

Date: 24 July 2020

Document: Final Report on External Grant

Grant: AFAANZ 2019 Research Fund

Applicants: Associate Professor Adrian Gepp (adgepp@bond.edu.au) and PhD student Milind Tiwari (milind.tiwari@student.bond.edu.au), Bond Business School, Bond University

Project Title: Identifying Shell Companies Being Used for Illicit Activities

Funding: \$5,507

Expenditure: \$5,507 on research assistant work, as stated in application, to extract the key information of entities from OpenCorporates database and UK Companies House, the British corporate registry, to be imported on a graph database platform. Financial Statement included at the end of this document.

Project Summary *(original in italics)*

The hypothesis is that analysis of shell companies associated with laundering and their characteristics would facilitate a model development that could be used to efficiently identify shell companies being used for illicit activities. The use of traditional statistical analysis along with big-data machine learning techniques on the features extracted through Neo4J towards model development would help in determining the importance of features and ultimately lead to development of a model.

[in addition to the original project summary] Using a hybrid approach comprising of graphical network analysis and supervised learning with trees, the model correctly classified illicit companies 96.10% of the time and fraudulent companies 90.36% of the time on the training data. Importantly, these strong results were maintained on new test data. The classification accuracy for illicit and licit companies was 94.81% and 90.96%, respectively, on the test data.

Outcome

Tiwari M., Gepp A. & Kumar, K. (2020) *Money Laundering: Using a hybrid approach to detect illicit shell companies* accepted for presentation at the International Conference on Application of Statistics in Sciences, Social Sciences, Commerce, Humanities and Management, Mumbai, June 29.

Abstract: This paper aims to detect illicit shell companies by using a combination of graph algorithms and modern supervised learning that are trained on prior cases of money laundering. Data on prior cases of illicit companies involved in money laundering, as provided by Transparency International, are collected through OpenCorporates, cleansed through OpenRefine and transported to the graph database platform Neo4J. Several graph algorithms were used to obtain measures of community, similarity, and centrality. The resulting scores were then used by decision-tree based models to classify the companies that are involved in illicit behaviour. By using a hybrid approach comprising graphical network analysis and supervised learning with trees, our modelling correctly classified illicit companies 96.10% of the time and fraudulent companies 90.36% of the time on the training data. Importantly, these strong results were maintained on new test data. The classification accuracy for illicit and licit companies was 94.81% and 90.96%, respectively, on the test data. The

accuracy of the models documented in the study provides support for using a combination of graph analytics and modern supervised learning in aiding detection efforts. This paper takes steps in strengthening the first line of defence, that is, incorporation services and corporate registries, in the fight against money laundering by proposing a network topology for identifying hidden links among companies and using a hybrid approach to detect illicit entities. No studies in the past have considered companies and their relationships from multiple cases in the same graph network for using a hybrid approach to detect illicit companies.

Future Intentions for this Project

We are currently drafting a manuscript with an initial target journal of the Journal of Business Research (ABDC: ranked A).

Being the first investigation of a hybrid approach comprising graphical analysis and supervised learning with trees on publicly available corporate information, there is much scope for additional research such as testing whether the results hold for entities from other countries. We are keen to investigate these questions ourselves and are considering how to obtain funding to continue supporting our research in this area.

More broadly, this work is part of a broader research project titled *Money laundering: Identification of Illicit Shell Companies*, which is led by Dr Adrian Gepp (Bond), Prof Kuldeep Kumar (Bond) and Milind Tiwari (Bond). This research has contributed to that project and its findings will contribute to future research in the project, which includes another related manuscript initially directed at PLOS One – this manuscript will also acknowledge this AFAANZ grant funding.

Summary of Outcomes and Benefits

It is the first research to integrate companies and their relationships from multiple cases in the same graph network for using a hybrid approach to detect illicit companies. There is a substantial benefit to the financial crime and data science literature with our finding that illicit shell companies can be detected using a hybrid approach. Wider beneficiaries of this research include corporate registries and financial crime investigators since they can utilise this information to enhance their detection efforts. Additionally, it lays foundation for combining publicly available information with banking transaction data to enhance the detection of money laundering.



Financial Statement for the period
1 July 2019 to 30 June 2020

Project: *Identifying Shell Companies Being Used for Illicit Activities*
Funder: *AFAANZ Research Grant Scheme*
Institution: *Bond University*
Institution Reference: *A149*
Chief Investigator *Dr. Adrian Gepp*

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	\$	\$	
Cash balance as at 5 July 2019			0.00
Funds received:			
5 July 2019 Invoice no 029164	5,570.00	Total	5,507.00
Funds available:			5,507.00
Expenditure:			
Salaries & On-Costs	5,507.00	Total	5,507.00
Cash balance as at 5 July 2020			0.00

I, Andrew Calder, have reviewed the above statement. I can confirm that this is a true and fair representation of expenditure associated with the AFANZ Research Grants Scheme, and the funds were expended on the conduct of the project and in accordance with the Funding Agreement.

Andrew Calder
Director of Research
Office of Research Services
Bond University

20/7/2020

Date