Man Versus Machine: Complex Estimates and Auditor Reliance on Artificial Intelligence

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**Item 1. Data Handling and Analyses**

Data handling was conducted by Benjamin Commerford, Sean Dennis, and Jenny Ulla. Data analyses were conducted by Benjamin Commerford, Sean Dennis, Jennifer Joe, and Jenny Ulla.

**Item 2. Generation of the Data**

See the article for a detailed description of the procedures used to generate the data. Data for main experiment reported in the paper was collected in June 2018 and August 2018. Participants were 199 auditors from two Big 4 firms. This experiment administered to practicing auditors using paper and pencil. Benjamin Commerford, Sean Dennis, and Jenny Ulla participated in the data collection process. The firm that provided the majority of the participants allowed Benjamin Commerford, Sean Dennis, and Jenny Ulla to distribute the instrument during a firm-sponsored training session. In order anonymize the data, we collected additional data from participants at other firms, which we identified through our professional contacts. Jenny Ulla manually coded the raw data into excel, and Sean Dennis and Benjamin Commerford reviewed the coding and the raw data. Sean Dennis and Jenny Ulla conducted the statistical analyses in SPSS and Stata. Benjamin Commerford and Jennifer Joe reviewed and re-performed the analyses using SPSS.

Data for the supplemental data collection (see footnote 18 in article) was collected in October 2020 – November 2020. Participants are 19 auditors from Big 4 firms, which we identified through our professional contacts. Participants completed the experiment via Qualtrics, a web-administered instrument.

**Item 3. Proprietary Nature of Data**

Our data was not obtained on a proprietary basis; however, we signed a non-disclosure agreement that prohibits us from revealing the identity of the firm that provided the majority of the participants without specific permission. With permission from the firm, we privately shared the details of this agreement with the JAR editors.

**Item 4. Steps Necessary to Collect and Process Data**

See section 3 of article for a detailed description of the steps necessary to collect and process the data.

**Item 5. Code Used to Conduct Primary Analyses**

The code to convert the raw data into the final dataset and conduct the primary analyses is available at the end of this document. As the data were obtained using an experiment, identifiers (e.g., CIK, CUSIP, etc.) are not applicable.
Item 6. Maintenance of Data and Programs
The authors assure that the data and programs will be maintained for at least six years, consistent with National Science Foundation guidelines.
Item 5. Code Used to Conduct Primary Analyses

Variable Definitions

Independent Variables

Source: 0 for human specialist condition and 1 for AI system condition.

NatureInputs: 0 for subjective inputs condition and 1 for objective inputs condition.

Dependent and Process Variables

Proposed: adjustment amount that participant recommended be proposed to Heartland management regarding the Allowance for Loan Losses that ranges from $0 = "No Adjustment" to $28 = "Full Adjustment".

Source_Expertise: the extent of participant's concerns about the firm specialist applying necessary knowledge and expertise to estimate collateral values that ranges from 1 = "Not at All Concerned" to 7 = "Very Concerned".

Convince: participant's beliefs about the likelihood that management could be convinced to adjust an estimate based on evidence provided by firm specialist that ranges from 1 = "Highly Unlikely" to 7 = "Highly Likely".

Filtering Variables

MC_SourceFail: Indicator variable equal to 1 (0) if participants failed (passed) the manipulation check related to the Source variable (participants were asked to identify whether the audit team received input from the firm's "Amadeus System" or "Internal Valuation Group").

MC_NatureFail: Indicator variable equal to 1 (0) if participants failed (passed) the manipulation check related to the NatureInputs variable (participants were asked to identify whether management's methodology of updating collateral involved “A very systematic, formula-driven estimation process, which relies on detailed market data” [i.e., objective inputs] or “An estimation process that relies heavily on the expertise of their loan officers and/or credit analysts” [i.e., subjective inputs]).

MC_Failures: Indicator variable equal to 1 (0) if participants failed either or both manipulation check questions (passed both manipulation check questions).
Data Analyses

We first conducted a 2x2 ANOVA model to examine the effects of our independent variables (Source and NatureInputs) on our dependent variable (Proposed). The following syntax generated results reported in the article:

Table 2, Panels A, B, and C (analyses conducted using SPSS):

USE ALL.
COMPUTE filter_$=(MC_SourceFail=0 and MC_NatureFail=0).
VARIABLE LABELS filter_$ 'MC_SourceFail=0 and MC_NatureFail=0 (FILTER)'.
VALUE LABELS filter_$ 0 'Not Selected' 1 'Selected'.
FORMATS filter_$ (f1.0).
FILTER BY filter_.$.
EXECUTE.

UNIANOVA Proposed BY Source NatureInputs
/METHOD=SSTYPE(3)
/INTERCEPT=INCLUDE
/PLOT=PROFILE(Source*NatureInputs)
/EMMEANS=TABLES(Source)
/EMMEANS=TABLES(NatureInputs)
/EMMEANS=TABLES(Source*NatureInputs) compare (Source)
/EMMEANS=TABLES(Source*NatureInputs) compare (NatureInputs)
/PRINT=HOMOGENEITY DESCRIPTIVE
/CRITERIA=ALPHA(.05)
/LMATRIX 'Source 1vs2 at TaskStructure=1High' Source 1 -1 Source*NatureInputs 1 0 -1 0
/LMATRIX 'Source 1vs2 at TaskStructure=0Low' Source 1 -1 Source*NatureInputs 0 1 0 -1
/DESIGN=Source NatureInputs Source*NatureInputs.

Table 2, Panels A, B, and C (analyses conducted using Stata):

anova Proposed Source##NatureInputs if MC_Failures==0
margins Source##NatureInputs
margins, at (Source =0 NatureInputs =1 ) ///
   at (Source =1 NatureInputs =1 ) ///
   at (Source =0 NatureInputs =0 ) ///
   at (Source =1 NatureInputs =0 ) post
test _b[1._at]=_b[2._at]
test _b[3._at]=_b[4._at]
We then conducted a moderated mediation model using the PROCESS Macro in SPSS (Model 89). Below is a screen shot of the PROCESS dialogue menu, as we completed it for this analysis.

Additionally, under “Options”, we mean-centered “All variables that define products”, as indicated below:
To calculate the 80% confidence interval we use to test the Index of Moderated Mediation, we used the “Paste” button in the PROCESS dialogue menu, and modified the confidence interval to “80” in line 5793, as indicated in the screenshot below:

It is important to note that we used the same filters for this PROCESS model as we used for the main analyses above; these filters are repeated below for convenience:

USE ALL.
COMPUTE filter_$=(MC_SourceFail=0 and MC_NatureFail=0).
VARIABLE LABELS filter_$ 'MC_SourceFail=0 and MC_NatureFail=0 (FILTER)'.
VALUE LABELS filter_$ 0 'Not Selected' 1 'Selected'.
FORMATS filter_$ (f1.0).
FILTER BY filter_$.
EXECUTE.

Lastly, we report descriptive statistics related to the mediator variables from this PROCESS model in Table 3. The syntax/code we used to do so is as follows:

*Table 3, Panels A and B (analyses conducted using SPSS)*

UNIANOVA Source_Expertise BY Source NatureInputs  
/INTERCEPT=INCLUDE  
/EMMEANS=TABLES(Source)  
/EMMEANS=TABLES(NatureInputs)  
/EMMEANS=TABLES(Source*NatureInputs)  
/PRINT DESCRIPTIVE  
/CRITERIA=ALPHA(.05)
/DESIGN=Source NatureInputs Source*NatureInputs.

UNIANOVA Convince BY Source NatureInputs
/METHOD=SSTYPE(3)
/INTERCEPT=INCLUDE
/EMMEANS=TABLES(Source)
/EMMEANS=TABLES(NatureInputs)
/EMMEANS=TABLES(Source*NatureInputs)
/PRINT DESCRIPTIVE
/CRITERIA=ALPHA(.05)
/DESIGN=Source NatureInputs Source*NatureInputs.

Table 3, Panels A and B (analyses conducted using Stata)

anova Source_Expertise Source##NatureInputs if MC_Failures==0
margins Source##NatureInputs
anova Convince Source##NatureInputs if MC_Failures==0
margins Source##NatureInputs