

"Blockchain Network System for Assessing SMEs' Creditworthiness"

by

Dr Mariya Yesseleva-Pionka

Email: mariya.yesseleva@imc.edu.au

Australian National Institute of Management and Commerce

Abstract

The availability of and easy access to external debt finance for small and medium enterprises (SMEs) has been a subject of close research interest for academics, industry practitioners and policymakers around the globe. Decentralised permissioned Blockchain Network System with vast and fast information processing capabilities opens up new funding opportunities for SMEs. This paper presents the SMEs' credit risk assessment model in the presence of the Blockchain Network System. For hundreds of millions of SMEs around the world and for over 2.3 million SMEs in Australia, this could mean receiving access to necessary debt finance within minutes.

Keywords: Blockchain, FinTech, SME finance, business digital footprint, blockchain network system, SME credit risk.

JEL Classification: G32, G28, G18, L26

Introduction

This paper is following a recommendation introduced in recent 2020 MSME report published by the International Council for Small Business for the United Nations and the rest of the world.

A recommendation for the Australian government to further explore the possibility of creating decentralised permissioned Blockchain Network System for SMEs in partnership with significant participants (e.g. financial institutions, taxation office, land and real estate registries, credit bureaus, alternative lenders among others) with the data/information used for assessing SMEs' creditworthiness. Creation of the SME Blockchain Network allows for the appropriate records to be stored in each SME's Business Digital Footprint (BDF) Account, which is verified by algorithms on the Blockchain Network. Future research directions should concentrate on creating new

SME credit models in light of having SME Blockchain Network with vast information processing capabilities (Yesseleva-Pionka, 2020, p. 90).

Industry 4.0

All businesses, including SMEs, are currently exposed to the 4th Industrial Revolution. Introduction of numerous payment platforms, digital currencies, applications for financial services and products, digital banks, machine learning, advancements in Application Programming Interfaces (APIs), data analytics has been revolutionising the way we live and conduct business operations and ultimately giving greater control of finances (SIFT, 2020). Thus, it is imperative to analyse the effect of digital disruption on servicing SMEs financing needs. The open banking regime, also known as consumer data right (CDR) in Australia, is giving SME owner-managers control over sharing their information/data for specific purposes such as new loan applications (Australian Competition & Consumer Commission (ACCC), 2019). *"Fintechs/alternative lenders can potentially disrupt the financing options for SMEs. World of Open Banking, Application Programming Interface (API) and shared data can expose both providers and users of funds to a wide range of fully digital financing instruments/products"* (Yesseleva-Pionka, 2019, p. 9). Therefore, the investigation and re-evaluation of the traditional sources of revenue for financial institutions in the presence of Open Banking, API and evolving technology in general, is required.

Traditional Banks' Perspective

The availability of external debt finance for SMEs is a subject of vital research interest to academics and an issue of great value to policymakers around the world (Berger, 2009; Brancati, 2015; Council of Small Business in Australia (COSBOA), 2010; Degryse, Goeij, & Kappert, 2012; Reserve Bank of Australia, 2012; Yesseleva-Pionka, 2019). Banks/financial institutions' products and services have been historically the primary sources of financing for SMEs (Gambini & Zazzaro, 2013; Hernandez-Canovas & Martinez-Solano, 2010; NSW Business Chamber, 2013; Tucker, 2006). The small business lending process at traditional banks is highly manual, conducted across numerous unintegrated applications/systems, which leads to data duplication, inefficient, time-consuming and expensive lending process (Page, 2016).

Further, previous research studies have confirmed that traditional banks had consistently reported data problems with SMEs, as there is no single source of information for

credit risk assessment (Page, 2016). The SME financing process in the traditional banking sector has changed due to the effects of the 2007 Global Financial Crisis. As a result, banks have adopted a more conservative lending approach, which is further exacerbated by the Basel III higher capital requirement for banks when providing loans to SME sector (Yoshino & Taghizadeh-Hesary, 2018). Thus, alternative financing products and services provided by Fintechs have been rapidly increasing around the world in delivering various funding opportunities for SMEs (Earnst & Young, 2018; SIFT, 2020; Yesseleva-Pionka, 2018; Yoshino & Nemoto, 2019).

SME's Perspective

Defining an SME has been on a research agenda worldwide (Berryman, 1983; Drever, 2006; Wiesner, McDonald, & Banham, 2007). Typically, the following dimensions are included in the definitions – legal type of the business, number of employees, level of sales/revenue, total assets, capital/investment, loan size and industry sector. The performance of all SMEs, regardless of their size, is affected by the environment in which they operate. The interaction of an MSME with its customers, suppliers, funders, competitors, government agencies, credit bureaus and the broader community is essential to all enterprises.

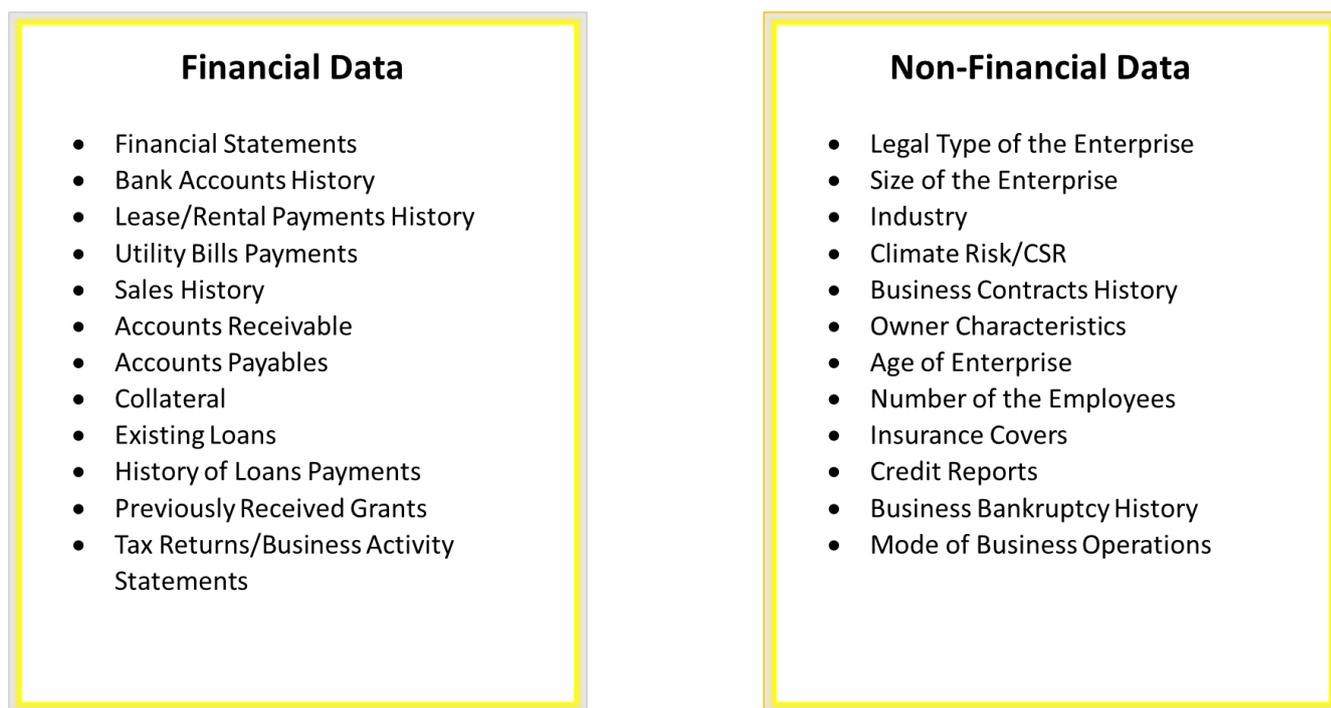
Previous academic studies have emphasised the environment of possible market failure and connection to the SMEs' access to bank and debt finance (Baldock & Whittam, 2008). Small business' success and failure research studies that relied on considerable datasets have acknowledged financial policy as a cause of failure (Jordan, Lowe, & Taylor, 1998). Additionally, it was noted by the Department of Innovation, Industry Science and Research (2011, p. 16) that survival rates for small enterprises are low in comparison to larger ones, due to "*...their greater susceptibility to the economic conditions...*", as SMEs generally do not have the long-term financial capacity to withstand economic downturns as larger enterprises do. Government programs may incorporate direct and technical assistance to an SME sector that requires financing (Korcsmaros, Takacs, & Dowers, 2003). A research study by Okura (2008) noted that enterprises that apply for government assistance are inclined to adopt advanced accounting reporting, which enables them to produce detailed financial statements. An enterprise that is entitled to receive government assistance tends to have access to accounting and legal services (Okura, 2008). This was reinforced in previous research studies and reports (Council of Small Business in Australia (COSBOA), 2010; CPA Australia, 2009; Korcsmaros

et al., 2003). Also, the COSBOA (2010) and CPA Australia (2009) recommended that the Commonwealth should pursue all available means that encourage investment and innovation among SMEs.

Taken together, the aforementioned research studies are fundamental to understanding how SMEs' adverse access to external debt finance may affect business operations and the broader economic environment. This was supported by Carter and Auken (2006), as SMEs' importance to the economy, managers, customers, suppliers and other stakeholders should not be underestimated when it comes to causes of business bankruptcy. This suggests that it is crucial to understand access to external debt finance, which is one of the leading causes of business bankruptcies in order to sustain SME sector stability and viability. SMEs that are better equipped with information and understanding of external finance arrangements do have an advantage (Australian Bureau of Statistics (ABS), 2012). Small business owners have limited knowledge of their credit risk and most importantly how they can improve their current creditworthiness/credit standing

The introduction of the blockchain network system (also known as Distributed Ledger Technology (DLT)) can potentially lead to the introduction of a single digital record for SMEs giving them the opportunity of being in charge of their proprietary data, which comes from verified sources and could be supplied to external lenders to maximise their chances and speed of accessing debt financing. At the time of writing this paper, COVID-19 is rapidly spreading across the world, which has accelerated the necessity of having reliable digital solutions for conducting business operations and accessing funding (SIFT, 2020). Blockchain Network System could process SMEs' vast data in assessing their creditworthiness (presented in Figure 1).

Figure 1: SMEs' Data in Assessing Creditworthiness



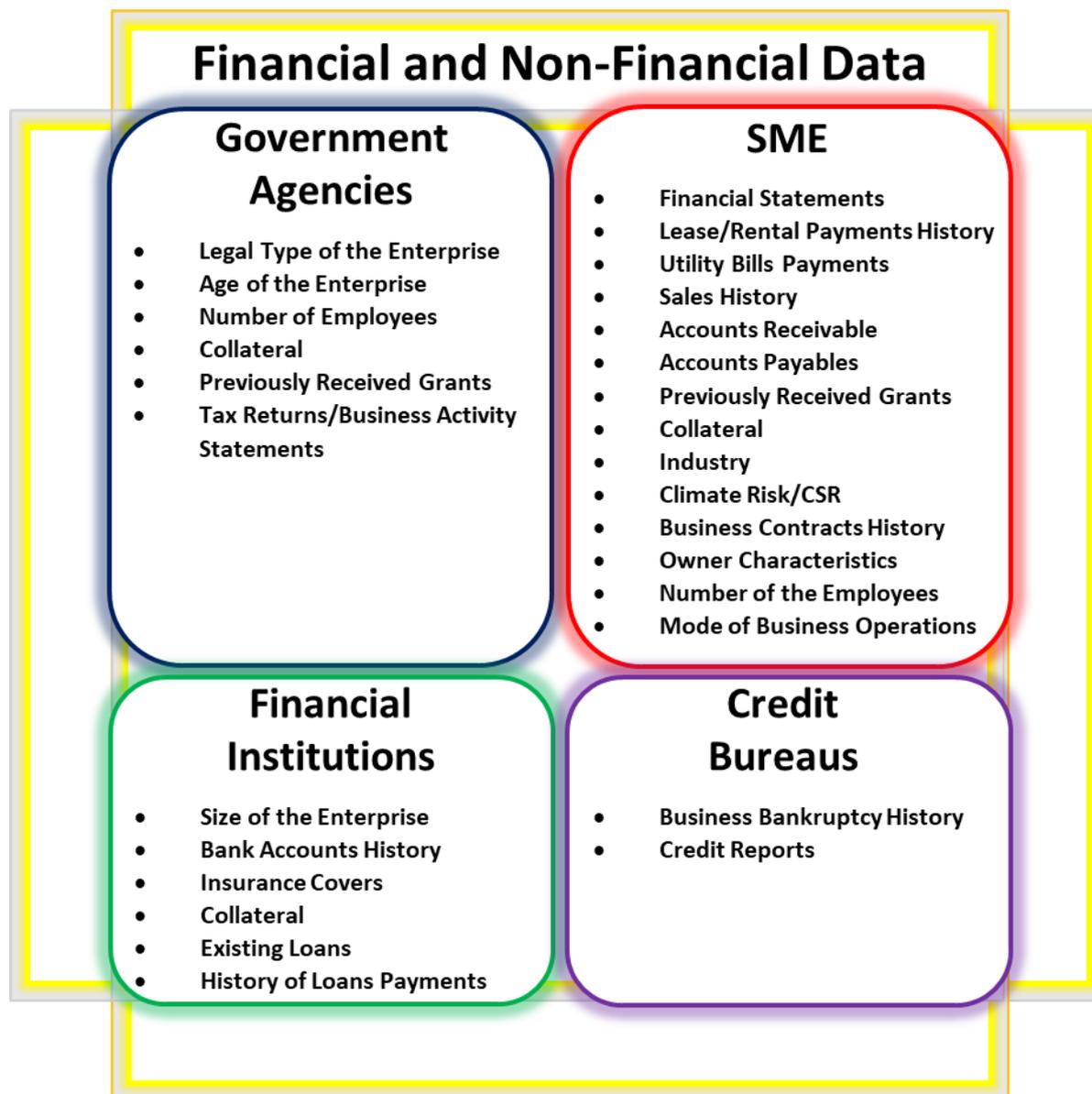
Historically, smaller enterprises have been labelled as less transparent and costly to service (Bruns & Fletcher, 2008). As a result, they received less capital and paid higher costs on borrowing in comparison to larger enterprises, as it was more costly for them to resolve information asymmetry with lenders (Cassar & Holmes, 2003). Blockchain Network System could be introduced as a solution to the information asymmetry. In the latest Blockchain 50 report published by Forbes, it is evident that Ant Financial and Amazon are providing loans to the vast SME sector by relying on their proprietary Blockchain data such as accounts receivables and accounts payables (Del Castillo & Schifrin, 2020). Figure 2 is presenting the merged data for performing a comprehensive credit risk analysis of each SME by using financial and non-financial data processed on the Blockchain Network system.

Figure 2: Merged Data in Assessing SMEs' Creditworthiness



The proposed decentralised permissioned Blockchain Network System (refer to Figure 3) is a digital space to which records/information could be added in partnership with significant participants (e.g. financial institutions, taxation office, land and real estate registries, credit bureaus, alternative lenders among others). The model should follow a hybrid approach *"...where both Blockchain technology and a data storage solution are both pursued, which provide the ability to link Blockchain transactions with data held off the chain and stored elsewhere."* (Berryhill, Bourgerly, & Hanson, 2018, p. 30). The creation of the SME Blockchain Network System will necessitate the revision of the Australian Government policies for building the network, adopting protocols/algorithm, privacy rights and providing data security.

Figure 3: SMEs' Credit Risk Assessment Model in the Presence of the Blockchain Network System

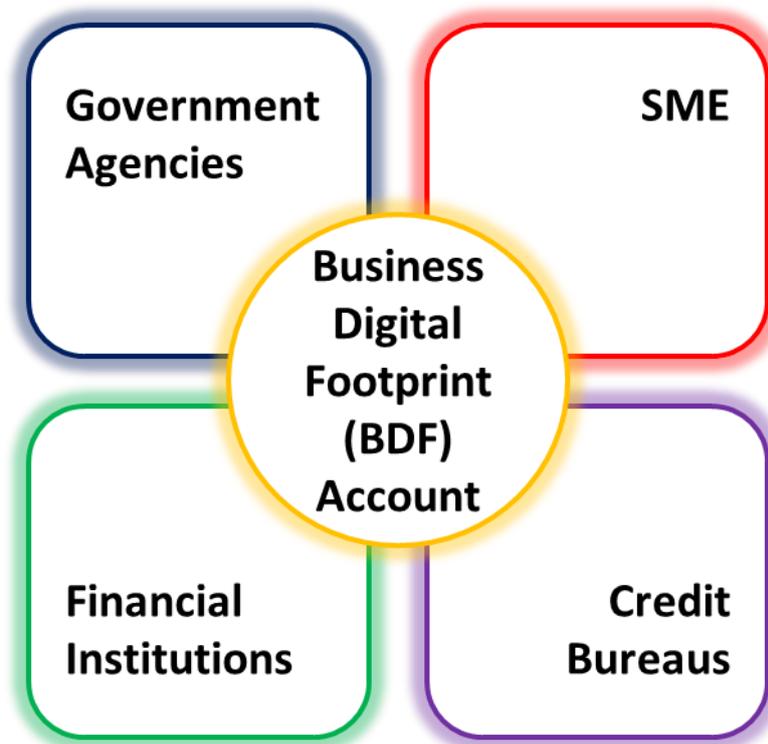


The final creation of a single digital record for each SME could track digital footprints and overcome the information asymmetry between the lenders and SMEs. The Statement from the U.K. Government Office for Science:

One of the greatest potential benefits of DLT is its ability to remove barriers and friction in the market and enable the creation of new information marketplaces...This would allow ministers to achieve policy outcomes centred on assisting [small and medium-sized enterprises] achieve economic growth through the effective use of technological innovation (Berryhill et al., 2018, p. 28).

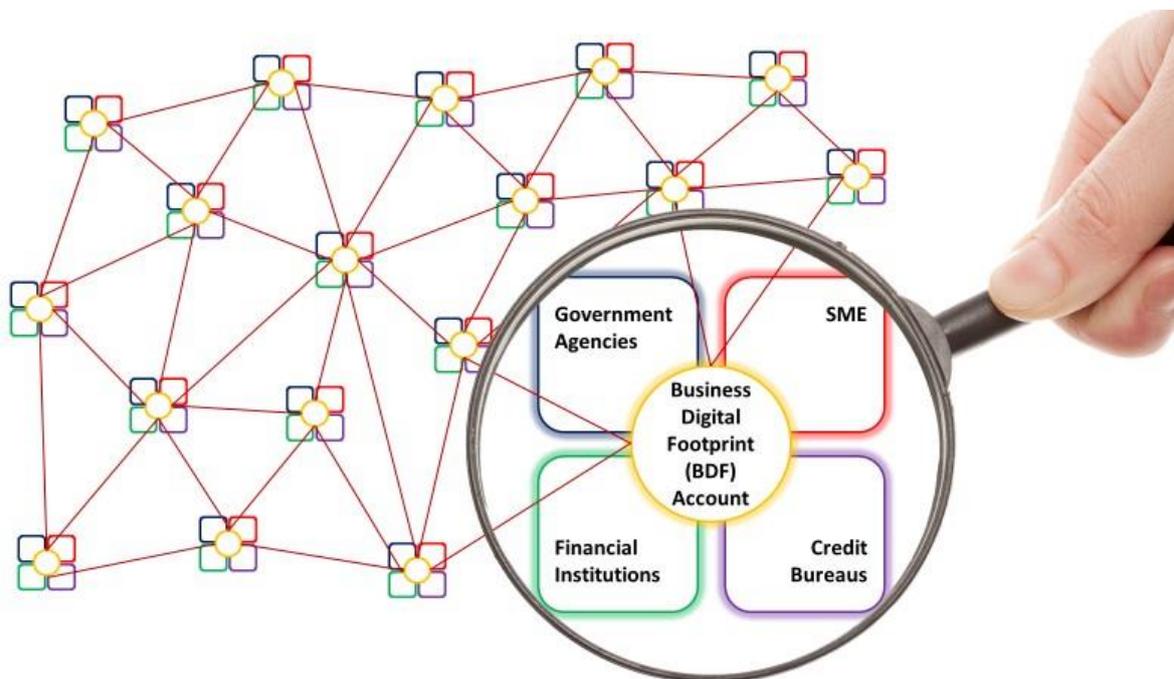
Business Digital Footprint (BDF) Account (refer to Figure 4) will have a set of validated and, most importantly, immutable records/transactions which will appear in chronological order with the details accessible by the participants in the Blockchain Network.

Figure 4: SME's Business Digital Footprint Account for Credit Risk Assessment



All the blocks (Business Digital Footprint Accounts) are linked in linear and sequential order and hence, resemble the chain concept (refer to Figure 5). For over 2.3 million of SMEs in Australia, this could mean receiving access to finance within minutes.

Figure 5: SME Blockchain Network System



Conclusions/ Recommendations for Future Research

A recommendation for the Australian Government to further explore, analyse, test and implement the decentralised permissioned Blockchain Network System for SMEs in partnership with significant participants (e.g. financial institutions, taxation office, land and real estate registries, credit bureaus, alternative lenders among others) with the data/information used for assessing SMEs' creditworthiness. Future research should concentrate on the empirical testing of the SMEs' credit risk assessment model in the presence of the Blockchain Network System.

Reference List

- Australian Bureau of Statistics (ABS). (2012). Microdata: Business Longitudinal Database. Retrieved from <http://www.abs.gov.au/AUSSTATS/abs@.nsf/DetailsPage/8168.0.55.0012006-07%20to%202010-11?OpenDocument>
- Australian Competition & Consumer Commission (ACCC). (2019). Consumer Data Right (CDR). Retrieved from <https://www.accc.gov.au/focus-areas/consumer-data-right-cdr-0>
- Baldock, R., & Whittam, G. (2008). SMEs' access to finance: is there still a debt finance gap? *Institute for Small Business & Entrepreneurship*.
- Berger, A. N. (2009). Comments on bank market structure, competition, and SME financing relationships in European regions by Mercieca, Schaeck, and Wolfe *Journal Financial Services*, 36(2), 157-159.
- Berryhill, J., Bourger, T., & Hanson, A. (2018). Blockchains Unchained. doi:doi:<https://doi.org/10.1787/3c32c429-en>
- Berryman, J. (1983). Small business failure and survey of the literature. *International Small Business Journal*, 1(4), 47-59.
- Brancati, E. (2015). Innovation financing and the role of relationship lending for SMEs. *Small Business Economics*, 44(2), 449-473. doi:10.1007/s11187-014-9603-3
- Bruns, V., & Fletcher, M. (2008). Banks' risk assessment of Swedish SMEs. *Venture Capital*, 10(2), 171-194.
- Carter, R., & Auken, H. V. (2006). Small firm bankruptcy. *Journal of Small Business Management*, 44(4), 493-512. Retrieved from 10.1111/j.1540-627X.2006.00187.x
<http://search.ebscohost.com/login.aspx?direct=true&db=bth&AN=22242913&site=ehost-live>
- Cassar, G., & Holmes, S. (2003). Capital structure and financing of SMEs: Australian evidence. *Accounting & Finance*, 43(2), 123-147. Retrieved from 10.1111/1467-629X.t01-1-00085
<http://search.ebscohost.com/login.aspx?direct=true&db=bth&AN=9925429&site=ehost-live>
- Council of Small Business in Australia (COSBOA). (2010). Submission to the Senate Economics Legislation Committee: Inquiry into access of small business to finance. Retrieved from <http://www.aph.gov.au/DocumentStore.ashx?id=2922614e-59b9-4c6b-81c4-2bab5245839b>
- CPA Australia. (2009). Access to finance for the small and medium-sized enterprise sector: Evidence and conclusions. Retrieved from <http://www.cpaaustralia.com.au/~media/corporate/allfiles/document/professional-resources/business/finance-sme-sector-evidence.pdf>
- Degryse, H., Goeij, P., & Kappert, P. (2012). The impact of firm and industry characteristics on small firms' capital structure. *Small Business Economics*, 38(4), 431-447. doi:10.1007/s11187-010-9281-8
- Del Castillo, M., & Schiffrin, M. (2020). Forbes Blockchain 50. Retrieved from <https://www.forbes.com/sites/michaeldelcastillo/2020/02/19/blockchain-50/#122ce49f7553>
- Department of Innovation Industry Science and Research. (2011). Key statistics Australian small business. Retrieved from <http://www.treasury.gov.au/~media/Treasury/Publications%20and%20Media/Publications/2011/Key%20Statistics%20Australian%20Small%20Business/downloads/PDF/SmallBusinessPublication.ashx>

- Drever, M. F. (2006). *Determinants of liquidity for Australian small and medium-sized enterprises (SMEs)*. (PhD). University of New England, Armidale.
- Earnst & Young. (2018). EY Fintech Australia Census.
- Gambini, A., & Zazzaro, A. (2013). Long-lasting bank relationships and growth of firms. *Small Business Economics*, 40(4), 977-1007. doi:10.1007/s11187-011-9406-8
- Hernandez-Canovas, G., & Martinez-Solano, P. (2010). Relationship lending and SME financing in the continental European bank-based system. *Small Business Economics*, 34(4), 465-482.
- Jordan, J., Lowe, J., & Taylor, P. (1998). Strategy and financial policy in UK small firms. *Journal of Business, Finance & Accounting*, 25(1), 1-27.
- Korcsmaros, K., Takacs, H., & Dowers, K. (2003). Increasing access of small and medium-sized enterprises to financing. Retrieved from <http://www.iadb.org/EXR/AM/2003/esp/Documents/DOC367AC369Background.pdf>
- NSW Business Chamber. (2013). Small business access to finance. Retrieved from http://www.nswbusinesschamber.com.au/NSWBC/media/Misc/Policy%20Documents/Local%20govt/Thinking%20Business/FINAL-Thinking-Business-Access-to-Finance_web.pdf
- Okura, M. (2008). Firm Characteristics and Access to Bank Loans: An Empirical Analysis of Manufacturing SMEs in China. *International Journal of Business & Management Science*, 1(2), 165-186. Retrieved from <http://search.ebscohost.com/login.aspx?direct=true&db=bth&AN=43484705&site=ehost-live>
- Page, H. (2016). *Seven Key Challenges in Assessing SME Credit Risk*. Retrieved from <https://www.moodysanalytics.com/-/media/whitepaper/2016/seven-key-challenges-assessing%20small-medium-enterprises-sme-credit-risk.pdf>
- Reserve Bank of Australia. (2012). Small business finance roundtable. Retrieved from <http://www.rba.gov.au/publications/workshops/other/small-bus-fin-roundtable-2012/pdf/small-bus-fin-roundtable.pdf>
- SIFT, T. (2020). *Fintech Unwrapped*. Retrieved from
- Tucker, M. (2006). Access to finance in Europe. *Local Economy*, 21(1), 78-83. Retrieved from 10.1080/02690940500472566
- <http://ezproxy.csu.edu.au/login?url=http://search.ebscohost.com/login.aspx?direct=true&db=bth&AN=19821323&site=ehost-live>
- Wiesner, R., McDonald, J., & Banham, H. (2007). Australian small and medium-sized enterprises (SMEs): a study of high performance management practices. *Journal of Management and Organisation*, 13(3), 227.
- Yesseleva-Pionka, M. (2018). *Emerging Trends in SME Finance*. Paper presented at the George Washington University October Conference Washington D.C.
- Yesseleva-Pionka, M. (2019). *Fintechs and the speed of financing for SMEs*. Paper presented at the 32nd Australasian Finance and Banking Conference, Sydney, Australia.
- Yesseleva-Pionka, M. (2020). *Blockchain for SME Finance*. Retrieved from <https://icsb.org/wp-content/uploads/2020/04/2020ICSBGlobalMSMEsReport.pdf>
- Yoshino, N., & Nemoto, N. (2019). *FinTech for Asian SMEs*. Retrieved from <https://www.adb.org/sites/default/files/publication/502781/adbi-fintech-smes.pdf>
- Yoshino, N., & Taghizadeh-Hesary, F. (2018). *A Comprehensive Method for the Credit Risk Assessment of Small and Medium-sized Enterprises based on Asian Data*. Retrieved from <https://www.adb.org/publications/comprehensive-method-credit-risk-assessment-sme-based-asian-data>