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# The International Journal of Entrepreneurship and Innovation Editors' Series: Advancing Quantitative Research in Entrepreneurship

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We are pleased to present the latest issue of *International Journal of Entrepreneurship and Innovation*. As always, our papers represent a range of topics and methodologies within the scope of the journal. In this editorial, we take the opportunity to offer some advice and guidance notes on presenting quantitative research within the field of entrepreneurship, which can hopefully enhance the high-quality quantitative research submissions to the journal.

In the digital era, new technologies have changed how research is done, which allows entrepreneurship researchers to access information, data, and data analytical tools in more flexible ways than ever. Consequently, research in entrepreneurship has seen significant advancements over the past few decades due to the rapid development of the field's theoretical underpinnings through the use of more advanced quantitative research methods (Anderson et al., 2019; Maula and Stam, 2020). Quantitative research is a research framework that focuses on quantifying the data collection and data analysis, which is often built on a deductive approach aiming at testing a hypothesis (hypotheses) based on existing theories (Antwi and Hamza, 2015). This approach is widely used in the fields of economics, marketing, education, and healthcare (Parker, 2018). It is also often performed by social scientists in various disciplines, including sociology, psychology, public health, and politics through the exploration of numeric patterns (Maula and Stam, 2020).

In the field of entrepreneurship, quantitative research can help entrepreneurship scholars to understand the trends and patterns of behaviour related to entrepreneurial phenomena from large sample size quickly and efficiently. The results of quantitative research are generally

more objective and accurate than qualitative research since they are derived from numeric data and close-ended questions, which provide precise decisions from target population (Antwi and Hamza, 2015). The data analysis can also be processed with speed via statistical software tools, which can quickly give entrepreneurs the utmost confidence when making plans for the future. Due to the quick advancements in empirical techniques and software packages, quantitative entrepreneurship research, therefore, has now more options than ever to explore real-world possibilities of entrepreneurship and potentially, the cutting edge of entrepreneurship research.

However, applying best practices for quantitative methodological approaches in entrepreneurship research is sometimes difficult due to uncertainty, heterogeneity and disequilibrium in entrepreneurial phenomena (Parker, 2018; Maula and Stam, 2020), as well as the common focus on new venturing activities for which reliable data are often unavailable (Maula and Stam, 2020). Thus, to ensure the quality of quantitative entrepreneurship research, there is urgent attention to greater rigour in quantitative analysis and methods among entrepreneurship researchers. Therefore, to advance the study of entrepreneurship using quantitative analysis, this editorial makes suggestions for key considerations in developing quantitative methodological rigour for entrepreneurship studies, making it a crucial starting point for entrepreneurship researchers who are interested in discovering new approaches to rigorous research and in publishing such work in *The International Journal of Entrepreneurship and Innovation* and other leading entrepreneurship journals.

**Quantitative research design**

In this editorial, we begin with discussing key concerns in quantitative research design, including identifying research questions and developing hypotheses. To provide research contributions and recommendations for policymakers, practitioners and academic researchers,

there is a strong commitment for researchers to conduct the rigour of the study to establish confidence in findings. This suggests that researchers should be dedicated to applying best practices for designing, conducting, and reporting their research studies (Maula and Stam, 2020), allowing them to establish consistency and accuracy in the methods and data used and also to ensure the quality of final research outputs (Anderson et al., 2019). However, in the field of entrepreneurship, quantitative scholars frequently encounter specific challenges related entrepreneurial phenomena. Among such challenges, the major concern is a mismatch between the research design and the research question (Maula and Stam, 2020). If the key research design (e.g., sample, empirical methods, hypothesis setting, etc.) is not appropriate for addressing the research questions, it is difficult to fix this mismatch in a revision, which often leads to rejection from leading entrepreneurship journals. Therefore, quantitative researchers should carefully consider the link between the research questions and research designs.

**Quantitative research questions and hypotheses**

Research questions in entrepreneurship studies often have a strong relationship with the phenomena we observe, which is a hallmark of entrepreneurship research (Maula and Stam, 2020). This points out that the advancement of empirical methods still cannot take precedence over the interesting, important, and relevant research questions for quantitative entrepreneurship research. Also, it would be a mistake for entrepreneurship research to deteriorate into a method-driven model, rather than theory-driven research (Maula and Stam, 2020). Entrepreneurship research can be developed significantly when the rigour of the empirical work rises to the significant level of the research question. Therefore, as well as focusing on the research questions, quantitative researchers should also pay attention to quantitative methodological rigour, including reliable data and appropriate methods to help enhance entrepreneurship research.

Quantitative researchers mainly aim to answer their research questions through testing hypotheses that are derived from one or several theories. This suggests that hypotheses should help researchers to navigate to the best answers for specific research questions. For quantitative analysis, hypotheses are often not suitable for the questions of "how" and "why" since quantitative data often cannot fully comprehend open-ended questions. This emphasises that research questions should drive hypotheses development as well as the research design, including methods, sampling techniques, and so on (Maula and Stam, 2020). Thus, it is important to have a clear and well-motivated research question. Also, to fix these limitations of quantitative analysis, Molina-Azorin et al (2017) recommend exploring multiple data sources, which combine both quantitative and qualitative data, within a single study. A Mixed-methods approach can offer great potential for entrepreneurship studies through maximising strengths, and potentially reducing weaknesses inherent in each approach. This could provide more insightful findings and conclusions than a single method alone could uncover. However, if researchers wish to use mixed-methods research, it is important to understand its challenges and limitations and provide a clear justification for the selected approach in their manuscript too. Such challenges and limitations go beyond the scope of this editorial, but are worthy to note.

**Opportunities within data sources**

For quantitative entrepreneurship research, researchers significantly rely on data collection and analysis, where two main types of data exist: primary and secondary. There are several potential data sources that can be used in the study of entrepreneurship such as survey data, archival data, experimental (and quasi-experimental) data, longitudinal data, and so on. In particular, longitudinal analysis has been recommended by many leading entrepreneurship

journals since its use can offer various benefits, such as addressing unobserved heterogeneity, improving causal inference, and explaining change over time (Maula and Stam, 2020). However, it is challenging to obtain high-quality data to cover the key activities of the entrepreneurial phenomena, particularly for early-stage ventures for which reliable secondary data is often lacking and primary data is generally difficult to collect from entrepreneurs who are too busy within rapidly changing enterprises (Maula and Stam, 2020). However, recent significant growth in the quantity and variety of data sources are revolutionising the field, thus creating new opportunities and challenges for scholars who wish to use them in empirical studies (Schwab and Zhang, 2019). There are several new ways to get high-quality data in the digital world such as website-scraped data and video data (e.g., Zoom, Teams, etc.), which can offer new possibilities to explore the behaviours of entrepreneurs, investors, and other relevant stakeholders such as body expressions, emotions, and so on. (Ciuchta et al., 2018). Consequently, it is necessary for researchers to understand the nature of data and its limitations in their analysis. This can help researchers to choose the appropriate analytical models for specific data to answer the research problem. In particular, the information on data used and its collection processes (whether collected by researchers or by data providers) are not always clarified in manuscripts, rendering it often difficult for reviewers or readers to understand and replicate the data analysis. Therefore, it is important for researchers to understand and provide the sufficient information on how the data are produced and its limitations for their analysis on their manuscripts too.

**Choosing the measures**

Quantitative researchers also need to carefully focus on their choices of data analyses and key measurements related to the selected analytical approaches that they need to address in quantitative entrepreneurship research. Before data analysis, it is recommended that the

datasets must be cleaned in order to minimise errors (e.g. missing value, null value, wrong scales, etc.) and to understand the nature of data. Also, due to the complex nature of entrepreneurial phenomena, scholars need to pay attention carefully to the key concerns in the specific types of data and their particular settings (e.g. the type of measures, potential longitudinal data structure, potential endogeneity concerns, etc.) and select the types of data analyses or methods that are best to test a particular hypothesis and answer a specific question. Also, it is essential for researchers to discuss the advantages and disadvantages of the chosen analytical methods on their manuscripts and present theoretical arguments and/or empirical evidence based on their selected methods. For some cases, they may also consider combining different analytical approaches to generate more insightful findings and research contributions given the complexity in entrepreneurship.

**Robustness checks**

There are several analytical methods that can be used in exploring entrepreneurial phenomena, such as regression analysis, non-linear regression, linear probability models (logit/probit model, survival analysis, etc.), longitudinal analysis, moderator and mediator analyses, multilevel analysis, and so on (see Maula and Stam, 2020). Given the increasing availability of big data and the current rapid progress of quantitative methods, researchers can easily analyse their data using advanced statistical software packages (e.g. Stata, R, SPSS, SmartPLS, etc.). Thus, we emphasise that entrepreneurship researchers should pay more attention to applying best practices or incorporating "rules of thumb" for data analyses to produce rigour in quantitative research and robust results. Especially, due to the complexity of entrepreneurial phenomena, scholars need to understand key challenges of analytical models and familiarise themselves with the use of specific approaches for data analysis to answer research questions and hypotheses in the field of entrepreneurship. More importantly, before drawing key findings

and conclusions, entrepreneurship researchers should carefully address key measurements and test a specific robustness check for their analytical choices such as endogeneity, multicollinearity, construct validity, selection bias, and so on (Tiwasing et al., 2019; Maula and Stam, 2020; Tiwasing, 2021). This can help reduce bias in quantitative data analysis and ensure quality of research fundings, which significantly promotes reproducibility, learning, and knowledge developments in the field. Therefore, we encourage quantitative researchers to clearly review the assumptions underlying their selected analytical methods, carefully consider the validity of measures, evaluate the suitability of research design and dataset for data analysis and incorporate these key considerations into their manuscripts.

**Transparency for replicability**

Another key concern of quantitative work is reporting results of data analysis. Different analytical models often produce results in different form, which require researchers to be familiar with how to interpret them carefully and thoughtfully. In particular, transparency of reporting has increasingly been recognised as an important part of conducting high-quality entrepreneurship to enhance research credibility and repeatability (Aguinis et al., 2018). This also includes data transparency and open access to research data since many leading entrepreneurship journals encourage researchers to make their datasets available. For quantitative results, many manuscripts mainly rely on the level of statistical significance. Instead, we encourage scholars to consider effect sizes since they allow us to understand the magnitude of differences found in results, while statistical significance assesses whether the findings are likely to be due to chance. Therefore, alongside reporting results, we also recommend that quantitative researchers report transparency of their robustness analyses in order to promote replication, while also allowing editors and reviewers to better understand patterns in data and data analysis. However, it is sometimes difficult for researchers to report

full information on robustness checks due to word limitations, in which case a separate online appendix could potentially be submitted.

## Conclusion

To sum up, this editorial provides a broad view of key empirical concerns on what entrepreneurship scholars should be mindful of when it comes to analysing quantitative data and publishing quantitative work, in such ways that can promote further advancements in the field. Furthermore, considering current advancements in quantitative data and methods, we encourage entrepreneurship researchers to continue investing in new data and innovative methods as well as methodological learning to promote better quality of work and robustness findings. Such promotion is necessary to drive greater confidence in recommendations for policy, practice and future research. Particularly, for researchers aiming to submit quantitative research manuscripts to *The International Journal of Entrepreneurship and Innovation*, we recommend taking suggestions in this editorial on board, alongside the journal's general submission guidelines.

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