International Journal of Economics and Finance; Vol. 14, No. 12; 2022
ISSN 1916-971X E-ISSN 1916-9728
Published by Canadian Center of Science and Education

Alignment Vetting of Bloomberg's ISS: QualityScore [GQS™]: Frequency of Provision of ESG & Related Disclosure Scores

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Received: October 10, 2022 Accepted: Otober 27, 2022 Online Published: November 5, 2022

doi:10.5539/ijef.v14n12p40 URL: https://doi.org/10.5539/ijef.v14n12p40

Abstract

Context The *Environment, Social, and Governance* [*ESG©*]-platform offered by Bloomberg™ Professional Services [https://www.bloomberg.com/professional/] is a leading source of relevant, reliable, and timely information on the context within which market trading firms operate. The ESG-platform of the Bloomberg Terminals [BBT] includes more than 2,000 data fields that provide intel to aid in better understanding the "Stakeholder-impact" of the firm's activities. One of the sub-platforms therein is the Institutional Shareholder Services [ISS] which offers Governance QualityScores: (GQS™). The BBT[ISS[GQS]]-platform is a data-driven approach to scoring & screening designed to help investors monitor a company's control of governance risk. Previous studies have provided vetting information of the BBT[ISS[GQS]]-platform. As an enhancement to these vetting-studies, we offer the following. ***Study Design*** In the ESG-Platform, there are Disclosure Scores for: The General [ESG], Environment, Social & Governance categories. ***The vetting question of interest is: Does the ISS score those firms that provide more Disclosure information as ISS[1] and those firms that provide less as ISS[10]?*** If so, this would cast doubt on the relevance and reliability of the ISS-assignment taxonomy. ***Results*** We discuss the critical role of vetting. Then, the Dul: Necessity & Sufficiency Screen is offered as the organizing logic of the Inferential vetting platform. Finally, using the Gold Standard test: Linear Discriminant Analysis for the vetting inference, it is clear that the ISS-assignment is not aligned with the degree of provision of disclosure information for any of the four ESG-Disclosure Score variables. Thus, these vetting results are not inconsistent with a functioning taxonomic-allocation platform.

Keywords: Bloomberg ESG-Disclosure scores, ISS decile assignment groups

1. Introduction: Vetting—Is It Necessary-Really!

1.1 Overview

Data Analytics [DA] is the *en vogue* parlance for *Crunch the Numbers* of the 1990s. DA processes *Data* to create *Information* that informs Decision Makers. Vetting is a pre-DA screening of the inferential protocol designed to enhance one's confidence in the DA-results by posing simple testing conditions either necessary or sufficient with respect to the inferential questions under scrutiny. For example, Lusk and Halperin (2015) offered an initial vetting of the CapitalCube™ Market Navigation Platform [CCMNP] [https://www.capitalcube.com/], which creates a plethora of information as a "carve-out" of the Big Data market-trading stream. In vetting the CCMNP, they used, among others, the following four market trading variables:

V1: Current Price Level Annual [CPLA],

V2: Scaled Earnings Score Average Latest [SESAL],

V3: Previous Day Closing Price Latest [PDCPL], and

V4: CapitalCube Price Latest [CCPL].

Lusk and Halperin (2015, p. 25) note:

> *"we examined the reasonability of these four variables as expressed through the S&P500 Panel. As we rejected the Nulls of the expectations formed for the three empirical validation hypotheses in support of the factor profiling hypotheses, there is strong evidence for the support of the expected structural nature of {V1, V2, V3 & V4} in that they behave in an expected manner given the usual AR & Fixed-Effects character of a Panel of traded Firms. ---. Conclusion: The CapitalCube variable set, herein examined, is structurally in-sync with the expected market generating process(es) and therefore, in this sense, the CapitalCube variable set represents variables from which longitudinal market performance information can likely be gleaned."*

As demonstrated in the above example, this vetting process can be done by independent researchers as a measure of confidence or reasonable assurance that the CCMNP is not flawed or biased in a way so as not to provide the expected utility of a market navigation platform. In summary, vetting is critical in providing independent assurance with respect to datasets that are used by the DA-platform to enhance the confidence needed to utilize the results of DA investigations.

1.2 Vetting Context of This Research Report

One of the critical aspects of the evaluation of market-traded firms is to view their activities *in a broad context* that includes, insofar as reasonable, the major Stakeholder-dimensions. One of the leading data sources to provide extensive intel in this regard is the *Environment, Social, and Governance* [*ESG*©]-platform offered by Bloomberg™ Professional Services [https://www.bloomberg.com/professional/]. One of the sub-platforms of the ESG Platform, which is our current interest, is Governance QualityScores (GQS™). GQS™ is offered by Institutional Shareholder Services [ISS]. The ISS uses Governance QualityScores (GQS™) to assign market-traded firms into Corporate Governance ***Risk*** Groups. Technically, the ISS offers the following context regarding their governance codex, noted in drill-down navigation as BBT[ES[G[ISS[GQS™]]]]. Following are sections of ISS ESG Corporate Rating [[20 Sept 2022]] (Note 1): [***Bolding*** added for emphasis.]

> ***Overview[p.1]*** *The ESG Corporate Rating provides relevant and forward-looking environmental, social, and governance (ESG) data and performance assessments. Rooted in a holistic understanding of materiality, companies are assessed against a standard set of universal ESG topics as well as additional industry-specific topics. The materiality approach covers both material sustainability risks as well as adverse impacts on society and the environment.* ***Drawing on an overall pool of more than 700 indicators,*** *ISS ESG applies approximately 100 social, environmental, and governance-related indicators per rated entity, covering topics such as employee matters, supply chain management, business ethics, corporate governance, environmental management, eco-efficiency, and others.*
>
> ***Research Process [Page 2****] The ESG Corporate Rating follows a staged update process: Scheduled annual updates are complemented by ad hoc updates triggered by significant events, including but not limited to, corporate actions (e.g., mergers, major spin-offs, acquisitions) and new or evolving ESG controversies involving a rated company. The rating process can be broken down into the following core steps:*
>
> ▪ *Data collection: Relevant information is retrieved both from the companies being analyzed and from alternative ESG data sources, including media sources (international, local), recognized international or local non-governmental organizations, government agencies, and inter-governmental agencies, among others. Generally, the overall ratio of quantitative to qualitative data used in ratings is about 1:3 (based on the type of indicators). At an individual rating level, this proportion can vary depending on the selection of material indicators.*
>
> ▪ *ESG research: Proprietary ratings and scoring models are applied, resulting in a draft rating.*
>
> ▪ *Quality assurance: Draft ratings are systematically proofread by experienced analysts.*
>
> ▪ *Company feedback: A comprehensive dialogue with the rated issuers is carried out once every two to three years.* ***Additionally, corporate issuers are welcome to send information/updates regarding sustainability issues for consideration at any time.***
>
> ▪ *Final report: The final ESG Corporate Rating report is made available to the assessed company free of charge on a confidential basis and will be* ***published on ISS ESG customer platforms****.*
>
> ***Outputs*** *[pps 1&2] The ESG Corporate Rating provides a qualitative assessment of ESG performance*

> *and comprises a range of complementary outputs. The rating model applies a twelve-point grading system from A+/4.00 (excellent performance) to D-/1.00 (poor performance). All indicators are individually assessed based on clearly defined absolute performance expectations. Based on individual scores and weightings at the indicator level, results are aggregated to yield data on the topic level as well as an overall score (rating). "Prime" status is granted to industry leaders who meet the industry-specific Prime threshold, with Prime thresholds ranging from C (for low risk industries) to B- (for high risk industries). In addition to the overall rating, a decile rank indicates performance relative to industry peers.* ***A decile rank of 1 indicates high relative performance, while a 10 indicates a lower relative performance.*** *The ESG Performance Score allows for cross-sector comparisons using a standardized best-in-class threshold, measuring company performance on a scale of 0 to 100 with 50 representing the Prime threshold applicable for the industry.*

And finally, on the ISS Governance QualityScore Methodology Guide [2020] (Note 2) as gestalt, it is noted [p. 4]:

> *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.*

2. Research Plan: The Variable Sets and Inference Tests

2.1 Overview

The *en bref* context of this research report is:

According to Tamimi and Sebastianelli (2017), the BBT: ESG Platform has the highest degree of reliability and transparency in providing firm-specific intel on Corporate Governance Risk or the lack thereof. If the conclusion of Tamimi & Sebastianelli is factual, and this is likely to be the case as ISS was incorporated in 1985 and their market longevity speaks volumes as to the utility of ISS's intel on Corporate Governance Risk (CGR) it is worth investigating. To ensure that the ISS: GQS™ is a viable assignment taxonomy with respect to CGR, we will offer a research plan to vet the ISS: GQS™. That is, we need to collect more evidence to evaluate the notion that the ISS-decile groups are indeed ordered from *low* CG*Risk* [ISS[1s]] through *high* CG*Risk* [ISS[10s]]. Simply, if the GQS indicates high-governance performance, the CGRisk should be low. On the other hand, a low GQS should be associated with a high CGRisk. Following is the structure of our research plan:

1) Present the peer-reviewed vetting studies that pertain to the ISS assignment taxonomy,
2) Review sources that report using Institutional Shareholder Services in the normal course of their workflow,
3) Detail the foci of this vetting study and offer the organizing logic of the inferential testing to be undertaken,
4) For each of the vetting platforms, present the results and discuss their vetting implications, and
5) Offer a conversational Summary and suggest the Outlook for enhanced vetting studies.

3. Review of the Peer-Reviewed Vetting Studies That Pertain to the ISS Assignment Taxonomy

3.1 Overview

As a vetting procedure, we need to examine the peer-reviewed articles that utilized the ISS: GQS™. We are interested in any implications indicating that the ISS: GQS™ performed as expected or failed to perform as expected. Interestingly, both are equally valuable in providing vetting intel. However, unfortunately for most peer review journals, the editorial radar is rarely sufficiently wide-banded to publish "negative results".

For this purpose, we searched *ProQuest*™[ABI/INFORM™] screening for: [*Institutional Shareholder Services* & *ISS & Risk* [*Abstract*]] for the last five years; there were no articles discussing whether or not the ISS: GQS™ performed as expected.

3.2 Sources Reporting on Using Institutional Shareholder Services

As a vetting procedure, we review sources that report *using* the ISS: GQS™ in the normal course of their workflow. Using the above search but eliminating {& *Risk*}there were 20 articles retrieved. Thus, there appears to be clear evidence that the ISS: GQS™ platform is a pervasive and valued source of intel. This is a very positive vetting indication. Examples of our findings among the 20- *ProQuest*™[ABI/INFORM™] retrievals are as follows:

> Langston, Harris, and Schupmann (2022) note: "---. *Under the Biden administration, the Securities and Exchange Commission (SEC) joined the fray and facilitated activism by taking a step back from its role in policing which shareholder proposals make it onto the annual meeting agenda and moving to repeal Trump-era reforms designed to limit the influence of Institutional Shareholder Services (ISS) and Glass Lewis.*"
>
> Moritz (2022) reports: *"---. ISS's influence has grown for several reasons. One is the explosion of exchange traded funds, many of which have managers locked into following the recommendations of the shareholder service firms since they know precious little about any of the underlying companies. Another is investor laziness. It's just easier to outsource these decisions to a third party."*
>
> Chase (2021): [Directors and Boards; Philadelphia (2021)] ***o****ffers: "Earlier this year, the Business Roundtable (BRT) and Institutional Shareholder Services (ISS) issued new initiatives and public policy recommendations on workplace diversity and inclusion, from the ground floor all the way to the boardroom, spelling out potential penalties for publicly traded companies that fail to take heed.*"

Finally, Moy-Huber and Comstock (2017) detail eight major providers of ESG-intel. Among these firms are the Bloomberg ESG Data Service & the Institutional Shareholder Services (ISS). This review was just before Bloomberg "Merged" ISS as part of the BBT-ESG Platform. The authors provide clear operational details on the services provided. Also, they offer a general summary in the *Reputation and Usage* section. For Bloomberg, they note [p. 2]: *In 2016, Bloomberg had more than 12,200 ESG customers, providing ESG data to mainstream investors worldwide*. They describe the ISS as *A leading ESG data and analytics provider in the space*. This suggests that there was an anticipated synergy that rationalized, at the behest of Bloomberg, that ISS join Bloomberg [ESG]. Thus, as ISS is still a functioning platform in Bloomberg, one may view ISS's continued participation, at the pleasure of Bloomberg, as a positive vetting sign.

4. The *Foci* of This Vetting Study and Organizing Logic of the Inferential Testing

4.1 Overview

After reviewing the peer-review studies and sources that offer vetting-intel on the ISS: GQS-platform, in the following sections we will develop our vetting-protocol by applying the Strawman Test to the ISS: GQS™-platform.

4.2 Introduction of Strawman Test

One usually posits, ***axiomatically and logically***, that there should be differences in the GAAP accounts between the set of firms in the decile of ISS[1]—the ***low*** Corporate Governance ***Risk*** ISS: Group compared to those firms assigned to the decile of ISS[10]—the ***high*** Corporate Governance ***Risk*** ISS: Group. Of course, we do not know the nature of the **actual** ISS protocol as it is used to assign firms to the ISS decile classes because the actual protocol is the intellectual property of ISS and thus not public information. In this typical context, the only information that we have is the empirical ***result*** of the ISS taxonomy group assignments. This offers two choices for us to vet the ISS: GQS™: (1) we can create vetting information by using the ISS groups in a positivist-inferential context where we pose expectations and test how likely it is that a sample of events indicates that the population is so characterized; or (2) we can opt for a Hume-Null-necessary testing-frame as discussed by Dul (2020, p. 1) (Note 3), which is a vetting-screen where we pose the following generalized test question:

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

This is sometimes called the ***Strawman Test*** whereby one proffers, *a priori*, a *possible* but *ludicrous* assignment protocol that if it were to mirror approximately the actual ISS assignments as found in *ISS[1] v. ISS[10]*, the quality and logic of the ISS-assignment protocol would be called into question. The generalized Strawman-Hume-Null is:

Event[Action X] is: {A Tacitly ***Ineffective*** or Illogical Assignment Protocol} →[Produces] The Y-Effect[Result] of: {ISS-groupings that are ***Effectively*** aligned with the ***actual*** ISS polar-CGR groups].

Where: {X} is the Driver and {Y} is the Effect. In this case, the {Y}, as scripted above, is the Strawman-Hume-Null to be tested in a False Positive Error: inferential context. Upon rejection of {Y}, as the likely state of nature, *Ha* is suggested—to wit {X}→Produces Not{Y}–i.e., an **Ineffective** set of Polar-groupings that do not align with the Actual-ISS-polar groupings i.e., are relatively random compared to the Actual-ISS-polar groupings.

The {Y}-measure of ***Effective*** is that the {X: Protocol} results in alignment with the ISS-decile polar groups as reported against a random assignment. Further, if False Positive Error [FPE]-inferential testing finds that the Strawman-protocol fails to align with the Actual ISS-polar assignments, then the Strawman-Hume-Null is rejected due to the fact that the inferential p-value(s) used to create the FPEs are low; for example, < 0.05: *Simply, Ha was that the Effect{X}-assignment was relative Random i.e., not{Y} is not aligned with the actual empirical ISS-Groupings*. This FPE-inferential result would provide sufficient evidence to reject the Strawman-Hume-Null in favor of *Ha*: or {X}→Not{Y}. However, if the inferential FPE[p-value] is high, for example, >0.25, then the Strawman-Hume-Null would not be rejected and this would cast doubt on the logic of the actual empirical ISS: GQS assignment protocol. *Simply, {Y} was produced by an "illogical {X}-assignment protocol that resulted in an assignment that was not Random i.e., more aligned compared to a random assignment for the ISS-Groupings or {X}→{Y}.*

5. Literature Review of Hume-Null Strawman-Screens

5.1 Overview

There have been three Hume-Null-Strawman-screens reported in the literature. Interestingly, they were not identified by *ProQuest*™[ABI/INFORM™] as their screening does not usually search for journals that publish negative-vetting results. Their *en bref* overview follows:

Lusk and Wells (2021A: p. 15) Tested if: X[Selected GAAP-Balance Sheet [BS] Account magnitudes using the Average of the Panel values as reported in the Annual SEC filings for the ISS[1]-group of firms compared to that of the ISS[10]-group of firms] were aligned with the placement of the Actual firms in ISS[1] & ISS[10]. In this case, Lusk and Wells note re: the vetting-test:

> *"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."*

Lusk and Wells (2021B: p. 97) note:

> "*We randomly selected 20 firms—ten each from the polar decile-groups [ISS [1] & ISS [10]]. These firms were profiled by the Bloomberg Analyst Recommendations [ANR©]. The ANR-PDF-captures were not identified as to the GQS-group to which they were assigned by ISS. These 20 ANR-profiles were given to nine-volunteers with advanced expertise in market-related discipline areas, and they were asked to: (i) sort the 20-firms into two groups of equal-size, and (ii) note their assignment logic. Results The inferential results are very clear. There is no inferential evidence overall for the assignments made by the volunteers that there are sufficient numbers of triage-matches to the ISS [1] group to reject the Null of Chance of 50%. This is a valuable vetting indication that ISS-Corporate: Governance: Risk-assignments are not surrogate-holomorphs to the relative ANR-profit-profiles.*"

Lusk, Omorogbe-Akpata, and Wells (2022: p. 39) note:

> "*We offer an extension of the vetting of the ISS-assignment to determine if there is discriminant evidence that a set of 21-financial variables from the Balance Sheet, Income Statement, Cash Flow Statement, and the Market Reported Annual Market Price are aligned with the reported ISS-triage of the firm into one of the ISS:CGR-polar groups. This will address a question begged by the study where there was alignment with the Revenue or the Net Asset Management basis for the Firms in the ISS:polar-groups. Results We elected to use a single BBT-Account Panel matched with the ISS-Polar Assignments to form the Discriminant 2×2 Classification-profile. This allows the computation of: (i) the percentage of the Misclassifications, (ii) inferential measures, and (iii) the R2 Entropy measure. We used these inferential measures to profile the discrimination of the BBT-Panel vis-à-vis that of the ISS-Assignment. Interestingly, among the 21 Discriminant Classification Matrices there were NO cases where the Nulls of no effect of these inferential measures could be rejected in favor of alignment of the Panels with the ISS-taxonomic assignment. Summary There was no Individual Panel over the 21 Accounts that indicated that the Accounts of these BBT-Panels could have been the likely driver of the ISS-assignment*."

We have devoted a major section of this research report to ***vetting*** to underscore the importance of vetting as an enhancement of the quality and the relevance of the inferences drawn from positivist-inferential testing. Further, in the interest of scientific ontology, we hope that our research report rationalizes that independent and plausible "Strawman-testing" is not a frivolous exercise. Following this, we will now present the current vetting study of

the ISS protocol.

5.2 Our Research Context

There are three vetting-Class-forms that offer the possibility to provide a relevant inferential context for vetting tests of the possibility of Strawman-Hume-Null surreptitious-coding as the driver of the ISS assignment protocol. We offer that the next logical step in ISS: GQS™ vetting is to select an inference-organizing protocol that will create a simple and useful vetting tool that uses the positivist inferential testing modalities. In this regard, we have elected to use the Necessary Condition Analysis [NCA]-protocol of Dul (2020) and Dul & Hak (2010) to organize our inferential-vetting context. These three binary inferential forms are:

Necessary But NOT Sufficient;

Sufficient But NOT Necessary, or

Necessary & Sufficient

These will be discussed and illustrated in due course.

5.3 The NCA-Dul Protocol

There are two elements in the montage of the binary Necessary Condition Analysis: The Variable Set: An Effect or Result {Y} and the Event or Action {X} that is the Driver producing {Y}:

$$\{[[X_s[0\ or\ 1]] \rightarrow [Y_s[0\ or\ 1]]]_e\}$$

Where: s is the exclusive binary condition: {1 ≡ Present OR 0 ≡ Not Present}, and *e* represents the event.

The Dul-Organizing Montage: Hume-Strawman-Null

The focus of this ISS-vetting test is:

Is there evidence that the propensity to individually populate the following four Disclosure Score variable (Note 4) of the Bloomberg GQS™ platform has been used surreptitiously to assign firms into one of the two-polar groups: ISS[1] or ISS[10]?

ESG Disclosure Score [Excel Field ID: ESG_DISCLOSURE_SCORE],

Environmental Disclosure Score [Excel Field ID: ENVIRON_DISCLOSURE_SCORE],

Social Disclosure Score [Excel Field ID: SOCIAL_DISCLOSURE_SCORE], and

Governance Disclosure Score [Excel Field ID: GOVNCE_DISCLOSURE_SCORE]

5.4 Strawman Vetting-Logic

Assume that an ISS-Analyst assumes that:

Firms that provide ***more*** disclosure information (DS) do so because they have the best internal control with respect to Corporate Governance Risk and are proud and willing to provide/share the required BBT-DS information. Thus, they probably should be assigned to ISS[1], and

Those firms that provide ***less*** DS information do not have adequate internal control with respect to Corporate Governance Risk and thus are more likely to try to "hide" that indication. Therefore, they should be considered as ISS[10] firms.

This is consistent with the report of Garas and El-Temtamy (2020) where they report [**bolding added**]:

> "*We used Bloomberg ENV and ESG disclosure indexes as a proxy for CSR practices. Our analysis indicates that firms' CSR disclosure levels and their financial performance levels are endogenously determined. Thus, using two simultaneous systems (accounting-based and market-based systems [---] the two systems showed a positive relationship between firms' ENV disclosure levels and both financial performance levels*" ***of ROA and Tobin's Q [A standard-risk measure]***.

This assignment is not that "illogical" in particular if the analyst is pressed for time. This just indicates that it may be a tempting shortcut to make ISS assignments benchmarked by the propensity to provide Disclosure Information. However, such an assignment would fly in the face of the ISS-manual's indication following:

> *"The materiality approach covers both material sustainability risks as well as adverse impacts on society and the environment.* ***Drawing on an overall pool of more than 700 indicators,*** *ISS ESG applies approximately 100 social, environmental, and governance-related indicators per rated entity, covering topics such as employee matters, supply chain management, business ethics, corporate governance, environmental management, eco-efficiency, and others."*

Thus, it does merit independent scrutiny—to wit: a vetting.

5.5 Organizing the Vetting-Testing Frame

We have mentioned above the Dul-Taxonomy as a useful way to reflect upon and arrive at a useful inferential-testing protocol. To be clear, the Dul-protocol is ONLY a useful tool to form a well-reasoned inferential or judgmental model. Following, we will examine the Dul-organizing taxonomy that has three Necessity & Sufficiency components, as noted above, that one could press into service for inferential ISS-vetting.

5.6 Simple NCA Illustrative Example

As previously indicated, Hume—in the Strawman modality—offered Necessary & Sufficient as useful conditions in developing the relationships among variables. These -judgement-conditionals are most useful in the design of inferential testing and the use of the results in a decision-making context. In the Binary-context, there are two epistemically relevant foci: ***Necessary*** & ***Sufficient*** conditions, and thus four active event environments. The exhaustive cases for the binary protocol are best illustrated using the following Table 1:

Table 1. [2 ×2] Binary Event Profile

	Event Profile[X[0]]	**Event Profile[X[1]]**
Y[1]: Present	Cell[1,1]	Cell[1,2]
Y[0]: Absent	Cell[2,1]	Cell[2,2]
	X[0]:Absent	X[1]:Present

The Cells are Possible Data-Bins Relative to the Marginals.

Table 1 facilitates the difference between Necessary & Sufficient four-event conditions and their coupling.

5.6.1 The **Sufficiency** [but not Necessity] Condition

This condition is illustrated for ***X*** if the Cells: {Cell[1,1] & Cell[2,1] & Cell[1,2] }→have possible events and Cell[2,2] is empty—i.e., an event is not possible. In this case, if X is present X[1] then Cell[1,2] has the event. However, if X is not present X[0] then despite the absence of X, an event is possible and may be observed for Cells[1,1] & Cells[2,1]. Thus, X is a driver but not the ONLY driver to produce Y; however, the combination of X[1] & Y[0] is not possible. Simple Illustration Dul (2020: p. 13) notes: Let X be the event {Rain} and Y is the effect of the Driver [Rain] that the Ground becomes wet. Table 1 indicates that if it Rains X[1**]** then Y[1] occurs—the ground becomes wet: thus, Cell[1,2] has the event; also, it can rain but it is impossible that the ground does not get wet: Cell[2,2] is empty as X[1] & Y[0] is not possible. Also, it is the case that if there is an absence of Rain[X[0]], it is possible that the ground sometimes is wet, while other times is NOT wet. Thus, this is defined as X is sufficient for the ground to become wet but NOT a necessary condition as in the absence of rain X[0] the ground ***can be wet*** or dry.

5.6.2 The **Necessary** [but not Sufficient] Condition

This condition is illustrated for ***X*** if the Cells: {Cell[1,2] & Cell[2,1] & Cell[2,2]}→Produce the event and Cell[1,1] is empty—i.e., no event is possible. In this case, if X is not present X[0] then Y cannot occur due to the absence of X. If, however, X were to be present then Y can occur, or alternatively Y can be absent. Simple Illustration Dul (2020, p. 13) notes: Let X be gasoline needed to drive a non-hybrid automobile, and Y is the event that the car moves. Table 1 indicates that if there is an absence of gasoline X[0] then the car cannot be driven/moved, thus Cell[1,1] is empty; however, and obviously, an absence of fuel can result in the car not moving so this is in the event domain at Cell[2,1] or X[0] & Y[0]. Finally, if there is a presence of fuel X[1] the car has the potential to move Y[1] or not to move Y[0]. Thus, fuel is necessary for driving/moving the car but not sufficient for it to be driven/moved as that is an action to be taken given that the necessity condition is satisfied.

5.6.3 The **Necessary** & **Sufficient** Condition

This condition is illustrated for ***X*** if the Cells: {Cell[1,1] & Cell[2,2]}→do not produce the unique Event[*e*] and are therefore empty; while, Cells: Cell[2,1] & Cell[1,2] have the unique Event[*e*]. In this case, if X is not present X[0] then Y cannot occur due to the absence of X. If, however, X were to be present X[1] then Y can/must and will occur. Simple Illustration Dul (2020: p.13) notes: Let X[1]: be an age that qualifies a person to cast a vote in the general election Y[1]. This age X[1] gives to certain persons the ***right to vote***. The actual casting of a vote is not the issue; the event issue is the *Right to Vote*. Thus X[0]→Y[0] reflect the absence of the Event[*Right to Vote*] & X[1]→Y[1] produce the Event[Right to *Vote*], and so Cell[2,1] & Cell[1,2] have the event. Thus, by definition, in the *Necessary & Sufficient* case for the binary case, there can ONLY be two event cells: one for the inability to have the right to

cast a vote{X[0]→Y[0] or Cell[2,1] and one for the ability to have the right to cast a vote{X[1]→Y[1] or Cell[1,2]. Interestingly, the coupling of X[1] & Y[0] meaning the combination of having the Age necessary and Y[0] not having the right to vote is definitionally impossible as is the rationale for X[0] & Y[1]. As a further elaboration of Table 1 & Table 2, we offer the following event-space context presented by: Shahjehan, Afsar, and Shah (2019, p. 2665):

> "*The NCA technique generates scatterplots between variables, set of variables or relationships to investigate the existence of necessary condition between them. An empty upper left corner called the ceiling zone separated from the lower right section by ceiling lines in the scatterplots suggests the presence of the necessary condition. These ceiling lines identify the level of the necessary factor (X) required for any given level of outcome (Y). There are different techniques for drawing ceiling lines each maximizing the ceiling zone by assuming a non-decreasing (piecewise) linear ceilings with limited or no observation in the ceiling zone. ---. Once the existence of the necessary condition is established, the level of a necessary condition is evaluated by the effect size. In NCA effect size refers to the level of constraint ceiling poses on the outcome. The effect size (d) is the size of the ceiling zone in relation to the total space in which observations are empirically observed. Larger the ceiling zone larger would be the effect size. Dul (2016) presents a rule of thumb for evaluating the effect size which is as follow: 0 to 0.1 is small effect size, 0.1 to 0.3 is medium effect size, 0.3 to 0.5 is large effect size and greater than 0.5 is very large effect size. Effect size is a general measure displaying the level of constrain the constrainer X extends on the constrainee Y. However, normally not all values of X constrain Y and for not all values of Y, Y is constrained by X. NCA calls this phenomenon as inefficiency and presents its two components condition inefficiency and outcome inefficiency. condition inefficiency specifies the level of X not needed for even the highest level of Y. While outcome inefficiency indicates that for a level of Y, any level of X allows for a higher value of the Y. The Inefficiencies are inversely proportional to effect size i.e., larger the inefficiencies smaller would be the effect size. In the absence of both Inefficiencies, the effect size would be 0.5.*

Also recommended is the work of Jada and Mukhopadhyay (2019).

5.7 Summary Dul-Classification Protocol

Dul offers three different NCA profiles for the Binary Events as illustrative guidance: [**S** not N], [**N** not S], and [**N** & **S**]. The rationales behind the three examples can be summarized as follows.

X[Rain]→Y[Dry Land] Pertain to [**S** not N]

X[Gasoline]→Y[Car Movement], [**N** not S] and

X[Age]→Y[Voting Rights] [**N** & **S**]

The exact context given by the Dul maps uniquely into only one of the three NS-binary classification matrices noted above. For example, the Gasoline context cannot be fitted into the [**S** not N] that was used in the Rain context. Specifically, the [**S** not N] has an empty-impossible event condition at X[1] & Y[0]: Cell[2,2]; however, in the Gasoline-context Cell [2,2] just means that the car has fuel but is not driven—that condition is in the event-context so is NOT impossible. Thus, if the Gasoline-context needs to be fitted into the [**S** not N] classification-matrix other conditions need to be scripted. This is exactly why the Dul-context can be used as guidance in scripting the inferential context. In this case, the inferential profile of events can be scripted as Necessary and/or Sufficient. The most precise or limiting case condition-set is the Necessary & Sufficient condition. The Necessary condition ALONE does not suggest that the event will ever happen unless these necessary events satisfy related sufficiency conditions. For example, one of the Necessary Conditions for graduation at SUNY is 120 credit-hours BUT students must satisfy a large number of Program & Major and conditions for graduation. Thus, Sufficiency in this context is the satisfaction of all of the Necessary Conditions. Said in another way:

If X is a necessary condition for Y, then Y is a sufficient condition for X and visa-versa.

Thus, there are myriads numbers of Necessary Conditions and usually less, but nonetheless, a challenging number of Sufficiency Conditions that could be detailed to provide a reasonable inferential context for a functioning analytic context. See Appendix A. For example, in the voting example, the context actually controls the execution of the profile to code the voting profile. In fact, there are some societies where gender, incarceration status, mental competency, or disability access considerations to mention a few that may figure into the Necessary & Sufficiency joint profile that governs the inferential "*problématique"*. Here is where parsimony is the operative imperative. The inferential evaluation can be based upon the *a priori* evaluation profile that is judgmentally proffered by the analyst. This needs not be based solely upon the False Positive Error that uses, as the inferential driver, the p-value.

It can be based, as demonstrated by Dul (2020) and indicated above on the occurrences generated by the evaluation of the individual N&S-Conditions. This evaluation profile for the FPE will be detailed in the following section.

6.Vetting the ISS-Taxonomy: The Results and Their Implications

6.1 Overview & Recapitulation

As indicated above, there are ten deciles, which are ordered from ESG[ISS[10]] to ESG[ISS[1]]. The firms in the decile grouping of ESG[ISS[10]] have the weakest control over Corporate Governance Risk [CGR] and are characterized as having the HIGHEST CGR. The ESG[ISS[1]] decile grouping contains the firms that have the strongest control over corporate governance risk [CGR] and are characterized as having the LOWEST CGR. These ISS classification polar-decile groups provide a benchmarking with respect to CGR that can be vetted. This, of course, is the foci of this research report. In forming the inferential structure of the ISS-vetting, we have elected to use the categorization of Dul where there are binary states of nature with respect to the selected triage measures. Specifically, the triage variable that we have selected is the **Disclosure Scores [DS]** for the following four Bloomberg ESG-partitions as reported by Bloomberg:

ESG Disclosure Score**[ESG] [**Excel Field ID: ESG_DISCLOSURE_SCORE],

Environmental Disclosure Score**[Env] [**Excel Field ID: ENVIRON_DISCLOSURE_SCORE],

Social Disclosure Score**[Soc] [**Excel Field ID: SOCIAL_DISCLOSURE_SCORE], and

Governance Disclosure Score**[Gov] [**Excel Field ID: GOVNCE_DISCLOSURE_SCORE]

We have assumed, as noted above, that firms that are ISS-categorized as ESG[ISS[10]] will have reported a lower percentage of ESG disclosure data than those firms that are classified as ESG[ISS[10]]. The Bloomberg measure for noting the Disclosure Score is: "*The score ranges from 0.1 for companies that disclose a minimum amount of ESG data to 100 for those that disclose every data point collected by Bloomberg.*"

6.2 Experimental Context

In this experimental context, referencing the Dul: Necessary and/or Sufficient Conditions [N&SC] and using the Hume-Null-Strawman test, we have judged that the following is the likely rapport that can be used as the inferential profile:

The Driver{X} is the CGR[Profile] of a firm, and

The {X}→{Y[**Disclosure Score**] of ESG[ISS-firms]}

Given this {X}→{Y} and that ISS uses a taxonomy—meaning that ISS-assignments into the decile-bins are ***ordered-exclusive-assignments*** by definition—the ISS-measure(s) used for assignment ***must be*** Necessary & Sufficient [**N&S**] as per the nature of the assignment into these binary polar decile-groups. Applying the logic of the assignment to the binary-polar-decile-groups under the **N&S**-profile of the ISS context, we will have:

X[0]: Low Degree of Control over CGR; binary-pair X[1]: High Degree of Control over CGR

Y[0]: Low **Disclosure Score [DS]**; binary-pair Y[1]: High **Disclosure Score[DS]**

This configuration, which is created as a judgmental-construct [See Appendix A] using the logic of a temporal assignment and re-calibration that is used by ISS will result in the central-tendency of the Dul Matrix that pertains to vetting using the ***Strawman-Hume-Null*** testing as:

Table 2. Disclosure Score profile as Expected under Dul{Necessary & Sufficient} Strawman-Hume-Null

	Profile	**Profile**
Y[1]: High ESG:DS	"Empty"	ESG[ISS[1]]
Y[0]:Low ESG:DS	ESG[ISS[10]]	"Empty"
	X[0]:High[CGR]	X[1]:Low[CGR]

Using the notation of Table 2, Table 2 offers that **if this Strawman N&S-assignment obtains**, then there will be only two collection bins for inferential analysis under the Strawman-logic. In this case, ISS, by and large, uses the propensity of a firm to populate the four-disclosure variables: {ESG, Env, Soc & Gov}. In this regard, we are using the probabilistic population of the empty cells, noted as "Empty". Dul (2020, pp. 17-18) notes:

> "*What does it mean if the empty space is not entirely empty, hence that only a few cases are in the upper left corner that is otherwise empty? Is this reason enough to reject the necessity? In other words, does necessity require a deterministic view without any exceptions? Or is it possible to have a probabilistic view on*

necessity such as stating that X is "practically", "virtually", or "almost always" necessary for Y? There are no simple answers to these questions."

In our view, given the nature of probabilistic generating functions at the firm-level and at the macro-level economic event shocks such as the *Lehman Bros.* sub-prime debacle or the COVID-pandemic that **"regularly"** create non-ergodic panel segments, we can accept the idea of "Inferentially Likely" to be "Empty" for purposes of FPE-testing. This is the spirit of the above citation of: Shahjehan, Afsar, and Shah (2019, p. 2665).

Additionally, as suggested by Dul, noted above, standard inferential analyses can be used to enhance the strength of the inferential profile drawn from the N&S-assignment analysis. In this regard, we have selected three FPE-measures to profile the four research ESG-variables; the expectations of which are noted in *Italics*:

1) The central tendency of the Cell[1,2] will be > than that of Cell[2,1]: *Mean & Median* [*p-value <10%*]. This was proffered above a rationale for the propensity assignment under the Strawman-Null Test as it is a Necessary condition for directional-alignment but not Sufficient.
2) The Linear Discriminant Analysis [LDA]: *Entropy* $R^2 > \sqrt{50\%}$, This is a vetting-test heuristic that is a Necessary condition for reasonable alignment but not in general Sufficient, and
3) The LDA is the gold-standard test for the Necessary & Sufficient testing configuration.

Specifically: Binary LDA[Empirical/Actual: Groups[ISS(1) & ISS(10); Continuous Variable:[BBT Propensity to give DS[0.01:100]; Output [4×4]Training Matrix].

In our case, using only the propensity of provident ESG Disclosure information Binary LDA tests and reports:

[Alignment:[LDA:Main Diagonals]]

Empirical/Actual[ISS(1) v. ISS(1)] as Populated by the Strawman-Test)

Empirical/Actual[ISS(10) v. ISS(10)] as Populated by the Strawman-Test)

Misclassification [Lack of Alignment: [LDA:Off-Diagonals]]

Empirical/Actual[ISS(1) v. ISS(10)] as Populated by the Strawman-Test)

Empirical/Actual[ISS(10) v. ISS(1)] as Populated by the Strawman-Test)

The simplest inferential p-value test of alignment is the test of proportions using the Training-set *Misclassification Percentage v.5%[directional p-value]*. This is a Necessary & Sufficient condition for directional-alignment.

6.2.1 Test (1)

The directional nature of the central-tendency test is Necessary if there is to be alignment with the ISS-protocol for the four DS-variables. Specifically, if Mean of Cell(1,2) is > Cell(2,1) as proffered, then the LDA will populate ISS(1) with the larger values compared to the population assignment of ISS(10). In this case, the Main Diagonals of the Training [Confusion Matrix] are the correct assignment using the ISS-as the benchmark; whereas, the Misclassifications will be found in the Off-Diagonals.

6.2.2 Test (2)

LDR-Entropy R^2 is usually in the Interval [0 to 1]. The *Inference Range* for LDR-Entropy R^2 [ER2] that we will reference is that suggested by Lusk, Omorogbe-Akpata, and Wells (2022, p. 44):

If there was a true state of entropy i.e., chaos then there is no order and the ER2 would be 0 and all the cells in Table 1 would have the same proportions or number of entries—i.e., no information or the state of stasis Re: entropy. If at the other extreme there was a perfect LDA-classification so that only the main-diagonals were to be filled, in that context, the ER2 would be 1 indicating perfect order in classification. With all the usual OLS Regression caveats, very often if ER2 > $\sqrt{0.5}$ *where:* $\sqrt{0.5}$ *is the usual Harman factor-cutoff for uniqueness in the Varimax-factor rotation-model, this is a strong indication of LDA-alignment with the ISS-assignment, ER2 < [1-* $\sqrt{0.5}$*] is an indication of a lack of interesting alignment, and in-between these values are the interesting-zone.*

We used the SAS[JMPv.13]-data analysis platform to generate the LDA-Classification & Confusion matrix. One of the standard measures is the LDR-Entropy R^2. However, this platform does not give a p-value for the Null of 0, nor a [1-FPE] Confidence interval. However, this is not an issue as we are using Entropy R^2 as a vetting check on the nature of the classification acuity. In this regard, above we have offered a heuristic for evaluating the Entropy R^2 that is useful in providing an indication of the classification results of the LDA—SAS[JMP,v13] output.

6.2.3 Test(3)

Another output of the SAS[JMPv.13]-data analysis platform is the classification/confusion-Training Matrix from which the misclassification matrix is provided. This information output offers the simple possibility of computing a classification p-value relative to a population expectation. The population expectation that we selected was 5% as 5% seems an acceptable frequency of misclassifications—*to wit—it is unavoidable*. This means that if the p-value of the test of 5% v. The actual frequency of misclassifications is low—on the order of 1% or 5%, the rejection of the Strawman-Hume:[FPE-Null] is not an unreasonable indication of a lack of alignment. ***Conjecture*** Perhaps this very simple test of proportion inferential computation is the reason why SAS did not offer a p-value for the R^2!

6.3 Results Inferential ESG-Analysis for the Strawman Test

We have selected the following four DS-measures that follow the exact same N&S-inferential protocol as just presented in Table 3:

Table 3. Results of the Hume-Strawman: DS-Tests

Classifications	**Overall ESG:DS**	**Environmental:DS**	**Social:DS**	**Governmental:DS**
Central Tendency	ISS1[20.2:16.1]	ISS1[17.2:11.2]	ISS1[17.7:14.0]	ISS1[53.2:51.8]
	ISS10[18.2:14.1]	ISS10[8.5:4.7]	ISS10[12.8:8.8]	ISS10[55.4:51.8]
p-values	*0.054:0.11*	*<.0001:<0.0001*	*0.0002:0.012*	*0.042:0.60*
LDA: Entropy R^2	0.005	0.058	0..029	0.007
Inference Range	*Lack of Alignment*	*Lack of Alignment*	*Lack of Alignment*	*Lack of Alignment*
LDA: MisClass%	47.2%	42.3%	41.4%	53.8%
Percentage:v.5%	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*
Over Assessment	Not ISS-Aligned	Not ISS-Aligned	Not ISS-Aligned	Not ISS-Aligned
Sample Size for LDA	n = 333	n = 137	n = 268	n = 333

Data Results for the ESG-Profile.

6.3.1 Discussion Codex

In Table 3 the presentation format is: Using the Bloomberg report on the scaled amount of Disclosure Information provided [0.01 to 100] by the ISS-firms the [Mean:Medians] are followed by the Parametric p-value using the Welch ANOVA and the non-parametric-version for the Medians-test the p-value is that derived from the Wilcoxon/Kruskal-Wallis Rank Sum test [χ^2]-version. The *Inference Range* for LDR-Entropy R^2 is reported. The test of the Misclassification percentage reported by the SAS[JMP_{v13} LDA-platform is the Test of Proportions using the qualifying test of 5s and then, if appropriate, the Continuity Correction is used. This is best illustrated.

For example, for the classification Matrix for the ***ESG-Governance DS***-variable is presented in Table 4.

Table 4. [**Gov**] Excel Field ID: GOVNCE_DISCLOSURE_SCORE

	ISS[LDA 1s]	**ISS[LDA 10s]**	**ISS Actual**	**Entropy R^2**
ISS[1]	119	58	**177 Actual ISS[1]**	0.00683
ISS[10]	121	35	**156 Actual ISS[10]**	ER2<< [1-$\sqrt{0.5}$]
LDS: Version	*240*	*93*	333	
Misclassed	**179 =121+ 58= 53.8%**	**53.8%(179/333)**		

This is only a Computational Illustration for the Gov: Disclosure Score.

6.3.2 Elaboration

Testing the Central Limit Theorem [CLT]-approximation. The test of CLT is:

If [333 ×53.8%] and [333 ×(1− 53.8%)] are both > 5 then the CLT Normal approximation to the exact binomial is likely adequate for the inference approximation. This is the case:

Test of Proportions:

$$z_{cal} = [[\frac{179}{333} - \left[0.5\frac{1}{333}\right]] - 5\%] / s_{\varepsilon}$$

$$s_{\varepsilon} = [\frac{\left[[5\%] \times [1-5\%]\right]}{333}]\text{^}.5$$

In this case, the z_{cal}= 40.7, and this, in the assumed Normal Probability context, is:

<0.00001=[1-NORM.S.DIST(40.7,TRUE)]

In this case, there is clear evidence that in the population the lack of alignment is not likely to be 5% but rather higher; this is consistent with the Entropy R^2 of 0.00683.

6.4 Summary Vetting Indication

For Table 4 we have generated the following results:

The Means and Medians for all four information DS-experiences{**ESG**, **Env**, **Soc** & **Gov**} are a strong inferential indication that the Bloomberg DS-scores for the Panels tested for the ISS[1] > than ISS[10] and also they are such that Cell(1,2) is > Cell(2,1) in Mean & Median as proffered.

The Entropy R^2s are a clear indication of a lack of alignment and suggest strongly that there is a random assignment with respect to the means of the DS and the groupings ISS[1] & ISS[10].

For the mis-classifications using LDA as illustrated in Table 4 where the FPE-test assumes that the population percentage is 5% misclassifications can be clearly rejected in favor that it is larger.

The Strawman-Hume ESG test vis-à-vis The empirical information reported in BBT[ISS[ESG]] for ISS[1] v. ISS[10] indicates that the Strawman-Hume-Null can be rejected in favor of Not{Y}; or simply there is no evidence that {X: Allocating firms to ISS[1] & ISS[10] based upon their propensity to populate the Bloomberg ESG-Disclosure Panels} created {Y: Binary firm groups that approximately mirror the actual ISS: firms in ISS[1] & ISS[10] sample in Appendix B}.

Final takeaway,

There is no evidence that the ISS-Assignment polar-groups ISS[1] & ISS[10] are created from the scaled-percentage of information provided individually for the four Disclosure variables:* {ESG, Env, Soc or Gov}. *This strong vetting evidence was created from the Strawman-Hume vetting tests.

7. Summary and Outlook

7.1 Summary

There has been copious testing of various Strawman-possibilities that may be used by the ISS to form a simple but illogical assignment of firms into ordered ISS-polar Corporate Governance Risk Groups. For these investigations there was no case where simple variables created relative alignment with actual ISS-reported groupings.

7.2 Outlook

After extensive testing and reflections, there does not seem to be any "Single" firm-variable that is differentially associated with firms in ISS[1] *vis-à-vis* those in ISS[10]. True, Lusk & Wells (2021A, p. 15) did suggest that the ISS[1] groups is focused on Revenue Management while the ISS[10]-firms have Asset Management on their decision-making radar. If it is of interest to expand the ISS:profile-framing context, continued testing of single-firm variables seems to be a fool's errand. Rather, an analysis of the decision-making systems of Evaluation & Monitoring for Control with respect to: (i) the COSO-imperative; Internal Control over Financial Reporting [ICoFR], and (ii) systems that generate Corporate Governance Risk-intel and so are used to make CGR-control decisions would be a valuable addition to the literature. We offer that empirical *on-site* firm testing using validated survey instruments as well as recorded interviews will create the guidance that can be used by firms to improve both of these critical corporate control foci. ***Reality Check*** *This ICoFR & CGR profiling of ISS[1]- & ISS[10]-firms will be ground breaking work; however, such a project will be very labor intensive, will require a team-effort, and serious financial support.* As we have been involved in these profiling issues in the past, we are most amenable to offering any advice in these endeavors.

Acknowledgments

Appreciation are due to: Mr. John Conners, Senior Vice President, Financial Counseling, West Coast Region, AYCO for his generous philanthropy which funded the establishment of the John and Diana Conners Finance Trading Lab at the State University of New York College at Plattsburgh and the Bloomberg Terminals that were instrumental in this research. Further appreciation is due to: Prof. Dr. H. Wright, Boston University: Department of Mathematics and Statistics, Mr. Frank Heilig: Strategic Risk-Management, Volkswagen Leasing GmbH, Braunschweig, Germany, The Faculty of the School of Business and Economics: SUNY: Plattsburgh for the SBE Workshop Series: in particular: Profs. Dr. Kameliia Petrova, and Dr. Samy Garas, and finally, the reviewers of the *Int. J. of Economics & Finance* for their careful reading, helpful comments, and suggestions.

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Notes

Note 1. https://www.issgovernance.com/file/publications/methodology/Corporate-Rating-Methodology.pdf?v=1648857612201

Note 2. This PDF is available ONLY as a download from the corresponding author: Chuo-Hsuan Lee (leeca@plattsburgh.edu)

Note 3. Our Hume vetting tests work on his second-indication—to wit: Where X is the Driver/Producer/Generator and Y is the Effect/Result caused by X, the Null-test is: The Absence of X results in the "practical-impossibility" of realizing Y. in this ISS-context, for vetting we pose that: X[The absence of a logical ISS-assignment protocol] results in the "practical-impossibility" of producing Y[logical and effective ISS-assignments]. See Dul (2020, p. 13) for the direct quote of Hume that supports this chain of logic.

Note 4. Critical Information For each of these four Bloomberg notes: *Proprietary Bloomberg score based on the extent of a company's Environmental, Social, and Governance (ESG) disclosure. Companies that are not covered by ESG group will have no score and will show N/A. Companies that do not disclose anything will show a value of '0'. The score ranges from 0.1 for companies that disclose a minimum amount of ESG data to 100 for those that disclose every data point collected by Bloomberg. Each data point is weighted in terms of importance, with data such as Greenhouse Gas Emissions carrying greater weight than other disclosures. A consistent list of topics, data fields, and field weights apply across sectors and regions. This score measures the amount of ESG data a company reports publicly, and does not measure the company's performance on any data point.*

Appendix A

To illustrate the judgmental nature of the forming the inferential context using the Dul-taxonomy, before the authors discussed the Dul-taxonomy they scored each of the four ESG-Disclosure variables on the following scale. Following are the survey instrument essentials:

For the ESG Disclosure Score as detailed above, does it seem reasonable that firms with adequate/better control over Corporate Governance Risk will provide more information on the variable ESG Disclosure Score than firms with inadequate/poorer control over Corporate Governance Risk?

1→ True in Most Cases

2→ Could be True

3→ Not Clear; Could go either Way

4→ Could be the Reverse: Firms with adequate/better control over Corporate Governance Risk will provide Less information on the variable ESG Disclosure Score than firms with inadequate/poorer control over Corporate Governance Risk

5→The Reverse is True in Most Cases.

Point of Information Excel Field ID: ESG_DISCLOSURE_SCORE is not an associational-homeomorph with the components: {Environment, Social & Governance.} For example, we collected a sample of correlations of:

CORR[ESG_DISCLOSURE_SCORE v. {**ENV** & **SOC** & **GOV** }]

We found that the highest Pearson Product Moment was 98.9% and the lowest was 34.6%; this suggests that there is independent information over these four DS-variables.

The point of this target of opportunity survey is to demonstrate the subjective or judgmental nature of assessing the likely Dul-coding in the binary-four case as presented in Table A. In the Questions column, the four-DS variables are: {1≡**ESG**, 2≡**Env**, 3≡**Soc**, 4≡**Gov**}. Thus, for Author A, the scores given for the four DS-variables are: {ESG was Scored as 2, Env was Scored as 2, Soc was Scored as 4 & Gov was Scored as 3}. Following are the codings of the authors; this information was obtained before any discussion of the Dul-coding taxonomy. The authors are not presented in alpha-order.

Table A. Variation in Expectation v. Dul-Codex

Authors	Platforms Scored {1, 2, 3 & 4 }
A	{2, 2, 4 & 3}
B	{1, 1, 1 & 1}
C	{1, 1, 2 & 1}
D	{3, 3, 3 & 2}

Platforms scored

1) **ESG** Disclosure Score**:[**Excel Field ID: ESG_DISCLOSURE_SCORE]:
2) **Env**ironmental Disclosure Score[Excel Field ID: ENVIRON_DISCLOSURE_SCORE],
3) **Soc**ial Disclosure Score**[**Excel Field ID: SOCIAL_DISCLOSURE_SCORE], and
4) **Gov**ernance Disclosure Score**[**Excel Field ID: GOVNCE_DISCLOSURE_SCORE]

Discussion

These coding-indications suggest that there are many possibilities for the Dul-coding. For example, clearly

Individual B sees all four as the **Necessary & Sufficient** case as presented above in Table A. this was the case taken up for Table 2. However, as others have a different view of the context that would be used to define Necessity or Sufficiency there could be many other cells created. This is illustrated in the work of: Jada & Mukhopadhyay (2019, p. 707).

Whereas Individual A has a has a very different population expectation. **ESG & Env** were scored as **2**. In this case, there are likely to be some events in Cells {Cells(1,1) **OR** Cells(2,2)}that are characteristically "Empty" in the N&S-context. Which of these Cells are populated—[Non-Empty] will depend upon the [Necessary & Sufficiency]-codex used to profile the decision-context. In this case, it is likely that the inferential testing will be in the ANOVA, $n > 2$ range. ***Point of Information*** Dul also has extended the Binary 2×2 discrete-platform to an $m \times n$ discrete-version; there is also a continuous case. See Dul(2020: Necessary Conditions for Discreet and Continuous Variables, pp. 20-25).

Soc was scored as **4**; this is just the contextual reversal of where the ISS[1] & ISS[10] are judgmentally juxtaposed relative to the expected inferential magnitudes relative to the ISS-standard assignment. So, the population expectation is the reversal of a **2**-secoring.

Finally, **Gov** was scored as **3**; this very likely suggests that the Dul-context is not sufficiently detailed to provide a meaningful delineation. So, this suggests re-visiting the nature of the inferential-context.

Appendix B

Table B1. Bloomberg-GQS[1] ISS-Assigned Firms

AMGN	**BECN**	**CYH**	**DDD**	**DE**	**EIX**	**ELS**	**FFG**
FISV	FOSL	GNRC	GTS	HRB	HSII	IVAC	KLAC
KRA	LEG	LNG	LRN	MLP	MRLN	MTG	MTX
MWA	PEAK	ROL	TPX	TXT	UFCS		

Table B2. Bloomberg-GQS[10] ISS-Assigned Firms

ADTN	**ADUS**	**ASTE**	**ASUR**	**ATEC**	**AZPN**	**BRKR**	**BWA**
CODA	CONN	CVGI	DZSI	FCEL	HTH	INOD	KONP
KWR	LWAY	MDP	MNTX	NGS	NWL	ORA	RICK
SHYF	STCN	TAP	TEN	TNAV	TRXC	TSLA	