses
Statistical significance at 1%, 5% and 10% levels (*** p<0.01, ** p<0.05, * p<0.1)
Results for Model2 are from the random effects logistic regression for panel data:

$$P[\text{NGE} = 1] = \alpha_0 + \alpha_1 REG + \alpha_2 GAAP + \alpha_3 FTSE + \alpha_4 INVP + \alpha_5 LEGS + \alpha_6 INSTO + \alpha_7 ADR + \alpha_8 LOSS + \alpha_9 EARV + \alpha_{10} UNU + \alpha_{11} LCYCLE + \alpha_{12} SIZE + \alpha_{13} REGION + \alpha_{14} IND + \alpha_{15} PER + CONTROLS + \varepsilon_{it}$$

NGE is coded as 1 if firms disclose the "as reported EBITDA", zero otherwise; REG is coded as 1 if firms are under the presence of regulation or guidance on non-GAAP measures, zero otherwise; GAAP indicates the accounting regime of each firm; FTSE indicates the level of equity markets development of a firm's country; INVP indicates the score from protecting-minority-investors" sourced from Doing Business database (The World Bank Database) and measured between 0-100; LEGS indicates the legal system origin of a firm's country; INSTO is the percentage of shares outstanding held by institutional investors; ADR is coded as 1 if firms are cross-listed in the U.S. (NYSE or NASDAQ) as American Depositary Receipts (ADR), zero otherwise; LOSS is coded as 1 if GAAP earnings is negative, and zero otherwise; ERV is the three-year standard deviation of earnings divided by total assets; UNU is the total amount of unusual items scaled by total assets; LCYCLE indicates firm's life cycle classification as presented in Table 28; and SIZE is the natural logarithm of total assets.

Adapted from STATA.

Comparing Model 2.3 to Model 2.3.1, all institutional factors remain positively associated with NGE reporting choice, and GAAP and FTSE also remain not significant to explain such reporting choice. Additionally, LEGS loses significance and LCYCLE is negatively associated NGE reporting choice, like AGE. However, AGE is statistically significant at the level of 0.05, while LCYCLE at the level of 0.1. I also observe that the panel-level variance does not change in a significant way.

Model 2.3.1 results suggest that firms from countries (i) with the presence of a regulation or guidance on non-GAAP measures; and (ii) with higher investor protection are *more* likely to disclose non-GAAP earnings, confirming H1 and H4.

In percentage terms, being under a regulation or guidance increases firm's probability of NGE reporting by 93.5%, almost the same percentage found in Model 2.3 (93.6%). The same happened to the INVP factor: presenting higher scores of investor protection increases firm's probability of NGE reporting by 55.9%, against 55.8% in Model 2.3.

ADR results were the most affected by sensitivity analysis: they show being cross-listed in the USA decreases firm's probability of reporting NGE by 78.9%, a much higher percentage when compared to the previous model (19.1%). Finally, presenting higher earnings volatility decreases firm's probability of reporting NGE by 37.4%, against 57.0% in Model 2.3.

While being older decreases firm's probability of reporting NGE by 49.9%, being in the growth life cycle stage decreases firm's probability of reporting NGE by 53.4%. Note that AGE and LCYCLE does not represent the same economic analysis, as for example, older firms may be in the growth stage or decline stage, for example, based on their cash flows activities.

4.5.3 Final remarks

In this paper I examine whether country-level and firm-specific factors affect non-GAAP earnings reporting choice. I do that by conducting a cross-country approach to NGE reporting, using a large international sample of the most economically relevant firms from G20 countries.

I provide novel evidence on the matter, helping to explain non-GAAP proliferation at a country-level perspective. Five main institutional factors are analyzed to investigate whether they explain NGE reporting choice: (i) the presence of a regulation or guidance over non-GAAP measures; (ii) the accounting regime; (iii) the level of financial market development; (iv) the level of investor protection; and (v) the type of legal system origin.

U.S. non-GAAP measures reporting setting is assumed to be very different from any other setting due to its strong regulation (and specific regulation on the use of non-GAAP measures),

enforcement and other robust institutional factors. Such characteristics shapes firm's incentives in disclosing voluntary metrics, such as NGE.

My confirmed hypothesis is that *firms in countries with institutional factors that are equal to the ones U.S. firms face are more likely to disclose non-GAAP earnings*. In this sense, my results confirm past studies (Isidro & Marques, 2015; Koning et al., 2010; Charitou et al., 2018) that countries with better economic conditions and under a high-quality reporting scenario put pressure on firms to provide additional performance measures as they have stronger incentives to not manage GAAP earnings (Isidro & Marques, 2015; Cormier et al., 2022).

Results for the individual models confirms (except for H2) all hypothesis, suggesting that firms from countries with non-GAAP measures regulation or guidance, in more developed equity markets, with higher investor protection and in a common law legal system origin, are *more* likely to disclose non-GAAP earnings.

Regulation plays an important role in NGE disclosure choice, confirming main theoretical frameworks (Healy and Palepu, 2001; Young, 2014; Leuz & Wysocki, 2016) and empirical evidence (Marques, 2006; Heflin & Hsu, 2008; Kolev et al., 2008; Jennings & Marques, 2011; Black et al., 2012; Bond et al., 2017; Chen et al., 2022; Malone et al., 2016; Clinch et al., 2022).

The adoption of U.S. GAAP accounting regime does not play a significant role in shaping firm's propensity to disclose NGE. In practice, reported earnings between IFRS and U.S. GAAP are minimal (Cormier et al., 2022) due to some normative convergence, although there is also evidence that preparers of financial statements present more opportunistic behavior when using rules-based standards (U.S. GAAP) if compared to principles-based standards (IFRS) (Solsma & Wilder, 2015).

Developed equity markets and high levels of investor protection are conditions related to a safer setting to disclose public information. In this scenario, high-quality financial reporting is also expected, so investors rely on public information (mandatory and voluntary ones). These characteristics may prompt NGE reporting as manager's face strong incentives to use voluntary metrics when needed, avoiding GAAP earnings management.

Legal system origins are associated to accounting behavior, like conservatism and value relevance of accounting information (Hope, 2003; La-Porta et al., 2008; Visani et al., 2020). The confirmed expectation that common law legal system would increase NGE reporting is due to greater relevance placed by firms and investors on financial disclosures (Cormier et al, 2022).

Results from Model2, where institutional factors effects occur concomitantly, suggests, unlike past evidence (Isidro & Marques, 2015; Visani et al., 2020), that the type of accounting

regime and level of equity markets development *does not* impact a firm's propensity to disclose non-GAAP earnings.

In summary, results indicate that the reporting incentives that shape managerial choices relative to NGE reporting are associated with stronger and higher-quality institutional factors. This suggests that management's intentions when disclosing NGE voluntarily are to provide a strategic performance measure, as firms have lower incentives to manage GAAP earnings.

This Essay has some limitations. I knowledge the decision to disclose EB measures is not random. With regards to the panel-level variance in my models, there is evidence that there are omitted variables that could help to explain EBITIDA's reporting choice. My objective was to investigate institutional factors that could affect the probability of firms disclosing non-GAAP earnings measures, and to do so I followed past literature on non-GAAP measures and country-level factors to test five main aspects that I could compare with NGE literature.

Thus, I leave to further research to stress my proposed research design and examine other institutional factors that might be important in explaining NGE reporting behavior. Also, more research including international data is needed to help structure a robust body of non-GAAP knowledge. I truly believe that mixed methods are an interesting and efficient way to approach many non-GAAP scientific questions.

5 ESSAY 3 – Non-GAAP Earnings Disclosures From U.S. Cross-Listed Firms

5.1 Introduction

In this paper I compare non-GAAP earnings (hereon, "NGE") disclosures of two annual reports for one sample of U.S. cross-listed firms: Form 20-F (listing-country annual report) and local annual report as disclosed outside of the U.S. (home-country report).

Unlike past literature that uses a matched sample to compare results between cross-listed and non-cross-listed firms or U.S. firms (Solsma & Wilder, 2015; Sang et al., 2022), I use one U.S. cross-listed sample and analyze two different annual reports to examine if home-country reporting incentives do play a role in determining firm-level disclosures.

As a complementary analysis, I then conduct a multiple correspondence analysis (MCA), a multivariate exploratory technique, to examine the association between a firm's home-country and other three qualitative variables: (i) non-GAAP frequency (proxy for NGE emphasis); (ii) non-GAAP value; and (iii) non-GAAP adjustments value. By providing that evidence I enhance the discussion about the influence of home-country reporting incentives over NGE disclosures by looking to emphasis and magnitude NGE qualitative data. Finally, I provide new descriptive evidence over NGE disclosures in a cross-listing setting.

Gagnon and Karolyi (2010) define "cross-listing" as "a strategic choice made by a firm to secondarily list its shares trading in a home market exchange on a new overseas market." (p. 1). The cross-listing choice can be explained by the bonding hypothesis (Coffee, 1999; Stulz, 1999), which states that foreign firms do so to minimize their home-country weaker institutional factors and "bond" themselves in the USA[37], as they are covered by the Securities and Exchange Commission (SEC) stricter enforcement and commit "to provide fuller financial information in response to SEC requirements" (p. 2).

Cross-listing scenario is a distinct setting for a cross-country-based research. Institutional differences between the home-country and the listing-country are expected to impact financial reporting outcomes. Home-country laws and enforcement, regulation, arrangements and market forces of cross-listed firms are generally more fragile than the U.S. scenario, leading to different reporting incentives that may shape their reporting behavior in the cross-listing context (Leuz, 2006; Holthausen, 2009).

[37] According to the World Federation of Exchanges (2019) in 2018 there were 946 foreign companies listed in NYSE and NASDAQ exchanges.

There is evidence that GAAP earnings data of cross-listed firms are more managed, less timely recognized and presente lower value relevance when compared to U.S. firms, when both groups apply U.S. GAAP in the preparation of financial statements (Leuz, 2006). Though, when U.S. cross-listed firms are compared to non-cross-listed firms with headquarters in the same countries, results suggest that the U.S. enforcement matters as cross-listed firms engage in less earnings management (Holthausen, 2009).

In this sense, Leuz and Wysocki (2016, p. 577) affirms that "U.S. cross-listings are a way for firms to provide additional reassurance to outside investors" because U.S. foreign firms are subjected to their laws and enforcement. Also, they are required to provide "certain disclosures (in Form 20-F) that are not necessarily required in firms' home countries" (p. 576).

Purkayastha and Kumar (2021) review the cross-listing literature based on a systematic review and concluded that the foreign listing literature is a fragmented research field and, thus, have a "huge scope for interesting future research" (p. 1). They explain past literature is divided between the antecedents and outcomes of cross-listing, with few context-specific investigation. The only cited research on voluntary disclosure from cross-listed firms is Shi, Magnan and Kim (2012). They examine one type of voluntary disclosure (management earnings forecasts) for a U.S. cross-listed sample, suggesting that firm's home-country factors, like the strength of legal institutions, influence the reporting choice of voluntary disclosures.

Evidence has suggested that those reporting incentives also affect non-GAAP reporting. In the U.S. setting non-GAAP measures disclosures are under stricter rules when compared to disclosures in the international scenario (Marques, 2017; Black et al., 2018; Clinch et al, 2022).

Solsma and Wilder (2015) extends previous research on pro forma disclosures from U.S. cross-listed firms (Epping and Wilder, 2011) by investigating disclosure behavior differences for foreign firms reporting under IFRS when compared to foreign firms and U.S. firms under U.S. GAAP. Their results suggest that US-listed foreign firms applying IFRS are more likely to disclose a pro forma measure than US firms and US-listed foreign firms applying US GAAP.

Sang et al. (2022) examine non-GAAP earnings and managerial incentives of cross-listed firms in the USA and U.S. firms. They conclude (p. 148) that "cross-listed firms do not behave in the same manner as U.S. firms in reporting segment earnings" because of existing incentives, like weaker investor protection. Their results suggest that cross-listed firms are more likely to use non-GAAP earnings in an opportunistic way.

Other studies include cross-listing as control variables, like Clinch et al. (2022). They use an international sample of non-GAAP reporters from 08 countries applying IFRS and conclude that non-GAAP reporting firms present higher values for the U.S. cross-listing control variable.

They also find that local reporting practices affect the disclosure of non-GAAP earnings (NGE). Studies from Isidro and Marques (2013), Isidro and Marques (2015), Malone et al. (2016) and Carvajal, et al. (2022) also applies controls for cross-listing firms in their sample.

The non-GAAP literature for cross-listing firms is very scarse. As indicated above, only Solsma and Wilder (2015) and Sang et al. (2022) examined NGE in this setting. Shi et al. (2012) also points that there are few studies that investigate voluntary disclosures for cross-listed firms: "The extant literature focuses either on the cross-listed firms' financial reporting quality or on the mandatory reporting requirements by US exchanges and other regulatory bodies" (p. 145). I answer their research call and explore whether home-country factors of cross-listed firms do play a role in defining firm-level voluntary disclosure (proxied by non-GAAP earnings).

Also, it is interesting to highlight that, in general, non-GAAP literature lacks evidence on international data, considering both country-specific perspective and cross-country perspective. In a recent literature review Herr et al. (2022) documents that more than 80% of all published papers on non-GAAP measures considers USA (60%) and European (22%) firm samples.

Given the presented large research gap there are several research avenues to investigate. I investigate, with an exploratory approach and considering sample size limitation (see section 5.3.3), associations not previously examined by past scholars.

To the best I know, this paper is the third to examine a sample of U.S. cross-listed firms in non-GAAP literature and the first to (ii) examine whether NGE disclosures of U.S. cross-listed firms reported on Form-20F differ from local NGE disclosures reported on annual report for the same firms to investigate if NGE disclosures are conditional on the reporting channel; and to (iii) conduct a correspondence analysis over non-GAAP qualitative data to examine the association between a firm's home-country and three qualitative proxies for NGE emphasis and magnitude.

Results suggest that home-countries institutional factors of U.S. cross-listed firms *do not* influence, in a significant way, their reporting incentives to disclose NGE in a different way in their local annual reports.

Multiple correspondence analysis over U.S. cross-listed NGE disclosures provides mixed results, as firms from countries with weaker and stronger institutional and economic factors are highly and lower associated to all three non-GAAP qualitative variables (NGE emphasis, NGE value and NGE adjustments value). However, specifically for U.S. GAAP adopters, I find that they are more highly associated with high adjustments magnitude.

I also find that U.S. cross-listed firms provide adjustments (types and magnitudes) similar to those described in past literature (for both U.S. and international samples): impairment, net equity investment and stock option/share-based compensation expenses.

I provide (i) first descriptive results from comparative annual data from NGE disclosures of U.S. cross-listed firms; (ii) first multiple correspondence analysis results over NGE; and (iii) insights on existing research on the relation between NGE and cross-listing, which are few.

This paper is organized as follows: Section 5.2 discusses the cross-listing financial reporting scenario and the paper's hypothesis. Section 5.3 presents sample selection and data collection procedures. Section 5.4 explains the research design. Section 5.5 provides descriptive evidence, empirical results and final remarks.

5.2 Non-GAAP reporting scenario for foreign firms cross-listed in the USA

The Securities and Exchange Commission (SEC) imposes many requirements to U.S. and foreign firms that decide to disclose non-GAAP numbers in different communication channels, as earnings calls, press releases, SEC filings and media interviews (Brown, 2020).

Foreign private issuers (FPIs) are eligible, under SEC basic rule 6120, to use Form 20-F to provide annual results and disclosures, subjected to Regulation S-K 10(e) with respect to the use of non-GAAP measures (SEC, 2008; SEC, 2011).

Note that the requirements and prohibitions for U.S. firms and FPIs disclosing NGE in Form-20F and 10-K (annual reports) are the same:

Tabela 1 - Regulation S-K 10(e) requirements and prohibitions

Requirements	Prohibitions
Presentation, with equal or greater prominence, of the most directly comparable GAAP measure.	Excluding charges or liabilities that required, or will require, cash settlement, or would have required cash settlement absent an ability to settle in another manner, from non-GAAP liquidity measures. This prohibition does not apply to EBIT and EBITDA used as liquidity measures.
A reconciliation of the differences between the non-GAAP measure and the most directly comparable GAAP measure.	Adjusting a non-GAAP performance measure to eliminate or smooth items identified as non-recurring, infrequent, or unusual, when (1) the nature of the charge or gain is reasonably likely to recur within 2 years or (2) there was a similar charge or gain within the prior 2 years.
A statement disclosing the reasons why management believes the presentation of the non-GAAP measure provides useful information to investors regarding the registrant's financial condition and results of operations	Presenting non-GAAP financial measures on the face of the GAAP financial statements or in the notes.
To the extent material, a statement disclosing the additional purposes, if any, for which management uses the non-GAAP measure.	Presenting non-GAAP financial measures on the face of any pro forma information required to be disclosed by Article 11.
-	Using titles or descriptions of non-GAAP measures that are the same or confusingly similar to GAAP titles.

Prepared by the author.

Brown (2020) resumes that FPI's requirements that are subjected to Regulation S-K 10(e) is the same for U.S. firms as they must provide a quantitative non-GAAP reconciliation to the most directly comparable GAAP metric, must give GAAP metric equal or greater prominence and provide qualitative information about why the non-GAAP measure is useful.

Nevertheless, there are some exceptions (Brown, 2020, p. 147):

> "cross-listed foreign firms are exempt from Regulation G if all of the following three conditions are met: (1) the company's stock or debt securities are listed on an exchange outside of the U.S., (2) the non-GAAP metric is not derived from or based on a measure prepared and presented under U.S. GAAP, and (3) the non-GAAP metric was disclosed outside of the U.S. These exemption criteria will still apply even if the non-GAAP metric is disclosed concurrently or shortly thereafter in the U.S., as long as individuals located in the U.S. are not the intended primary target of the disclosure communication.".

Note that the third exception – "the non-GAAP metric was disclosed outside of the U.S." – implies there's a practical possibility for cross-listed firms in U.S. exchanges to disclose non-GAAP measures in their home-country reports (i.e., annual reports) but not report them in U.S. reports (i.e., SEC filings), or that there may be differences between those disclosures[38].

From that exception and considering the institutional theory framework, following Shi et al. (2012), I built the paper's research design. As they argue, voluntary disclosures in the U.S. that are a common reporting practice may encourage foreign firms to voluntarily converge with US practices.

This is the exact case of non-GAAP measures reporting, where much descriptive evidence has consistently indicated an increasing trend in the frequency of non-GAAP measures. Black et al. (2018, p. 2) states that "The growth in these non-GAAP metrics over the past twenty years reflects a widespread acceptance of non-standard performance metrics as a way to evaluate firm performance.".

As Shi et al. (2012) explain, "institutional theory implies that cross-listed firms face dual pressures from both host and home countries." (p. 144). As it is expected that U.S. cross-listed

[38] I consulted an investor relations expert (see https://www.linkedin.com/in/andrelcvasconcellos/) about voluntary reporting incentives in a cross-listing setting, specifically about the possibility that U.S. cross-listed firms present voluntary data in different ways, conditional on the reporting channel. Based on his professional expertise and to the best he knows, it is plausible that cross-listed firms present the same data (like adjusted earnings) in different ways when comparing SEC filings and home-country filings due to some institutional factors, as for example: the reporting protocol may differ from one country to another; there are more/less sophisticated reporting settings; investors may demand different information; etc. He understands there is flexibility in the way cross-listed firms prepare disclosures as required by interested parties and by following the reporting protocol traditionally accepted in local markets. I thank André Vasconcellos for the discussion and professional knowledge sharing.

firms face more general financial reporting regulation and more specific non-GAAP reporting regulation, when compared to their home-countries institutional system, they face more market pressure to follow such regulation and disclosures practices.

In line with Shi et al. (2012) overall result and based on Regulation S-K 10(e) exemption criteria, *I expect U.S. institutional factors influence the reporting incentives of cross-listed firms to converge with non-GAAP disclosures practices in both annual reports (Form 20-F and local annual report)*.

The underlying premise is that home-country institutional factors *do not* influence, in a significant way, the reporting incentives of cross-listed firms to disclose non-GAAP earnings in a different way in their local annual reports[39]. This implies that NGE disclosures of U.S cross-listed firms *do not* differ conditional on the type of annual report's reporting channel due to the stronger U.S. market forces over firms financial reporting.

In section 5.3 I describe sample selection procedures and final sample and observations.

5.3 Methodological procedures

5.3.1 Sample selection approach

Sampling procedures start from all not financial[40] public firms from G20 countries (G20, 2021) that are cross-listed in U.S. exchanges. I focus on foreign private issuers (FPIs) listed on NASDAQ or NYSE.

Cross-listed firms from the G20 setting was selected for several reasons: (i) first, like past scholars, I identified a lack of NGE evidence from firms in countries other than USA, Australia and European countries; (ii) second, cross-listing setting is a unique setting to examine reporting incentives; (iii) third, G20 countries represent the most relevant economies of the world (G20, 2021).

I use a two-step approach for sampling firms:

(i) Foreign private issuers (FPIs) from G20 countries listed on U.S. exchanges NASDAQ or NYSE: An "FPI" is a foreign national or a corporation or other organization that is incorporated or organized under the laws of any foreign country (SEC, 2008). This

[39] The extent to whether and how those disclosures differ is an explanatory question.
[40] I excluded non-financial firms because such industry do not use EBITDA as a performance measure.

definition comprises firms "dual listed" in their exchange home country and in north american exchanges. I select FPIs firms from Top Foreign Stocks (2023)[41] website.

(ii) U.S. firms listed on NASDAQ-100 index: As american firms are not FPIs but United States is comprised in the G20 economies, I select american firms from the NASDAQ-100 index.

I chose NASDAQ and NYSE exchanges because they are the main U.S. exchanges, and also the NASDAQ-100 index because it "includes 100 of the largest domestic and international non-financial companies listed on the NASDAQ Stock Market based on market capitalization." (NASDAQ, n.d.a).

5.3.2 Sample selection criteria

I identify FPIs from G20 countries listed on NASDAQ or NYSE exchanges by consulting Foreign Stocks (2023) website on February the 24th, 2023. This site provides an updated list of all ADRs trading on U.S. exchanges by country.

The consultation returned 359 non-financial FPIs distributed like shown below:

Table 30 - Number of FPIs by country (Essay 3)

Region	Country	FPIs	%
Africa	South Africa	7	1.9%
South America	Argentina	12	3.3%
	Brazil	23	6.4%
North America	Canada	71	19.8%
	United States	-	-
	Mexico	12	3.3%
Asia	China	126	35.1%
	India	5	1.4%
	Indonesia	1	0.3%
	Japan	9	2.5%
	South Korea	6	1.7%
	Saudi Arabia	-	-
	Turkey	2	0.6%
Europe	France	13	3.6%
	Germany	9	2.5%
	Italy	4	1.2%
	Russia	7	1.9%
	United Kingdom	38	10.6%
Oceania	Australia	14	3.9%
Total		**359**	**100%**

Prepared by the author.

[41] My first attempt to obtain a list of ADRs was by consulting Capital IQ's database. But as they do not have point in time information the data could not be used. I checked with other sources that the information provided by the Top Foreign Stocks website was updated and used their data.

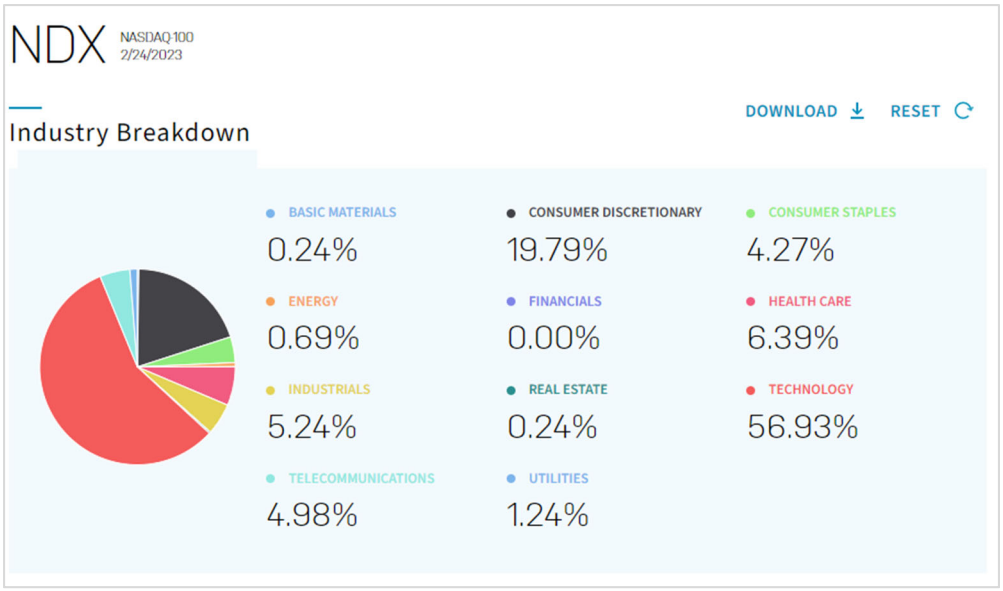
The majority of firms are from China, representing 35.1% of all FPIs. Then Canada holds 19.8% and United Kingdom 10.6%. Together they represent 65.5% of all firms. Saudi Arabia is the only country that has no ADR trading on NYSE or NASDAQ.

I followed past researchers as Isidro and Marques (2015) and Choi and Young (2015) and focus on the most valuable firms. Based on the latest market capitalization available on Capital IQ database, as of February the 24th, 2023, and measured in USD billions, I chose the "Top 05" most valuable firms of each country. After "Top 05" criterion, Italy, Turkey and Indonesia were disregard for having less than 5 firms. Such procedure resulted in 70 FPIs from 14 countries.

Based on the index weightings as of February the 24th, 2023, from the NASDAQ website (NASDAQ, n.d.b), I chose the "Top 05" most valuable firms by latest market capitalization.

The industry breakdown (NASDAQ, 2023) at the collection date shows that the majority of companies were concentrated in Technology (56.9%) and Consumer Discretionary (19.7%) industries.

Figure 12 - NASDAQ-100 index industry breakdown



Prepared by the author.

Thus, the final sample comprises 75 firms (70 most valuable FPIs of 14 countries and 05 most valuable U.S. firms by market cap[42]). Sample is distributed as follows:

[42] "Market Capitalization" variable from Capital IQ database, measured as "Stock Price * Share Outstanding" in USD billion.

Table 31 - Number of firms by industry (Essay 3)

Industry Sector	Firms	%
Communication Services	14	18.7%
Materials	12	16.0%
Consumer Discretionary	11	14.7%
Information Technology	11	14.7%
Health Care	9	12.0%
Industrials	6	8.0%
Consumer Staples	4	5.3%
Energy	4	5.3%
Real Estate	3	4.0%
Utilities	1	1.3%
Total	**75**	**100%**

Prepared by the author.

The majority (34.7%) of firms are concentrated in Communication Services and Materials industries, followed by Consumer Discretionary and Information Technology (29.3%).

5.3.3 Data collection

5.3.3.1 Research period and observations

Previous research has identified non-GAAP measures are more prevalent in press releases as they supply investors demands and are not subject to audits.

However, I use annual data from annual reports due to the inclusion of audited financial statements and therefore, GAAP earnings figure, and also management commentary and other independent reports and written communications. These components collectively may provide a higher level of disclosure when compared to press releases.

I focus on annual data from fiscal years 2013-2022. Because I hand-collect all NGE data, I considered as many previous years as possible beginning on the last available year with annual reporting data (2022). Young (2014) affirms that “Reducing the set of firms on which to focus would enable researchers to collect more granular data capable of casting new light on reporting practices”. Black et al. (2021), for example, explain that as their research design requires a time-series of hand-collected data they limited their collection by selecting a set of firms to keep the collection tractable.

Choosing the last ten consecutive years reaches a recent panel data to analyze up-to-date information on non-GAAP earnings.

In relation to the types of reports under analysis, U.S. firms must fill annual reports in the 10-K and FPIs must fill annual reports in the Form 20-F. For each firm I analyzed a panel of 10 documents (01 annual report for year), ending with potentially 750 observations.

Final sample is 138 and 120 firm-years observations (see next section for details).

5.3.3.2 Data and variables

5.3.3.2.1 Identifying non-GAAP earnings reporters

As non-GAAP measures are voluntary metrics, one cannot know *ex ante* if firms disclose or not disclose non-GAAP earnings unless periodic reports are read. This is an important issue in this type of research, as the main research data are not commonly available in databases.

Even though Capital IQ supplies the "EBITDA as reported" variable, it does not provide detailed information for an in-depth analysis, such as adjustment types, prominence and many other qualitative information about non-GAAP disclosures. Therefore, data used in this essay are the result of hand-collected work.

The first step was to hand collect 750 annual reports. Using EDGAR Full Text Search I identified and saved all available links that contain annual reports (20-F or 10-K) for the final sample. I found that 123 links were not available because either (i) the firm did not exist until a specific year between 2013-2022; or (ii) the firm existed but was not listed on U.S. exchanges until a specific year between 2013-2022. In this sense I lost 123 firms-observations, remaining 627 (83.6% of all potential observations).

In order to identify annual reports that contain any type of non-GAAP earnings measures I hired a programmer who created a Python script[43] to search firms' annual reports for validated non-GAAP keywords[44], following Bhattacharya, Black and Christensen (2007) apud Wallace (2002), and Laurion (2020).

The search considers 20 keywords: "non-GAAP", "non-IFRS", "alternative performance measure", "ebitda", "adjusted ebitda", "underlying earnings", "adjusted earnings", "adjusted net income", "adjusted income", "adjusted net profit", "adjusted profit", "adjusted loss",

[43] I hired a Python programmer to build a code that assess SEC's links to annual reports and search for keywords that identifies the presence of non-GAAP earnings inside them. See Appendix to reach the links to documentation and contact info of the programmer.

[44] Unlike Bhattacharya, Black and Christensen (2007) I add EBITDA keywords because they also represent a type of non-GAAP earnings and exclude any keyword that identifies cash measures (ex: "free cash flow").

“underlying earnings”, “normalized earnings”, “headline earnings”, “recurring earnings”, “GAAP adjusted”, “pro forma earnings”, “proforma earnings” and “pro-forma earnings”.

In short, after accessing all 627 links the script returns, by link, the number of times each term is mentioned. If the term has not been mentioned, it returns the number zero, exactly like a “Ctrl + F” command on a PDF file. The results of this procedure can be seen below:

Table 32 - Python script results

Keyword description	Frequency
Non-GAAP	185
Non-IFRS	0
Alternative performance measure	22
EBITDA	286
Adjusted EBITDA	138
Underlying Ebitda	19
Adjusted earnings	54
Adjusted net income	87
Adjusted income	19
Adjusted net profit	24
Adjusted profit	17
Adjusted loss	0
Underlying earnings	24
Normalized earnings	12
Headline earnings	28
Recurring earnings	0
GAAP adjusted	0
Pro forma earnings	0
Proforma earnings	0
Pro-forma earnings	0

Prepared by the author.

One can see that the most mentioned keyword is “non-GAAP”, which is a broader term for identifying non-GAAP reporters, and “EBITDA” is the most mentioned NGE keyword by firms in my sample, reaching 286 firms-observations (45.6%). I focus on “EBITDA” because it is a more precise indicator of non-GAAP earnings disclosures than solely “non-GAAP”.

From those 286 *possible* non-GAAP reporters, I found out by reading and analyzing each document that 148 annual reports only mention the keyword “EBITDA” throughout the annual report, but doesn’t disclose the EBITDA measure. This happened when firms use EBITDA to monitor financial covenants or to indicate the use as a metric for their executive compensation plan. In such cases this information is not useful for this paper research objectives, as I needed more information on EBITDA disclosures.

In this sense I end up with 138 firm-year observations from 26 firms in 12 countries that included the reconciliation between Adjusted EBITDA and the GAAP earnings measure. Note that this number (138) matches the script output for the keyword “adjusted EBITDA”, which

indicates that all firms that disclosed EBITDA also disclosed Adjusted EBITDA in the same reconciliation board.

Other past studies also ended up with few observations because of the hand-collect aspect of the research, like Lougee and Marquardt (2004), for example, that reached a final sample of 249 firm-quarters observations. Similarly, Mey and Lamprecht (2020) and also Cormier et al. (2022), which investigated hand-collected EBITDA measures, reached samples of 185 and 224 firm-observations.

5.3.3.2.2 Form-20-F and local annual reports data

I analyzed the disclosed reconciliation board between the NGE and the GAAP earnings and collected (i) the NGE number and (ii) types and magnitudes of the adjustments[45] to conduct descriptives analysis and discuss disclosures characteristics[46].

Then, for the same 138 observations, I compared Form-20F non-GAAP disclosures with the local annual reports disclosures, which I collected from each investor's relations website. I lost 18 observations due to lack of data (annual reports) for five firms, ending up with 120 firm-year observations for the comparative analysis.

See section 5.5.1 to descriptive analysis results.

5.3.3.2.3 Correspondence analysis data

I conduct a multiple correspondence analysis (MCA) over main qualitative variables, as shown in Table 33. These variables were constructed based on data collection process.

MCA procedure examines the association between firm's home-country and non-GAAP keyword frequency, non-GAAP earnings value and adjustments value.

[45] I included in the Appendix one example of non-GAAP earnings disclosure I collected.
[46] With regards to disclosures original currency, there are data presented in currencies other than U.S. dollar (USD). I converted the original values to USD using historical data from Yahoo Finance Website.

Table 33 - Qualitative variables and categorical levels

Country (COUNTRY)	Non-GAAP keyword frequency (FREQ)	Non-GAAP value (NGEV)	Adjustments value (ADJV)
Argentina Australia Brazil Canada China France Germany Japan Mexico Russia South Africa United Kingdom	High	High	High
	Low	Low	Low

Prepared by the author.

Table 33 presents twelve categorical levels for COUNTRY and two categorical levels for FREQ, NGEV and ADJV ("high" or "low"). COUNTRY is defined as country of incorporation. FREQ is defined as the number of times "EBITDA" keyword is mentioned in Form-20F (as of information provided in Table 32). NGEV and ADJV is defined as "high" for observations with values above the median and "low" for observations with values below the median (NGE and ADJV absolute values are scaled by total revenues, as provided by Capital IQ).

See correspondence analysis results in section 5.5.2 and STATA script in the Appendix.

5.4 Research design

This research is an explanatory investigation with two overall objectives:

To examine whether non-GAAP earnings disclosures of U.S. cross-listed are conditional on the reporting channel I compare NGE disclosures from the listing-country annual report with NGE disclosures from the home-countries annual report.

To examine the association between a firm's home-country and qualitative variables that represent non-GAAP emphasis and magnitude I apply a multivariate exploratory technique for categorical data. Multiple correspondence analysis (MCA) helps in the study of the association between more than two qualitative variables and the intensity of such association.

I follow Fávero and Belfiore (2015) protocol to MCA procedure.

5.5 Results

5.5.1 Descriptive evidence

5.5.1.1 Form 20-F

In this section I present the main descriptive evidence of non-GAAP earnings disclosures for 26 U.S. cross-listed firms from twelve countries (138 firm-years observations).

Tables 34 and 35 present the distribution and frequency of Adjusted EBITDA reporting by year. 60.9% of all observations are concentrated in the last four years (2019-2022). Cross-listed firms in my sample vary the disclosure decision choice among the years under analysis. 15.4% of them report the Adjusted EBITDA metric in eight of the ten years, which indicates a high degree of reporting persistence, but at the same time also 15.4% of them disclosed non-GAAP earnings in only two periods, indicating a less persistent reporting behavior. 19.2% of all firms disclosed the Adjusted EBITDA in four of the ten years.

Table 34 - NGE reporting by year (Essay 3)

Adj. EBITDA reporting	*N*	%
FY2013	5	3.6%
FY2014	7	5.1%
FY2015	8	5.8%
FY2016	9	6.5%
FY2017	12	8.7%
FY2018	13	9.4%
FY2019	18	13.0%
FY2020	21	15.2%
FY2021	22	16.0%
FY2022	23	16.7%
Total	138	100.0%

Prepared by the author.

Table 35 - NGE reporting frequency (Essay 3)

Adj. EBITDA reporting	%
Firms reporting in all ten years	7.7%
Firms reporting in nine of the ten years	7.7%
Firms reporting in eight of the ten years	15.4%
Firms reporting in seven of the ten years	3.8%
Firms reporting in six of the ten years	11.5%
Firms reporting in five of the ten years	3.8%
Firms reporting in four of the ten years	19.2%
Firms reporting in three of the ten years	11.5%
Firms reporting in two of the ten years	15.4%
Firms reporting only in one year	3.8%
Total	100.0%

Prepared by the author.

Table 36 shows the Adjusted EBITDA disclosure by country. South Africa holds almost 25% (24.6%) of firm-year observations. Brazil also holds a significant number of observations, concentrating 18.1%. France appears next with 10.1% of all observations. Together they hold 52.9% of firm-year observations.

Note that those countries are more representative in firms' number, suggesting that cross-listed firms from South Africa, Brazil and France report non-GAAP earnings frequently.

Table 36 - NGE reporting by country (Essay 3)

Adj. EBITDA reporting	*N* firms	*N* firm-years (NGE reporters)	% firm-years (NGE reporters)
Argentina	2	9	6.5%
Australia	2	11	8.0%
Brazil	4	25	18.1%
Canada	1	6	4.3%
China	1	8	5.8%
France	2	14	10.1%
Germany	1	2	1.4%
Japan	1	1	0.7%
Mexico	1	8	5.8%
Russia	3	9	6.5%
South Africa	5	34	24.6%
United Kingdom	3	11	8.0%
Total	26	138	100.0%

Prepared by the author.

Table 37 resumes the EBITDA disclosure by industry. The majority (53.6%) of firms are concentrated in the Materials (36.2%) and Consumer Discretionary (17.4%) sectors, followed by Communication Services (15.9%). Together they concentrate almost 69.6% of all firms.

Table 37 - NGE reporting by industry (Essay 3)

Adj. EBITDA reporting	*N* firms	*N* firm-years (NGE reporters)	% firm-years (NGE reporters)
Materials	9	50	36.2%
Consumer Discretionary	5	24	17.4%
Communication Services	4	22	15.9%
Energy	3	9	6.5%
Consumer Staples	2	15	10.1%
Information Technology	2	14	10.9%
Industrials	1	4	3.0%
Total	26	138	100.0%

Prepared by the author.

In Table 38 is presented the EBITDA adjustments by category. *N* is the frequency of each category and % is the percentage of the frequency over 138 firm-years observations.

Table 38 - Adjustments types (Essay 3)

Adjustments types	Value (abs)	*N*	%
Income taxes	195.575	138	100%
Interest/income expenses	115.495	138	100%
Depreciation and amortization	283.063	138	100%
Impairment	52.111	63	45.7%
Net equity investment	47.988	56	40.6%
Stock option/share-based compensation	33.438	54	39.1%
Other income/expense	9.596	53	38.4%
Acquisitions and disposals	10.106	48	34.8%
Restructuring charges	17.559	44	31.9%
Foreign exchange loss/gain	882	38	27.5%
Special items	28.341	33	23.9%
Fair value measurement	3.577	27	19.6%
Provisions	92	11	8.0%
Dividends	2.297	11	8.0%
Leasing	137	8	5.8%
Other[47]	38.317	55	39.9%
Total	838.575	138	

Prepared by the author.

As can be seen above, in addition to EBITDA's traditional adjustments, cross-listed firms frequently adjust earnings for (i) impairment effects (45.7%), (ii) net equity investment effects (40.6%), and (iii) stock option/share-based compensation expenses (39.1%).

Finally, Table 39 indicates U.S. cross-listed firms in my sample chose[48] to prepare their financial statements under IFRS or U.S. GAAP:

Table 39 - Accounting regime (Essay 3)

Country	Accounting regime
Argentina	IFRS
Australia	IFRS
Brazil	IFRS
Canada	U.S. GAAP
China	U.S. GAAP
France	IFRS
Germany	IFRS
Japan	IFRS
Mexico	IFRS
Russia	U.S. GAAP/IFRS
South Africa	U.S. GAAP/IFRS
United Kingdom	IFRS

Prepared by the author.

[47] Correspond to some items for which the disclosure was to scattered or with insufficient transparency to classify them in one of the existing categories.

[48] Cross-listed firms are not obligated to file financial statements prepared under U.S. GAAP. They are permitted to prepare financial statements under their local GAAP, IFRS or U.S. GAAP, but reconciliation to US GAAP is required in the case of local GAAP preparation.

In my sample the majority (66.6%) of countries adopt IFRS, 16.67% adopt U.S. GAAP and 16.67% contain firms from both regimes (Russia and South Africa).

5.5.1.2 Form 20-F *versus* local annual reports

The comparative analysis between listing-country and home-countries annual reports was carried out upon 120 firm-year observations, as presented below:

Table 40 - NGE reporting by country v2 (Essay 3)

Adj. EBITDA reporting	*N* firms	*N* firm-years (NGE reporters)	% firm-years (NGE reporters)
Argentina	1	3	2.5%
Australia	2	11	9.2%
Brazil	4	25	20.8%
Canada	1	6	5.0%
China	1	8	6.7%
France	2	14	11.7%
Germany	1	2	1.7%
Russia	3	7	5.8%
South Africa	5	33	27.5%
United Kingdom	3	11	9.2%
Total	26	120	100.0%

Prepared by the author.

South Africa and Brazil represents 48.3% of all observations, and Mexico and Japan are not included in the comparative analysis because their firms do not provide annual reports for the years under investigation.

I find the majority of firms (92.5%) disclosing NGE in Form 20-F (listing-country annual report) disclose the *same* NGE number and reconciliation board in the local annual report. Only 6.7% of them disclosed NGE *solely* on Form-20F and 0.8% have disclosed the NGE measure in both annual reports but the reconciliation board *exclusively* on Form-20F[49].

Table 41 - Results from comparative analysis (Form-20F and annual reports)

Description	*N*	%
Same NGE disclosures	111	92.5%
NGE disclosed solely on Form-20-F	8	6.7%
Reconciliation board solely on Form-20-F	1	0.8%
Total	120	100.0%

[49] I included in the Appendix examples when non-GAAP earnings disclosures differ.

Prepared by the author.

Table 41 indicates that 15.8% of NGE disclosures from cross-listed firms in my sample differ, in some level, when comparing listing-country and local annual reports. Although such percentage is not representative, results clearly indicate cross-listed firms in the USA still have (i) a reporting choice with regards to NGE disclosures; and that (ii) NGE disclosures can differ from the NGE disclosures filled with SEC.

5.5.2 Correspondence analysis results

As Fávero and Belfiore (2015) explain, to perform the MCA procedure it is recommended a diagnosis regarding the existence of association between variables. Only variables that show an association with at least one of the other variables must be included in the analysis (p. 251). This is tested by generating the observed absolute frequency tables for each pair of variables along with their respective X^2 tests. Below are presented the contingency tables, indicating the measures of association of each pair of variables (Tables 42 to 47):

Table 42 - Contingency table COUNTRY x FREQ

COUNTRY	FREQ		
	High	Low	Total
Argentina	6	3	9
Australia	7	4	11
Brazil	10	15	25
Canada	0	6	6
China	0	8	8
France	14	0	14
Germany	2	0	2
Japan	0	1	1
Mexico	0	8	8
Russia	7	2	9
South Africa	19	15	34
United Kingdom	2	9	11
Total	67	71	138

Pearson X^2 = 49.45
Prob = 0.0000

Table 43 - Contingency table COUNTRY x NGEV

COUNTRY	NGEV		
	High	Low	Total
Argentina	3	6	9
Australia	9	2	11
Brazil	20	5	25
Canada	5	1	6
China	4	4	8
France	0	14	14
Germany	0	2	2
Japan	0	1	1
Mexico	0	8	8
Russia	4	5	9
South Africa	17	17	34
United Kingdom	7	4	11
Total	69	69	138

Pearson $X^2 = 43.05$
Prob = 0.0000
Adapted from STATA

Table 44 - Contingency table COUNTRY x ADJV

COUNTRY	ADJV		
	High	Low	Total
Argentina	7	2	9
Australia	8	3	11
Brazil	16	9	25
Canada	6	0	6
China	7	1	8
France	0	14	14
Germany	0	2	2
Japan	0	1	1
Mexico	0	8	8
Russia	4	5	9
South Africa	19	15	34
United Kingdom	2	9	11
Total	69	69	138

Pearson $X^2 = 47.55$
Prob = 0.0000
Adapted from STATA

Table 45 - Contingency table FREQ X NGEV

FREQ	NGEV		
	High	Low	Total
High	32	35	67
Low	37	34	71
Total	69	69	138

Pearson $X^2 = 0.26$
Prob = 0.6094
Adapted from STATA

Table 46 - Contingency table FREQ X ADJV

FREQ	ADJV		
	High	Low	Total
High	32	35	67
Low	37	34	71
Total	69	69	138

Pearson $X^2 = 0.26$
Prob = 0.6094
Adapted from STATA

Table 47 - Contingency table NGEV X ADJV

NGEV	ADJV		
	High	Low	Total
High	53	16	69
Low	16	53	69
Total	69	69	138

Pearson $X^2 = 39.68$
Prob = 0.0000
Adapted from STATA

As can be seen from the X^2 tests results, at a significance level of 5%, there is a statistically significant association between all pair of qualitative variables except for FREQ x NGEV and FREQ x ADJV (the outputs are the same for both pair of variables). But as FREQ, NGEV and ADJV are statistically associated with COUNTRY, all variables are included in the analysis.

When the associations between variables are statistically significant it means they are not randomly associated and MCA procedure is adequate (Fávero & Belfiore, 2015). By testing the associations, and since they are not random, "we can use the analysis of adjusted standardized residuals to study the dependency relationship between each pair of categories." (p. 212).

To identify the dependency relationships between the variables categories, I generate the results for adjusted residuals with positive values greater 1.96 (Tables 48 to 50):

Table 48 - Adjusted residuals COUNTRY x FREQ

COUNTRY	FREQ	
	High	Low
Canada	-	2.433
China	-	2.831
France	4.063	-
Mexico	-	2.831
United Kingdom	-	2.101

Adapted from STATA

Table 49 - Adjusted residuals COUNTRY x NGEV

COUNTRY	NGEV	
	High	Low
Australia	2.200	-
Brazil	3.315	-
France	-	3.947
Mexico	-	2.914

Adapted from STATA

Table 50 - Adjusted residuals COUNTRY x ADJV

COUNTRY	ADJV	
	High	Low
Canada	2.505	-
China	2.186	-
France	-	3.947
Mexico	-	2.914
United Kingdom	-	2.200

Adapted from STATA

From Tables 48 to 50 one can note countries most strongly associated with each variable category. They are, in descending order of each column:

Table 51 - Countries strongly associated with NGE qualitative data

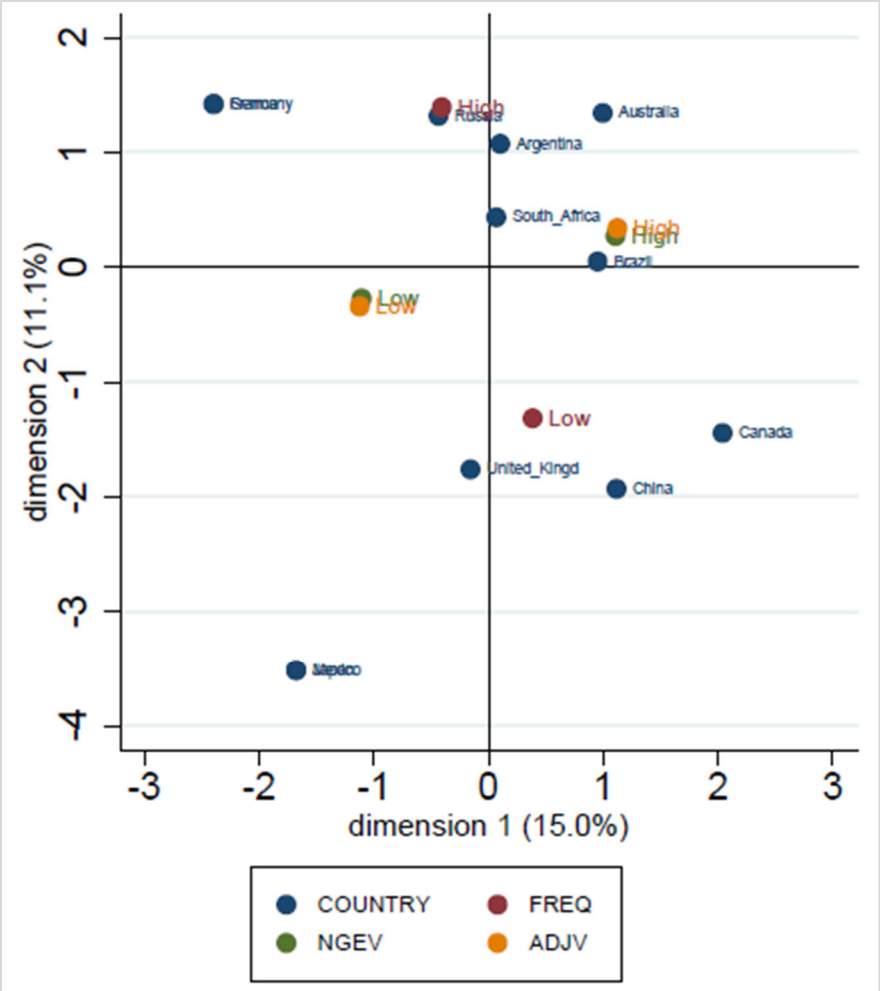
FREQ		**NGEV**		**ADJV**	
High	**Low**	**High**	**Low**	**High**	**Low**
France	Canada China Mexico UK	Brazil Australia	France Mexico	Canada China	France Mexico UK

Prepared by the author.

France is strongly associated with high NGE emphasis and low non-GAAP earnings value and adjustments value. Mexico is strongly associated with low levels for all variables. Canada and China are strongly associated with low NGE emphasis and high adjustments value. UK is strongly associated with low levels for NGE emphasis and adjustments value. Finally, Brazil and Australia are strongly associated with high levels of NGE value.

After confirming the existence of a statistically significant association between variables and identifying the dependency relationships between their categories, I generate two graphics, the first refers to the perceptual map resulted from the multiple correspondence analysis.

Figure 13 - Perceptual map



Prepared by the author.

The perceptual map allows the visualization of the relative position of all variables in two dimensions (Fávero, Martins, & Lima, 2007). In Figure 13 the blue points indicate the home-country categories for the variable COUNTRY, and the other points (green, red and yellow) are the categories for the other qualitative variables (FREQ, NGEV, ADJV).

The closest countries are to the other categories ("high" or "low") more strongly they are associated with those non-GAAP characteristics. Moreover, the closest countries are on the map more similar they are perceived to be, and the further they are from the origin (where the x and axes equal to 0) the more discriminating (different) they are (Bock, n.d.).

As Bock (n.d.), explains, the dimensions percentages indicate how well the variance is explained by the map. In Figure 13 it can be seen that visualization displays 26% of the variance in the data, which means that countries left out of visualization may be highly differentiated on some dimension that is irrelevant for most of the countries.

It can be observed there are some associations between a firm's home-country and NGE emphasis and magnitude. Figure 13 suggests that countries like UK, Canada and China exhibit characteristics more strongly related to low levels of non-GAAP earnings emphasis. In contrast, Russia, Argentina and Australia are more strongly related to high levels of non-GAAP earnings emphasis. Brazil and South Africa are the countries more strongly related to high levels of NGE and adjustments value, while UK, in the contrary, is the less strongly related to them.

Finally, note that Japan and Mexico, on the lower left side, and France and Germany, on the upper left side, present very similar associations with all three variables. Also, note they are the most apart countries from the origin, indicating they are the most different countries in the sample. In summary:

Table 52 - Relative position of countries regarding NGE qualitative data

FREQ		**NGEV**		**ADJV**	
High	**Low**	**High**	**Low**	**High**	**Low**
Russia Argentina Australia	Canada China UK	Brazil S. Africa	UK	Brazil S. Africa	UK

Prepared by the author.

In the next section I discuss results and final remarks.

5.5.3 Final remarks

In this paper I explore non-GAAP earnings disclosures in a cross-listing setting because these firms face unique reporting conditions. At the same time, they face different market forces from their home-countries and listing-country that may influence reporting practices.

Given that, I examine whether NGE disclosures of U.S. cross-listed firms are conditional on the reporting channel (i.e., listing-country or local annual reports). My exploratory premise, based on institutional theory, is that *U.S. institutional factors influence the reporting incentives of cross-listed firms to converge with non-GAAP disclosures practices in both annual reports (Form 20-F and local annual report).*

In line with that prediction, the majority (92.5%) of cross-listed firms provided the same NGE disclosure in both annual reports. I find 7.5% of firm-observations presented some level of divergence between the listing-country and home-country annual reports. I find (i) there are

firms providing NGE measures solely on Form 20-F; and that (iii) there are firms providing the reconciliation between the non-GAAP earnings and the GAAP earnings solely on Form 20-F.

Results suggest, consistently with the premise that NGE disclosure characteristics of U.S cross-listed firms *do not* differ conditional on the periodic reports reporting channel, that home-countries institutional factors of U.S. cross-listed firms *do not* influence, in a significant way, their reporting incentives to disclose non-GAAP earnings in a different way in their local annual reports. This evidence is explained by the institutional theory and is consistent with Shi et al. (2012) results.

Further, I investigate the association between NGE emphasis, NGE magnitude and cross-listed firms' home-countries. Results from multiple correspondence analysis suggest that cross-listed firms from France emphasizes more non-GAAP earnings, while cross-listed firms from Canada, China, Mexico and United Kingdom do not emphasizes non-GAAP earnings in their SEC annual reports. With regards to NGE magnitude, firms from Brazil and Australia disclose higher NGE numbers, while France and Mexico firms disclose lower numbers for NGE value. Adjustments values are higher for Canadian and Chinese firms, and lower for France, Mexico and UK firms.

Evidence from the perceptual map indicates, in relative terms, that (i) firms from Russia, Argentina and Australia are highly associated with NGE emphasis, while Canada, China and UK are less associated with NGE emphasis; (ii) firms from Brazil and South Africa are highly associated with NGE magnitude, while firms from UK are less associated with NGE magnitude. Countries' reporting incentives, driven by institutional factors, shape those associations (Healy & Palepu, 2001; Holthausen, 2009).

Isidro and Marques (2015) points that firms from countries with stronger institutional and economic factors present more rigorous regulation and scrutiny over financial reporting, which pressures firms to provide voluntary disclosures in a strategic way. Regarding such argument, my results are mixed.

My results suggest, for example, that French firms, which are from a developed economy and are under non-GAAP guidance from European Securities and Markets Authority (ESMA), emphasizes NGE in their annual report. Yet, results also reveal that firms from Canada and UK, which are economically developed countries and present non-GAAP regulation or guidance, do not emphasizes NGE in their annual reports.

As U.S. cross-listed firms applying IFRS are no longer required (since 2008) to reconcile financial statements with U.S. GAAP, financial reporting differences may impact NGE values. Past research points that another institutional factor that shapes firm-level disclosures is the

adopted accounting regime. Solsma and Wilder (2011; 2015) postulate that the accounting regime is associated with non-GAAP disclosures behavior. They conclude that U.S. cross-listed firms applying IFRS report lower NGE adjustments when compared to U.S. firms. Still, when comparing cross-listed firms applying IFRS with U.S. GAAP, results suggest NGE magnitude are similar. Thus, they argue the accounting regime do not help to explain NGE magnitude for U.S. cross-listed firms.

As shown in Table 39, considering Russia and South Africa, IFRS is adopted by 83.3% of countries in my sample. My results suggest that U.S. adopters are more associated with high adjustments magnitude, while IFRS adopters are associated with low adjustments magnitude. Yet, some results are mixed: for IFRS adopters there are countries highly associated with NGE value and countries lower associated with NGE value.

Finally, I provide evidence that U.S. cross-listed firms frequently adjust (i) impairment, net equity investment and stock option/share-based compensation expenses, which are also the categories presenting the higher adjustments value. Special items and restructuring charges also present high adjustment magnitude for my sample.

Black et al. (2018) results indicate that U.S. firm frequently adjust non-recurring expenses like restructuring charges, tax resolutions and acquisition related charges. Clinch et al. (2022) compare that result with their sample descriptive evidence on an international sample and show evidence is much aligned, except for stock-based compensation expense. However, Isidro and Marques (2015) affirm stock-based compensation is also frequently adjusted by firms.

Clinch et al. (2022) results point that impairment is the most frequently adjusted and with the higher average value for firms in their sample. With regards to the types and magnitudes of NGE adjustments from U.S. cross-listed firms, I do not find a specific pattern in disclosures to differentiate them from past international descriptive evidence.

My results have some limitations due to sample size concerns and procedures. This paper provides internal validity evidence, but lacks external validity attributes. Future research could extend Solsma and Wilder (2011; 2015) study to provide evidence on the relation of accounting regime and NGE disclosures behavior to shine a light on the matter, and investigate, based on other approaches and methods, like Sang et al. (2022), whether and to what extent institutional factors and other reporting incentives affects U.S. cross-listed firms voluntary disclosures.

6 FINAL CONSIDERATIONS

I contribute to the non-GAAP literature with a novel cross-country approach. I shed light on non-GAAP earnings international data to help fill a void previous research has left to others scholars to deal with.

Non-GAAP earnings measures are a kind of corporate communication that has proven to impact equity markets participants and mandatory financial reporting, as they refer to business performance – the most important concept and output from the financial accounting system.

One way to understand NGE measures reporting is to account for the existing different reporting incentives firms face. In this study I address some practical and theoretical concerns in the field that were waiting for more evidence to be properly discussed and theorized.

I provide conclusive results that firms from countries that present the same characteristics to the U.S. institutional factors are under a reporting environment that forces firms to disclose alternative performance measures as they have lower incentives to manage GAAP earnings. This evidence, in line with past research like Isidro and Marques (2015), confirms my proposed thesis that *if reporting incentives faced by international firms are equal to those placed on U.S. firms, the more pressure they face to disclose non-GAAP earnings*, thus, contributing to the strategic role of NGE reporting.

This work extends empirical and other analysis to new jurisdictions and settings. Yet, I focus on EB measures when there are other types of adjusted earnings frequently disclosed by firms around the world. There are other limitations, like sample size issues and panel limitation, as my research comprises a specific interval of 10 years for empirical investigation.

The role NGE plays in financial reporting is a broad and relevant question waiting to be answered, and I'm very excited to continue to contribute to the answers.

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APPENDIX

1) Main data from literature review results

See below the main results obtained after my content analysis:

Table 53 - Main data from 80 international papers (1)

Item	Reference	Research focus	Research objectives	Dependent variable	Independent variables
1	Bhattacharya, Black, Christensen and Larson (2003)	Information content (informativeness)	Examine informativeness of pro forma earnings to investors	Abnormal stock returns	1. Categories of adjustments 2. Market value 3. EPS pro forma 4. EPS IBES 5. EPS GAAP 6. One-quarter-ahead earnings forecasts
2	Brown and Sivakumar (2003)	Information content (informativeness) and Predictive ability (persistence)	Examine the predictive ability to predict future earnings Test information content of earnings	Abnormal stock returns	1. Market value 2. Common equity 3. Net income per share 4. Unexpected operating income 5. Operating income measures
3	Gu and Li (2003)	Other	Investigate management incentive to disclose non-GAAP indicators concerning innovation in high-technology industries and the usefulness of the disclosure	Disclosure score of non-GAAP indicators	1. Change in R&D intensity 2. R&D intensity 3. Loss 4. Age 5. Monthly stock return 6. Log R&D expenditure 7. Debt or equity offering 8. Controls

Item	Reference	Research focus	Research objectives	Dependent variable	Independent variables
4	Palmrose and Scholz (2004)	Other	Analyze the nature of restatements by determining whether earnings components are misstated	Litigation	1. Core accounting issues 2. Number of accounting issues 3. Fraud or irregularities 4. Percentage change in net income 5. Number of years restated 6. Total assets (ln) 7. Bankrupt or delisted 8. Recent IPO 9. Sales growth 10. Security price change 11. Type of auditor (Big 5) 12. 1996 indicator 13. Financial industry indicator 14. Interim-only financial statements
5	Lougee and Marquardt (2004)	Information content (informativeness), Predictive ability (persistence) and Determinants (propensity)	Test the determinants of pro forma reporting behavior	Pro forma earnings (0,1)	1. Total assets 2. Intangible intensity 3. Earnings response coefficients 4. Corresponding adjusted R2 5. Sales growth 6. Market to book 7. Leverage 8. Earnings variability 9. Special items 10. Earnings decrease 11. Analyst consensus
			Test investor response to pro forma earnings	Abnormal stock returns	1. Earnings surprise 2. Pro forma earnings 3. GAAP earnings
			Test predictive ability of pro forma earnings	Abnormal stock returns	1. Pro forma earnings 2. GAAP earnings 3. Earnings response coefficients 4. Corresponding adjusted R2

Item	Reference	Research focus	Research objectives	Dependent variable	Independent variables
6	Coté and Qi (2005)	Information content (informativeness)	Examine whether there is an anomalous factor return to a stock's Honest EPS	Abnormal return	1. GAAP 2. Street 3. Honest EPS
				Honest EPS	1. Analyst revision factor 2. Momentum 3. Free cash flow 4. Dividend yield 5. Capital expenditure 6. Change in working capital
7	Marques (2006)	Information content (informativeness) and Determinants (propensity)	Test the determinants of non-GAAP disclosure before and after regulation	Non-GAAP measure (0,1)	1. Lougee and Marquardt (2004) 2. Heflin and Hsu (2005)
			Examine how the use of non-GAAP earnings by investors has changed across SEC interventions	Abnormal stock returns	1. Earnings surprise 2. Lougee and Marquardt (2004) 3. Heflin and Hsu (2005)
8	Bhattacharya, Black, Christensen and Mergenthaler (2007)	Other	Identify who trades on pro forma earnings information (types of investors)	Small, medium and large investors' abnormal net-buy volume	1. GAAP operating earnings forecast error 2. Pro forma forecast error 3. I/B/E/S forecast error 4. Total assets 5. Market-wide trading volume
9	Choi, Lin, Walker and Young (2007)	Information content (informativeness) and Predictive ability (persistence)	Identify the sources of disagreement between management and analysts.	Stock price per share	1. EPS I/B/E/S 2. GAAP EPS 3. Adjusted items (managers) 4. Adjusted items (analysts) 5. Book value
			Examine the incremental forecasting relevance of management exclusions and inclusions.	CFO	

Item	Reference	Research focus	Research objectives	Dependent variable	Independent variables
10	Landsman, Miller and Yeh (2007)	Predictive ability (persistence)	Estimate the persistence of earnings components	Abnormal earnings	1. Equity book value 2. Equity market value 3. Operating income 4. Special items 5. Total exclusions 6. Net income 7. Analyst pro forma earning
11	Kolev, Marquardt and McVay (2008)	Regulation impacts	Test the impact of SEC's intervention on the average quality of exclusions from non-GAAP earning	Future operating income	1. GAAP Earnings 2. Non-GAAP Earnings 3. Non-GAAP Earnings Total Exclusions 4. Special Items Other Exclusions 5. Future Operating Income Sales Growth 6. Total Assets 7. Earnings Volatility Loss 8. Book-to-Market Assets 9. Log(Age) 10. Volatility 11. Loss 12. STOP 13. M&A 14. Log(Total Assets)

Item	Reference	Research focus	Research objectives	Dependent variable	Independent variables
12	Heflin and Hsu (2008)	Regulation impacts	Test the determinants of non-GAAP disclosure behavior as a function of SEC regulations	Non-GAAP earning (0,1)	1. Non-GAAP earnings 2. Dummy variables to control periods 3. Special item 4. Magnitude of special item 5. Intangible intensity 6. Loss 7. Tech 8. Negative special item / negative earnings 9. Log(Total Assets) 10. Leverage 11. SOX
13	Black and Christensen (2009)	Information content (informativeness) and Determinants (propensity)	Test the determinants of adjustments managers may use strategically to meet benchmarks	EPS operating earnings loss (0,1)	1. EPS pro forma 2. EPS I/B/E/S 3. EPS operating earnings 4. EPS diluted 5. Adjusted items (managers) 6. Adjusted items (analysts) 7. Total asset 8. Analysts' consensus
			Assess the magnitude and statistical significance of different adjustment types	Manager exclusions	
14	Marques (2010)	Prominence of disclosure	Assess whether S&P 500 firms place their non-GAAP earnings more prominently	N/A (Difference in prominence)	1. Six-point scale for prominence
			Examine where the earnings exclusions do not convert a GAAP loss to a pro forma profit	Reconciliation	1. Reconciliation 2. GAAP income statement 3. Non-GAAP income statement 4. Balance sheet statement 5. Cash flow statement 6. Difference in reported earnings 7. Difference in sales
			Examine whether non-GAA earnings receive more prominence in the cases when the GAAP earnings value is lower than analysts' forecast	Abnormal return	

Item	Reference	Research focus	Research objectives	Dependent variable	Independent variables
15	Entwistle, Feltham and Mbagwu (2010)	Information content (informativeness) and Predictive ability (persistence)	Test the value relevance of pro forma earnings, GAAP earnings and I/B/E/S earnings and which in comparative terms has the greatest value relevance	Price	1. Book value per share 2. Three earnings measures 3. Growth 4. Loss 5. Timeliness of earnings 6. Earnings uncertainty 7. Earnings dispersion 8. Number of analysts
				Abnormal return	1. Three earnings measures
			Examine the stock market's ability to predict future earnings (whether current stock returns are more highly associated with future GAAP, future I/B/E/S, or future pro forma earnings)	Abnormal return	1. Three earnings measures t-1 2. Three earnings measures t 3. Three earnings measures t+1 4. Return t+1 5. Controls 6. Post-sox interactions
16	Chen (2010)	Predictive ability (persistence)	Examine whether analysts and investors fully understand the persistence of the items excluded from street earnings and whether their ability to understand it has improved since the adoption of Reg G	Future street earnings, Future analyst earnings forecast, forecast errors and abnormal return	1. Street exclusions 2. Accruals 3. Growth rate in sales 4. Analyst earnings forecast 5. Controls
17	Koning, Mertens and Roosenboom (2010)	Information content (informativeness) and Determinants (propensity)	Examine whether there has been a shift away from the use of non-GAAP metrics due to negative attention in the media	Non-GAAP (0,1)	1. Gross Domestic Product 2. M&A Activity 3. Loss 4. Miss forecast 5. Negative media
18	Campbell and López (2010)	Determinants (propensity)	Investigate the relation between non-GAAP emphasis and a firm's value-relevance	Non-GAAP (0,1)	1. Hitech 2. Earnings variability 3. Institutional ownership 4. Index S&P 600 5. Number of years that the firm has been public 6. Controls

Item	Reference	Research focus	Research objectives	Dependent variable	Independent variables
19	Jennings and Marques (2011)	Information content (informativeness) and Predictive ability (persistence)	Estimate the persistence of manager-generated adjustments to GAAP-based earnings	GAAP earnings per share	1. Non-GAAP earnings per share 2. Non-GAAP adjustments per share 3. Measures of corporate governance
			Investigate whether investors were misled by manager-generated adjustments to GAAP-based earnings	Cumulative excess return	1. Surprise 2. Non-GAAP adjustments per share 3. Measures of corporate governance
20	Frankel, McVay and Soliman (2011)	Predictive ability (persistence) and Other	Examine whether board independence affects monitoring of earnings-related disclosures	Future earnings	1. Non-GAAP exclusions 2. Non-GAAP earnings 3. Board independence 4. Analysts' consensus 5. Size 6. Growth 7. Loss 8. Earnings volatility 9. Control variables
			Examine whether management's decision to exclude items from non-GAAP earnings reflects an element of opportunism	Insider trading	
21	Zhang and Zheng (2011)	Determinants (propensity) and Regulation impacts	Examine whether better reconciliations mitigate mispricing associated with pro forma disclosures.	Reconciliation quality	1. Loss 2. Managerial incentives 3. Analysts 4. Ln(Total assets) 5. Types of adjustments 6. Hitech 7. Emphasis
			Examine whether pro forma earnings are mispriced after Reg G.	Return of portfolio	1. Return on small firms minus the return on large firm 2. Return on high book-to-market stocks minus the return on low book-to-market stocks
			Test whether the quality of excluded items and reconciliation quality are correlated.	Future operating income	1. EPS 2. Exclusions

Item	Reference	Research focus	Research objectives	Dependent variable	Independent variables
22	Barth, Gow and Taylor (2012)	Information content (informativeness) and Predictive ability (persistence)	Test whether opportunism explains analysts' exclusion of stock-based compensation expense	Pro forma earnings excluding stock-based compensation (0,1)	1. Stock-based compensation expense 2. Total assets (deflated) 3. I/B/E/S actual earning 4. Analysts' consensus 5. Loss 6. Number of analysts 7. Shares held by institutional investors 8. Control variables
			Test the predictive ability explains analysts' exclusion of stock-based compensation expense	Net income before extraordinary items	
23	Black, Black, Christensen and Heninger (2012)	Regulation impacts	Test if predict investors' perceptions of pro forma earnings disclosures have changed in the post-SOX environment	Abnormal stock returns	1. GAAP earnings 2. Non-GAAP Earnings 3. Profit 4. Analysts' consensus 5. Recurring expense items
			Investigate if investors discount aggressive pro forma earnings numbers in the post-SOX period differently than they did in the pre-SOX period	Abnormal stock returns	1. GAAP earnings 2. Non-GAAP Earnings 3. Pre/Post-SOX indicator
24	Brown, Christensen and Elliott (2012)	Information content (informativeness)	Test if managers time the release of their earnings announcements in quarters in which they report an adjusted (pro forma) earnings metric differently from quarters in which they do not	Timing of earnings announcement	1. Earnings surprise 2. Pro forma earnings indicator 3. Pro forma earnings indicator t-1 4. GAAP Loss 5. Negative GAAP operating earnings forecast error indicator 6. Controls
			Examine whether managers, on average, accelerate or delay their earnings announcement when it contains a pro forma earnings figure versus when it does not	Timing of earnings announcement	1. Earnings surprise 2. Pro forma earnings indicator 3. Pro forma earnings indicator t-1 4. GAAP Loss 5. Negative GAAP operating earnings forecast error indicator

Item	Reference	Research focus	Research objectives	Dependent variable	Independent variables
					6. Managers' total recurring exclusions 7. Controls
			Investigate the average quality of managers' recurring exclusions	Future earnings performance	1. EPS pro forma 2. Exclusions 3. Unexpectedly early announcements 4. Controls
			Investigate the relation between announcement timing and the transparency of the pro forma earnings reconciliation	Timing of earnings announcement	1. Negative GAAP operating earnings forecast error indicator 2. Exclusions 3. Transparency score 4. Pro forma earnings indicator t-1 5. Controls
25	Entwistle, Feltham and Mbagwu (2012)	Information content (informativeness)	Examine whether firms with stronger credibility attributes (corporate governance, higher-quality auditors, and higher historical information quality) will be perceived as providing more credible non-GAAP exclusions than those with weaker attributes.	Abnormal return	1. Non-GAAP earnings 2. Non-GAAP exclusion 3. GAAP forecast error 4. Credibility attributes 5. Controls
26	Doyle, Jennings and Soliman (2013)	Information content (informativeness) and Determinants (propensity)	Compare the propensity to meet or beat analyst earnings forecasts for firms that report non-GAAP exclusions	Consensus forecast	1. EPS I/B/E/S 2. EPS operating earnings 3. EPS diluted 4. Book to market 5. Sales Growth 6. Ln(Size) 7. Profitable 8. ROA 9. Abnormal accruals
			Whether managers use exclusions and other earnings/expectations management tools as substitutes or complements	Exclusion's level	1. Discretionary accruals 2. Net operating assets 3. Abnormal forecast 4. Control variables

Item	Reference	Research focus	Research objectives	Dependent variable	Independent variables
			Capture the market's response to the earnings announcement	Three-day market-adjusted buy-and-hold returns	1. Surprise 2. Book to market 3. Ln(Size) 4. Sales Growth 5. Accruals
27	Isidro and Marques (2013)	Determinants (propensity)	Analyze how two corporate mechanisms (compensation contracts and governance quality) affect non-GAAP reporting practices	Non-GAAP reporting decision	1. Compensation 2. Board quality 3. Firm's incentives (emphasis, adjustments, ownership, consensus beating, avoid losses, analyst following, intangibles, special items, st. ROA, size, leverage, listing US)
28	Venter, Cahan and Emanuel (2013)	Information content (informativeness)	Investigate the persistence and pricing of earnings components	Earnings (profit) Size adjusted return	1. Headline earnings 2. Earnings excluded from the headline earnings 3. Operating accrual 4. Cash flows 5. Free cash flows
	Sadique and Rahman (2013)	Information content (informativeness)	Examine the impact of a strategic emphasis on non-GAAP earnings on stock returns	Abnormal return	1. Pro forma earnings surprise 2. GAAP earning surprise 3. Size 4. Analysts following 5. Policy dummy (regulation)
29			Identify the impact of a strategic emphasis on volatility	Volatility return	1. Pro forma earnings surprise 2. GAAP earning surprise 3. Size 4. Analysts following 5. Policy dummy (regulation) 6. Abnormal trading volume

Item	Reference	Research focus	Research objectives	Dependent variable	Independent variables
30	Curtis, Mcvay and Whipple (2014)	Information content (informativeness), Predictive ability (persistence) and Determinants (propensity)	Estimate the persistence of earnings components	Future operating earnings	1. Operating earnings 2. Transitory gain 3. Book to market ratio 4. Ln(Total assets) 5. Sales growth 6. Loss 7. Earnings volatility
			Investigate the market's assessment of the permanence of transitory gains relative to operating earnings	Announcement return	1. Earnings surprise 2. Transitory gain 3. Market value of equity 4. Book to market ratio
			Test the determinants of disclosure of choice of transitory gains	Non-GAAP earning (0,1)	1. Ln(Announcement difference) 2. Loss 3. Analyst forecast 4. Benchmark profit 5. Book to market ratio 6. Ln (Total assets) 7. Transitory gain 8. Frequency
31	Venter, Emanuel and Cahan (2014)	Information content (informativeness)	Investigate the incremental value relevance of headline earnings	Market value	1. Headline earnings 2. Headline earnings exclusions 3. Book value of equity
			Investigate the relative value relevance of headline earnings and GAAP earnings	Headline earnings/GAAP earnings	

Item	Reference	Research focus	Research objectives	Dependent variable	Independent variables
32	Christensen, Drake and Thornock (2014)	Information content (informativeness)	Examine the difference in short volume for pro forma quarters relative to non-pro forma quarters	Trading volume of shares	1. Pro forma earnings 2. Market return 3. Analysts' consensus 4. EPS indicator variable 5. Short interest ratio 6. Market value of equity 7. Book to market ratio 8. Total operating accrual 9. Forecast error 10. Number of pro forma disclosures 11. Mills ratio
			Examine if short trading is higher when managers exclude recurring items than when they (i) exclude nonrecurring items or (ii) do not disclose adjusted earnings numbers	Trading volume of shares	1. Pro forma earnings 2. Market return 3. Analysts' consensus 4. EPS indicator variable 5. Short interest ratio 6. Market value of equity 7. Book to market ratio 8. Total operating accrual 9. Forecast error 10. Number of pro forma disclosures 11. Mills ratio 12. Number of recurring items excluded
33	Baumker, Biggs, McVay and Pierce (2014)	Regulation impacts	Examine how managers report one-time gains resulting from legal settlements and insurance recoveries in press releases following Reg G	Disclosure granularity (0,1)	1. Size of gain 2. Met Benchmark 3. Transitory loss 4. Disclosure Quality (Size) 5. Gain Frequency 6. Controls
34	Aubert and Grudnitski (2014)	Information content (informativeness) and Prominence of disclosure	Investigate market mispricing of pro forma earnings	Abnormal return	1. Pro forma earnings forecast error 2. Alternative pro forma earnings forecast error 3. GAAP earnings forecast error 4. Reconciliation quality score

Item	Reference	Research focus	Research objectives	Dependent variable	Independent variables
					5. Strength of investor protection laws 6. Legal origin 7. Crisis 8. Log(Market capitalization) 9. Meet or beat 10. Prison term
35	Isidro and Marques (2015)	Determinants (propensity) and Meet-or-beat earnings benchmark	Examine whether managers are more likely to disclose a non-GAAP earnings number when GAAP earnings miss the earnings benchmark	Non-GAAP earning (0,1)	1. Miss GAAP 2. Special or extraordinary items 3. Intangible ratio 4. Standard deviation of ROA 5. Size 6. Leverage 7. % of outstanding shares 8. Number of analysts
			Assess the effect of country-level institutional and economic factors on managers' use of non-GAAP numbers to meet earnings benchmarks	Meet or beat earnings benchmark	1. Country factor 2. Standard deviation of ROA 3. BM 4. Growth 5. Special or extraordinary items 6. % of outstanding shares 7. Listed in the U.S. market 8. IFRS GAAP
36	Choi and Young (2015)	Meet-or-beat earnings benchmark	Test for asymmetry in the association between non-GAAP EPS disclosure and transitory items conditional on the sign and magnitude of the GAAP earnings surprise	Non-GAAP (0,1)	1. GAAP EPS FRS 3 2. IBES adjusted actual EPS 3. Operating EPS 4. Forecast EPS 5. Miss or beat EPS 6. Absolute value of exceptional items 7. Absolute magnitude of transitory gains and losses 8. Controls

Item	Reference	Research focus	Research objectives	Dependent variable	Independent variables
37	Rainsbury, Hart and Buranavityawut (2015)	Information content (informativeness) and Predictive ability (persistence)	Examine earnings persistence	Net profit, Non-GAAP	1. Prior year's Net profit 2. prior year's Non-GAAP earnings
			Test value relevance	Share price	1. Book value of equity 2. GAAP-adjusted earnings 3. Adjustments
38	Solsma and Wilder (2015)	Determinants (propensity)	Investigate the pro forma disclosure behavior of US-listed foreign firms applying IFRS	Disclosure frequency Income increasing Size of adjustment Meet or beat earnings benchmark	1. Reporting standards (USA or IFRS) 2. Industry 3. Size 4. Leverage 5. Growth 6. Disclosure type
39	Choi (2015)	Information content (informativeness) and Determinants (propensity)	Examine whether the first non-GAAP EPS reporting is less dominated by opportunistic incentives	Non-GAAP (0,1)	1. Absolute value of transitory items 2. Loss 3. Regulation change 4. Industry dummies 5. Controls
40	Malone, Tarca and Wee (2016)	Information content (informativeness) and Predictive ability (persistence)	Explore whether the release of non-GAAP earnings is associated with the extent of IFRS remeasurements in companies' financial statements.	Non-GAAP earning (0,1)	1. Fair value remeasurement 2. Revaluation 3. Impairment 4. Amortization 5. Merger 6. Other 7. Count of items 8. Magnitude 9. Control variables (industry group, size, etc)

Item	Reference	Research focus	Research objectives	Dependent variable	Independent variables
			Explore whether companies providing non-GAAP earnings disclosures at year t are more likely to have lower error and less dispersion in forecasts for earnings in year t + 1	Absolute forecast error	1. Non-GAAP earnings 2. Loss 3. Standard deviation in cash flows 4. Change in EPS 5. Error and dispersion in previous year 6. Number of forecasts 7. Size 8. ADR 9. Pre crisis / Post crisis period
41	Huang and Skantz (2016)	Information content (informativeness)	Test the informativeness of non-GAAP earnings to investors	Pre-announcement adverse-selection cost	1. Likelihood of non-GAAP earnings 2. Previous quarter's pre-announcement adverse-selection cost 3. Average daily bid-ask midpoint 4. Trade size 5. Trade frequency 6. Number of analysts 7. Book to market ratio 8. Meet or beat analysts' forecasts 9. Controls for regulatory changes
42	Shiah-Hou and Teng (2016)	Regulation impacts	Explore the informativeness of non-GAAP earnings after Regulation G	Future operating income	1. EPS 2. Merge 3. Debt 4. Goodwill 5. Gain/loss 6. Restructuring cost 7. R&D 8. Litigation 9. Write-offs 10. Other special items 11. Other exclusions 12. Controls

Item	Reference	Research focus	Research objectives	Dependent variable	Independent variables
			Test the effect of executives' selling their holdings on disclosing non-GAAP earnings	Selling decision (0,1)	1. Disclosure of non-GAAP earnings 2. CAR 3. Ownership 4. Book-to-market ratio 5. Size 6. Mills ratio 7. Earnings volatility 8. Leverage 9. String 10. Litigate
43	Guillamon-Saorin, Isidro and Marques (2017)	Information content (informativeness)	Examine whether market participants react differently to the disclosure of non-GAAP earnings that are communicated with high impression management	Abnormal stock returns	1. GAAP surprise 2. Non-GAAP adjustments 3. Impression management 4. Controls
			Test if investors react to the combination of non-GAAP disclosures and high impression management negatively in countries with more sophisticated users and stronger enforcement	Abnormal stock returns	
44	Black, Christensen, Kiosse and Steffen (2017)	Regulation impacts	Examine the association between our two aggressive behavior proxies and the particular adjustments firms use to achieve these objectives	Incremental manager exclusions (0,1)	1. Meet or beat 2. R&D exclusions 3. Amortization and depreciation exclusions 4. Interest-related costs exclusions 5. Tax related costs exclusions 6. Ln(Total assets) 7. Stock compensation exclusions 8. Controls
				Beat analysts' expectations (0,1)	

Item	Reference	Research focus	Research objectives	Dependent variable	Independent variables
			Examine whether managers engage in aggressive non-GAAP reporting by excluding recurring items above and beyond what analysts exclude in the post-SOX relative to the pre-SOX period	Incremental manager exclusions (0,1) Beat analysts' expectations (0,1)	1. Meet or beat 2. R&D exclusions 3. Amortization and depreciation exclusions 4. Interest-related costs exclusions 5. Tax related costs exclusions 6. Ln(Total assets) 7. Stock compensation exclusions 8. Interaction terms (post and pre-sox periods) 9. Controls
45	Cormier, Demaria and Magnan (2017)	Information content (informativeness) and Predictive ability (persistence)	Test whether formally disclosing an EBITDA number reduces the information asymmetry between managers and investors beyond the release of GAAP earnings	Analyst following Bid-ask spread Forecast dispersion Price Future cash flow from operations	1. Systematic risk 2. Negative earnings 3. EBITDA 4. Corporate governance 5. Log(volume) 6. Log(price volatility) 7. Equity per share 8. Tobin's Q 9. Ln(Total assets)
46	Sinnewe, Harrison and Wijeweera (2017)	Predictive ability (persistence)	Examine whether non-IFRS earnings contain statistically significant information on future cash flow predictability that could be useful for investors	Future cash flow	1. Non-GAAP earnings 2. IFRS earnings 3. Adjustments 4. Growth 5. Accruals 6. Crisis
47	Bond, Czernkowski, Lee and Loyeung (2017)	Regulation impacts	Examine the impact of Regulation G in 2003 and the issuance of C&DIs in 2010 on the reporting of non-GAAP earnings	Future operating earnings	1. Non-GAAP earnings 2. Total Exclusions 3. Post 2003 4. Growth 5. Size 6. Loss 7. Earnings volatility 8. Book to market assets

Item	Reference	Research focus	Research objectives	Dependent variable	Independent variables
				Meet or beat earnings benchmark	1. Positive total exclusions 2. Post 2003 3. Positive special items 4. Positive other exclusions 5. SOX 6. Growth 7. Size 8. Loss 9. Earnings volatility 10. Book to market assets
				Abnormal return	1. Earnings surprise 2. Positive total exclusions 3. Post 2003 4. Growth 5. Size 6. Loss 7. Earnings volatility 8. Book to market assets
48	Bentley, Christensen, Gee and Whipple (2018)	Information content (informativeness) and Meet-or-beat earnings benchmark	Examine whether differences across the manager and I/B/E/S datasets are associated with factors that we predict to differentially influence managers and analysts reporting	Difference between non-GAAP numbers (0,1)	1. Transitory gain 2. Peer firms 3. Litigation risk 4. FAS 123 (regulation)
			Test whether systematic differences across the datasets affect inferences regarding non-GAAP earnings quality	Future operating performance	1. Non-GAAP earnings 2. Exclusions 3. I/B/E/S non-GAAP 4. Manager non-GAAP
			Test how well stock compensation expense, amortization expense, and transitory items explain the exclusions	Exclusions	1. Stock compensation 2. Amortization 3. Transitory gains or loss

Item	Reference	Research focus	Research objectives	Dependent variable	Independent variables
49	Bradshaw, Christensen, Gee and Whipple (2018)	Information content (informativeness)	Examine how bias affects overall inferences regarding the determinants of meet-or-beat behavior	Meet-or-beat	1. Transitory item 2. Recurring item 3. Book to market 4. Size 5. Meet-beat trend 6. Ext. financing 7. Net operating assets 8. Low forecast
			Test whether investors find street information to be more informative when GAAP forecasts are available	Abnormal returns	1. Earnings surprise 2. Controls
			Test whether investors find the information in GAAP forecasts incrementally useful to that in street forecasts		
50	Leung and Veenman, (2018)	Information content (informativeness), Predictive ability (persistence) and Determinants (propensity)	Test the determinants of non-GAAP earnings disclosure in loss versus profit firms	Non-GAAP trigger	1. Ln(Total assets) 2. Book-to-market 3. Ln(Firm age) 4. Cash flow from operations 5. Accruals 6. Sales growth 7. Earnings volatility 8. Special items 9. R&D expense 10. Dividends 11. Compensation expense 12. Intangibles 13. Depreciation and amortization
			Analyze the ability of GAAP versus non-GAAP earnings	Future performance (cash flows)	1. GAAP earnings 2. Non-GAAP earnings 3. Exclusions

Item	Reference	Research focus	Research objectives	Dependent variable	Independent variables
			measures to predict future operating cash flows and earnings	Future operating earnings	4. Firm size 5. Firm Age 6. Growth 7. Earnings volatility
			Analyze investor reactions to GAAP and non-GAAP earnings	Earnings announcement returns	1. GAAP earnings surprise 2. Non-GAAP earnings surprise 3. Exclusion's surprise 4. Ln(Market value) 5. Book-to-market 6. Lagged returns
51	Charitou, Floropoulos, Karamanou and Loizides (2018)	Determinants (propensity) and Other	Examine the drivers of non-GAAP disclosure	Non-GAAP earnings (0,1)	1. ROA 2. Missed forecast 3. Missed prior earnings 4. Loss 5. Leverage 6. Board size 7. Board Ind 8. CG Score 9. Control
			Examine how the stock's liquidity is affected by the disclosure of non-GAAP earnings	Illiquidity measure	1. Non-GAAP 2. Controls
52	Yang (2018)	Information content (informativeness)	Test the aggressive pro forma earnings reporting	Internal, external, human capital	1. Aggressive pro forma 2. Leverage 3. Firm size 4. Corporate governance 5. Earnings targets 6. Controls
			Test market reactions to aggressive pro forma earnings reporting	Price	1. Pro forma earnings 2. Statutory earnings 3. Book value of equity 4. Market capitalization 5. Controls

Item	Reference	Research focus	Research objectives	Dependent variable	Independent variables
53	He (2018)	Other	Examine the rounding phenomenon in reported pro forma earnings	N/A (Benford's law)	N/A
54	Kyung, Lee and Marquardt (2019)	Determinants (propensity), Predictive ability (persistence) and Meet-or-beat earnings benchmark	Estimate the likelihood of disclosing non-GAAP earnings in a given quarter	Non-GAAP earnings (0,1)	1. Clawback provision firm 2. Intangible intensity 3. Hitech 4. Sales growth 5. Leverage 6. Earnings volatility 7. Special items 8. Big bath 9. Accruals 10. Loss 11. Market-to-book
			Examine whether non-GAAP exclusions have implications for future performance	Future operating income	1. Non-GAAP Exclusions 2. Non-GAAP earnings 3. Clawback adoption 4. After (period) 5. Controls
			Examine whether clawback adoption affects managers' use of non-GAAP reporting to meet or beat analyst earnings forecasts	Meet-or-beat	1. Meet-or-beat variables 2. Sales growth 3. Ln(Total assets) 4. Profitable 5. ROA 6. Clawback adoption 7. After (period)
55	Christensen, Pei, Pierce and Tan (2019)	Determinants (propensity)	Test the likelihood of non-GAAP disclosures	Non-GAAP earnings (0,1)	1. Violation 2. Covenant controls (ratios) 3. Loss 4. Meet-or-beat analyst consensus forecast 5. Special item 6. Controls

Item	Reference	Research focus	Research objectives	Dependent variable	Independent variables
			Test the effect of covenant violations on non-GAAP exclusion quality	Future GAAP	1. EPS 2. Violation 3. Exclusions 4. Covenant controls (ratios) 5. Controls
56	Ribeiro, Shan and Taylor (2019)	Earnings attributes (earnings quality) and disclosure quality	Measure earnings persistence	Net income	1. Non-GAAP earnings 2. Loss 3. Controls
			Measure earnings smoothness	Smoothness	1. Non-GAAP earnings
			Measure earnings relevance	Price	1. Book value 2. Earnings (GAAP EPS) 3. Controls
			Measure earnings timeliness and conservatism	Net income	1. Non-GAAP earnings 2. Return (12 month) 3. Controls
57	Kim and Yoon, (2019)	Information content (informativeness)	Test the incremental value-relevance of non-GAAP adjustments for additional loan-losses reported	Cumulative returns	1. Net income 2. Loss 3. Net loss 4. Net loss / total assets 5. Non-GAAP adjustments
58	Thielemann and Dinh (2019)	Determinants (propensity), Meet-or-beat earnings benchmark and Regulation impacts	Test the association between managers' choice to disclose non-GAAP earnings implicitly and our two benchmark beating proxies	Non-GAAP earnings implicit (0,1)	1. Meet-or-beat variables 2. Non-GAAP earnings post regulation-G 3. Negative earnings surprise 4. Control variables
59	Taylor and Tong (2019)	Information content (informativeness)	Examine the efficiency of the market for earnings information	Earnings information flow timeliness	1. Good news 2. Bad news 3. Ln (dispersion) 4. Ln(following) 5. Ln(MTB) 6. Ln (Earnings announcement lag) 7. Ln (Market cap)

Item	Reference	Research focus	Research objectives	Dependent variable	Independent variables
60	Cain, Kolev and McVay (2020)	Determinants (propensity)	Test the determinants of special items	Special items	1. Return 2. BM 3. ROA 4. Merger 5. Employee decline 6. Discontinued operations 7. Large sales decline 8. Sales 9. Loss 10. CFO 11. OpCycle 12. Capital intensity 13. Intangible intensity 14. Ln(Assets)
61	Laurion (2020)	Other	Test whether non-GAAP-reporting firms invest and acquire more	Investment-related variables	1. Past non-GAAP 2. Investment 3. High investment 4. Value acquired 5. Acquire control 6. Large acquisition 7. Restructuring 8. Controls
62	Lin, Xia and Ryabov (2020)	Meet-or-beat earnings benchmark	Test whether analysts play a role in mitigating classification shifting	Unexpected core earnings	1. Non-GAAP exclusions 2. GAAP forecast 3. After 4. Controls

Item	Reference	Research focus	Research objectives	Dependent variable	Independent variables
63	Visani, Di Lascio and Gardini (2020)	Determinants (propensity)	Test whether and how country-specific institutional and cultural factors affect the propensity to disclose NGFMs in press releases, the materiality of adjustments, and their transparency	Non-GAAP earnings (0,1), Materiality, Motivation, Reconciliation	1. Size 2. Profitability 3. Debt 4. Market to book 5. US GAAP 6. Local GAAP 7. Regulation 8. Market 9. Cultural variables 10. Institutional variables 11. Control variables
64	Henry, Hu and Jiang (2020)	Information content (informativeness) and Determinants (propensity)	Test the determinants of relative emphasis on non-GAAP earnings and general non-GAAP emphasis	Emphasis measures	1. Non-GAAP earnings 2. Only non-GAAP achieved 3. Only non-GAAP increased 4. High-tech 5. High non-recurring 6. Analysts 7. Ln(Assets) 8. SPI below zero 9. NOPIO below zero 10. Ln(Length)
			Test market reaction association with relative emphasis on non-GAAP earnings	Abnormal returns	1. Unexpected EPS 2. Non-GAAP adjustments 3. Emphasis measures
65	Mey and Lamprecht (2020)	Earnings attributes (earnings quality) and disclosure quality	Examine whether companies disclose poor quality reconciliations between EBITDA and IFRS earnings in a way that is consistent with opportunistic disclosure	Reconciliation quality	1. Emphasis 2. Avoid loss 3. Invalid adjustments 4. Loss 5. Size 6. ROA 7. Number of losses 8. Controls

Item	Reference	Research focus	Research objectives	Dependent variable	Independent variables
66	Isidro and Marques (2020)	Predictive ability (persistence)	Examine whether the persistence of non-GAAP exclusions varies with the intensity of industry competition	Future performance (cash flows) or future GAAP earnings	1. Non-GAAP exclusions 2. High competition 3. Size 4. Leverage
67	Chen, Gee and Neilson (2021)	Information content (informativeness), Predictive ability (persistence) and Prominence of disclosure	Examine whether firms use prominence to highlight higher or lower quality non-GAAP information	Prominence of non-GAAP measure	1. Transitory item 2. Recurring item 3. Exceed analysts' consensus 4. GAAP loss / non-GAAP profit 5. Controls
			Test the persistence of non-GAAP measure	Future operating cash flows	1. Non-GAAP earnings 2. Firms' exclusions 3. Controls
			Examine investors' response at the earnings announcement date	Market-adjusted return	1. Non-GAAP EPS 2. Exclusions 3. Prominence 4. Controls
68	Christensen, Gomez, Ma and Pan (2021)	Determinants (propensity), Earnings attributes (earnings quality) and Predictive ability (persistence)	Test the propensity to disclose non-GAAP EPS	Non-GAAP EPS	1. Losing analyst coverage 2. Firm size 3. Book to market 4. Leverage 5. Profitability 6. Growth 7. Guidance 8. Cash flow volatility 9. Stock illiquidity 10. Stock return 11. Auditor quality 12. Percentage of institutional ownership
			Test the quality of non-GAAP reporting	Profit, consensus or recurring items	1. Losing analyst coverage 2. Drop (period) 3. Controls

Item	Reference	Research focus	Research objectives	Dependent variable	Independent variables
			Test the predictive ability of non-GAAP exclusions	Future performance (cash flows) or future GAAP earnings	1. Non-GAAP 2. Total exclusions 3. Losing analyst coverage 4. Controls
69	Black, Christensen, Ciesielski and Whipple (2021)	Predictive ability (persistence)	Examine the consequence of managers' non-GAAP reporting inconsistency	Future performance	1. Adjusted earnings 2. Consistent exclusions 3. Inconsistent inclusions 4. Consistent inclusions 5. Inconsistent exclusions 6. Controls
			Examine whether the discretion afforded in non-GAAP reporting improves earnings comparability, relative to GAAP-based earnings	Future performance	1. Adjusted earnings 2. Comparable exclusions 3. Incomparable inclusions 4. Comparable inclusions 5. Incomparable exclusions 6. Controls
70	Griffin and Lont (2021)	Other	Explore patterns of street earnings surprises over time	Diff-in-Diff metric	1. Street earning surprise 2. GAAP EPS
71	Chen, Lee, Lo and Yu (2021)	Other	Assess the quality of non-GAAP earnings based on the persistence of non-GAAP exclusions	Future operating income	1. Exclusions 2. Disclosure score 3. Controls
			Assess the quality of non-GAAP earnings based on managers' aggressive use of exclusions to meet or beat analysts' forecasts	Meet or beat earnings benchmark	1. Positive exclusions 2. Disclosure score 3. Controls
72	Bc and Liu (2022)	Information content (informativeness) and Determinants (propensity)	Investigate whether the non-GAAP measures disclosure by high-tech initial public offering (IPO) firms signal firms' efforts to maintain relatively high stock price levels before the expiration of the lock-up period to benefit insider selling	Sell of net shares by managers Net proceeds	1. Number of analysts 2. Ln(IPO proceeds) 3. IPO underpricing 4. Number of underwriters 5. Rank of the highest-ranking lead underwriters 6. Controls

Item	Reference	Research focus	Research objectives	Dependent variable	Independent variables
73	Sang, Alam and Hinkel (2022)	Determinants (propensity)	Examine whether cross-listed firms are different from US firms in segment earnings reporting	Earnings gap (earnings – segment level earnings)	1. Cross listing 2. Higher industry concentration (managerial incentive) 3. Agency cost (managerial incentive) 4. Segment information 5. Investor protection 6. Controls
74	Chen, Medinets and Palmon (2022)	Regulation impacts	Examine the effect of Regulation G on analysts' information environment for non-GAAP reporting firms	Forecast accuracy Signed forecast bias Forecast dispersion	2. Regulation 2. Treatment group 1. Size 2. Earnings volatility 3. Firm's growth 4. Intangibles 5. Other controls (firm's stock characteristics)
75	Carvajal, Lont and Scott (2022)	Other	Examine the long-term trend in non-GAAP earnings disclosures	NGE (1, 0)	1. Size 2. Leverage 3. Intangible 4. Loss 5. Prior loss 6. Big4 7. Tech 8. Cross-listed 9. Analyst
76	Hribar, Mergenthaler, Roeschley, Young and Zhao (2022)	Determinants (propensity)	Examine whether managers provide more voluntary disclosure when GAAP limits their reporting discretion in financial statements	Non-GAAP earnings	1. Discretion measures 2. Controls
77	Black, Black, Christensen and Gee (2022)	Information content (informativeness) and Predictive ability (persistence)	Investigate the appropriateness of non-GAAP earnings disclosure in annual earnings announcements and proxy statements	NGE in annual announcements NGE in proxy statements	1. Non-GAAP surprise 2. Number of analyst 3. Contracting incentives variables (CEO's variables) 4. Controls

Item	Reference	Research focus	Research objectives	Dependent variable	Independent variables
78	Heflin, Kolev and Whipple (2022)	Information content (informativeness)	Examine the equity risk-relevance of non-GAAP earnings and exclusions	Total risk Systematic risk	1. Operating earnings accounting risk 2. Total exclusions accounting risk 3. GAAP earnings accounting risk 4. Special item exclusions 5. Other exclusions 6. ROA 7. Debt-to-equity ratio 8. Ln(Total assets)
79	Clinch, Tarca and Wee (2022)	Other	Understand possible motivations for NGE disclosures in a cross-country sample	Non-GAAP disclosure	1. Size 2. Leverage 3. ROA 4. Growth 5. Variability in cash flows 6. Variability in net income 7. Segments (firm's complexity) 8. USlisting 9. Analyst following 10. Capital raising variable 11. Shareholding variables
80	Cormier, Demaria and Magnan (2022)	Information content (informativeness) and Determinants (propensity)	Examine if EBITDA has effects on information asymmetry	Share price volatility	1. Adjusted EBITDA 2. Adjustments 3. Systematic risk 4. Trading volume 5. Controls
			Examine if EBITDA has effects on value relevance	Stock market return	

Adapted from Vasconcelos and Hadad Junior (2022).

Table 54 - Main data from 80 international papers (2)

Item	Reference	Chosen measure	Proxy for non-GAAP earnings	Sample country	Final sample (observations)	Period
1	Bhattacharya, Black, Christensen and Larson (2003)	EPS	Actual non-GAAP EPS	U.S.	1.149	1998-2000
2	Brown and Sivakumar (2003)	Operating earnings	I/B/E/S EPS	U.S.	11.036	1989-1997
3	Gu and Li (2003)	Non-GAAP indicators of innovation	N/A	U.S.	1.510	1992
4	Palmore and Scholz (2004)	Earnings components (core and non-core items)	N/A	U.S.	492	1995-1999
5	Lougee and Marquardt (2004)	Adjusted GAAP earnings	Hand-collected pro forma earnings	U.S.	249	1997-1999
6	Coté and Qi (2005)	EPS	I/B/E/S pro forma earnings	U.S.	N.I.	1987-2002
7	Marques (2006)	Any non-GAAP financial measure	Any non-GAAP financial measure (including cash metrics)	U.S.	4.234	2001-2003
8	Bhattacharya, Black, Christensen and Mergenthaler (2007)	Any adjusted GAAP earnings	N/A	U.S.	5.736	1998-2003
9	Choi, Lin, Walker and Young (2007)	EPS	Hand-collected non-GAAP EPS	UK	1.301	1993, 1996 and 2001
10	Landsman, Miller and Yeh (2007)	All IBES pro forma data	I/B/E/S pro forma earnings	U.S.	21.748	1999-2000
11	Kolev, Marquardt and McVay (2008)	EPS	I/B/E/S actual earnings	U.S.	104.954	1998-2004
12	Heflin and Hsu (2008)	EPS	I/B/E/S EPS	U.S.	42.570	2000-2005
13	Black and Christensen (2009)	EPS	Hand-collected diluted EPS	U.S.	5.674	1998-2003
14	Marques (2010)	Adjusted GAAP earnings	Hand-collected non-GAAP earnings	U.S.	2.473	2001-2003
15	Entwistle, Feltham and Mbagwu (2010)	Any pro forma earnings per share	Hand-collected pro forma earnings per share	U.S.	1.486	2000-2004

Item	Reference	Chosen measure	Proxy for non-GAAP earnings	Sample country	Final sample (observations)	Period
16	Chen (2010)	EPS	I/B/E/S EPS	U.S.	114.685 and 27.420	1992-2005
17	Koning, Mertens and Roosenboom (2010)	Non-GAAP earnings	Hand-collected non-GAAP earnings	Germany	545 (**)	1999-2004
18	Campbell and López (2010)	All non-GAAP measures	Hand-collected non-GAAP earnings	U.S.	93 (**)	2006
19	Jennings and Marques (2011)	Adjusted GAAP earnings	Hand-collected non-GAAP earnings	U.S.	4.234	2001-2003
20	Frankel, McVay and Soliman (2011)	EPS	Hand-collected non-GAAP earnings	U.S.	4.246	1998-2005
21	Zhang and Zheng (2011)	Pro forma earnings	Hand-collected pro forma earnings	U.S.	1.900	1998-2001
22	Barth, Gow and Taylor (2012)	Adjusted GAAP earnings	Hand-collected non-GAAP earnings	U.S.	8.406	1998-2095
23	Black, Black, Christensen and Heninger (2012)	Pro forma earnings	Hand-collected manager-adjusted pro forma earnings	U.S.	9.663	1998-2006
24	Brown, Christensen and Elliott (2012)	EPS	Manager-adjusted EPS	U.S.	8.127	1998-2006
25	Entwistle, Feltham and Mbagwu (2012)	Non-GAAP earnings	Hand-collected non-GAAP earnings	U.S.	2.017	2000-2008
26	Doyle, Jennings and Soliman (2013)	EPS	I/B/E/S EPS	U.S.	237.617	1988-2009
27	Isidro and Marques (2013)	Non-GAAP earnings	Hand-collected non-GAAP earnings	Europe	805	2003-2005
28	Venter, Cahan and Emanuel (2013)	Headline earnings	Headline earnings	South Africa	1.618	2001-2008
29	Sadique and Rahman (2013)	EPS	Street earnings per share	U.S.	5.522	2000-2006
30	Curtis, Mcvay and Whipple (2014)	Transitory gains	Compustat special items (transitory gains)	U.S.	1.920	2004-2009
31	Venter, Emanuel and Cahan (2014)	Headline earnings	Headline earnings	South Africa	2.042	2002-2009
32	Christensen, Drake and Thornock (2014)	Pro forma earnings	Hand-collected manager-adjusted pro forma earnings	U.S.	1.908	1998-2006

Item	Reference	Chosen measure	Proxy for non-GAAP earnings	Sample country	Final sample (observations)	Period
33	Baumker, Biggs, McVay and Pierce (2014)	Transitory gains	Compustat special items (transitory gains)	U.S.	253	2005-2007
34	Aubert and Grudnitski (2014)	Pro forma earnings	Hand-collected pro forma earnings	Europe	989	2008-2011
35	Isidro and Marques (2015)	Non-GAAP earnings	Hand-collected non-GAAP earnings	Europe	1.301	2003-2007
36	Choi and Young (2015)	EPS	Hand-collected non-GAAP EPS	UK	3.914	1993-2001
37	Rainsbury, Hart and Buranavityawut (2015)	Non-GAAP earnings	Hand-collected non-GAAP earnings	New Zealand	104	2004-2012
38	Solsma and Wilder (2015)	Pro forma earnings	Hand-collected pro forma earnings	U.S. and International (cross-listed)	451	2007
39	Choi (2015)	EPS	Hand-collected adjusted EPS	UK	5.139	2001; 1996; 1993-1994
40	Malone, Tarca and Wee (2016)	Non-GAAP earnings	Hand-collected non-GAAP earnings	Australia	371 (**)	2008-2010
41	Huang and Skantz (2016)	EPS	I/B/E/S pro forma earnings and Hand-collected non-GAAP earnings	U.S.	21.327	1999-2006
42	Shiah-Hou and Teng (2016)	EPS	Hand-collected non-GAAP earnings	U.S.	25.291	2006-2011
43	Guillamon-Saorin, Isidro and Marques (2017)	Non-GAAP earnings	Hand-collected non-GAAP earnings	Europe	845	2003-2009
44	Black, Christensen, Kiosse and Steffen (2017)	EPS	Hand-collected diluted EPS	U.S.	8.136 (**)	1998-2006
45	Cormier, Demaria and Magnan (2017)	EBITDA	Hand-collected EBITDA	Canada	450	2012-2013
46	Sinnewe, Harrison and Wijeweera (2017)	Non-GAAP earnings	Hand-collected non-GAAP earnings	Australia	1.494	2006-2011

Item	Reference	Chosen measure	Proxy for non-GAAP earnings	Sample country	Final sample (observations)	Period
47	Bond, Czernkowski, Lee and Loyeung (2017)	EPS	I/B/E/S actual earnings	U.S.	69.800 and 67.874	1998-2008; 2005-2015
48	Bentley, Christensen, Gee and Whipple (2018)	EPS	Manager-adjusted EPS metrics	U.S.	115.370	2003-2012
49	Bradshaw, Christensen, Gee and Whipple (2018)	I/B/E/S street earnings	I/B/E/S street earnings	U.S.	43.025	2000-2015
50	Leung and Veenman (2018)	Non-GAAP earnings	Hand-collected non-GAAP earnings	U.S.	5.174	2006-2014
51	Charitou, Floropoulos, Karamanou and Loizides (2018)	Non-GAAP earnings	Non-GAAP EPS	UK	1.227	2006-2013
52	Yang (2018)	Non-GAAP earnings	Hand-collected non-GAAP earnings	Australia	610	2006-2008
53	He (2018)	Pro forma earnings	Pro forma EPS	U.S.	2.273	2000-2015
54	Kyung, Lee and Marquardt (2019)	Non-GAAP earnings	Hand-collected non-GAAP earnings	U.S.	660	2005-2009
55	Christensen, Pei, Pierce and Tan (2019)	EPS	Hand-collected non-GAAP earnings	U.S.	65.667	2003-2012
56	Ribeiro, Shan and Taylor (2019)	Non-GAAP earnings	Hand-collected non-GAAP earnings	Australia	11.648	2000-2014
57	Kim and Yoon (2019)	Non-GAAP adjustments	Non-GAAP adjustments	Korean	N.I.	2011-2015
58	Thielemann and Dinh (2019)	Non-GAAP earnings	Hand-collected non-GAAP earnings	U.S.	7.728	1999-2005
59	Taylor and Tong (2019)	EPS	I/B/E/S EPS	Australia	4.871	1995-2016
60	Cain, Kolev and McVay (2020)	Special items	Special items	U.S.	104.495	1989-2016
61	Laurion (2020)	EBITDA and other non-GAAP metrics	N/A	U.S.	11.928	2006-2016

Item	Reference	Chosen measure	Proxy for non-GAAP earnings	Sample country	Final sample (observations)	Period
62	Lin, Xia and Ryabova (2020)	Non-GAAP exclusions	Non-GAAP exclusions	U.S.	5.968	2001-2017
63	Visani, Di Lascio and Gardini (2020)	Non-GAAP measures	Hand-collected non-GAAP earnings	International (23 countries)	1.800	2008-2012
64	Henry, Hu and Jiang (2020)	EPS	I/B/E/S EPS	U.S.	19.521	2006-2015
65	Mey and Lamprecht (2020)	EBITDA	Hand-collected EBITDA	South Africa	185	2014-2016
66	Isidro and Marques (2020)	Non-GAAP earnings	Hand-collected non-GAAP earnings	Europe	2.161	2003-2011
67	Chen, Gee and Neilson (2021)	EPS	Manager-adjusted EPS metrics	U.S.	48.648	2003-2016
68	Christensen, Gomez, Ma and Pan (2021)	EPS	EPS	U.S.	17.812	2003-2013
69	Black, Christensen, Ciesielski and Whipple (2021)	EPS	Hand-collected non-GAAP EPS	U.S.	2.586	2009-2014
70	Griffin and Lont (2021)	EPS	N/A	U.S.	58.796	1997-2016
71	Chen, Lee, Lo and Yu (2021)	Non-GAAP disclosures	N/A	U.S.	2.266	2009-2013
72	Bc and Liu (2022)	Non-GAAP disclosures	Hand-collected non-GAAP earnings	U.S.	228	2006-2013
73	Sang, Alam and Hinkel (2022)	Segment earnings	Earnings gap	U.S. and International (cross-listed)	2.297	1997-2015
74	Chen, Medinets and Palmon (2022)	EPS	Hand-collected EPS	U.S.	7.359-13.408	2001-2004
75	Carvajal, Lont and Scott (2022)	All non-GAAP measures	N/A	New Zealand	1.823	2004-2018
76	Hribar, Mergenthaler, Roeschley, Young and Zhao (2022)	Non-GAAP earnings and NGE forecast	I/B/E/S non-GAAP exclusions	U.S.	56.674	1993-2016

Item	Reference	Chosen measure	Proxy for non-GAAP earnings	Sample country	Final sample (observations)	Period
77	Black, Black, Christensen and Gee (2022)	EPS	Hand-collected adjusted EPS	U.S.	9.511	2009-2015
78	Heflin, Kolev and Whipple (2022)	EPS	I/B/E/S street earnings	U.S.	83.781	2006-2018
79	Clinch, Tarca and Wee (2022)	Adjusted non-GAAP earnings	N/A	International (Australia, France, Germany, Hong Kong, Italy, Singapore, Sweden, UK)	192-198	2005, 2008, 2011 and 2013
80	Cormier, Demaria and Magnan (2022)	EBITDA	Hand-collected EBITDA	French and Canada	224	2016-2017

Adapted from Vasconcelos and Hadad Junior (2022).
(*) N.I. = Not identified.
(**) Final sample not indicated.

2) Python script information

Python documentation

Project on Gihub:

https://github.com/Srctwd/SecSearch

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Python Specialist

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3) Non-GAAP earnings disclosures examples – Data collection process

3.1 OPENTEXT (FY2017)

Reconciliation of Adjusted EBITDA

	Year Ended June 30, 2017
GAAP-based net income, attributable to OpenText	$ 1,025,659
Add:	
Provision for (recovery of) income taxes	(776,364)
Interest and other related expense, net	119,124
Amortization of acquired technology-based intangible assets	130,556
Amortization of acquired customer-based intangible assets	150,842
Depreciation	64,318
Share-based compensation	30,507
Special charges (recoveries)	63,618
Other (income) expense, net	(15,743)
Adjusted EBITDA	$ 792,517

4) Non-GAAP earnings disclosures examples – Comparative analysis

4.1 DRDGOLD (FY2022)

Form 20-F

	Year ended, June 30	
Reconciliation of adjusted EBITDA	**2022**	2021
Profit for the year	**1,123.8**	1,439.9
Income tax	**334.3**	523.7
Profit before tax	**1,458.1**	1,963.6
Finance expense	**74.8**	69.5
Finance income	**(225.8)**	(216.2)
Results from operating activities	**1,307.1**	1,816.9
Depreciation	**267.6**	252.5
Share based payment (benefit)/expense	**18.4**	(28.3)
Change in estimate of environmental rehabilitation recognised in profit or loss	**(2.2)**	(12.4)
Gain on disposal of property, plant and equipment	**(6.6)**	(0.1)
IFRS 16 Lease payments [1]	**(23.8)**	(15.8)
Exploration expenses and transaction costs	**15.2**	3.1
Adjusted earnings before interest, tax depreciation and amortisation ("Adjusted EBITDA") [2]	**1,575.7**	2,015.9

Local annual report

The initial and amended RCF permits a consolidated debt ratio (net debt to adjusted EBITDA) of no more than 2:1 and a consolidated interest coverage ratio (net interest to adjusted EBITDA) of no less than 4:1 calculated on a twelve-month rolling basis, respectively. Management monitors the covenant ratio levels to ensure compliance with the covenants, as well as maintain sufficient facilities to ensure satisfactory liquidity for the Group. The covenant ratios were not breached as at or during the years ended 30 June 2022 or 30 June 2021.

In this example, DRDGOLD disclosed the Adjusted EBITDA number and reconciliation board solely on Form 20-F.

4.2 SUZANO (FY2018)

Form 20-F

Adjusted EBITDA (R$ million)	2018	2017
EBITDA Reconciliation		
Net income (loss)	319.8	1,821.0
(+/–) Net financial result	4,842.5	1,018.9
(+/–) Income and social contribution taxes	(154.5)	438.6
(+) Depreciation, amortization and depletion	1,563.2	1,402.8
EBITDA	**6,571.0**	**4,681.3**
Expenses with Fibria's Transaction	126.6	—
Fair value adjustment of biological assets	129.2	(192.5)
Complement of provision for Variable Remuneration	—	26.5
Provision for intangible assets — Research agreement (Futuragene)	—	18.8
Provision for wood inventory damaged	—	16.3
Provision for losses with sales and scrapping of forest machines	—	14.0
Sale of Distribution Center — Anchieta	—	(31.4)
Provision (reversal) for losses with property, plant and equipment, write-offs, taxes, doubtful accounts and provision of contingencies	7.4	68.0
Land conflict agreement	—	11.8
Equity in earnings of associates	(7.6)	(5.9)
Land invasion - landless movement (MST Movimento Sem Terra)	—	1.9
Reconciliation adjustments	7.6	2.0
Tax Credits	2.9	—
Write-off of IPI credits - (São Paulo) subsidiary	—	0.7
Wood Inventory Adjustment	—	9.6
Issue with genetic material - Arrangement Leasing - Vale Florestar	—	(10.7)
Additional Provision for — Complement — share-based compensation plan (long-term)	—	15.1
Provision related to PERT (Programa de Regularização Tributária) - Tax Regularization Program	—	2.4
Donations and Sponsorships	—	5.2
Review Tax (PIS and Cofins)	9.5	—
Agreement Valmet	(52.8)	—
Write-off of Inventory	24.1	—
Windstorm Maranhão	1.6	—
Insurance claim (Muruci and Imperatriz)	(3.1)	—
Retroactive contributions — Antidumping	—	2.2
Adjusted EBITDA	**6,817.8**	**4,635.3**

Local annual report

ROIC (R$ milhões)	2018	2017
EBITDA Ajustado	6.814	4.615
Capex de Manutenção	1.269	1.100
IR/ CSLL Caixa	257	38
Capital Empregado	25.876	23.957
ROIC[1] (%)	**20,8%**	**14,5%**

In this example, Suzano disclosed the Adjusted EBITDA number in both annual reports, but the reconciliation board solely on Form 20-F.

5) STATA script

5.1 Essay 2 (panel-data logistic regression)

General commands:

```
xtset id per
tab y
xttrans y
pwcorr reg gaap1 ftse1 invp legs1 insto adr loss earv unu age size salesg ROA bm lev big4
tabstat reg gaap1 ftse1 invp legs1 insto adr loss earv unu age size salesg ROA bm lev big4, stats(N mean median sd min max) by(y)
```

Model1 commands:

```
xtlogit y reg insto adr loss earv unu age size salesg ROA bm lev big4 i.region1 i.sector1 i.per, re nolog
xtlogit y b1.gaap1 insto adr loss earv unu age size salesg ROA bm lev big4 i.region1 i.sector1 i.per, re nolog
xtlogit y b4.ftse1 insto adr loss earv unu age size salesg ROA bm lev big4 i.region1 i.sector1 i.per, re nolog
xtlogit y invp insto adr loss earv unu age size salesg ROA bm lev big4 i.region1 i.sector1 i.per, re nolog
xtlogit y b4.legs1 insto adr loss earv unu age size salesg ROA bm lev big4 i.region1 i.sector1 i.per, re nolog
```

Model2 commands:

```
xtlogit y reg b1.gaap1 b4.ftse1 invp b4.legs1 insto adr loss earv unu age size, re nolog
xtlogit y reg b1.gaap1 b4.ftse1 invp b4.legs1 insto adr loss earv unu age size salesg ROA bm lev big4, re nolog
xtlogit y reg b1.gaap1 b4.ftse1 invp b4.legs1 insto adr loss earv unu age size salesg ROA bm lev big4 i.region1 i.sector1 i.per, re nolog
```

Omnibus test commands:

```
xtlogit y reg b1.gaap1 b4.ftse1 invp b4.legs1 insto adr loss earv unu age size salesg ROA bm lev big4 i.region1 i.sector1 i.per, re nolog
```

```
estimates store full
xtlogit y reg insto adr loss earv unu age size salesg ROA bm lev big4 i.region1 i.sector1 i.per,
    re nolog
lrtest full
```

Sensitivity analysis commands:

```
xtlogit y reg b1.gaap1 b4.ftse1 invp b4.legs1 insto adr loss earv unu lcycle size, re nolog
xtlogit y reg b1.gaap1 b4.ftse1 invp b4.legs1 insto adr loss earv unu lcycle size salesg ROA bm
    lev big4, re nolog
xtlogit y reg b1.gaap1 b4.ftse1 invp b4.legs1 insto adr loss earv unu lcycle size salesg ROA bm
    lev big4 i.region1 i.sector1 i.per, re nolog
```

5.2 Essay 3 (multiple correspondence analysis)

Contingency tables commands:

```
tab2 country_ freq_2 ngev_3 adjvalue_3, chi2
```

Adjusted residuals commands:

```
tabchi country_ freq_2, a
tabchi country_ ngev_3, a
tabchi country_ adjvalue_3, a
tabchi freq_2 ngev_3, a
tabchi freq_2 adjvalue_3, a
tabchi ngev_3 adjvalue_3, a
```

MCA commands:

```
mca country_ freq_2 ngev_3 adjvalue_3, method(indicator)
mcaprojection, normalize(standard)
mcaplot, overlay origin dim(2 1)
```