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Vetting of Bloomberg's ESG Governance ISS: QualityScore [GQS™]

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ABSTRACT

Context Of the plethora of market navigation platforms, the Environment, Social, and Governance [ESG©]-platform offered by Bloomberg™ Professional Services* is one of the most richly endowed, including nearly 2,000 data-fields that provide an invaluable context for better understanding the "Stakeholder-impact" of the firm's activities. A recent amelioration of the ESG-platform is the link with Institutional Shareholder Services [ISS] that offers a taxonomy where firms are assigned to Governance-risk decile-groups based upon ISS:GovernanceQualityScores: (GQS™). The GQS-platform offers a data-driven approach to scoring & screening designed to help investors monitor company governance activities so as to better inform their decision-making. Study Design Clear is: Market Intel-Platforms only have one simple raison d'être: To provide a relative advantage in teasing out market winners relative to the "Squawk-On-The Street". If this is the case, information professionals, in a best practices context, are tacitly obligated to offer vetting tests of platforms such as the GQS to service investors in need an independent and reliable evaluation to Ferret-out useful market guidance platforms. In this endeavor, we offer a vetting evaluation of a random sample of firms included in the two polar-ISS:GQS:Classifications: GQS[1] & GQS[10]]. Point of information The intent of the GQS-Vetting is not to "reverse-engineer" the results of the GQS-assignment protocol so as to arrive an "inferentially" de-coded approximation of the actual ISS:GQS-protocol. Our vetting addresses the question: Is there a logical reason to reject the belief that the set of GQS-assignment protocols are not well formed thus creating Governance-risk-groupings that have no intra-group coherence and so exhibit no inter-group differentiability. Results Initially, we used a Strawman-Vetting test followed by FPE-inferential tests using specific and sensitive Income Statement and Balance Sheet Panel-profiles from a random sample of the firms in: GQS[1] & GQS[10]. We find that the triage-focus of GQS[1] is "Revenue at the Margin" while that of GQS[10] is "Asset[Net] Management". Also, both groups have exhibited impressive attention to managing Working Capital. Summary: The ISS:GQS-assignment protocols seem to be well-formed and capable of offering useful differentiation.

***[<https://www.bloomberg.com/professional/>]**

Keywords: Strawman Screening, p-value conditioning

INTRODUCTION

Overview

There is a plethora of market guidance platforms [MGP] available at a cost be it part of the subscription fee for access or embedded as part of the stock-transaction costs. As there is ***cost*** for accessing MGP-intel, there needs to be a ***benefit***. Ruling out an intrinsic benefit—they are "fun with which to play"—the tacit assumption for their extrinsic benefit is that the MGP offers market-intel at some return greater than a reasonable opportunity-return on ***cost***. Sometimes, actually rarely, a particular service offering an MGP allows access to recent performance profiles, thus "hyping" the benefit of their market-intel. However, skepticism, berthed by the nature of ***conflict of interest***, requires that such MGPs should be vetted, i.e., subjected to a reliable analytical evaluative-protocol competently executed by an independent group. An excellent example of such a vetting is the evaluative analysis of the CapitalCube™ Market Navigation Platform [CCMNP][i] offered by AnalytixInsight™ executed by Lusk (2018) & Lusk & Halperin (2015, 2016 & 2017). Lusk (2018) noted:

> *In our previous three studies, we have tested many of the CCMNP-variables as expressed through the S&P500; we have rejected the Nulls of their inter-and intra-group association in favor of the likelihood that the variables that constitute the CCMNP are not produced by random generating processes. This suggests that the CCMNP is capable of creating market relevant information that may inform the investment decision. Current Study The previous results beg the question that is the focus of this report: Given the Non-Random character of the various CCMNP panel variables, does this panel of information enable the identification of a particular stock that will, in the near future, experience a turning-point?* ***Results: We find no evidence that the CCMNP aids in detecting turning-points for the S&P500 Panel of data tested.*** *Various caveats to this study are detailed in the summary section of this research report.*

This sort of vetting evaluation is critical for informing investors; to wit, ignoring vetting-intel, the only germane advice is: ***Caveat emptor***!

Current Study Context

Following on the spirit of the CCMNP-vetting, we present a vetting of a recently launched MGP *spin-in* to the Bloomberg™ Environment, Social & Governance [ESG] Markets Platform created by: Institutional Shareholder Services [ISS], that offers a taxonomy where firms are assigned to Governance-risk decile-groups based upon: ISS:Governance QualityScores: (GQS™): ESG Fund Rating - ISS (issgovernance.com), ISS note:

> *The new ESG Fund Rating by ISS enables asset managers and financial advisors to meet the growing demand for sustainable investment products. But how does the ISS ESG Fund Rating stand out from the rest? For one, the ISS ESG fund ratings have more than 1,000 data factors available for client use in Fund Screening – that's far more than those offered by similar products currently on the market.*

As an elaboration, page 5, they continue:

> *Factors used to assess risk-related concerns for a given company in each market are based on the same principles that form the foundation of ISS' global benchmark voting policy. A score in the 1st decile indicates higher quality and relatively lower governance risk, and, conversely, a score in the 10th decile indicates relatively lower quality and higher governance risk. These scores provide an at-a-glance view of each company's governance risk relative to their index and region. The individual factor breakdown takes a regional approach in evaluating and scoring companies, to allow for company-level comparisons within markets where corporate governance practices are similar.*

And finally, as an overview context, it is noted:[The ***Bolding*** is our script-modification.]

*At both an overall company level and along topical classifications covering **Board Structure, Compensation, Shareholder Rights, and Audit & Risk Oversight**, scores indicate relative governance quality supported by factor-level data. That data, in turn, is critical to the scoring assessment, while historical scores and underlying reasons prompting scoring changes provide greater context and trending analysis to understand a company's approach to governance over time. With the continued and growing focus on investor stewardship and engagement, alongside the global convergence of standards and best practices, governance plays an increasingly prominent role in investment decisions.*

RESEARCH PLAN: THE VARIABLE SETS AND INFERENCE TESTS

Focus **The "*en bref*" overview of this research is:**

> *It is encouraging that in the BBT:ES**G**-platform, the **Governance** component has the highest degree of reliability and transparency. See [Tamimi &Sebastianelli (2017)]. Thus, as the ISS;GQS-platform should be a Taxonomy, the focus of which is **Governance**, we feel that this BBT-embedded GQS-platform is an ideal target for vetting. Our GQS-vetting-protocol is to randomly sample firms from the ISS:polar-groups: GQS[1] & GQS[10], and test them for intra-group similarity & inter-group differentiability—the two critical aspects of a Taxonomy. If such Similarity & Differentiability are likely to be in evidence, we will offer summary indications on the nature of the firms in these two taxonomic polar-ISS-groups. Specifically, if the ISS-GQS assignment is taxonomic in nature, then the following vetting phases expectations should obtain:*
>
> 1. ***Vetting Phase I**: The ISS-GQS assignment logic should <u>differ</u> from a simple but meaningless assignment protocol—to wit, the Strawman-Testing Phase,*
> 2. ***Vetting Phase II**: The ISS-GQS assignment logic should result in firm intra-group <u>similarity</u> **and** <u>differentiability</u> for the inter-group-firms for the GQS[1]-group vis-à-vis those firms in the GQS[10]-group, and*
> 3. ***Vetting Phase III**: If the above vettings are inferentially likely to be founded, then there is likely to be an indication of <u>coordinated</u> managerial actions re: the execution protocols pertaining to assuring the adequacy of Internal Control over Financial Reporting* [*ICoFR*] *over the Panels for firms in <u>both</u> ISS-polar groups.*

These three-vetting-protocol phases are staged; thus, we will move from Vetting Stage I through Stage III if logic so dictates.

Interacting Drivers of our Research Context

Our research-lynch-pin for developing a vetting study of the GQS-Platform, is that Governance re: Audit & Risk Oversight, as noted above, are Public Company Accounting Oversite Board [PCAOB][ii]-control variates by which the Audit LLPs evaluate management's system of ICoFR. [See Goel (2018)—a must read for students in an Audit and Assurance course.] This is the case, as the focus of the execution of adequate corporate governance is logically coordinated though the Audit Committee [AC] of the Board of Directors as required by the PCAOB. The nature of the adequacy of the financial oversight is required to be tested in PCAOB-audits and is summarized by the Audit, LLP in the ICoFR-COSO opinion. This is critical as the PCAOB has exclusive Federal licensure control over the Audit, LLPs, thus ensuring active audit analyses of the ICoFR attested to in the "COSO-audit opinion; this usually is an effective guarantor of the linkage and interacting of:{ICoFR & Governance & AC & The Board of Directors}. Further, due to a "required' collaboration between the SEC the PCAOB, two sections of the PCAOB-Public Law offered critical "joint-proclamations" to insure governance-input to financial oversight. Specifically, PCAOB[SOX]:Sections: 404 and 302 of the SOX legislation are the enforcement enhancements to the SEC & PCAOB agency collaboration re; The COSO-opinion. To clarify the montage of interacting relationships between [Bloomberg:ES[G[ISS[GQS]]]]: the PCAOB : the SEC} re: ICoFR-mandates, we offer the SEC:[PCAOB]] promulgations[*verbatim*] that underlie the ICoFR testing for the certification audit. They are most illuminating and we have bolded the critical linkages that underlie our GQS-vetting context:

SEC: Section 302(a) Summary[iii]:

> *As directed by Section 302(a) of the Sarbanes-Oxley Act of 2002, we are adopting rules to require an issuer's principal executive and financial officers each to certify the financial and other information contained in the issuer's quarterly and annual reports. The rules also require these officers to certify that: they are* ***responsible for establishing, maintaining and regularly evaluating the effectiveness of the issuer's internal controls; they have made certain disclosures to the issuer's auditors and the audit committee of the board of directors about the issuer's internal controls****; and they have included information in the issuer's quarterly and annual reports about their evaluation and whether there have been significant changes in the issuer's internal controls or in other factors that could significantly affect internal controls subsequent to the evaluation. In addition, we are adopting previously proposed rules to require issuers to maintain, and regularly evaluate the effectiveness of, disclosure controls and procedures designed to ensure that the information required in reports filed under the Securities Exchange Act of 1934 is recorded, processed, summarized and reported on a timely basis.*

SEC: Section 404 SUMMARY[iv]:

> *As directed by Section 404 of the Sarbanes-Oxley Act of 2002, we are adopting rules requiring companies subject to the reporting requirements of the Securities Exchange Act of 1934, other than registered investment companies, to include in their annual reports a report of management on the company's internal control over*

> *financial reporting.* ***The internal control report must include: a statement of management's responsibility for establishing and maintaining adequate internal control over financial reporting for the company; management's assessment of the effectiveness of the company's internal control over financial reporting as of the end of the company's most recent fiscal year; a statement identifying the framework used by management to evaluate the effectiveness of the company's internal control over financial reporting; and a statement that the registered public accounting firm that audited the company's financial statements included in the annual report has issued an attestation report on management's assessment of the company's internal control over financial reporting.*** *Under the new rules, a company is required to file the registered public accounting firm's attestation report as part of the annual report. Furthermore, we are adding a requirement that management evaluate any change in the company's internal control over financial reporting that occurred during a fiscal quarter that has materially affected, or is reasonably likely to materially affect, the company's internal control over financial reporting. Finally, we are adopting amendments to our rules and forms under the Securities Exchange Act of 1934 and the Investment Company Act of 1940 to revise the Section 302 certification requirements and to require issuers to provide the certifications required by Sections 302 and 906 of the Sarbanes-Oxley Act of 2002 as exhibits to certain periodic reports.*

To draw these contextual drivers that **underlie** the vetting-protocols that we will discuss following, we offer the following graphic:

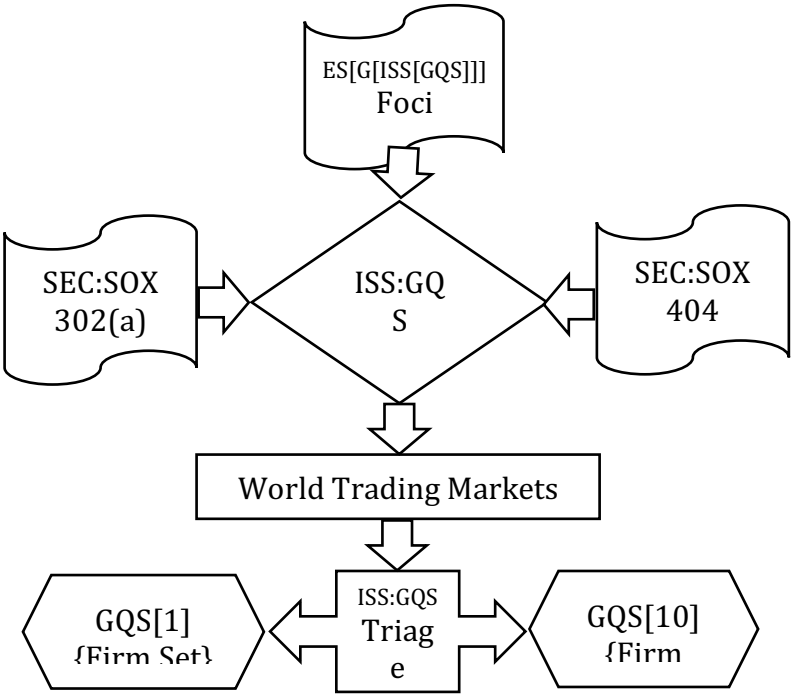


Figure A Suggested Drivers of the ISS:GSO Assignment Protocol

Caveat The operational issue of our study is the nature of the "Financial Underlyings" of the GQS[1]- and GQS[10]-groups. We are NOT interested in the Market performance of these groups for two reasons: (i) there is a "self-fulfilling *boiler-room effect*[v] to wit, if investors believe in a rating system and so react to its "dictates", then the rating system is driving the market rather *visa-versa*, and (ii) nowhere in the ISS-discussions do we find that they indicate explicitly that their ISS:GQS-taxonomy creates a unique ***relative return market advantage***.

Research Plan Vetting

In this vetting endeavor, we have created a relatively standard set of Balance Sheet and Income Statement variables to, insofar as possible, offer various vetting perspectives of the inter-group profiles of [GQS[1] v. GQS[10]]. If the Balance Sheet and Income statement accounts consistently reflect the tacitly-implied differences between the GQS-group [GQS[1] vis-à-vis the other end of the spectrum, the GQS[10] collection, then this would offer a vetting profile and so perhaps engender confidence in the utility of the ISS:GQS-intel offered by the flagship of the market navigation platforms: Bloomberg™. This is the point of departure of our research project.

Following, we will:

1. Offer two assignment protocols: (i) a simple relative-magnitude scale, and (ii) a magnitude scale conditioned by standard statistical p-value inferential differences. These assignments will be made to a random sample of firms taken from the two GQS-extremes—GQS[1] & GQS[10] as reported by ISS. These assignments will then be tested for their information content re: the actual financial underlyings,

2. Discuss and justify the Balance Sheet and Income Statement accounts that are used in the magnitude and p-value conditioned tests,

3. Indicate the accrual-calculation for the inferential arm of the study re: the number of firms in the randomization to populate the study,

4. Detail and discuss the computations used to create the study variables used to form the vetting profiles,

5. Present an illustration of a selected sample of a dataset to clarify the relationship between the p-values, the vetting-scoring, and final judgmental assessment of the GQS-platform,

6. Display and analyze the results of the full sample accrual and render our judgmental assessment of the vetting, and

7. Muse as to extensions begged by this research report.

TESTING FOCI: VETTING THE ISS:GQS ASSIGNMENT PROTOCOL

Overview: Vetting—The Litmus Test

In the vetting context, one accepts a blend of reasoned judgment and inferential calibration both in terms of creating the inferential testing montage, as well as forming protocols by which inference guides the assessment of the results of the tests. With this guidance, the initial step is

to form an *a priori* inferential context needed to render an informed judgment—*albeit it idiosyncratic but we hope logical*.

Phase I: Strawman-Test:

We posit, ***axiomatically***, that there must be a difference [on some logical set of measures] between the set of firms in GQS[1] compared to the firms assigned to GQS[10]—i.e., the polar-groups in the taxonomy offered by ISS[GQS]. Further, the ***actual*** ISS-protocol that is used to assign firms into the various classes: {*GQS[1], - - -, GQS[10]*} *is the intellectual property of ISS[GQS] and is, of course, not public information.* In this typical context, the only information that vetting-researchers have is the ***result*** of the ISS-taxonomy group-assignments. In this context, we cannot "analytically-discover" the actual ISS-assignment protocol—nor is that our intent as it is a fool's errand; however, we can, nonetheless, test the ISS-assignment-protocol for its summary observable effects. In this endeavor, it is <u>initially</u> useful to pose and test the following question:

> *What is the least valid but the easiest protocol by which to assign firms to disparate or polar-groups—in this case: GQS[1] v. GQS[10].*

This is sometimes called the ***Strawman Test*** whereby one proffers *a priori* a *possible* but *ludicrous* assignment protocol that if it were to result in the approximate assignments as actually found in *GQS[1] v. GQS[10]* would call into question the quality of the ISS-assignment protocol. The simple summary-context for testing using the Strawman-Protocol is:

> ***The Strawman[SM]*** *uses a random sample of firms taken from the actual ISS:Groups GQS[1] & GQS[10] and uses <u>only</u> the magnitudes of accounts found on the Income Statements and Balance Sheets of those firms* ***to create simple but "difficult to defend as logical" Governance assignment scores*** *for populating GQS[1] & GQS[10]. For this SM-protocol two results could obtain: (i) these SM-assignment-scores overall are "inferentially" not different between the GQS[1] & GQS[10] groups. This would be an encouraging result as it says that The Strawman scoring-protocol fails to differentiate between the ISS:Classified firms and thus it is <u>possible</u> that the ISS-taxonomy is well formed, or (ii) The Strawman does differentiate between the two ISS-groups. This could be a troubling result, in particular if the Strawman "replicates" the ISS:Taxonomy, as it indicates that a nonsensical assignment mirrors the binary ISS-Taxonomic partition.*

There are two possible but questionable SM-assignments protocols: One is so simple as to be ***prima facia ludicrous***; This is termed SM[Magnitude]. The other, termed SM[Conditioned] is slightly less simplistic and also less ludicrous. They will be detailed subsequently. SM[Conditioned] relies on the p-value formed from the FPE-inferential hypothesis testing framework. The FPE-testing-Null for SM[Magnitude] and SM[Conditioned] is: *The Strawman assignment-protocol does not differentiate between: GQS[1] and GQS[10]—i.e., the standard Null.* Simply: For a sample of firms randomly taken from *GQS[1] and GQS[10]* there is no difference ***in the SM-scores*** between *GQS[1] and GQS[10].* If the Strawman FPE-testing-Null is inferentially ***not rejected***, this suggests that the ***actual*** ISS-assignment protocol used to populate *GQS[1] and GQS[10]* ***is*** possibly a logical, and so a viable, assignment protocol. In this case, further testing is justified/warranted/needed to explore the nature of the ***actual*** ISS-assignment taxonomy used to form: {*GQS[1], - - -, GQS[10]*}. *If, on the other hand,* the Strawman FPE-testing-Null is ***rejected***, and so is <u>not</u> the likely state of nature, the logic of the ***actual*** ISS-assignment protocol used to populate the two "presumed disparate groups" *GQS[1] and GQS[10]* ***may be called into question***

and thus could be characterized as possibly illogical. ***Clarification*** If the p-value is relatively high, usually >0.35, this would indicate that the FPE-Null of No difference is the population propensity and thus is the likely the State of Nature. In this case, the Strawman Assignment Protocol seems to populate the groups GQS[1] and GQS[10] equally and this likely state of nature offers the implication that utility of the ***actual*** ISS-taxonomy under scrutiny is ***not called*** in to question. If the p-value is relatively low, for example <0.01, the likelihood that the Strawman Null of No difference could be true, given the results, is very unlikely to be true and so ***rejected*** in favor of the Strawman does differentiate between the GQS[1]- and GQS[10]-firms and this indication ***could be a troubling indication*** for the validity of the actual ISS-Assignment Protocol.

Phase II: Testing Profile Differences of the Panel Variables

Assuming the Strawman-Test has a relatively high FPE p-value and so suggests that the ISS[GQS] assignment protocol should be vetted. In this case, we will use (i) Income Statement [IS] & Balance Sheet [BS] Panel-***ratios*** of sensitive accounts as meaningful profiling measures, and (ii) the Mean, Median, and Standard Deviation [Variation] of these inferential inter-group variable differences to develop a vetting score for each of these ratios for each firm. The scoring will logically be expected to differentiate between two-polar-ISS-groups. *Rationale*: The Mean and the Median of these ***ratio***-variable measures over the firms are directly comparable as they are ratio-calibrated magnitudes. We will also use the magnitude of the Variability of these ratios as an inferential indication. *Rationale* The variability of the IS & BS test-variables is selected as Panel-variability is: (i) an independent variable with respect to the Mean or the Median, and is: (ii) a standard risk related variable that underlies the evaluation of a Panel. For example, Panel-variability is the basis of the VIX-index[vi] also referred to as the ***FEAR***-index. Simply, analysists are fearful of highly variable Panels; one prefers those Panels with less variability *vis-à-vis* those with more variability. Also, variability differences over Panels is so important that Welch (1951) developed an inferential correction that provides a more realistic FPE-indication when there is inferentially significant relative Panel-variation[vii].

In this second vetting protocol phase, we expect that if the actual ISS:GQS-protocol is taxonomic then ratio-vetting will produce FPE-differentiation for at least one of the Financial Statements. *Rational* Adya & Lusk (2016) suggest that the usual characteristic of a reliable taxonomic-assignment-protocol is near-neighbor differentiability [NND]. If this is the design-agenda for the developing the taxonomy, then in the "N-1 Degree of Freedom" context for assignment into N-bins, there should be Intra-Group Similarity [IGS] that results when the assignment model has been calibrated for *specificity* and *sensitivity* [viii]. In this context, NND usually is a profile characteristic where the likelihood of firms classified in Group[i] is FPE-inferentially different, from the firm members of Group[i-1] or Group[i+1]. Also, for the set of firms in any and all of the taxonomy groups one expects:

> *If NND were to be the case for the ISS:GQS-protocol, then logically, the firms in GQS[1] would be expected to have financials that are inferentially differentiable from the most disparate taxonomic-group that being GQS[10].*

Assuming that the Strawman-test FPE p-value—i.e., the Null-test—is not likely to be rejected, this rationalizes the Phase II-arm, the inferential expectation—i.e., the alternative to the Null—of which is:

> *There will be inferential aggregate Account-ratio differentiability for at least one of the two testing-arms: {GQS[1:BS] v. GQS[10:BS]} or {GQS[1:IS] v. GQS[10:IS]}.*

If it were to be the case that the Nulls of these two testing-arms were to be the state of nature, this would argue that the ISS:GQS-assignment protocol would likely not satisfy the characteristic of NND-differentiability. Tacitly, this would call into question the logic or utility of the IS:GQS-taxonomy.

Phase III: Extended test for ICoFR Coordinated Association

As implied above, the COSO-phase of the audit often tests the strength of association of accounts. This is one of the Analytic Procedures often found in PCAOB-Audit as coordinated IS or BS account movement often is a reliable indication of the adequacy of the nature of management's system ICoFR. In this context, the management of Working Capital—the Current Ratio—is often used in creating audit information that would speak to the nature of management's system of ICoFR. Tacitly, this suggests that management would have coordinated protocols to control the Current Assets [CA] & Current Liabilities [CL] as Working Capital is the Current Ratio≡CA/CL. As coordination is the one of the hallmark indications of the adequacy of ICoFR, we will examine the coordination of CA & CL as between the GQS[1]- and GQS[10]-groups. Specifically, we will use (i) the Pearson Product Moment Correlation [PPM] and the Non-Parametric alternative the Spearman Rank Order Correlation: Spearman's ρ S[ρ] as the measures of coordinated control. Given the tacit focus of the ISS:GQS-assignment protocol, we expect that the majority of both the GQS[1]-firms as well as the GQS[10]-firms, will have PPM & S[ρ] correlations:[CA w. CL] greater than 50%. This will be a vetting aspect of the evaluation of the ISS:GQS-taxonomy. *Rationale*: As both sets of firms are traded on active exchanges, and so are subject to PCAOB-audits, ICoFR will be in play for these audits. This being the likely context for these firms, it is reasonable to expect that most of them will have attended to the COSO-dimension of the PCAOB-audits. Further, this expectation is consistent with the research report of Goel (2018) where the use of Discretionary Accruals is examined. Goel offered that the PCAOB requirement regarding scripting the COSO-certification as it will be reviewed by the PCAOB as well as by the SEC seems to have had provided guidance that has reduced the capricious and self-serving tendency of management to use Discretionary Accrual-adjustments inappropriately to achieve certain goals that presumably would not have been possible in the application of the GAAP-model as it is intended to be used according to the AICPA. Thus, in the SOX-era one would expected better COSO-management and so higher Panel associations that are in-line with the GAAP-model. For example, Goel, notes:

> *Our findings are consistent with the argument that management reporting on internal controls (Section 404(a)) may be a cost-effective alternative to internal control audits (Section 404(b)) for smaller U.S. public companies.*

VETTING SCALES: THE PHASE-TESTING CODEX

Vetting Phases I, II & III

For the Phase I Strawman-Testing, we will only use reported account values for the BS and will report SM[Magnitude] & SM[Conditioned] tests. For the Phase II Calibration test, we will use various IS & BS performance-***ratios*** in the same two-testing frames: (i) an analysis using only the magnitude of the ratios, and also (ii) specific BS or IS Account ***FPE-p-values to condition*** the reported account-ratio-magnitudes. Finally, for Phase III we will use the [PPM] and the S[ρ] for the [CA w. CL] for each of the two Groups GQS[1] & GQS[10].

Consider now the ***Phase I & II*** scoring rationalization. For the Strawman test—i.e., ***Phase I***, the testing logic is that there is no valid inferential assignment-logic in matched-account magnitude differences—p-value conditioned or not—to establish Governance-assignments. *Rationale*: It would be capricious and would defy taxonomic-assignment logic to make Governance-classifications only on account magnitudes. For example, in the SM[Magnitude] context, if the CAs of firms Classified as GQS[1] were on average $10,000.10 and the average CAs of GQS[10]-firms were $10,000.00, it would be inconsistent with common-sense ***in any assignment context*** to assert that the CA of the GQS[1]-firm is meaningfully greater than that of the GQS[10]-firms. In the SM[Conditioning] context, assume that the CAs for GQS[1]-firms were on average $100,000.10, and the CAs of GQS[10]-firms were $10,000.10, and the directional p-value for this difference were to have been 0.002. In this case, it is clear that the FPE-Null would be rejected offering that the CAs of the GQS[1]-firms were greater than those of the GQS[10]-firms. Inferentially this is ***True*** but ***Irrelevant*** in the logic of the intent of the ***Governance-taxonomy***. As it "just" offers that firms that have MORE CAs were classified as GQS[1]-firms and firms that had LESS CAs were assigned to GQS[10]. This is nonsensical as (i) just measuring the magnitude of the CAs without knowing the magnitude of the Current Liabilities provides no basis to offer NND-information useful taxonomically in the Governance context, and (ii) it is difficult to imagine, ***in any economic context***, where only having CA-profiles can provide a valid taxonomic information.

For ***Phase II***, the measure will be financial ratios. Financial Statement Ratios are natural benchmarks and so enable inter-group comparisons both (i) in ratio magnitudes, and (ii) in p-value conditioned ratio magnitudes. Thus, they will be use in the inference vetting for Phase II. ***Point of Information*** We will use, as the vetting-profiler, the non-directional, thus conservative, p-value for rejecting of the standard-FPE-Null. The Six-Point p-value staged-conditioning values & vetting score to be used is:

Table 1 Vetting Inferential-Mapping Protocol: Context Non-directional p-value

p-value Interval	***Vetting Score***
p-value <0.0001	5
p-value <0.01	4
p-value <0.10	3
p-value <0.15	2
p-value <0.25	1
p-value >=0.25	0

These p-value conditional-vetting scores will be applied for each statistical test, excepting the Correlation Measures, for each variable over the aggregation of the firms in the two groups: GQS[1] v. GQS[10]. As noted above, there will be various testing modalities: Mean, Median, & Variance from which inferential p-values will be used to assign vetting scores using Table 1. In this case, for the *Mean*: we will use the SAS:Welch-unequal variance ANOVA. For the *Median*, we will use the Wilcoxon / Kruskal-Wallis Tests (Rank Sums[Chi2]) for testing the relative Medians. Regarding the scoring of *Variability*, there are three (3) standard measures used to inferentially test differences in variability: [O'Brien[0.5] (1979); Brown-Forsythe (1974) & Levene (1960)][ix]. These are somewhat related; for that reason, so as to not over-weight the scoring system, we

have opted to take the average of the p-values and score that average. ***Point of Information*** There is likely a difference in the strength of the inferential effect between the p-value conditioned-magnitude and that using the the magnitude-only. Typically, the p-value of the comparative scores for the magnitude-only vis-à-vis the conditioning-arm will be lower—i.e., a more convincing rejection of of the FPE-Null. If both are in the clear rejection region, that aids to strengthen the vetting profile.

PPM & S[ρ]:

Association p-value Codex In this case, we will select, where appropriate, two sensitive accounts and compute their PPM-association of those variables. A high degree of association, positive or negative, of the selected intra-firm variables will receive a high vetting score. In this case, the vetting-score will use the Harman (1960) eigenvalue cut-point for unique factor identification of: ***Hs*** = 0.7071 [ABS[$0.5^{(0.5)}$]]. The PPM- & S[ρ]-scoring are not necessary dependent as they are formed under independent statistical assumptions. However, in most practical analyses, they are often in the same inferential neighborhood. This being the case, we will take the Absolute value of the average of the PMM and S[ρ] associations for p-value scoring. There will be three scoring states:

For each firm, the computation is C=ABS[AVE[PPM : S[ρ]] giving the conditional:
IF C> Hs: Score=5, next: if C > 0.5: Firm Score=2.5; Otherwise: Firm Score=0.

THE VARIABLE-SETS

Overview

We selected a standard set of Balance Sheet and Income Statement accounts. They follow the basic definition of the GAAP-Recording Model: [Assets = Liability + Equity] and are sensitive to the firm's liquidity management re: creating attractive Working Capital profiles. The selection criterion was to use aggregate measures reported by Bloomberg as they are relatively more consistent in the application of the GAAP-filter over aggregations as manipulations within sub-categories can make comparability difficult. For example, for Current Liabilities [CL] there can be a very large number of sub-categories such as: Deferred Revenue, Derivatives and Hedging, or, Miscellaneous Short-Term Liabilities. Thus, using just the aggregate Current Liabilities within which are subsumed these idiosyncratic and relatively subjective sub-grouping offers, in most cases, offers better stability and so comparability.

Basic Variables Reported On the BBTs

We selected measures that we judged to be *sensitive*—i.e., measures that change as the firm's operational profile changes without too long of a Panel-lag—and *specific* measures—BS- & IS-variables generally used by analysts and firms, such as Bloomberg, the WSJ™, FT™ or Reuters™ and the like, who profile and report on firm activities. Specifically, to make the selection, we consulted Fraser and Ormiston (2013) and the research report of: Kliestik, Valaskova, Lazaroiu, Kovacova & Vrbka (2020) and selected the following variables.

***Balance Sheet* [*Standard*]**:[BS]

Liquidity Domain

Current Assets [CA]: [BS_CUR_ASSET_REPORT*]
Cash & Short-Term Instruments [CC]: [C&CE_AND_STI_DETAILED*]

Current Liabilities [CL]: [BS_CUR_LIAB*]

Aggregation: Assets = Liabilities + Equity

Total Assets [TA]: [BS_TOT_ASSET*]
Total Liabilities [TL]: [BS_TOT_LIAB2*]
Total Equity [TE]: [TOTAL_EQUITY*]

***Income Statement* [*GAAP*]**:[IS]
Trickle-Down

GM [GROSS_MARGIN*]
OM [OPER_MARGIN*]
PM[PROF_MARGIN*]

****These are the exact labels used in the Bloomberg Market Platform***

The six (6) BS-variables are reported in monetary dollar-values [$-Values]; this is important as $-Value magnitude could be a statistical differentiator if the GQS-categories {1, - - -, 10} are biased to be triaged principally on $-Value magnitude. In fact, these BS-variates will be used in the test for the Strawman-effect examined initially in Phase I. However, as the IS-variables that we selected are presented as ratios—i.e., relative percentages, they will not factor into the Strawman-test. For example, consider the following abstracted from the BBTs[x] that illustrates the ratio-nature of the selected IS-variates:

> *"Gross Margin Excel Field ID: GROSS_MARGIN Gross margin represents the percent of total sales revenue that the company retains after incurring the direct costs associated with producing the goods and services sold by a company. Calculated as: (Net Sales - Cost of Goods Sold) * 100 / Net Sales."*

For example$_{[\text{In millions}]}$: GM = 50.88: $[(77.09 - 37.87) \times 100] / 77.09$

The Complete Variable Set

Given the above nine variables, we have selected a set of variable-configurations to vet the ISS:GQS-platform, the nature of which are as follows:

Phase I:* [*Strawman Test*]**: The BBT-Reported Value*** Set

BS: {CA; CL; CC; TA; TL & TE} [n = 6]

Phase II:* [*Undelyings Testing]*: Created *Performance BS-Ratios and selected IS-ratios:

{CA/CL; CC/CA; CC/CL; TA/TL & TL/TE} [n = 5]
IS: {GM; OM & PM} [n = 3]

***Phase III*: [*ICoFR Correlation*]**:

BS: PMM & S[ρ] using {CA with CL]

TESTING AND VETTING PROTOCOLS: ILLUSTRATION OF THE COMPUTATIONS FOR THE RATIOS: FCEL INC.

FCEL BS[2004[An Illustration

This set of tests examines only selected ***Phase II Performance Ratios***. Ratios are the gold standard for inter-firm benchmarking as ratios neutralize relative magnitudes; thus, ratios are more sensitive to performance profile differences created by management. In this illustrative domain, we are interested in the BS: ratio-values: {CA/CL; CC/CA; CC/CL; TA/TL & TL/TE} as well as the ratios from the IS: {GM; OM & PM}. Thus, there will be eight-ratio variables BS, n=5 & IS, n=3. These ratios are the *sensitive* and *specific* performance indicators. ***Point of Information*** We are offering ONLY an illustration of the ***BS-ratio computations*** and a related *en bref* ***discussion*** for *one year* in the FCEL, Inc. Panel: 2004. Subsequently, we will use these ratio-profiles for all the firms in the accrual-sets computed over the full Panels.

Table 2 FCEL, Inc. Phase II Computational Illustration

FCEL: Balance Sheet[Std]	**FY[2004]**
BS_CUR_ASSET_REPORT	178.866
BS_CUR_LIAB	22.07
BS_TOT_ASSET	236.51
BS_TOT_LIAB2	23.546
C&CE_AND_STI_DETAILED	152.395
TOTAL_EQUITY	212.964
BSRatios	Ratio
CC/CA	**0.85**
CC/CL	**6.91**
CA/CL	**8.11**
TA/TL	**10.05**
TL/TE	**0.11**

Balance Sheet Ratios FCEL[2004]

Following are the computations and brief note on the sensitivity of these ratios.

CC/CA: [[C&CE_AND_STI_DETAILED⬧[xi]] / [BS_CUR_ASSET_REPORT⬧]]

This ratio is the [CC]: Cash and Cash Equivalents and Standard Trading Instruments divided by the Current Assets[CA]. CC/CA measures the proportion that CC is to CA where, it is the case, that CC is part of CA. Thus, CC/CA theoretically has the following interval: [>=0% to <=100%]. For example, CC/CA = [$152.395 / $178.866] = 0.852. This means that 85.2% of the CA is composed of the liquid CC-component and so 14.8% [100% – 85.2%] are other components that are properly GAAP-classified as CA—e.g., CA x 14.8% = $26.5 or $26.5 [$178.866 – $152.395]. We prefer the proportional component-context as it gives a relatively informative profile. For example, this suggests that around 80% of the Current Assets are relative liquid where conversions are not difficult to effect.

CC/CL: [[C&CE_AND_STI_DETAILED⬧] / [BS_CUR_LIAB⬧]]

This ratio is CC divided by the Current Liabilities [CL]. For example, CC/CL = [$152.395 / $22.07] = 6.9. Thus, CC/CL is the number of times that the CL could be "easily" paid.

CA/CL: [[BS_CUR_ASSET_REPORT•] / [BS_CUR_LIAB•]]

This ratio is the CA divided by the CL. CA/CL is also called the Current Ratio [CR] or the Wording Capital ratio. The CR is one of the most important ratios in profiling firms. See Fraser and Ormiston (2013) and Soekarno, S. & Kinanthi, E. (2020). For example, CR: CA/CL = [$178.866 / 22.07] = 8.1. Thus, for FCEL the ratio CA/CL of 8.1 means that they could pay their Current Liabilities eight times over before they became Cash-Stressed. Thus, in general, the CR is the number of times that the CL could be paid—usually, over the coming operating cycle or one-calendar year, and ***usually with conversions***.

TA/TL: [[BS_TOT_ASSET• / BS_TOT_LIAB2•]]

This ratio is the Total Assets[TA] divided by Total Liabilities[TL]. For example, TA/TL = [$236.51/ 23.546] = 10.1. TA/TL is a measure of the nature of the Stress or Lack of Flexibility in managing the firm's project-profile over the short to intermediate timeframe. In this case, the Stress has to do with the ease of access to the intermediate-term borrowing: Bank term-borrowing, Intermediate-term to Long-term Capital Liability, usually Bonds and Debt instruments that are sometimes needed to fund ***current- to intermediate-term*** Capital Project needs. For FCEL, the indication for 2004 is that the Stress-factor is very low as a ratio of 10.1 suggests that there are ten Total Assets dollars per Total Liability dollar. Therefore, there will likely be sufficient "room" to engage in borrowing as there is likely a high Asset-pledge potential.

TL/TE: [[BS_TOT_LIAB2• / TOTAL_EQUITY•]]

This ratio is the [TL] divided by the Total Equity[TE]. For example, TL/TE = [$23.546 / $212.964] = 0.11. TL/TE is another measure of Stress likely to be the case for flexibility in managing the firm's project-profile over the ***intermediate to long-term*** timeframe. In this context, the Stress is often focused on the ability to offer IPO-revenue or Treasury-reissuances or Preferred non-voting financing & liquidity enhancing sources such as re-new to engage ***new*** project initiatives. Here FCEL is in the Low-Stress Equity[TL/TE]-zone as the TL/TE percentage is around 10%.

THE FPE & FNE SAMPLE-SIZE CONDITIONING

Overview

In this study, as is common practice in the required ***Best Practices*** context in inferential testing, we will offer a "reasonable" inferential testing context; reasonable means that if the sample size it too small it is difficult to find a p-value where a reasonable analyst rejects the Null of the *a priori* expectation. If, one the other hand, the sample size is too large most any minuscule sampling difference will produce a p-value that begs rejecting the Null of the *a priori* expectation. We need to be in the *Goldilocks-Zone* a sample size that is *Just Right*![xii]

Sample Accrual: A Gestalt Rendering

In this study, there are four principal testing-platforms used for developing an inference profile. Thus, for practical reasons forming a reasonable sample size for determining the accrual of firms sensitive to all the inference platforms will be a non-productive errand of obsession. In this context, a sample-size approximation can be generated by switching from a numeric-metric to a proportional context. A practical indicator of binary-tests is to compute the test of proportions for a two-sample test where the FPE and the False Negative Error [FNE] can be used as conditioning factors. The resulting sample sizes are a "practical guideline" to the overall sample adequacy for the various Cartesian-point process-tests. Specifically, the test of proportion

sample-size analogue indicates the Percentage differentials vis-à-vis the Mean-Metric differences and, in this recalibration, will be a reasonable basis for FPE- & FNE-precision-tests. In this context, assume we are interested in the most disaggregated non-directional test of proportions [ToP] for two-sampled populations. Standard practice suggests that FPEs in the range: [75% to 95%] and the FNEs in the range: [65% to 80%] provide reasonable or informed discrimination. See Wang and Chow (2007). Thus, we used: FPE[90%[CrV=1.645]] & FNE[80%[CrV=0.842]] as a guide to determining the number of firms to accrue for the ensemble of tests proposed. In this case, we assumed that one of the GQS-groups has a proportion of scaled assignment-successes of: 75% and the other comparison population: 60%. To form the sample accrual information in this two-population context, we used the Wang & Chow (2007) [WC] sample adequacy formulation:

$$\text{Sample size} = [1.645 + 0.842]^2 \times [\frac{[[75\%]*[1-75\%]+[60\%]*[1-60\%]]}{[Abs[75\%-60\%]]^2}]$$

Discussion To initialize a gestalt, ignoring the probable Panel ARIMA(1,1,0)-effects, we used a 15% proportional test difference over the scaling of the accounts. Note that the selection of $GQSx[75\%]$ and $GQSy[60\%]$ will give the same result as: $GQSx[25\%]$ and $GQSy[40\%]$ as the WC-formula is symmetric in proportion. Using this parametrization, gives a sample size of 118 per generalized testing binary-partition. For our study, we used the minimal expectation, where the Income Statement the Panel goes from 2007 through 2019, and thus will accrue n=13 Panel-points. This would require nine (9) firms in each GQS-group—i.e., 117 [9 × 13]. This is the lower bound; for the BS, where the Panel is n = 16, there will be 144 [16 × 9] points and so will provide an increase in the precision resulting in a detectable difference of 13.5%. Thus, we have opted to randomly accrue nine (9) firms per sampling unit.

ILLUSTRATION OF THE DETAILS OF THE SCORING OF THE VARIABLE-SETS

Alert:

This is an illustration, the intent of which, is to: (i) clarify the scoring computations, and (ii) illustrate the nature of the application of our GQS-vetting protocol. In this regard, only two firms are profiled. *Assume*, one was in GQS[1] the other in GQS[10]. We are only profiling two of the variables: Current Assets [CA] and Current Liabilities [CL]. These illustrative Panels are in Appendix B. We have labeled them as FirmA & FirmB. These firms are NOT in the actual accrual datasets. The following computations are readily derivable from the FirmA- & FirmB-Panels presented in Appendix B and would thus be an excellent pedagogical exercise for students in a basic statistics course. Specifically assumed, all of the inferential tests that pertain to the application of standard statistical models will proceed as follows: (i) the *a priori* FPE-Test-against-Null is: No difference in the Accounts tested between the Firms in the accrual sets, (ii) the analytic p-value for FPE-testing will be two-tailed—i.e., non-directional, (iii) in rejecting the FPE-Null, a logical alternative will be formed depending on the actual results, and (iv), after all the testing is profiled, an inferential-judgment—***that of the authors***—will be offered. Also, in the service of brevity, we have elected to use ONLY the p-value conditioning-arm. We will use both the p-value-conditioning and the simple magnitude in the analysis of the full datasets.

Phase I Strawman [SM] Detailed

In this example, the Strawman-scoring protocol will use the p-value conditioned magnitude to assign a score to: FirmA & FirmB. We used the data-Panels in Appendix B. The magnitude SM-tests profiles are in Table 3. The relatively more desirable value is **bolded**.

Table 3 Magnitude Differences: CA & CL

Magnitude Only	Firm A, Panel: n=16	Firm B, Panel: n=16	p-value Null-Tests
Mean	**CA:7913.7** CL:4142.4	CA:4673.4 **CL: 3262.0**	**CA[<0.0001] CL[0.005]**
Median	**CA:7529** CL:4103	CA:4385.8 **CL:3079.4**	**CA[<0.0001] CL[0.012]**
Standard Deviation[Sd]	CA:1787.7 CL:1012.9	**CA:1558.8 CL:506.5**	**CA[0.485] CL[0.021]**

Discussion and Vetting Scoring for Phase I Strawman Test [SM[Conditioned]] The p-value scoring re: The ***Conditioned-Magnitude*** Evaluation for rendering a judgment re: the test of the Strawman-assignment is detailed following. ***Point of Information*** The p-values are derived from the inferential testing, where the CAs of FirmA are tested ***against*** the CAs of FirmB; for the Mean-test, a p-value is reported for the parametric test, and for the Median-test a non-parametric test is used. The p-values conditioning values are those in Table 1.

*CA: FirmA v. FirmB: [FirmA:Mean[5]; FirmA:Median[5]];as the magnitudes of the CAs are higher for FirmA **and** the p-values are both <0.0001. Thus, our vetting-scale assigns 5 to FirmA for the Mean and a 5 for the Median.*

*CL: FirmA v. FirmB: [FirmB:Mean[4]; FirmB:Median[3]]; as the magnitudes of the CLs are lower for FirmB **and** the p-values are: 0.005 & 0.012 respectively. Thus, our vetting-scale assigns 4 to FirmB for the Mean and a 3 for the Median.*

CA:Variation:The standard deviation of FirmB is 1558.8 *and is less than that of FirmA. However, the average of the three P-values was 0.485; thus, the p-value score for FirmsA & B is 0.*

CL:Variation:The standard deviation of FirmB is 506.4 *and is less than that of FirmA. The average of the three P-values was 0.021; thus, the p-value score for FirmsA is 0 & for FirmB is 3.*

Phase I: Aggregate Score: FirmA[10=[5+5+0]] & FirmB[10=[4+3+3]].

If this had been an analysis of all the eight-variables and all of the 18-firms in the accrual set and not only the CA & CL for two sampled firms, then we would base our decision on the inferential analysis of the two accrual datasets for all the firms. Where we have only two firms, only two variables, and have not considered the IS, the decision is simply illustrative of the computations. Thus, as the firm-scores are the same at ten, there is no inferential evidence that the SM[Conditioned] assignment Null should be rejected; this indicates that the logic of the ISS:Protocoal is ***not called into question***. Given the failure to reject the Strawman-Null, we move to Phase II. Following is the Vetting Analysis using the Phase II: ***Ratios*** of the CA & CL—i.e., The Working Capital Ratio or The Current Ratio [CR].

Phase II Ratio Vetting [CR≡CA/CL] for FirmA v. FirmB

Here is the tabular representation of the Ratio-Calibration that will be used in the Vetting of the Logic of the GQS *for the Current Ratio*.

Table 4 Current Ratio Working Capital Test

Ratio: CR≡CA/CL	Firm A, n=16	Firm B, n=16	p-value Null-Tests
Mean	CR= **1.96**	CR=1.48	CR: p=0.0096
Median	CR= **1.96**	CR= 1.45	CR: p=0.0014
Standard Deviation	CR = **0.37**	CR = 0.58	StDev: [p=0.49]

Discussion and Vetting Scoring for Phase II ***Point of Information*** Recall that the Ratio of the Averages is not the same as the Average of the Ratios; for example, using the Averages for FirmA from Table 3 CA/CL would be: 1.910423 [7913.688 / 4142.375], whereas the Average of CA/CL over the 16 panel points is: 1.95607 as noted in Table 4.

Vetting CA/CL Working Capital
FirmA [Mean[4] & Median[4]] as both p-values of 0.0096 & 0.0014 are in the 4-range of Table 1; Standard Deviation: As the average of the Standard deviation p-values was 0.49 the p-value assigned was 0 for both firms. Thus, the scores for FirmB are: [Mean[0]; Median[0]]; Sd[0]].

Phase II: Aggregate Ratio Score: FirmA[8=[4+4+0]] & FirmB[0=[0+0+0]].

Assessment Phase II: Ratios In this ratio case, let us assume that the inferential analysis indicates that FirmA [Score=8] dominates FirmB Score = 0.

Phase III Correlation [CA v. CL]

The ICoFR Domain In the audit context, it is presumed that one of the statistical features of an adequate system of ICoFR is that over the Panel for Current Assets [CA] and Current Liabilities [CL] there would be actions that would be taken to "manage" the Current Ratio [CR]—one of the key profile indications of the market impact of the firm. See Herawati (2017). If this were to be the case, one would expect, over a Panel, that the association of the CA & CL would be coordinated as they are both in the formula of the CR.

Table 5 The Association Protocol of CA & CL

Correlation CA & CL	Firm A, n=16	Firm B, n=16	Correlation score
PPM	PPM= 0.7099	PPM= –0.2007	N/A
Spearman[ρ]	S[ρ]= 0.6235	S[ρ]= –0.2382	N/A
Ave[ABS[PPM] & ABS[S[ρ]]]	Ave[0.6667]	Ave[–0.2195]	**Firm[A: 2.5] Firm[B: 0]**

Discussion and Vetting Scoring for Phase III Firm A: The absolute value of the average of the values of the correlations of the CA and CL is 0.67 and is in the interval [0.5 : Hs]. Thus, the score is Firm A =2.5. Firm B: The absolute value of the average of the correlations of the CA and CL is 0.22 and is < than 0.5. Thus, the score is Firm B = 0.

Phase III Correlation Aggregate Magnitude Score: FirmA[2.5] & FirmB[0].

Judgmental Overall {Phase I, Phase II & Phase III}

Summary The aggregate scores for FirmA and FirmB are:

Table 6 Summary of the Illustrative Vetting of the CR

	FirmA	**FirmB**	**Conclusion**
Phase I: Strawman	Score[10.0]	Score[10.0]	**Null not Rejected**
Phase II: Ratios	Score[8.0]	Score[0]	ISS[GQS] **founded**
Phase III: Correlation	Score[2.5]	Score[0]	ISS[GQS] **founded**
Aggregate Phases II & III	**Score[10.5]**	**Score[0]**	ISS[GQS] **founded**

In this illustrative case, for the Strawman-test, the scores for FirmA and FirmB were not differentiable. Thus, the FPE-test-against Null would not be rejected. This SM-test offers that the p-value conditioned magnitude-assignment leads to an illogical result because as between FirmA & FirmB there ***should be differences in their profiles*** and, in fact, from Phase II & III there were ***differences*** between FirmA & FirmB. In this case, we can examine these FirmA & FirmB profiles and perhaps "glean", subject to all the usual inferential caveats, the tacit-effect focus of the actual ISS-assignment protocol. If these profiles, which differentiate FirmA & FirmB, offer indications that suggest managerial intention over the way that the resources were employed, this would be confirmatory evidence that would enhance the creditability of the vetting profile. Specifically, it suggests that it is likely that the ISS:GQS protocols are well-formed and so, to that extent, can be relied upon to not be illogical or random with respect to the usual economic considerations underlying well managed firms traded on active markets.

VETTING ANALYSIS: THE FULL ACCRUAL DATASET

Overview

Heretofore, we have given multiple elaborations that detail the computations, the p-value scoring, and the intention of vetting MGPs. Thus, in the following section, we will only present the profile tables with all the details needed to make the vetting determinations and then also offer our overall judgmental assessment. *The Codex*: In the profile-tables, the first number in Cols [4&5] are the p-value-conditioned scores; the numbers in the []s are the max-scores applied—i.e., NOT assuming that there was a conditioning aspect using the p-values.

Strawman tests: SM[Conditional] & SM[Magnitude]

The Phase I Strawman-Test, Table 7, is the likelihood that the GQS-assignment triage-protocol is driven by the only account monetary magnitudes of the firm under scrutiny either p-value conditioned or just using the magnitudes. The relatively more desirable value is **bolded**.

Table 7 Strawman Vetting: SM[Magnitude] & SM[Conditioned]

Strawman-Test	**GQS[1] v. GQS[10]**	**Inferential p-value**	**Vetting Score GQS[1]**	**Vetting Score GQS[10]**
CA: Mean	1115.8 : **1407.5**	0.266	0[0]	0[5]
CA: Median	**477.2** : 188.3	0.002	4[5]	0[0]
CA: StDev	**1555.1** : 2727.9	0.067	3[5]	0[0]
CL: Mean	814.9 : **794.9**	0.901	0[0]	0[5]
CL: Median	178.2 : **86.3**	<0.0001	0[0]	5[5]
CL: StDev	**1236.7**:1464.1	0.390	0[5]	0[0]
CC: Mean	**497.3** : 402.3	0.964	0[5]	0[0]
CC: Median	37.7 : **75.2**	0.063	0[0]	3[5]
CC: StDev	**926.6** : 978.4	0.888	0[5]	0[0]
TA: Mean	**5978.7** : 3489.0	0.020	3[5]	0[0]
TA: Median	**1077.7** : 342.2	<0.0001	5[5]	0[0]
TA: StDev	10680.5 : **6935.7**	0.021	0[0]	3[5]
TL: Mean	4082.9 : **2134.5**	0.017	0[0]	3[5]
TL: Median	431.6 : **155.2**	<0.0001	0[0]	5[5]
TL: StDev	8648.0 : **4357.3**	0.022	0[0]	3[5]
TE: Mean	**1895.8** : 1354.5	0.182	1[5]	0[0]
TE: Median	**569.8** : 208.2	0.001	4[5]	0[0]
TE: StDev	4054.6 : **2668.5**	0.039	0[0]	3[5]
Average Vetting			**1.11:0[2.5:0]**	**1.39:0[2.5:0]**

Strawman P-value Conditioned Magnitudes

GQS[1] : 1.11 [20/18]; and GQS[10]: 1.39 [25/18]; the Medians for both groups are 0. The two-tailed p-values using the Welch-ANOVA and the Wilcoxon/Kruskal-Wallis Tests (Rank Sums: *Chi2version*) test are respectively: 0.65 and 0.74. This offers ***no*** inferentially convincing evidence that the FPE-Null should be rejected. Thus, there is no evidence of a scoring differential between GQS[1] v. GQS[10].

Strawman Only Magnitudes

GQS[1] : 2.5 [45/18]; and GQS[10]: 2.5 [45/18]; the Medians for both groups are 0. The Means and Medians are <u>equal</u> over the two groups. Thus, the Null-test is trivial and clearly not rejected.

Strawman Assessment

Thus, in this case, there is clear evidence that the assignment of the firms to the GQS[1]- or the GQS[10]-groups by the ISS:Protocol <u>is</u> <u>not</u> <u>bias</u> to the simple magnitude or the p-value conditioned magnitude of the reported Balance Sheet magnitudes. This rationalizes further testing.

Phase II Ratio Profiles

Recall there are two inferential-arms. There is a Balance Sheet [BS]: Profiling for the GQS[1] v. GQS[10] and independently an Income Statement: Profiling for the GQS[1] v. GQS[10]. The codex for Table 8 is that in Col[1] are the ***ratio-labels***. In Col[2], the value of each of the ratios is

indicated for GQS[1] & GQS[10] respectively; and, the most "desirable" ratio is ***bolded***. For example, for the CC/CL, shaded, the Median for GQS[1] is 0.207 and for GQS[10] is 0.711. In this case, as 0.711 > 0.207, and given the nature of CC/CL, a larger ratio is more desirable compared to a smaller ratio, thus **0.711** is bolded for GQS[10]. Further, the standard deviation [StDev] of CC/CL for GQS[1] & GQS[10] are 0.789 & 2.267 respectively; in this case, **0.789** is bolded for GQS[1] as it is the lower. Then, using the bolded-values of Col[2], we first used the p-value conditioning Table 1 to score the bolded values. For example, for the standard deviation of CC/CL, the p-value is 0.001, thus, the p-value conditioned-score of GQS[1] is 4. In addition, in the []s are the scores un-conditioned by the p-value—i.e., magnitude only. For the ratio: CC/CL re: the StDev for GQS[1] is scored [5] as **0.789** < 2.267.

Table 8 Phase II Balance Sheet Ratio Analysis

	GQS[1] v. GQS[10]	**Inferential p-value**	**Vetting Score GQS[1]**	**Vetting Score GQS[10]**
Balance Sheet				
CC/CA: Mean	0.246 : **0.381**	<0.0001	0[0]	5[5]
CC/CA: Median	0.174 : **0.355**	<0.0001	0[0]	5[5]
CCCA: StDev	0.233 : **0.197**	0.015	0[0]	3[5]
CC/CL: Mean	0.590 : **1.552**	<0.0001	0[0]	5[5]
CC/CL: Median	0.207 : **0.711**	<0.0001	0[0]	5[5]
CC/CL: StDev	**0.789** : 2.267	0.001	4[5]	0[0]
CA/CL: Mean	1.872 : **3.152**	<0.0001	0[0]	5[5]
CA/CL: Median	1.560 : **2.047**	<0.0001	0[0]	5[5]
CA/CL: StDev	**1.159** : 2.980	0.003	4[5]	0[0]
TA/TL: Mean	2.257 : **3.112**	<0.0001	0[0]	5[5]
TA/TL: Median	1.986 : **2.532**	<0.0001	0[0]	5[5]
TA/TL: StDev	**1.023** : 2.050	0.001	4[5]	0[0]
TL/TE: Mean	**1.038** : 1.078	0.852	0[5]	0[0]
TL/TE: Median	0.958 : **0.653**	0.004	0[0]	4[5]
TL/TE: StDev	2.292 : **1.190**	0.072	0[0]	3[5]
Average Vetting			**0.80:0.0[1.33:0.0]**	**3.33:5.0[3.67:5.0]**
Income Statement	**GQS[1] v. GQS[10]**	**Inferential p-value**	**Vetting Score GQS[1]**	**Vetting Score GQS[10]**
GM: Mean	**31.493** : 27.720	0.126	2[5]	0[0]
GM: Median	**34.692** : 32.027	0.347	0[5]	0[0]
GM: StDev	**15.317** : 21.670	0.018	3[5]	0[0]
OM: Mean	**10.322** : -2.224	<0.0001	5[5]	0[0]
OM: Median	**8.975** : 5.269	<0.0001	5[5]	0[0]
OM: StDev	**11.988** : 27.889	0.006	4[5]	0[0]
PM: Mean	**5.139** : -3.522	0.002	4[5]	0[0]
PM: Median	**4.754** : 3.664	0.055	4[5]	0[0]
PM: StDev	**10.944** : 28.117	0.003	4[5]	0[0]
Average Vetting			**3.44:4.0[5.0:5.0]**	**0.0:0.0[0.0:0.0]**

Phase II Balance Sheet Ratio Analysis

In the ratio case—i.e., intra-BBT-accrual IS & BS group-variables, we used the financial statements as a blocking factor. For the 15 [5 ×3] ***Balance Sheet[BS]*** set of ratios, there is strong inferential evidence that the GQS[10] set of ratios is consistent with a profile of firms where managers have taken direct and effective actions to exercise adequate control over the ***Asset-***base by managing the firms' Liabilities and Equity—in particular the Long-Term Debt and Equity resource sources compared to the BS-profile of the GQS[1]-firm set. This is another way of saying that the managers of the GQS[1]-set of firms did NOT seem to be concerned with the profile of their management of the A= {L +P}-feature that characterizes the Balance Sheet. Therefore, for the Balance Sheet analysis there is consistent information that the ISS:GQS-triage: (i) is not likely random, and (ii) has identified that the groups GQS[10] & GQS[1] are different re: their attention to management of the Balance Sheet profile of the organization in favor of GQS[10]. This is not inconsistent with organizations that are often required to support their project and growth activities through Debt and Asset-pledges rather than through equity IPOs, treasury stock re-issuances and/or Preferred issuances. Specifically, for the Balance Sheet component, the inferential profiles of the vetting scores are:

Balance Sheet For the p-value conditioned magnitudes:
GQS[[1]: Mean: 0.80 [12/15] & Median[0.0]
GQS[[10]: Mean: 3.33 [50/15] & Median[5.0]
The two-tailed p-values using the Welch-ANOVA is 0.0014 and for the Wilcoxon / Kruskal-Wallis Test (Rank Sums: Chi2version) test is 0.0017. This suggests, using the usual FPE-Null of no-difference, that for the BS-scores for the GQS[1]- and GQS[10]-groups, the FPE-Null may be rejected in favor that the GQS[10] scores are greater, in general. The implication is that the ISS:GQS-taxonomy is more likely to allocate a firm with a demonstrable commitment to managing their relative Asset-base into the GQS[10]-group.

Balance Sheet For the magnitudes only:
GQS[[1]: Mean: 1.3 [20/15] & Median[0.0]
GQS[[10]: Mean: 3.67 [55/15] & Median[5.0]
The two-tailed p-values using the Welch-ANOVA is 0.0093 and for the Wilcoxon / Kruskal-Wallis Tests (Rank Sums: Chi2version) test is 0.012. This suggests, using the usual FPE-Null of no-difference, that for the BS-scores for the GQS[1]- and GQS[10]-groups, the FPE-Null may be rejected in favor that the GQS[10] scores are greater, in general. The implication is that the ISS:GQS-taxonomy is more likely to allocate a firm with a commitment to managing their relative Asset-base into the GQS[10]-group.

Phase II Income Statement Ratio Analysis

For the ***Income Statement set of Ratios*** the results are exactly opposite. For the Income Statement set of ratios: {GM, OM, PM} there is strong inferential evidence that the GQS[1] set of ratios depicts a profile of well managed Revenue and Profit relationships. Also, interestingly, we observe management of the ***trickle-down effect*** for the set of firms in the GQS[1]-group. Note, both in Mean & Median, that: GM>OM>PM ***and*** PM > 0; this is not the case for the firms in the GQS[10] group.

Income Statement For the p-value conditioned magnitudes:
GQS[[1]: Mean: 3.44 [31/9] & Median[4.0]
GQS[[10]: Mean: 0.0 [0/9] & Median[0.0]
As the Welch-ANOVA defaults as there is no variation in the GQS[10]-arm, we report only the two-tailed p-values the Wilcoxon / Kruskal-Wallis Test (Rank Sums: Chi2version) that is 0.0004. This suggests, given rejection of the usual FPE-Null of no-difference, that the GQS[1] scores are greater, in general, than those for GQS[10]. This implication is that the ISS:GQS-taxonomy is more likely to allocate firms with a strong set of IS-ratio profiles into the GQS[1]-group rather than into GQS[10].

Income Statement For the magnitudes only:
GQS[[1]: Mean: 5 [45/9] & Median[5.0]
GQS[[10]: Mean: 0.0 [0/9] & Median[0.0]
As the Welch-ANOVA defaults as there is no variation in the GQS[10]-arm, we report only the two-tailed p-values the Wilcoxon / Kruskal-Wallis Test (Rank Sums: Chi2version) that is 0.0001. This suggests, given rejection of the usual FPE-Null of no-difference, that the GQS[1] scores are greater, in general, than those for GQS[10]. This implication is that the ISS:GQS-taxonomy is more likely to allocate firms with a strong set of IS-ratio profiles into the GQS[1]-group rather than into GQS[10].

An Extension: Confirmatory Comparative Testing
In this analysis, we examined the scores of the above four partitions. In this case, there are six-testing pairs: $[C_2^4]$. Using the Tukey:Kramer HSD-test for the two-way with interaction ANOVA, we find that of the six possible tests, four had p-values <0.001. The remaining two:

IS[GQS[10]] v. BS[GQS[1]] p-value 0.68 &
IS[GQS[1]] v. ISB[GQS[10]] p-value 0.99.

This is very significant information that the symmetry of the effects is about identical. This suggests that the strength of the IS-Revenue focus is arguably the same as that of the Asset[net] focus regarding the ICoFR-differentiation.

Phase III Correlation: CA & CL The ICoFR-context
Following, we present the correlation profiles of the accruals for both the PPM- & the S[ρ]-arms. Recall that the association under examination is: [CA w. CL] as these variables are used to form the Current Ratio [CR] that is the usual measure of Working Capital management. These firm-variables are often used in PCAOB-audits to provide an indication of the adequacy of management's system of ICoFR. Correlation values > Hs:[$\sqrt{0.5}$] will be **bolded**. We have posited that the coordination of CA w. CL over the Panels will usually exhibit correlations of at least 50%.

Table 9 Phase III Correlation CA & CL

Accrual-Sets	**GQS[1] PPM & S[ρ]**	**GQS[10] PPM & S[ρ]**	**GQS[1] Score**	**GQS[10] Score**
Firm-set 1	**0.9771** & **0.9676**	**0.7818** & **0.7559**	5	5
Firm-set 2	–0.1333 & –0.1147	0.1447 & 0.1706	0	0
Firm-set 3	**0.8117** & **0.8059**	0.0278 & –0.0412	5	0
Firm-set 4	**0.7174** & 0.5941	**0.7134** & **0.7412**	2.5	5
Firm-set 5	**0.7254** & **0.7206**	–0.1387 & –0.1294	5	0
Firm-set 6	**0.8784** & **0.8676**	**0.9641** & **0.8794**	5	5
Firm-set 7	**0.9071** & **0.8912**	**0.9914** & **0.9882**	5	5
Firm-set 8	0.6172 & 0.6412	0.6448 & **0.8324**	2.5	5
Firm-set 9	0.5869 & 0.6382	–0.0797 & 0.0412	2.5	0
Average	N/A	N/A	**3.61:5.00**	**2.78:5.00**

Assessment of the Association of the Two Vetting-Arms

Recall the codex for the association is:
For each firm, the computation is C=ABS[AVE[PPM : S[ρ]] giving the assignment:
IF C> Hs: Score=5, next: if C > 0.5: Firm Score=2.5; Otherwise: Firm Score=0.
For example, for Firm 4 in the GQS[1]-group the computation is:
0.65575 = ABS[AVE[0.7174 : 0.5941]]
Thus, the score given was 2.5.

As a preliminary profile, there are 11 associations that are > Hs in GQS[1] and nine > Hs in GQS[10] or in percentage terms: GQS[1] = 61.1%[11/18] and GQS[10] = 50.0%[9/18]. The vetting-test for this against a random-effect produces a test of proportion p-value of <<0.0001, thus rejecting the Random-Null in favor of a strong associational-effect. This is definitive confirmatory information that both groups of traded organizations were attentive to the importance of taking actions to effect coordinated management of CA & CL to serve their Working Capital needs. Interestingly, there is an exploratory inferential indication in the analysis of the scores reported in Table **9** Cols[4 & 5] suggesting no difference between the GQS[1] v. GQS[10]. Specifically, we analyzed the Means/Medians presented in Table 10.

Table 10 Summary of the Correlation of CA w. CL

	GQS[1] Mean: Medians	GQS[10] Mean: Medians
Values[Table 9]	3.61 : 5.00	2.78 : 5.00
Inference	Para: p=0.45	NonPara: p=0.56
Summary	**GQS[1] v. GQS[10] Fail to Reject Null**	

Discussion

It is clear that both accrual sets of Firms have attended to the management of Working Capital—a standard and important indication of the adequacy of management's system ICoFR. As expected, the majority of the firms have associations between CA & CL in excess of 50%, for GQS[1] 88.9% [16 of 18] and for the GQS[10] 55.7%[10/18]. The information in Table 10 addresses if there are differences between the two groups. In this testing, for the scoring used in

parameterizing Table 10 there are no indications the FPE-Null would likely be rejected. Thus, both set of firms GQS[1] & GQS[10] are likely to have managed CA & Cl over their Panel time-frame. This is also a vetting of the inferential information presented in Phase II.

SUMMARY

Summary & Overall Judgement Assessment

Following, we offer our summary judgment of the implication of the Phase I, Phase II & Phase III profiles. We have provided detailed analyses above; they are in no need of rumination. Thus, we will offer a conversational assessment.

Phase I

Using the Strawman-Tests, we find that there is credible evidence that the ISS:GQS taxonomy-protocol is not simply based upon relative reported monetary values. This suggests that: (i) there may be a logical, economic-based, and market-sensitive taxonomy that is the GQS-driver of the triage of firms into NND-groups, and (ii) continuing the evaluative analysis of the GQS-protocol would be informative.

Phase II

The profile of the results of Phase II is: (i) the firms in the random sample drawn from the GQS[1]- & GQS[10]-groups have highly differentiated performance ratios over the BS and the IS, and (ii) the GQS[1]-firms are best characterized as: "*Revenue at the Margin*"-driven; while the GQS[10]-firms are "*Asset Management*"-driven. This characterization avoids the temptation to believe, as we have heard quipped, that GQS[1] is the "*Penthouse Residence*" and GQS[10] is a "*Tenement Hovel*". Recall the ISS:GQS characterization:

> *A score in the 1st decile indicates higher quality and relatively lower governance risk, and, conversely, a score in the 10th decile indicates relatively lower quality and higher governance risk.*

In reality, the Phase II profile suggests that these polar-decile-groups have different managerial agendas both of which seem to be: (i) well-conceived, and (ii) effectively-executed. Thus, the ISS:GQS Governance Risk differential seems to surrogate for the way management has addressed the employment of the resources committed to their charge—to wit, we conjecture, the GQS[1]-group aggressively courts Revenue Opportunities, and at the other end, the GQS[10]-group conservatively Manages the Assets to support ongoing projects. *Rationale*: There are credible studies that highlight the use of Discretionary Accruals—management's *Sorcerer's Stone*—to ameliorate their ***Revenue-profile*** [See: Karami, Bazrafshan & Mohammadi (2011); Chansarn & Chansarn (2016); Manahipor & Hojat (2017) & Goel(2018)] as well as their ***Asset[net]-profile*** [See: Saeidi, Sofian, Saeidi & Saeidi (2015); Passetti, Cinquini & Tenucci (2018); Hamrouni, Boussaada & Ben Farhat Toumi (2019)]. Thus, there are two well-documented uses of decision-making analytics in the ICoFR-context to focus the firm in one of these two directions. This literature suggests that the ***Revenue-focus*** concentrates on the short- to intermediate-range and usually in play is: (i) an **M**&**A**-event: ***M***[sometimes as the Child rather than the Parent] ***& A***[sometimes as the Target rather than the Acquirer], and (ii) IPO-IB[Black-book courting] opportunities. Whereas the ***Asset[net]-focus*** is the longer-run project perspective where various debt-contracts: [at one end: short-term Bank-loans to Long-term IB-shopped debt-contracts] are in play. In these cases, the deal-closer is often the quality of the Asset pledge-base.

Phase III

The correlation testing is confirmatory in nature in particular re: the Phase II results. One would expect for such a clear inferential set of differential profiles: GQS[1]:Revenue Basis and GQS[10]: Relative Asset[net] Basis that these firms have expertly managed Working Capital in the service of their agendas. Thus, the demonstrable commitment to have produced, in the main, well-coordinated CA v. CL panels engenders confidence in the reliability of the Phase II results.

Our Judgmental Assessment

There is clear inferential evidence that the Bloomberg[ES[G[***ISS*[*GQS*]**]]] platform is a well-formed taxonomy and applied in a way so as to differentiate firms along Governance-Risk and -Control and so assigns these firms over the disparate polar-groups: GQS[1] & GQS[10]. Firms in these groups have attended to their Working Capital management and each taxonomic-group seems to have a differentiated planning focus: ***Revenue-at-the-margin*** for the GQS[1]-set of firms and ***Asset[net]-management*** for the GQS[10]-set.

Take-Away Conclusion:

> *This vetting of the Bloomberg[ES[G[ISS[GQS]]]] platform engenders belief that there is evidence that taxonomic protocols are driving the ISS:GQS decile-assignments for their polar groups.*

OUTLOOK

This is the first report of a vetting analysis of the Bloomberg[ES[G[ISS[GQS]]]] platform. Hopefully, one of many. In this regard, we offer a few research directions begged by our research report that would add to the intellectual montage re: ***Vetting***:

1. Replications using groups that are not Polar-endpoints in the ISS-taxonomy would be an important extension. Indexing a bit towards GQS[5], for example: GQS[7] v. GQS[3] would be of interest,

2. Testing if the "p-value magnitude conditioning" protocol, as we proposed, is robust or idiosyncratic to the polar-context of the ISS-protocol,

3. There are now other "GQS"-platforms. For example, recently Morningstar™ has offered a launch of a governance monitoring and evaluation platform[xiii]. In addition, Huber-M & Comstock (2017) detail a large number of Governance platforms many of which are "sort of progenitors" of the ISS:GQS and Morningstar versions. An excellent, but very challenging study, would be to determine if the cornucopia of GQS-versions are "Clones" benchmarking-off each other as is the standard tendency of "more than many" IB-firms relative to firm market {Sell : Hold : Buy} ratings,

4. Perhaps, our results are NOT correct and were in the 5%-range of a non-representative sample. This occurs as it is an unavoidable feature of a random sample that is the basis of ALL statistical inference. A replication would be a valuable research project. In this regard, there is an excellent journal that accepts well-designed RE-analyses and replications*: Transactions on Replication Research:* [<https://aisel.aisnet.org/trr/>], finally

5. Vetting is an Investor's ***Patronus*** against ineffective MGPs offering hope but returning ruin.

6. We hope that our study and these suggestions are a cajole to action.

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APPENDIX A

GQS[1]	ICIF	MCD	MSM	OKE	RUTH	SYKE	SYPR	TER	TVTY
GQS[10]	BAX	FCEL	INOD	LWAY	NGS	NWL	PSMT	SNCR	STCN

Table A Accrual Firms: Reported by Ticker Selection

APPENDIX B

Codex: A[CA]a is FirmA for the first half of their Current Asset Panel. B[CL]b is FirmB for the second half of their Current Liabilities Panel.

A[CA]a	6019	5116	6970	7555	7148	8271	7989	8650
A[CA]b	9260	10195	10351	11796	6574	7263	5959	7503
B[CA]a	2857.8	5849.7	5192.2	3581.9	3517.6	3416.3	4368.5	4403
B[CA]b	4922.1	5050.1	4185.5	9643	4848.6	5327.2	4053.2	3557.9
A[CL]a	4286	4165	3610	3812	4857	4041	4464	3635
A[CL]b	4759	5248	6042	5750	2744	2821	2814	3230
B[CL]a	3520.5	4036.3	2951.6	4498.5	3509.2	2924.7	2988.7	2537.9
B[CL]b	3403.1	3170	2747.9	2950.4	3468.3	2890.6	2973.5	3621

Table B Current Assets and Current Liabilities for Demo-Firms: A & B

[i] <https://www.capitalcube.com/>

[ii] The Public Company Accounting Oversight Board [PCAOB] is established under the Sarbanes-Oxley Act of 2002: [107th Congress, 2nd Session. H.R.3763[<https://www.soxlaw.com/>]] and took effect for audits occurring after 24 May 2004.

[iii] https://www.sec.gov/rules/final/33-8124.htm

[iv] <https://www.sec.gov/rules/final/33-8238.htm>

[v] <https://www.theguardian.com/money/2015/aug/17/the-biggest-mistake-in-my-life-how-gold-coast-boiler-room-scams-duped-investors> This is also called the Greenspan-Effect, where during the tenure of Allen Greenspan, five-term Chair of the FRB, his market briefings were very much in sync with subsequent short-term market movements—i.e., the movers of the market used these briefings as their market-intel.

[vi] <https://www.investopedia.com/terms/v/vix.asp>

[vii] The Welch-ANOVA is used in most statistical platforms. For example, in Excel there is: Data[DataAnalysis[t-test:TwoSampleAssumingUnequalVariances] and also in SAS™[JMP™v.13].

[viii] Interestingly, testing for NND is simple; whereas, testing for IGS is fraught with inferential difficulties; experience suggests that Bootstrapping iterative methods are useful in this endeavor.

[ix] These three variance platforms are testing options in SAS[JMPv.13].

[x] Bloomberg[<https://bba.bloomberg.net>/[FA[IS[GAAP]]]]

[xi] The variable under examination is scripted exactly as it was presented in the reference financial statement in the BBTs. The ♦affixed indicates that the BBTs has a comprehensive and detailed definition of the concept so identified. This may be accessed with a scroll-over and click to open the current BBT-definition.

[xii] The issue in ascertaining an adequate sample size fits well in the vetting context. Most often when there are misspecifications of the FPE, FNE and the p-value, these misspecifications are linked to not understanding the nature of the population from which the random sample is taken. If vetting is used to focus the accrual to the appropriate population under examination many of the inaccuracies in the inferential context would not occur. Treatment of this subject is beyond the scope of this research report. Interested readers are referred to: Kim, Ahmed & Ji (2018) who examine the accounting literature to highlight the underlying causes of fallacious inferential indications that can be traced back to population misspecification. Additionally, for those with a technical background Benjamini & Hochberg (1995) and Benjamin (2018) treat these specification and vetting issues.

[xiii] <https://www.morningstar.com/company/esg-investing>