MPRA
Munich Personal RePEc Archive

Bank loan loss provisioning for sustainable development: the case for a sustainable or green loan loss provisioning system

Ozili, Peterson K

2023

Online at https://mpra.ub.uni-muenchen.de/115989/
MPRA Paper No. 115989, posted 14 Jan 2023 06:47 UTC

Bank loan loss provisioning for sustainable development: the case for a sustainable or green loan loss provisioning system

Peterson K. Ozili

Abstract

The purpose of this study is to present a sustainable (or green) loan loss provisioning system that align bank loan loss provisioning with the sustainable development goals. The findings of the study are that the proposed sustainable (or green) loan loss provisioning system will align bank loan loss provisioning with the sustainable development goals by adjusting loan loss provisions estimates to reflect the environmental benefits and costs of borrowers' business activities. Banks will incur additional provisions above normal provisions for loans issued to businesses whose activities are harmful to the environment and the climate. Banks will allocate fewer provisions whenever they issue loans to eco-friendly or green businesses. The implication of the proposed sustainable (or green) loan loss provisioning system is that bank regulators and supervisors need to consider the impact of the sustainable (or green) loan loss provisioning system on bank capital and bank stability.

Keywords: Bank performance, loan loss provisions, sustainability, sustainable development, SDGs, green washing, credit risk, green loan loss provisioning, sustainable loan loss provisioning.

JEL code: G21, G28, Q01, Q53.

January 2023

Published in: **Journal of Sustainable Finance and Investment**

http://dx.doi.org/10.1080/20430795.2022.2163847

1. Introduction

The objective of this paper is to present a sustainable (or green) loan loss provisioning system that align bank loan loss provisioning with the sustainable development goals. The study uses the discourse analysis methodology to explain the workings of the proposed sustainable (or green) loan loss provisioning system.

Loan loss provisions is the amount of money that banks must set aside in anticipation of expected credit losses while sustainable development is defined as development that meets the needs of the present without compromising the ability of future generations to meet their own needs (Rosen 2017; Ozili 2017). Sustainable development and its principle-based variant 'sustainability' are significant buzzwords in the banking community. Banks are becoming more conscious about sustainable development. Banks are becoming more concerned about environmental issues and climate issues and they want to spend their money in a way that is kind to the planet (Carè 2018). But the current loan loss provisioning system of banks does not take into account the impact of borrowers' activities on the environment, people and society.

Prior to the COVID-19 pandemic, banks and non-bank financial institutions were disclosing information about how their activities contribute to sustainability and how their activities protect people, the environment and the planet (Nobanee and Ellili 2016; Sobhani, Amran and Zainuddin 2012). Banks traded in green financial instruments and made voluntary and mandatory sustainability disclosures. They also issued loans to corporate borrowers whose activities are ESG-compliant. These activities led to the emergence of specific buzzwords in the banking sector in the pre-COVID period. Some of the buzzwords include 'sustainability reporting', 'ESG banking', 'sustainable banking', and 'sustainability performance' (see Raut et al 2017; Buallay et al 2020; Korzeb and Samaniego-Medina 2019). The 2020-2022 COVID-19 pandemic further accelerated the sustainability movement in the banking sector. Yet, no consideration has been given to how the loan loss provisioning system of banks can be modified to take into account the impact of borrowers' activities on the environment, people and society.

Existing studies have examined the weakness of the current bank provisioning system (Ozili and Outa 2017; Camfferman 2015; López-Espinosa et al 2021). Most studies argue that the incurred-loss provisioning system is backward-looking while the expected credit loss provisioning system is forward-looking and it permits too much managerial discretion in determining the size of loan loss provisions estimate (Camfferman 2015; López-Espinosa et al 2021). Some studies have called for strict bank supervision to mitigate the opportunistic manipulation of loan loss provisions by bank managers (Gaston and Song 2014; Ozili and Outa 2017). But no studies have emphasized the need to develop a sustainable (or green) loan loss provisioning system that align bank provisioning with the goals of sustainable development while also satisfying the profit expectation of bank shareholders. The lack of studies in this area creates a gap in the literature which this study seeks to fill. There is a need to develop a provisioning system that would make bank provisioning align with sustainable development in the post-COVID era.

Loan loss provisions is the amount of money that banks must set aside in anticipation of expected credit losses (Ozili 2018). Loan loss provisioning for sustainable development, also known as sustainable (or green) loan loss provisioning, is essentially a loan loss provisioning system that align bank provisioning with the goals of sustainable development. For this reason, sustainable (or green) loan loss provisioning is part of a larger movement toward sustainable and ethical banking practices. This paper presents an innovative idea which is the 'sustainable (or green) loan loss provisioning system' or 'loan loss provisioning for sustainable development' or 'green loan loss provisioning'. The three terms mean the same thing and is used interchangeably in the paper. The goal of loan loss provisioning for sustainable development or sustainable (green) loan loss provisioning is to encourage lending to green borrowers as it offers mutual benefits for the environment and for banks. It will increase lending to businesses whose activities are beneficial for the environment and also increase bank profitability for the greater good of the planet and its people. Having a loan loss provisioning system that takes into account sustainable development concerns will ensure that banks put the environment and society first before profit. It will allow banks to think about how they can help green businesses grow in the short and long

run within ethical and moral principles. Generally, when banks give loans to green borrowers or ESG-compliant borrowers, they have to account for credit risk through loan loss provisioning.

This study contributes to the literature in two ways. First, the concept of sustainable (or green) loan loss provisioning contributes to several studies in the literature that investigates the role of the banking sector in climate change mitigation. This study contributes to this literature by proposing an innovative idea that allows banks to take into account climate change risk considerations in their lending activities. Banks will be able to increase loan loss provisions when their obligors have high exposure to climate change risks and decrease loan loss provisions when their obligors have low exposure to climate change risks. Second, this study contributes to the literature that examine the role of the financial sector in achieving the sustainable development goals. Studies in this literature examine the role of financial institutions, financial instruments and financial regulation in accelerating the realization of the sustainable development goals. This study contributes to this literature by proposing a regulatory framework known as the sustainable loan loss provisions system. The proposed system can help to align banks' loan loss provisioning with the sustainable development goals.

The rest of the paper is structured in the following way. Section 2 presents the literature review. Section 3 presents the proposed sustainable (or green) loan loss provisioning system. Section 4 presents a discussion about the role of regulators, regulatory treatment and other regulatory concerns. Section 5 highlights the challenges of the proposed sustainable (or green) loan loss provisioning system. Section 6 concludes.

2. Literature review

2.1. The incurred loss and expected credit loss provisioning models

Under the FASB and IASB accounting standards, the incurred loss model was the accounting model for recognizing loan losses. Under the model, provisions are set aside when losses have been incurred and estimated. Existing studies such as Edwards (2014), Mahieux et al. (2020) and Ozili and Outa (2017) have argued that the incurred loss model limits provisioning to losses that are considered probable as of the balance sheet date rather than of probable future losses. Edwards (2014) points out that the incurred loss model does not permit the recognition of credit losses based on events that are expected to occur in the future; for this reason, the incurred loss model gives rise to provisions that are too late and too little, and in most cases, provisions have been allocated too late during financial crises. Laeven and Majnoni (2003) also argued that episodes of financial crisis or economic downturns showed that the incurred loss model leads to the delayed recognition of loan losses which is usually low during "good years" before crises and suddenly becomes very high during bad years, thereby worsening the performance of banks in bad years. This has led to the argument that the incurred loss model recognizes loan losses "too little" and "too late" (Laeven and Majnoni 2003; Edwards 2014). The criticisms of the incurred loss model led international standard setters to replace the incurred loss model with the IFRS expected credit loss model.

The expected credit loss (ECL) model allows for the early recognition of credit losses using an expected credit loss model that generates an estimate of expected loan losses over the lifetime of the loan (Gomaa et al 2019; Cohen and Edwards 2017). The ECL model is generally considered to be a more superior provisioning system because it generates high provisions and recognizes provisions early compared to the incurred loss provisioning model that allocates provisions that is 'too late' and 'too little' (Laeven and Majnoni 2003; Ozili and Outa 2017). Under the expected credit loss model, banks would be required to allocate provisions for probable future credit losses. The expected credit loss model permits the recognition of credit losses based on events that are expected to occur in the future; thereby making provisions timely and large in response to banks' risk assets. Mahieux et al (2020) show that the key difference between the two

provisioning models is that under the incurred loss model, banks delay recognition of credit losses until they have been incurred, whereas under the expected loss model, banks must recognize the full amount of credit losses that are expected as soon as loans are originated. The expected credit loss model was expected to bring an end to the era of loan loss provisioning that is too little or too late, rather, the expected credit loss model led to new problems. For instance, Mahieux et al (2020) and Maurer (2020) point out that the expected credit loss model produces forecasts of future credit losses that are often unreliable and could lead to false loss recognition that may reduce bank capital ratio, reduce credit availability, make credit losses worse during a recession and heighten the volatility of bank earnings. Another criticism of the expected credit loss model is that it does not take into account sustainability, eco-friendly or green concerns in bank provisioning processes.

2.2. Sustainable development and sustainability and banking

A growing literature show that banks have begun to adopt sustainability practices through sustainability disclosures and sustainability reporting. For instance, Novokmet and Rogošić (2016) show that banks have adopted sustainability accounting by making sustainability-related disclosures through sustainability reporting. Other studies in the literature such as Sobhani, Amran and Zainuddin (2012) focused on the nature of corporate sustainability disclosures in annual reports. Sobhani, Amran and Zainuddin (2012) focused on the nature of corporate sustainability disclosures in the annual report of Bangladesh banks and the disclosures on their websites. They find that all listed banks disclose information about sustainability in an unstructured manner in both the annual reports and corporate websites. They also observe that banks disclosed more sustainability information in their annual reports than on their corporate website.

Other studies assess the association between bank performance and sustainability practices. For instance, Scholtens and van't Klooster (2019), in their empirical analysis, find that banks that have higher sustainability scores experience low default risk. The implication is that banks that have high sustainability score have low systemic risk, thereby suggesting a negative association between sustainability and risk in the banking sector. In another study, Buallay, Fadel, Alajmi and

Saudagaran (2020) examine the relationship between sustainability reporting and bank performance in developed and developing countries. They examine 882 banks from developed and developing countries for 11 years after the 2008 financial crisis. They find that ESG disclosures improve banks' accounting and market-based performance in developed countries. In a related study, Nobanee and Ellili (2016) measure the degree of corporate sustainability disclosures by listed banks in the financial markets of the United Arab Emirates from 2003 to 2013. They observe that the overall level of sustainability disclosure by listed banks in the United Arab Emirates' financial markets is low. They also observe that the level of corporate sustainability disclosure is higher in conventional banks than in Islamic banks. They also find that sustainability disclosure has a significant positive effect on the performance of conventional banks and has no significant effect on the performance of Islamic banks. Another empirical study focused on the decision-usefulness of sustainability disclosures to investors. Carnevale and Mazzuca (2014), in their analysis, show that investors appreciate the additional disclosure provided by sustainability reporting and that the disclosures produce a positive effect on stock prices. The implication of their findings is that sustainability reporting is decision-useful to investors. But the value relevance of the sustainability report varies across countries due to different institutional characteristics. Overall, the study of Carnevale and Mazzuca (2014), Buallay et al (2020), Scholtens and van't Klooster (2019), collectively shows that there is a link between sustainability and financial (or bank) performance.

Other studies examine banks' contribution to the sustainable development goals as well as banks' support for the transition toward sustainability. In South Africa, Peeters (2005) shows that the inability to fund sustainable development programs through philanthropic official assistance made private sector agents and policy makers to solicit the assistance of private banks and development banks in financing sustainable development programs. The author emphasizes the need for socially responsible investing (SRI) as it can help to increase investment toward sustainable development. Avrampou, Skouloudis, Iliopoulos and Khan (2019) examine whether the reported performance of banks contribute to the sustainable development goals. The study employed a Global Reporting Initiative (GRI) framework of performance indicators to assess the non-financial performance indicators disclosed in the annual sustainability reports. They focus

on a small sample of leading European banks and find that banks' reported performance has a very low contribution to the sustainable development goals. Cosma, Venturelli, Schwizer and Boscia (2020) investigate the contribution of European banks to the sustainable development goals (SDGs). They also explore the factors that differentiate the SDGs approach of individual banks. The study finds that European banks contribute to the SDGs and that country of origin, legal system and adoption of an integrated report seem to differentiate banks in terms of contribution to the SDGs while business model and stock exchange listing do not differentiate banks in terms of contribution toward the SDGs.

Collectively, the literature shows a positive association between sustainability and bank performance as banks seek to contribute to the SDGs. However, the literature has not examined how the loan loss provisions of banks can be adjusted in ways that support that the attainment of the sustainable development goals toward sustainable development. This creates a gap in the banking-sustainability literature. This study fills this gap in the literature by focusing on bank loan loss provisions (LLP) and the possible adjustments that can be made to loan loss provisions to align it with the sustainable development goals.

3. The proposed sustainable (or green) loan loss provisioning system

3.1. The need for a shift to a sustainable (or green) loan loss provisioning system

One reason why the banking sector need to shift to a sustainable (or green) loan loss provisioning system is because a sustainable (or green) loan loss provisioning system appeals to the global sustainability movement. Carè (2018) show that financial institutions, especially banks, can contribute to sustainable development by paying attention to sustainability issues especially in their credit risk management process. The sustainable (or green) loan loss provisioning system will align bank lending activities with the United Nations sustainable development goals (SDGs), and can help to shift the global economy towards sustainable growth and development by adjusting provisions for loans issued to sustainable businesses, eco-friendly businesses and circular businesses (Ozili 2021).

Two, there is a need for a shift to a sustainable (or green) loan loss provisioning system because it aligns bank credit practices with sustainability. A sustainable (or green) loan loss provisioning system will encourage banks to incorporate sustainability factors in their credit risk measurement processes. This will give rise to sustainability-adjusted credit risk estimates that will reflect banks' outlook about the environmental impact of their borrowers' business activities (Henry Ntarmah et al 2019). It will also encourage banks to lend money to businesses that produce eco-friendly products and businesses that engage in environment protection activities (Ozili 2021).

Three, there is a need for a shift to a sustainable (or green) loan loss provisioning system because it mitigates green washing in banks. Greenwashing is considered to be a common issue in banks as it allows banks to mislead people or misrepresent their support for environment-friendly business activities (Attig et al 2021). By adopting a sustainable (or green) loan loss provisioning system, banks can make an actual effort to lower the amount of loan loss provisions they have to set aside for loans given to eco-friendly businesses. This will constitute real action towards being green by banks, thereby mitigating greenwashing.

Four, there is a need for a shift to a sustainable (or green) loan loss provisioning system because it creates competition to be sustainability-oriented in the banking sector. Prasanna et al (2019) argue that there is need to encourage businesses to compete in being sustainability-oriented. Adopting a sustainable (or green) loan loss provisioning system that takes into account sustainable development concerns will increase competition for eco-friendly or green borrowers among banks. Such system would create an incentive for banks to lower the absolute size of provisions, thereby increasing bank profitability. This will give banks an incentive to compete for eco-friendly or green borrowers because the sustainable (or green) loan loss provisioning system creates a direct connection between eco-friendly green lending and profitability through a reduction or increase in the loan loss provisions estimates. Banks that want a significant reduction in provisions will have an incentive to find a large number of eco-friendly or green borrowers, thereby increasing competition among banks.

Five, there is a need for a shift to a sustainable (or green) loan loss provisioning system because it boosts the sustainability ranking and reputation of banks. Sustainability rankings and

reputation can be increased by engaging directly in, or supporting, actions and activities that mitigate climate change and protect the environment (Phillis et al 2011; Liern and Pérez-Gladish 2018). As more and more banks adopt a sustainable (or green) loan loss provisioning system, it can increase banks' patronage of eco-friendly borrowers who want to borrow money to finance eco-friendly business activities. This in turn will improve the sustainability rankings and reputation of banks that adopt a sustainable (or green) loan loss provisioning system.

Six, there is a need for a shift to a sustainable (or green) loan loss provisioning system because it prevents banks from contributing to carbon emission in the climate. A sustainable (or green) loan loss provisioning system can introduce higher provisions for loans granted to carbon-emitting businesses, thereby reducing bank profit. Banks will mitigate this effect either by out-rightly refusing to lend to carbon-emitting businesses or by reducing the number of loans given to carbon-emitting businesses.

3.2. Understanding the proposed sustainable (or green) loan loss provisioning system

A sustainable (or green) loan loss provisioning system refers to a provisioning system that adjust the size of loan loss provisions to take into account borrowers' contribution to climate change with a focus on whether borrowers' activities reduce or increase climate change risks and related risks to the environment. It is a loan loss provisioning system that adjusts loan loss provisions estimates to reflect the environmental benefits or costs of borrowers' business activities. A sustainable (or green) provisioning system allocates fewer loan loss provisions for loans issued to businesses whose activities are environment-friendly and allocates higher loan loss provisions for loans issued to businesses whose activities are harmful and destructive to the environment.

Consider a hypothetical example. The example below illustrates how a sustainable (or green) loan loss provisioning system works. Assume a bank wants to issue a total loan of $20 million dollars to corporate borrowers. But the bank is concerned about the environmental impact of borrowers' business activities. After studying the total environmental impact of borrowers' businesses, the bank will choose the scenario that best describes the environmental impact of its borrowers' business. The bank can choose whether the impact falls under the "very harmful" scenario, "moderately harmful" scenario, "neutral (neither harmful nor beneficial)" scenario,

"moderately beneficial" scenario, and "very beneficial" scenario. The bank conducts a scenario analysis to determine the sustainability-adjusted loan loss provisions estimate using the sustainable (or green) loan loss provisioning model in table 1. The bank can apply a surcharge rate in terms of percentage. The surcharge rate is an estimate of the environmental cost (a positive surcharge) and the environmental benefit (a negative surcharge) of lending to businesses.

Scenario 1 in table 1 shows that, if the bank lends the entire $20 million to environmentally-harmful businesses, the bank will incur an additional loan loss provision of $8 million in addition to normal loan loss provision of $20 million. The effect of this is a reduction in profit by $8 million. In the second scenario, if the bank lends the entire $20 million to businesses whose activities cause moderate harm to the environment, the bank will incur an additional loan loss provision of $3 million in addition to normal loan loss provision of $20 million. The effect of this is a reduction in profit by $3 million. In the third scenario, if the bank lends the entire $20 million to businesses whose activities have no apparent harmful or beneficial effect on the environment, the bank will not incur any additional loan loss provision. There is no effect on profit. In the fourth scenario, if the bank lends the entire $20 million to businesses whose activities have moderate benefits for the environmental, the bank's normal loan loss provisions will decrease by $4 million. The effect of this is a possible increase in profit by $4 million. In the fifth scenario, if the bank lends the entire $20 million to businesses whose activities have significant benefits for the environment, the bank's normal provisions will decrease by $8 million. The effect of this is a possible increase in profit by $8 million. Overall, the model in table 1 shows how a sustainable (or green) loan loss provisioning system works. It shows that a sustainable (or green) provisioning system allocates fewer loan loss provisions for loans issued to businesses whose activities are environment-friendly, and allocates higher provisions for loans issued to businesses whose activities are harmful and destructive to the environment.

Table 1. The sustainable (or green) loan loss provisioning model

	Environmental impact	Surcharge Rate	Adjustment to normal provisions	Adjusted provisions amount	Implication	Decision
Scenario 1	Very harmful	+40%	$20,000,000 * 1.40	$28,000,000	The bank will allocate a very high additional provisions for the loan	Do not lend to businesses in this category to avoid depleting profit by $8,000,000
Scenario 2	Moderately harmful	+15%	$20,000,000 * 1.15	$23,000,000	The bank will allocate a moderately high additional provisions for the loan	Do not lend to businesses in this category to avoid depleting profit by $3,000,000
Scenario 3	Neutral (neither harmful nor beneficial)	0%	$20,000,000 * 1.00	$20,000,000	The bank does not allocate any additional provisions for the loan	Lend to businesses in this category. Such lending leaves profit level unchanged
Scenario 4	Moderately beneficial	-20%	$20,000,000 * 0.80	$16,000,000	The bank will allocate a moderately low additional provisions for the loan	Lend to businesses in this category. It will increase profit by $4,000,000
Scenario 5	Very beneficial	-40%	$20,000,000 * 0.60	$12,000,000	The bank will allocate a very additional provisions for the loan	Lend to businesses in this category. It will increase profit by $8,000,000

4. Role of regulators, regulatory treatment and other regulatory concerns

When adopting a sustainable (or green) loan loss provisioning system, bank regulators and supervisors need to consider the implication of the sustainable (or green) loan loss provisioning system on regulatory capital. The literature show that high loan loss provisions usually have a negative effect on bank capital by reducing bank profit and equity capital (Laeven and Majnoni 2003; Leventis et al 2011). Therefore, regulators need to analyse the impact of the sustainable (or green) loan loss provisioning system on regulatory capital. Regulators need to understand that a sustainable (or green) loan loss provisioning system will introduce fundamental changes to banks' provisioning practices in specific ways, as it will require banks to report higher provisions when they give loans to harmful businesses and report lower provisions when they give loans to eco-friendly businesses.

Regarding the regulatory treatment of a sustainable (or green) loan loss provisioning system, regulators may need to introduce a regulatory surcharge limit that is flexible. This will prevent banks from using their own discretion to fix surcharge rates arbitrarily to reduce provisions and increase profit. Under a flexible surcharge regime, for instance, the bank regulator can fix a 35% to 50% surcharge limit for loans given to businesses whose activities pose great harm to the environment. Bank supervisors can require banks to choose a surcharge within the regulatory surcharge limit, and justify the surcharge they choose within the regulatory surcharge limit. If a bank chooses a surcharge rate of 40% but the bank supervisor feels that borrowers' activities poses more harm to the environment than the bank recognizes, the bank supervisor can increase the surcharge closer to the highest regulatory surcharge limit, say 50%, to make the bank keep higher provisions. Conversely, the bank regulator can fix a -40% to -20% surcharge limit for loans given to businesses whose activities present great benefits for the environment. The bank supervisor can also require banks to choose a surcharge within the regulatory surcharge limit and justify the surcharge they choose within the regulatory surcharge limit. If a bank chooses a surcharge rate of -40% but the bank supervisor feels that borrowers' activities do not present as much benefits for the environment as the bank claims, then the bank supervisor can increase the

surcharge rate to a value closer to the higher limit, e.g. -20%, to avoid any significant reduction in normal provisions.

Regarding cross regional adoption of the sustainable (or green) loan loss provisioning system, it is important to understand that banks in some jurisdiction may or may not adopt the sustainable (or green) loan loss provisioning system for different reasons. Some jurisdiction may rather retain the existing IFRS expected credit loss framework, preferring to modify the existing IFRS ECL framework to take into account sustainability risk concerns and this will explain why several jurisdictions may not adopt or accept a sustainable (or green) loan loss provisioning system.

5. Challenges of a sustainable (or green) loan loss provisioning system

One challenge of adopting a sustainable (or green) loan loss provisioning system is that there are few eco-friendly businesses compared to carbon-emitting businesses. Gunawan and Dhewanto (2012) show that sustainable development is a recent issue in some countries, and for this reason, these countries may have very few eco-friendly businesses and large number of carbon-emitting businesses. Some countries have very few number of eco-friendly businesses and large number of carbon-emitting businesses. The implication of having very few number of eco-friendly businesses is that some banks will not be able to find new eco-friendly borrowers to extend new loans to. This will prevent such banks from benefiting from low provisioning under a sustainable (or green) loan loss provision system. Banks that are unable to find enough eco-friendly borrowers are more likely to under-perform because they will not be able to reduce their provisions. This might lead to high provisions and low profitability, thereby posing bank stability risks for banks that cannot find enough eco-friendly businesses to lend to.

Another challenge of adopting a sustainable (or green) loan loss provisioning system is that there are different opinions about what is an 'eco-friendly' or 'green' business activity. The literature shows that there are disagreements about what constitutes 'green' (Lindenberg 2014; Ozili 2022), and there is presently no universal definition of what it means to be green or eco-friendly

(Thatcher 2013). For this reason, there will be different opinions or views about what makes a borrower's activity 'green' or 'eco-friendly'. Individual banks will hold different views about what makes a business' activity green or eco-friendly while bank supervisors will hold a different view as well. This can introduce subjectivity in determining whether a borrower's activity is green or eco-friendly. However, introducing a regulatory framework that clearly defines the term 'green' and 'eco-friendly' can help to alleviate this problem.

Another challenge of adopting a sustainable (or green) loan loss provisioning system is that it can reduce credit supply in the economy. When banks cannot find new eco-friendly businesses to lend to, banks may decrease lending to carbon-emitting businesses in order to leave the size of normal provisions unchanged and to preserve profit. As more banks reduce lending to carbon-emitting businesses, it can lead to a decline in aggregate credit supply and increase in interest rate as only few banks may be willing to lend to carbon-emitting businesses. The consequence will be a possible credit crunch and macroeconomic instability (Iyer et al 2014).

Another challenge of adopting a sustainable (or green) loan loss provisioning system is that it can hide significant fragilities in individual banks from unsophisticated investors. Weak banks, or banks that have serious fragilities, can increase the number of loans they issue to eco-friendly businesses in order to decrease the size of loan loss provisions and increase profit as a strategy to hide their internal fragility from unsophisticated investors since unsophisticated investors are less concerned about risks when banks are very profitable. Dechow and Skinner (2000) show that sophisticated investors can see beyond the profit number to determine whether banks' fundamentals are stable and sound while unsophisticated investors are less concerned about risks when banks are very profitable.

6. Conclusion

This study presented a sustainable (or green) loan loss provisioning system that align bank loan loss provisioning with the sustainable development goals. In the study, I showed that a sustainable (or green) loan loss provisioning system can allocate fewer loan loss provisions for loans issued to businesses whose activities are environment friendly, and allocate higher provisions for loans issued to businesses whose activities are harmful and destructive to the environment. Bank regulators have a role to play in fixing a regulatory surcharge limit for the allocation of additional provisions under the sustainable (or green) loan loss provisioning system. The study showed that adopting the sustainable loan loss provision system is important because it appeals to the global sustainability movement, it aligns bank credit practices with sustainability, it mitigates green washing in banks, it creates competition to be sustainability-oriented in the banking sector, it boosts the sustainability ranking and reputation of banks, it prevents banks from contributing to carbon emission in the climate and it helps the environment as a whole. The study also identified some factors that may hinder the working of the sustainable (or green) loan loss provisions such as the presence of very few eco-friendly businesses relative to the large number of carbon-emitting businesses in many countries, the different opinions about what is an 'eco-friendly' or 'green' business activity, the likely reduction in credit supply to the economy under a sustainable (green) loan loss provisioning system and the concerns that a sustainable (green) loan loss provisioning system may hide significant fragilities in individual banks from unsophisticated investors

The practical implication of the sustainable (or green) loan loss provisioning system is that it allows adjustments to be made to loan loss provisions estimates so that provisions can take into account borrowers' contribution to climate change with a focus on whether borrowers' activities reduce or increase climate change risks as well as risks to the environment. The theoretical implication of the study is that the proposed system supports the sustainable finance literature that suggest ways to make financial institutions support the realization of the sustainable development goals. Another implication of the sustainable (or green) loan loss provisioning system is that it allows individual banks to make a significant contribution to the sustainable

development goals. It also provides an opportunity for bank supervisors to get involved in sustainability discussions with banks, thereby making sustainability and sustainable development an important issue in the banking sector. Finally, regulators need to ensure that they understand the application and impact of the proposed sustainable (or green) loan loss provisioning system on bank's regulatory capital. One limitation of the study is that it did not consider how the sustainable (or green) loan loss provisioning system might decrease or increase systemic risk in the financial system. Future studies can explore how other bank financial numbers can contribute to sustainable development other than loan loss provisions.

Reference

Attig, N., Rahaman, M. M., and Trabelsi, S. 2021. Greenwashing and Bank Loan Contracting: Does Environmental Disclosure Quality Matter to Creditors?. *Available at SSRN 3880113.*

Avrampou, A., Skouloudis, A., Iliopoulos, G., and Khan, N. 2019. Advancing the sustainable development goals: Evidence from leading European banks. *Sustainable Development 27*(4): 743-757.

Buallay, A., Fadel, S. M., Alajmi, J., and Saudagaran, S. 2020. Sustainability reporting and bank performance after financial crisis: evidence from developed and developing countries. *Competitiveness Review: An International Business Journal* 31(4): 747-770.

Camfferman, K. 2015. The emergence of the 'incurred-loss' model for credit losses in IAS 39. *Accounting in Europe* 12(1): 1-35.

Carè, R. 2018. Exploring the role of banks in sustainable development. In *Sustainable banking* (pp. 39-64). Palgrave Pivot, Cham

Carnevale, C., and Mazzuca, M. 2014. Sustainability report and bank valuation: evidence from E uropean stock markets. *Business Ethics: A European Review 23*(1): 69-90.

Cohen, B. H., and Edwards, G. 2017. The new era of expected credit loss provisioning. *BIS Quarterly Review, March*.

Cosma, S., Venturelli, A., Schwizer, P., and Boscia, V. 2020. Sustainable development and European banks: A non-financial disclosure analysis. *Sustainability 12*(15): 6146.

Dechow, P. M., and Skinner, D. J. 2000. Earnings management: Reconciling the views of accounting academics, practitioners, and regulators. *Accounting horizons 14*(2): 235-250.

Edwards, G. A. 2014. The upcoming new era of expected loss provisioning. *SEACEN Financial Stability Journal* 2: 13-24.

Gaston, E., and Song, M. I. 2014. Supervisory roles in loan loss provisioning in countries implementing IFRS. *International Monetary Fund.*

Gomaa, M., Kanagaretnam, K., Mestelman, S., and Shehata, M. 2019. Testing the efficacy of replacing the incurred credit loss model with the expected credit loss model. *European Accounting Review 28*(2): 309-334.

Gunawan, A. A., and Dhewanto, W. 2012. Why eco-friendly family business is less popular in Indonesia?. *Procedia-Social and Behavioral Sciences* 57: 61-68.

Iyer, R., Peydró, J. L., da-Rocha-Lopes, S., and Schoar, A. 2014. Interbank liquidity crunch and the firm credit crunch: Evidence from the 2007–2009 crisis. *The Review of Financial Studies* 27(1): 347-372.

Korzeb, Z., and Samaniego-Medina, R. 2019. Sustainability performance. A comparative analysis in the polish banking sector. *Sustainability 11*(3): 653.

Laeven, L., and Majnoni, G. 2003. Loan loss provisioning and economic slowdowns: too much, too late?. *Journal of financial intermediation 12*(2): 178-197.

Leventis, S., Dimitropoulos, P. E., and Anandarajan, A. 2011. Loan loss provisions, earnings management and capital management under IFRS: The case of EU commercial banks. *Journal of financial services research* 40(1): 103-122.

Liern, V., and Pérez-Gladish, B. 2018. Ranking corporate sustainability: A flexible multidimensional approach based on linguistic variables. *International Transactions in Operational Research* 25(3): 1081-1100.

Lindenberg, N. 2014. Definition of green finance. DIE mimeo. Available at SSRN: https://ssrn.com/abstract=2446496

López-Espinosa, G., Ormazabal, G., and Sakasai, Y. 2021. Switching from incurred to expected loan loss provisioning: Early evidence. *Journal of Accounting Research* 59(3): 757-804.

Mahieux, L., Sapra, H., and Zhang, G. 2020. CECL: Timely loan loss provisioning and bank regulation. *Available at SSRN 3523321.*

Maurer, M. 2020. Lawmakers Press Rule Maker on Economic Impact of Credit Loss Standard. *Wall Street Journal*. Available at https://www.wsj.com/articles/lawmakers-pressrule-maker-on-economic-impact-of-credit-loss-standard-11579139500.

Nobanee, H., and Ellili, N. 2016. Corporate sustainability disclosure in annual reports: Evidence from UAE banks: Islamic versus conventional. *Renewable and Sustainable Energy Reviews 55*: 1336-1341.

Novokmet, A. K., and Rogošić, A. 2016. Bank sustainability reporting within the GRI-G4 framework. *Zeszyty Teoretyczne Rachunkowości* 88 (144): 109-123.

Ozili, P. K. (2017). Discretionary provisioning practices among Western European banks. *Journal of Financial Economic Policy*, 9(1), 109-118.

Ozili, P. K., and Outa, E. 2017. Bank loan loss provisions research: A review. *Borsa Istanbul Review 17*(3): 144-163.

Ozili, P. K. 2018. Bank loan loss provisions, investor protection and the macroeconomy. *International Journal of Emerging Markets* 13(1): 45-65.

Ozili, P. K. 2021. Circular economy, banks, and other financial institutions: what's in it for them?. *Circular Economy and Sustainability* 1(3): 787-798.

Ozili, P. K. 2022. Green finance research around the world: a review of literature. *International Journal of Green Economics* 16(1): 56-75.

Peeters, H. 2005. Sustainable development and the role of the financial world. In *The World Summit on Sustainable Development* (pp. 241-274). Springer, Dordrecht.

Phillis, Y. A., Grigoroudis, E., and Kouikoglou, V. S. 2011. Sustainability ranking and improvement of countries. *Ecological Economics* 70(3): 542-553.

Prasanna, R. P. I. R., Jayasundara, J. M. S. B., Naradda Gamage, S. K., Ekanayake, E. M. S., Rajapakshe, P. S. K., and Abeyrathne, G. A. K. N. J. 2019. Sustainability of SMEs in the competition: A systemic review on technological challenges and SME performance. *Journal of Open Innovation: Technology, Market, and Complexity* 5(4): 100.

Raut, R., Cheikhrouhou, N., and Kharat, M. 2017. Sustainability in the banking industry: A strategic multi-criterion analysis. *Business Strategy and the Environment 26*(4): 550-568.

Rosen, M. A. 2017. The Future of Sustainable Development: Welcome to the European Journal of Sustainable Development Research. *European Journal of Sustainable Development Research 1*(1): 1

Scholtens, B., and van't Klooster, S. 2019. Sustainability and bank risk. *Palgrave Communications 5*(1): 1-8.

Sobhani, F. A., Amran, A., and Zainuddin, Y. 2012. Sustainability disclosure in annual reports and websites: a study of the banking industry in Bangladesh. *Journal of Cleaner Production 23*(1): 75-85.

Thatcher, A. 2013. Green ergonomics: definition and scope. *Ergonomics 56*(3): 389-398.