Financial stability and sustainable development

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Abstract

Financial institutions operating in a stable financial system seem to be willing to support the realization of the sustainable development goals (SDGs). This view assumes that financial stability is crucial for sustainable development. We investigate the effect of financial stability on sustainable development. We use a unique financial stability index, sustainable development index and four SDG indicators. We analyse 26 countries from 2011 to 2018 using the system GMM method. The findings of the sustainable development index analysis show that financial stability has a significant effect on the level of sustainable development and the effect is negative in Asian countries. European and Asian countries have a high sustainable development index compared to African countries. The result of the individual SDG analyses show that financial stability has a significant effect on SDG3. Financial stability has a negative effect on SDG10 in Asian countries and a negative effect on SDG3 during periods of economic prosperity. Financial stability has a positive effect on SDG3 and SDG7 in countries where the banking system have high capital buffer. The results show that the effect of financial stability on sustainable development depends on how sustainable development is measured.

Keywords: Financial stability, sustainable development, financial institutions, institutional quality, capital buffer, sustainable development goals, economic growth, ZSCORE, banks.

JEL Classifications: G01, G21, G28, M4, Q02

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1 Introduction

There have been calls for financial institutions to play a significant role in financing the realization of the sustainable development goals (Peeters, 2005; Weber, 2014). These calls arose because of the recognition that financial institutions play an important role in the development process through their role as financial intermediaries. Financial institutions provide funds to support activities and projects that lead to better development outcomes for society (King and Levine, 1993, Rajan and Zingales, 2003).

Recently, financial institutions face increasing pressure to contribute to the realization of the SDGs through their credit allocation and investment decisions. They are being pressured to show their support for the United Nations sustainable development goals (SDGs) by financing and investing in SDG-related activities and projects, and divesting from carbon-intensive activities (Peeters, 2005). Doing this presents a trade-off because financial institutions can engage in SDG activities to show their support for achieving the SDGs. But their financial commitment to SDG activities could pose new risks to financial stability and may lead to losses that threaten the stability of financial institutions. On the other hand, a stable financial system can give financial institutions an incentive to increase funding for SDG activities in order to generate higher earnings from their diversification into SDG activities. While many studies have examined the role of finance for sustainable development, there are no studies that explicitly examine the effect of financial stability on the level of sustainable development.

Financial stability refers to the stability of major financial institutions and markets which comprise the financial system (Elsayed et al, 2022). Financial stability is crucial because it instills confidence in the financial system and encourage investors, depositors and savers to supply the funds that would be channeled to deficit units (Brunnermeier et al, 2009; Taylor, 2015; Silva et al, 2017). These funds can also be channeled to the deficit units that need funds for activities geared towards sustainable development. Hence, it is crucial to have a sound, stable and healthy financial system to support the efficient allocation of financial resources across the economy (Elnahass et al. 2022). While the majority of prior studies focused on the effect of sustainable development risks on financial stability such as climate change and climate risks (e.g., Dafermos

et al, 2018; Caloia and Jansen, 2021), limited attention has been paid to identifying the role of financial stability in achieving sustainable development. Accordingly, it remains questionable whether financial stability supports the realization of the sustainable development goals.

The United Nations emphasize the need for all countries to attain the SDGs by 2030s so that all countries can attain a level of development that meets the needs of the present without compromising the ability of future generations to meet their own needs (Brundtland Commission, 1987). Sustainable development is important because it seeks to place a constraint upon present consumption to ensure that future generations will inherit a resource base that is no less than the inheritance of the previous generation (Gautam et al, 2019). Promoters of sustainable development predict that sustainable development will have a positive effect on society through the 17 SDGs such as eliminating poverty and hunger, good health and well-being, quality education, gender equality, clean water and sanitation, affordable and clean energy, decent work and economic growth, industry, innovation and infrastructure, reduced inequality, sustainable cities and communities, responsible consumption and production, coordinated climate action, marine life protection, animal life protection and strong institutions (see Nilsson et al, 2016; Sachs et al, 2019; Rashed and Shah, 2021). Previous studies have largely focused on the determinants of sustainable development such as social development (Phimphanthavong, 2014), economic growth (Koirala and Pradhan, 2020) and environmental conditions (Karintseva et al, 2021). However, no study to the best of our knowledge has empirically examined the impact of composite-level financial stability on sustainable development in developing countries or developed countries. Accordingly, this study aims to fill this gap in the finance literature by presenting a systematic analyses of the impact of financial stability on sustainable development. In line with Kirkpatrick and Green (2002), we predict that a stable financial system will provide incentives for financial institutions to fund activities geared towards sustainable development. This is the fundamental premise investigated in our study.

We utilize a diverse sample of country-level financial sector data, sustainable development data and institutional data. We employ different sustainable development proxy indicators (i.e., a composite sustainable development index and the individual SDG3, SDG4, SDG7 and SDG10 proxy indicators). We measure financial stability using a composite financial stability index. The

analysis is based on a sample of 26 countries from 2011 to 2018 using both the system GMM and FGLS estimation techniques. The findings from the sustainable development index analysis show that financial stability has a significant effect on the level of sustainable development and the effect is negative in Asian countries. The result from the individual SDG analyses show that financial stability has a significant effect on SDG3. Financial stability has a negative effect on SDG10 in Asian countries and a negative effect on SDG3 during periods of economic prosperity. Financial stability has a positive effect on SDG3 and SDG7 in countries where the banking system have high capital buffer. The findings are robust to alternative estimation techniques.

This study makes several contributions to the literature. First, this is the first study that employs a unique composite financial stability index to investigate the impact of financial stability on sustainable development. The absence of such studies is quite surprising given that financial stability ought to be a precondition that could incentivize financial institutions to fund activities that are geared towards sustainable development. Yet, existing studies have not examined the effect of financial stability on sustainable development. We performed a number of joint tests to take into account several factors that might have a moderating influence on the relationship between financial stability and sustainable development. Our study also contributes to the finance studies that examine the role of finance in sustainable development (e.g., Barua, 2020; Lagoarde-Segot, 2020; Dridi, 2021), but which have not captured the effects of financial stability on sustainable development. Moreover, we add to the sizable literature that examine the effect of financial stability on overall societal outcomes (Kim, 2004; Clark, 2013; Pianta, 2013).

Our results offer important insights for policymakers and regulators. The results emphasize that financial stability is fundamental to achieving specific sustainable development goals. The results also emphasize the need for policymakers to develop financial stability strategies or frameworks that support the attainment of the sustainable development goals. Therefore, policymakers should constantly review existing financial stability frameworks and ensure that they align with sustainable development policies. Furthermore, the results of this study can inform investors and financial institutions' choice regarding the sustainable development goal they should fund during fluctuating economic cycles and in times of financial stability. Policy makers also need to support financial stability governance with sustainability-related financial disclosures as well as

environmental, social and governance (ESG) disclosures to ensure that financial institutions provide material disclosures on how environmental factors affect their decision-making in financing the sustainable development goals (Adams and Abhayawansa, 2022). Financial institutions should also disclose how their own activities affect sustainable development outcomes, such as climate change, in the context of double materiality (Pizzi et al, 2022).

The next section presents the literature review. Section 3 develops the hypothesis. Section 4 presents the research methodology. Section 5 reports the empirical results. Section 6 concludes the study.

2. Literature review

2.1. Theoretical literature

The link between finance and development dates back to the work of Schumpeter (1912) who emphasized the fundamental role of innovations, credit and banks in the development process of a capitalist economy. Schumpeter argued that the presence of uncertainty in an economy gives banks and other financial institutions an incentive to choose the innovations to finance, and their decisions will influence the development of the economic system. Other theoretical studies such as Stiglitz (1994), Kirkpatrick and Green (2002) and Stallings (2006) argued that finance, or access to finance, play an important role in the development process. Stiglitz (1994) and Westley (2001) argued that expanding access to financial services to citizens can strengthen the productive assets of citizens, enhance their productivity and increase the opportunities for achieving a sustainable livelihood and sustainable development. King and Levine (1993) and Levine (2005) showed that financial institutions can ease external financing constraints and facilitate the allocation of credit to productive activities that lead to growth and development. Other theoretical studies emphasize the role of financial market imperfections on the finance-development nexus. Stallings (2006) argued that a fundamental cause of low level of development is market failure and financial market imperfections which lead to gross distortions in the distribution of income and wealth, and hinders the development of the economic system.

Kirkpatrick and Green (2002) argued that market failure and financial market imperfections can lead to frequent financial crises in the financial system which reduces the level of development. Kirkpatrick and Green (2002) then propose that a stable financial system – one without financial crises – would ultimately support the development process while an unstable financial system would hinder the development process.

2.2. Sustainable development determinants

The literature identifies three dimensions of sustainable development, namely, the economic dimension, social dimension and environmental dimension (see Sen, 2013; Strezov et al, 2017). Of these dimensions, the dimension that relates to financial stability is the economic dimension of sustainable development (Ahmed, 2010; Bordon and Schmitz, 2015). Studies on the economic dimension of sustainable development, for instance, Panaiotov (1994) showed that sustainable development can be achieved through market-based instruments which include financial institutions and financial instruments. They show that countries are using market-based instruments to achieve the sustainable development goals. Other studies identify additional determinants of sustainable development. Coman (2008) argued that education and entrepreneurship are enabling conditions for sustainable development because businesses and institutions of higher education can function as role-models of sustainability by operating with fairness in their own social policies and economic interactions, and they can play a more active role in the development of sustainable communities. In relation to sustainable communities, Rosiek (2016) argued that the creation of sustainable communities is a major determinant of sustainable development in the EU because sustainable comminuties are able to manage and use resources efficiently. Koirala and Pradhan (2020), in their study of Asian countries, show that per capita income, financial development, inflation rate, natural resource rent and time are significant determinants of sustainable development in Asian countries. At the firm level, Cassely et al (2020) show that factors such as firm's sustainable development commitment, firm size, research and development policy can influence the sustainable development of companies. Busch et al (2016) emphasize that financial market participants should integrate environmental, social and governance (ESG) criteria into their investment decisions towards more sustainable business practices, and they should have a long-term orientation for sustainable investment and

sustainable development. In addition to ESG criteria, Zhang and Wang (2021) argued that the development of green finance can promote sustainable development through sustainable energy development. Anton and Nucu (2020) show that financial sector development is a determinant of sustainable development because financial development can support the development of green technologies which can positively affect the share of renewable energy consumption. Khaled et al (2021) argue that there are particular SDGs and targets which are more relevant to the business sector than others. This is because some firms are distinct in the way they approach their role in contributing to the SDGs and sustainability performance. This implies that not all the 17 SDGs will be relevant to the business sector. Hence, there is a need to assess the determinants of the SDGs that are most relevant to the business sector. While these studies have examined the determinants of sustainable development, no studies have examined the direct effect of financial stability on crucial indicators of sustainable development. We add to this literature by examining financial stability as a potential determinant of sustainable development.

2.3. Effect of financial stability on development outcomes

Few studies examine the impact of financial stability on development outcomes, but no study has examined the effect of financial stability on broader measures of sustainable development. For instance, Babajide et al (2020) focused on the relationship between financial stability and entrepreneurship development in 24 Sub-Sahara Africa from 2004 to 2017. They used the pooled ordinary least squares and random effects techniques, and find that financial stability has a significant positive effect on entrepreneurship development. Their findings suggest that stability in the financial environment facilitates the provision of credit for entrepreneurship. Safi et al (2021) focused on the link between financial stability and consumption-based carbon emissions in advanced economies from 1990 to 2018. They used co-integration analysis and find an association between financial stability and consumption-based carbon emissions. Based on their result, they argued that policymakers in advanced countries should focus more on financial system stability, and that any policy that safeguard financial stability can significantly help to reduce carbon emissions. Nasreen et al (2017) examined the relationship between financial stability and environmental quality or reduced environmental pollution. They used co-integration and Granger causality tests and find that financial stability improves environmental quality. Their

findings emphasize the need for policy makers to design financial sector policies that facilitate the reduction of environmental pollution towards achieving the SDGs. The above studies show that financial stability can have a positive effect on some development outcomes depending on how 'development' is measured. However, existing studies have not examined the effect of financial stability on crucial indicators of the sustainable development such as the SDGs, for example, quality education, reduced inequalities, quality healthcare, affordable and clean energy, etc. We add to this literature by examining the effect of financial stability on sustainable development.

3. Hypothesis

Existing studies show that finance play a key role in achieving the sustainable development goals because financial institutions can provide credit and other tailored financial services, such as green loans and green investment to fund the realization of the sustainable development goals (Barua, 2020; Ozili, 2021; Bertheau and Lindner, 2022). But for this to happen, there is a need to safeguard the financing of sustainable development by ensuring there is a stable financial system (Bordon and Schmitz, 2015). In a stable financial system, financial institutions such as banks will have incentives to expand their activities to non-core banking activities such as financing the sustainable development goals. They will have incentives to allocate credit to activities and projects geared towards sustainable development as a way to show their support for the realization of the sustainable development goals and as a revenue diversification mechanism. Conversely, when the financial system is unstable or during financial crises, there will be difficulty in the mobilization of financial resources for sustainable development, difficulty in the disbursement of funds for sustainable development and difficulty in accessing new financial resources and financial instruments to fund the realization of the sustainable development goals. More importantly, if the financial system is unstable, financial institutions will prefer to focus more on their survival and focus on their core business. They will reduce the financing of non-core banking activities, such as financing the realization of the SDGs, when the risks to financial stability are high. The reduction in financing the realization of the sustainable development goals

would delay the realization of the sustainable development goals, implying that financial system fragility reduces the level of sustainable development. Consequently, the risks to financial stability should be taken into account in financing sustainable development because a stable financial system can provide an incentive for financial institutions and investors to fund and invest in SDG activities while an unstable financial system could be used as an excuse for postponing investment in sustainable development (Bordon and Schmitz, 2015). Financial institutions can use recurring financial crises as an excuse to postpone or delay the financing of sustainable development activities. Therefore, we predict that a stable financial system would support the realization of sustainable development goals. Furthermore, it is possible that the central bank's involvement in financial stability governance may provide an opportunity for the central bank to pressure regulated financial institutions to support the SDGs by decarbonizing their balance sheet and allocating tailored credit to specific SDG projects or activities (Fabris, 2020; Battiston et al, 2021; D'Orazio and Popoyan, 2022). This further suggests that financial stability can have a positive impact on sustainable development through regulatory pressure or action. Therefore, we predict a positive and significant relationship between financial stability and sustainable development.

H1: Financial stability has a significant positive impact on sustainable development.

4. Research methodology

4.1. Data and sample

Data were collected for 37 countries. The selection of countries is based on the availability of data. Country-level annual data were collected from the World development indicators (WDI), the global financial development indicators (GFDI) and the world governance indicators (WGI) from the World Bank database. We filtered the sample following similar criteria applied in prior finance studies (see Trinh et al (2020) and Elnahass et al. (2022)). We excluded countries that had substantial incomplete data for the crucial variables as well as countries that had missing data for at least three consecutive years. Our final sample is an unbalanced panel data of 26 countries during the 2011 to 2018 period. The selection of the 2011 to 2018 sample period allows us to avoid the potential effect of the 2007-2009 global financial crisis period and the COVID pandemic (from 2020 to 2022) so that these events won't contaminate the estimation results. Table 1 presents the sample distribution by country and the descriptive statistics. Countries with the highest level of financial stability in our sample are the United States and Singapore while countries like Ghana and Pakistan had the most unstable or fragile financial system during the period examined as indicated by their low financial stability index. In terms of capital buffer, Cambodia, Indonesia, the United Kingdom and Kenya had high capital buffer while India, Vietnam and China had very low capital buffer. Japan and the United Kingdom had better institutional quality compared to Cambodia and Russia which had the lowest institutional quality during the period examined. Domestic credit to the private sector is highest in the United States and Japan, and is much lower in Nigeria and Ghana. Banking cost is highest in Russia and Argentina, and is much lower in Japan and China during the period examined. Regarding the SDGs, the United States and the Netherlands ranked high in good health and wellbeing 'SDG3'. Cambodia and the United Kingdom ranked high in quality education 'SDG4'. Tanzania and Pakistan ranked high in affordable and clean energy 'SDG7'. Tanzania and Nigeria ranked high in reduced inequalities 'SDG10' over the period. The Pearson correlation coefficients between the dependent variables and the independent variables are all below 0.6 which affirm that multicollinearity is not a problem in the empirical analysis (see table 9 for correlation matrix).

Table 1. Descriptive Statistics

	SDG3	SDG4	SDG7	SDG10	FSI	COST	DCP	GDPR	ISI	BUFF	SDI
Countries	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean
Argentina	9.75	92.46	9.47	20.28	-0.37	6.36	14.68	0.72	-0.20	7.31	-1.52
Brazil	8.61	95.03	44.37	26.95	0.15	4.25	62.44	0.71	-0.07	8.89	-0.42
Cambodia	6.59	99.85	65.54	56.52	1.41	2.51	65.48	7.2	-0.75	14.41	1.11
Cameroun	3.78	89.32	78.58	74.25	-1.67	4.76	14.11	4.55	-0.97	0.75	2.28
China	4.82	-	12.16	45.76	1.07	0.97	143.51	7.52	-0.46	5.24	-0.05
Egypt	5.04	-	5.11	22.79	-0.03	1.50	28.11	3.41	-0.86	-	-0.83
Georgia	7.68	-	29.56	52.91	-0.53	4.28	48.38	4.68	0.31	9.13	0.07
Ghana	4.05	93.98	45.99	70.56	-2.09	6.29	14.47	6.67	0.05	10.19	1.44
India	3.36	-	35.75	77.44	0.13	1.79	50.94	6.76	-0.24	4.79	1.49
Indonesia	2.93	87.67	27.35	49.57	-0.76	3.09	36.51	5.36	-0.27	12.22	0.67
Japan	10.67	88.27	5.95	9.03	0.61	0.79	164.25	1.03	1.33	7.68	-2.02
Kenya	5.15	94.14	74.28	54.24	0.14	5.26	34.51	4.64	-0.61	11.99	1.46
South Korea	6.64	84.87	2.38	20.41	0.26	1.66	133.49	3.03	0.79	6.52	-1.19
Malaysia	3.62	92.55	3.60	21.73	0.81	1.31	118.19	5.21	0.36	8.43	-0.67
Mexico	5.58	96.61	9.32	27.79	0.77	3.04	30.57	2.72	-0.23	7.54	-0.69
Netherlands	10.33	88.49	5.64	12.36	-0.35	1.18	113.06	1.40	1.68	10.42	-1.89
Nigeria	3.44	-	82.39	81.35	-0.65	5.41	12.15	3.28	-1.08	8.26	2.59
Pakistan	2.71	75.44	45.34	59.06	-1.61	2.90	16.82	4.62	-1.05	7.93	1.33
Philippines	3.99	-	26.19	37.39	0.83	3.07	38.78	6.33	-0.32	7.89	0.17
Russia	5.16	92.01	3.29	5.76	-1.42	9.49	50.11	1.71	-0.71	5.04	-1.32
Singapore	3.88	91.23	0.61	9.17	1.47	1.16	119.39	4.24	-0.09	8.58	-1.09
Tanzania	4.32	-	84.46	83.71	-0.82	6.26	13.13	6.37	-0.46	10.05	2.57
Thailand	3.66	94.61	23.02	50.91	-0.35	1.44	142.39	3.34	-0.29	8.71	0.49
United Kingdom	9.89	96.96	7.57	12.52	0.21	1.26	143.53	2.06	1.42	11.01	-1.78
United States	16.44	-	9.23	4.11	2.29	2.77	181.44	2.29	1.24	6.45	-2.96
Vietnam	4.76	78.23	33.30	59.07	0.52	1.76	111.66	6.21	-0.44	4.43	0.76
Aggregate statistics:											
Mean	6.04	92.07	29.64	40.22	0.01	3.26	73.44	4.08	-0.07	8.11	0.02
Median	4.96	92.66	23.35	42.53	0.11	2.73	51.88	4.20	-0.29	7.94	-0.02
Maximum	16.84	100	87.11	85.60	2.59	17.32	190.24	14.05	1.73	17.15	2.65
Minimum	2.34	75.44	0.48	3.97	-2.90	0.66	10.24	-3.55	-1.18	-2.53	-3.02
SD	3.18	4.89	27.19	25.25	1.09	2.55	54.75	2.56	0.77	3.16	1.49
Observation	208	92	208	208	205	208	207	208	208	208	208

SDG3 = Good health and well-being indicator. SDG4 = Quality education indicator. SDG7 = Affordable and clean energy indicator. SDG10 = Reduced inequalities indicator. FSI = Financial stability index. COST = Bank cost. DCP = Domestic credit to the private sector. GDPR = Real GDP growth. ISI = Institutional quality index. BUFF = Bank capital buffer.

4.2. Measures of sustainable development and financial stability

Regarding the sustainable development variables, we selected four SDGs out of the 17 SDGs. The selected SDGs are SDG3, SDG4, SDG7 and SDG10. The four SDG variables were selected because existing studies have used them as sustainable development indicators (e.g. Lior et al, 2018; Sun et al, 2019; Sundararaman and Ranjan, 2019; Anton and Nucu, 2020; De Paz et al, 2020; Shahbaz et al, 2020; Vorisek and Yu, 2020; Brollo et al, 2021). These studies identified meaningful proxies based on economic data that can be used to measure the SDGs. For example, regarding SDG3 'good health and well-being', Sundararaman and Ranjan (2019) and Brollo et al (2021) identify healthcare expenditure as a catalyst for good health and well-being. They linked healthcare expenditures to GDP and argue that healthcare expenditures relative to GDP need to increase in order to achieve greater sustainable development. In their study, they show that higher health expenditures to GDP correspond to high levels of sustainable development. Regarding SDG4 'quality education', Vorisek and Yu (2020) used education spending as a proxy for quality education and show that higher education spending is a necessary SDG-related expenditure for human capital development and greater sustainable development. Similarly, Sun et al (2019) and Brollo et al (2021) show that shortfalls in education spending hinder improvements in human development and sustainable development, thereby implying that higher education spending is correlated with better sustainable development outcomes. Regarding SDG7 'clean and affordable energy', Anton and Nucu (2020) and Shahbaz et al (2020) used the share of renewable energy to final total energy consumption as a proxy of sustainable development when investigating the effect of financial development on sustainable development. Regarding SDG10 'reduced inequalities', Lior et al (2018) and De Paz et al (2020) show that vulnerable employment is a SDG-based proxy indicator of the extent to which vulnerable people are given equal opportunities in society especially with regard to employment, hence, vulnerable employment is considered to be a measure of reduced inequality. Finally, the four SDGs were also selected because proxy variables for the four SDGs are available and there is sufficient data for the SDG proxy variables compared to the other SDGs whose proxy variables had very few data observations.

The first dependent variable is SDG3. We use current health expenditure as a percentage of GDP as the proxy for 'SDG3' which represents the sustainable development goal of 'good health and well-being'. Higher values of SDG3 variable implies higher sustainable development related to health. The second dependent variable is SDG4. We use the current education expenditure as a percentage of total expenditure in public institutions as the proxy for 'SDG4' which represents the sustainable development goal of 'quality education'. Higher values of SDG4 variable implies higher sustainable development related to education. The third dependent variable is SDG7. We use renewable energy consumption as a percentage of total final energy consumption as the proxy for SDG7 which represents the sustainable development goal of 'affordable and clean energy'. Higher values of SDG7 variable implies higher sustainable development related to clean energy. The fourth dependent variable is SDG10. We use the vulnerable employment ratio[1] as the proxy for SDG10 which represents the sustainable development goal of 'reduced inequalities'. Higher values of SDG10 variable implies higher sustainable development related to reduced inequality. Furthermore, we combined the four SDGs to develop a composite index of sustainable development (SDI) using the Principal Component Analysis method. Data for the four SDG variables were obtained from the world development indicators (WDI).

The financial stability variable is the explanatory variable of interest in the analyses. Rather than using multiple indicators of financial stability which may yield conflicting results, we used a unique composite measure of financial stability. Previous studies have also used some composite indexes of financial stability (see Nasreen et al, 2017; Elsayed et al, 2022). We constructed a unique financial stability index (FSI). The index consists of two variables, namely (i) the performing loans ratio derived from the non-performing loan (NPL) ratio[2] and (ii) the Z-score[3].

[1] As more vulnerable people become employed, they will be able to earn an income. This helps to reduce income inequality among vulnerable people in society and leads to higher sustainable development.

[2] The nonperforming loans (NPL) ratio is an important measure of financial stability and has been used in many studies such as Podpiera and Weill (2008), Lepetit and Strobel (2015) and Ozili (2019). Lower values of the NPL ratio indicates greater financial stability.

[3] The Z-score is a popular measure of insolvency risk of the banking sector. The Z-score has been used in studies to measure financial stability. Such studies include Lee and Hsieh (2013), Fiordelisi and Mare (2014) and Ozili (2018). The Z-score is computed as the sum of return on assets ratio (ROA) and equity to asset ratio (CAR), divided by the standard deviation of return on assets. Since ROA and CAR are already included in the computation of Z-score, we did not introduce ROA and CAR as separate explanatory variables in our model to avoid multi-collinearity in the explanatory variables.

The performing loans ratio is derived as one minus the NPL ratio (in percentage) divided by 100. For example, if the NPL ratio is 5 percent. The performing loans ratio would be [1 – (5/100)] which is 0.95 or 95 percent. Higher values of the performing loans ratio indicate greater financial stability because it means that a large share of the loans in the financial sector performed well and did not default. Also, higher values of the Z-score indicates higher solvency of the banking sector. The higher the Z-score, the better. Thereafter, the FSI index is derived from the principal component analysis of the 'performing loans ratio' and the 'Z-score'. High values of the FSI variable indicate greater financial stability. The FSI variable is introduced as a determinant of sustainable development in the empirical models. We expect a positive relationship between financial stability and sustainable development because financial institutions operating in a stable financial system will have incentives to fund and invest in activities and projects that are geared towards achieving the SDGs as a way to show their support for the sustainable development goals and as a revenue diversification mechanism. This expectation is supported by Carè (2018). Conversely, if the financial system is unstable, financial institutions will focus more on their survival and focus on their core business, they will be less interested in non-core business activities such as supporting the attainment of the SDGs. The variable description is reported in table 2.

We control for a set of country-level characteristics that are commonly related to sustainable development. The DCP variable represents domestic credit allocated to the private sector as a share of GDP. Existing studies show that financial institutions can play a role in financing the sustainable development agenda. They can provide credit to the private sector using innovative credit instruments to support the attainment of the sustainable development goal (Shen et al, 2013; Barua, 2020), but the provision of credit for the attainment of the SDGs needs to be balanced with financial stability considerations and aligned interests such as the cost of credit and institutional support for the SDGs. Therefore, we expect a positive relationship between domestic credit to the private sector and the level of sustainable development. The GDPR variable measures real GDP growth or economic growth. Existing studies show that economic growth has a complementary effect on sustainable development because economic growth, reflected in increases in national output, leads to job creation which translates to improved

standard of living and poverty reduction towards greater sustainable development (see. Soubbotina, 2004; Hess, 2016). Therefore, we expect a positive relationship between GDPR and sustainable development. The ISI variable measures institutional quality. The literature show that institutional quality plays an important role in promoting development and in supporting the attainment of the sustainable development goals (e.g. Bulte and Damania, 2005; Sarkodie and Adams, 2018). The general view is that high institutional quality will have a positive effect on the level of sustainable development because strong governance institutions will support and enforce laws, policies, regulations and the needed protections that lead to the attainment of one or more sustainable development goals for the benefit of people and society (Tarlock, 2001; Jahanger et al, 2022). Therefore, we expect a positive relationship between institutional quality and the level of sustainable development. The COST variable measures operating expenses as a percentage of total asset of banks. A banking sector that incurs high operating cost may be reluctant to finance activities and projects related to the sustainable development agenda due to cost efficiency considerations. Therefore, we expect a negative relationship between bank cost and sustainable development. Finally, the lagged sustainable development indicators control for the auto regressive nature of sustainable development – one in which the current level of sustainable development is based on the immediate past level of sustainable development.

Table 2. Definition of variables			
Symbol	Variables	Definitions & Measurement	Source
SDG3	SDG: Good health and well-being	The proxy measure of SDG3 is current health expenditure as a percentage of GDP.	WGI
SDG4	SDG: Quality education	The proxy measure of SDG4 is current education expenditure as a percentage of total expenditure in public institutions.	WGI
SDG7	SDG: Affordable and clean energy	The proxy measure of SDG7 is renewable energy consumption as a percentage of total final energy consumption.	WGI
SDG10	SDG: Reduced inequalities	The proxy measure of SDG10 is the vulnerable employment ratio. It is measured as vulnerable employment as a percentage of total employment.	WGI
FSI	Financial stability index	The index consists of the performing loans ratio (which is derived from the NPL ratio) and the Z-score. The index is derived using principal component analysis.	Authors construct
COST	Bank cost performance	Operating expenses of banks as a percentage of the value of all held assets.	GFDI
DCP	Domestic credit to the private sector	Credit or loans provided to the private sector by financial institutions including the central bank, deposit money banks, and other financial corporations. It is measured as credit to the private sector as a share of GDP	GFDI
GDPR	Real GDP growth	Annual change in real GDP	WGI
ISI	Institutional quality index	The ISI index is the average of the score of the six world governance indicators (WGI) which are the voice and accountability index, the political stability and absence of violence/terrorism index, the government effectiveness index, the regulatory quality index, the rule of law index and the control of corruption index.	WGI

4.3. Empirical models

To estimate the effect of financial stability on sustainable development, our model is a modified form of the models used in Ozili (2019), Safi et al (2021) and Elnahass et al (2022). The first equation, Eq. (1), estimates the impact of financial stability on the sustainable development index while the second equation, Eq. (2), estimates the impact of financial stability on the individual indicators of sustainable development (proxy by SDGs 3, 4, 7 and 10). The third and fourth equations, Eq. (3) and Eq. (4), estimates the interaction effects.

$$SDIi,t = \beta 1 SDIi,t-1 + \beta 2 FSIi,t + \beta 3 COSTi,t + \beta 4 DCPi,t + \beta 5 GDPRi,t + \beta 6 ISIi,t + \varepsilon i,t \ \ldots\ldots\ldots\ldots\ldots\ldots\ldots Eq1$$

$$(SDG\ vector)i,t = \beta 1(SDG\ vector)i,t-1 + \beta 2FSIi,t + \beta 3COSTi,t + \beta 4DCPi,t + \beta 5GDPRi,t + \beta 6ISIi,t + \varepsilon i,t \ldots\ldots\ldots\ldots\ldots Eq2$$

$$SDIi,t = \beta 1SDGi,t-1 + \beta 2FSIi,t + \beta 3BUFF * FSIi,t + \beta 4BOOM * FSIi,t + \beta 5REC * FSIi,t + \beta 6AFR * FSIi,t + \beta 7ASN * FSIi,t + \beta 8EUR * FSIi,t + \beta 9BUFFi,t + \beta 10BOOMi,t + \beta 11RECi,t + \beta 12AFRi + \beta 13ASNi + \beta 14EURi + \beta 15COSTi,t + \beta 16DCPi,t + \beta 17GDPRi,t + \beta 18ISIi,t + \varepsilon i,t \ldots\ldots\ldots\ldots\ldots Eq3$$

$$(SDG\ vector)i,t = \beta 1(SDG\ vector)i,t-1 + \beta 2FSIi,t + \beta 3BUFF * FSIi,t + \beta 4BOOM * FSIi,t + \beta 5REC * FSIi,t + \beta 6AFR * FSIi,t + \beta 7ASN * FSIi,t + \beta 8EUR * FSIi,t + \beta 9BUFFi,t + \beta 10BOOMi,t + \beta 11RECi,t + \beta 12AFRi + \beta 13ASNi + \beta 14EURi + \beta 15COSTi,t + \beta 16DCPi,t + \beta 17GDPRi,t + \beta 18ISIi,t + \varepsilon i,t \ldots\ldots\ldots\ldots\ldots Eq4$$

Where i,t represent country and year. The SDI variable represents the sustainable development index. The SDG vector variable represents the four SDG variables namely SDG 3, SDG4, SDG7 and SDG10. The SDI variable is a composite sustainable development index (SDI) which is derived from the combination of the four SDG variables (SDG3, SDG4, SDG7 and SDG10) using principal component analysis. The SDI variable is used as the baseline dependent variable in the study. The FSI variable represents the composite financial stability index which is the main explanatory variable. The AFR, EUR and ASN variables represent the regional binary variables. The BOOM and REC binary variables represent economic upswings and downturns, respectively. The BUFF variable represents the capital buffer of the banking sector. The COST variable represents bank cost. DCP represents domestic credit to the private sector as a percentage of GDP. The GDPR variable represents real GDP growth. The ISI variable represents the institutional quality index. The lagged SDI and SDG variables represents the one-year lag of the sustainable development variable. εit is the error term.

Regarding the estimation method, we employ panel data analysis to account for unobservable country heterogeneity such as developmental differences and financial sector-specific characteristics (Stock and Watson, 2008). However, since endogeneity is a common issue in finance and development studies, we expect that some independent variables in the regression model are determined simultaneously and endogenously with the dependent variables, leading

to possible simultaneity and endogeneity bias. To mitigate these problems, the panel models were estimated using the system generalized method of moments (GMM) regression estimation which helps to mitigate potential endogeneity between financial stability and sustainable development. The system GMM estimator, based on Arellano and Bover (1995) and Blundell and Bond (1998), allows us to control for the unobserved effects by transforming the variables into first differences to eliminate unobserved heterogeneity and omitted variable bias. It also allows us to treat all country characteristic variables as endogenous and it allows us to orthogonally use the lag values of the endogenous variables as internal instrumental variables (Elnahass et al, 2022). For robustness purposes, we use the feasible generalized least square (FGLS) regression estimator. The feasible generalized least square (FGLS) estimates the impact of time-invariant variables while it controls for country-specific effects. FGLS addresses the issues of cross-sectional dependence, clustering problems, inappropriate variable selection, cross-sectional correlation and heteroscedasticity and endogeneity (Hansen, 2007).

4.4. Additional analysis

We perform some interaction analyses to identify other factors that could influence the relationship between financial stability and sustainable development. First, we consider the effect of financial stability on sustainable development in some regions. Roberts (2006) and Liu et al (2013) show that different regions are at different stages of sustainable development and these regions also have dissimilar levels of financial stability. Accordingly, we examine whether the regional differences affect the relationship between the financial stability and sustainable development. To do this, we introduce the AFR, ASN and EUR binary variables into the model. The AFR variable takes the value of one if the country is an African country and zero otherwise. The ASN variable takes the value of one if the country is an Asian country and zero otherwise. The EUR variable takes the value of one if the country is a European country and zero otherwise. The three regional binary variables are interacted with the FSI variable to determine their joint effect on the level of sustainable development in these regions. Second, we take into account the effect of fluctuating economic cycles on the relationship between financial stability and sustainable development. Li et al (2022) find that the level of sustainable development increases during economic expansions while the level of sustainable development decreases during

economic recessions. We examine whether fluctuating economic cycles affect the relationship between financial stability and sustainable development. To do this, we introduce the REC and BOOM binary variables into the model. The REC variable takes the value of one for the years where GDP growth rate is negative and zero otherwise, representing periods of recession or economic downturn. The BOOM binary variable takes the value of one for the years where GDP growth rate is above-the-median GDP growth rate and zero otherwise, representing periods of economic prosperity. The REC and BOOM binary variables are interacted with the FSI variable to determine the joint effect of BOOM*FSI and REC*FSI on sustainable development.

We also consider the role of banking sector capital buffer in influencing the relationship between financial stability and sustainable development. Bank capital buffer (BUFF) is the difference between actual capital adequacy ratio (CAR) and the regulatory minimum CAR or the difference between actual bank capital and the minimum regulatory bank capital. The bank capital buffer (BUFF) variable reflects the extent to which the banking sector can absorb unexpected losses while maintaining the provision of key banking services to the real economy both in good and bad times. Bank capital buffer also serves as an insurance against failure to meet capital requirements, thus improving financial stability (Lindquist, 2004). Higher values of the BUFF variable imply greater banking or financial stability. Guidara et al (2013) find that banks hold a larger capital buffer in times of economic expansion than in recession whereas Shim (2013) finds a negative relationship between the economic cycle and capital buffer. Following the literature, we predict that higher capital buffer will make the financial system more stable and will put banks in a better position to support the attainment of the SDGs towards greater sustainable development.

5. Empirical Results

5.1. The baseline results

This section presents the baseline result for the impact of financial stability index on the sustainable development index. It also presents the result of the moderating effect of regional characteristics, fluctuating economic cycles and capital buffer on the relationship between the financial stability index and the sustainable development index.

5.1.1. Impact of financial stability index on sustainable development index

In the baseline result, we first examine the impact of the financial stability index (FSI) on the sustainable development index (SDI). The sustainable development index (SDI) is derived from the combination of the four SDG variables (SDG3, SDG4, SDG7 and SDG10) using principal component analysis. The derived SDI variable is the dependent variable. The results are reported in table 3.

The FSI variable is positive and significantly associated with the SDI variable in column 1 of table 3. This result indicates that the financial stability index has a positive effect on the sustainable development index. This result supports our hypothesis (H1) that financial stability has a positive and significant effect on sustainable development and is consistent with Kirkpatrick and Green (2002) who show that a stable financial system would ultimately support a sustainable development process. This result implies that financial institutions operating in a stable financial system would fund and invest more in activities or projects geared towards sustainable development. In terms of economic significance, the FSI coefficient is economically significant. A unit increase in the financial stability index (FSI) leads to a 4.5 percent increase in the sustainable development index (SDI).

Regarding the control variables, some control variables report the expected coefficient signs while other control variables report opposite signs in relation to SDI. For instance, the COST variable is negatively associated with SDI in the baseline estimation in column 1 of table 3 as expected. This suggests that high operating cost in the financial sector leads to low level of sustainable development. The implication is that a banking sector that incurs high operating cost

would be reluctant to fund SDG activities due to cost efficiency considerations, thereby confirming the expected negative relationship between banking cost and the level of sustainable development. The DCP variable is negatively associated with SDI in columns 1 to 4. The negative DCP coefficient is contrary to our expectation of a positive relationship between private credit allocation and the level of sustainable development. This suggests that higher credit to the private sector by the financial sector may not lead to higher levels of sustainable development. The GDPR variable is negatively associated with SDI in columns 1 to 4. The negative GDPR coefficient is contrary to our expectation of a positive relationship between GDP growth and the level of sustainable development. This indicates that economic growth does not have a positive complementary effect on sustainable development as predicted. This suggests that economic growth, reflected in increases in national output, may not translate to greater sustainable development. The ISI variable reports a negative sign in column 1. This indicates that institutional quality has a negative effect on the level of sustainable development and imply that high institutional quality may not translate to better sustainable development outcomes.

5.1.2. Regional effects

In this section, we examine the moderating effect of regional differences on the relationship between financial stability and sustainable development. Existing studies such as Vogel and Winkler (2010), Deng et al (2019), Moudud-Ul-Huq et al (2020) and Ozili (2022a) show that regional differences explain the differing levels of financial stability and sustainable development across countries. Also, Roberts (2006) and Liu et al (2013) show that different regions are at different stages of sustainable development and these regions also have dissimilar levels of financial stability. These studies suggest that regional differences may influence the level of financial stability and sustainable development. Therefore, we control for the effect of regional differences in the empirical model.

The purpose of introducing 'regional differences' into the model in the heterogeneity analysis is to capture the effect of regional characteristics on the relationship between financial stability and sustainable development. The analysis enables us to determine whether financial stability

regional differences have a significant effect on the realization of the sustainable development goals.

Such analysis can provide valuable insights on whether regional differences in financial stability affect the realization of the sustainable development goals. The implication of such analysis is that it can provide policymakers with insight on whether financial stability regional differences have a significant influence on the realization of the sustainable development goals.

In the analysis, we examine whether regional differences affect the relationship between the financial stability index and the sustainable development index. The results are reported in column 2 of table 3. In the regional analysis in column 2 of table 3, the AFR*FSI variable is positive and significantly related to SDI. This result indicates that greater financial stability is significantly associated with high levels of sustainable development in African countries. The explanation for this result is that African countries rely on the financial sector to provide financing to meet their sustainable development objectives; therefore, financial system regulators in African countries would ensure that the financial system is stable so that financial institutions can efficiently provide the funds needed to support national sustainable development goals. Financial system regulators in African countries will increase their effort to preserve financial stability because it has a positive effect on the level of sustainable development.

In contrast, the ASN*FSI variable is negative and significantly related to SDI. This indicates that greater financial stability is significantly associated with lower sustainable development in Asian countries. In other words, the result suggests that a stable financial system does not translate to higher levels of sustainable development in Asian countries. A possible explanation for the negative relationship is that the aim of preserving financial stability in Asian countries is not to make the financial sector provide financing for the realization of the sustainable development goals; rather, the goal of preserving financial stability in Asian countries is to support the attainment of other economic goals (Kawai and Morgan, 2012).

Meanwhile, the EU*FSI variable is not statistically significant. This indicates that a stable financial system does not have a significant effect on the level of sustainable development in European countries. A possible explanation for the insignificant result is that the aim of preserving financial

stability in European countries is to support the attainment of other economic goals rather than to support the attainment of the sustainable development goals. This explanation is consistent with the argument made in Arner (2007) and Uhde and Heimeshoff (2009).

Overall, the implication of the regional results is that regional differences have a significant moderating influence on the relationship between financial stability and sustainable development.

5.1.3. Effect of fluctuating economic cycles

We also examine the moderating effect of fluctuating economic cycles on the relationship between financial stability and sustainable development. The literature shows that fluctuating economic cycles, particularly economic expansion and recession, can affect both financial stability and sustainable development outcomes. For instance, Shim (2013) shows that the financial system is less stable during recessions because default risk increases during recessions and it forces financial institutions to retreat from lending. Bouheni and Hasnaoui (2017) found that financial stability is procyclical which implies that financial stability risks increase during economic recession while there is greater financial stability during economic expansions. Li et al (2022) find that the level of sustainable development increases during economic expansion while the level of sustainable development decreases during economic recession. These studies suggest that fluctuating economic cycles may influence the level of financial stability and sustainable development. Therefore, we control for the effect of fluctuating economic cycles in the empirical model.

The purpose of introducing 'fluctuating economic cycles' into the model in the heterogeneity analysis is to capture the effect of changing macroeconomic developments on the relationship between financial stability and sustainable development. It enables us to determine whether the level of financial stability and changing macroeconomic developments have a significant effect on the realization of the sustainable development goals.

Such analysis can provide valuable insights into whether economic expansion or recession together with the prevailing level of financial stability affects the realization of the sustainable development goals. The implication of such analysis is that it can provide policymakers with

insight into whether changing macroeconomic developments have a significant influence relationship between financial system resilience and the realization of the sustainable development goals.

In the analysis, we examine whether economic expansion (BOOM) and economic recession (REC) affect the relationship between the financial stability index (FSI) and the sustainable development index (SDI). The REC and BOOM binary variables are interacted with the FSI variable to determine the joint effect of BOOM*FSI and REC*FSI on SDI. The result is reported in column 3 of table 3. The REC*FSI and BOOM*FSI variables are both positive and significantly related to the SDI variable. This indicates that greater financial stability is significantly associated with higher sustainable development during periods of economic recession and economic prosperity. A possible explanation for this is that financial institutions would be willing to fund and invest in SDG-related activities and projects that contribute to sustainable development when the financial system is stable irrespective of whether the economy is experiencing a recession or a boom. The implication is that the positive effect of financial stability on sustainable development holds true regardless of the fluctuation in the economic cycle. The result supports the findings of Li et al (2022) who shows that economic expansion has a positive moderating influence on the relationship between financial stability and sustainable development.

5.1.4. Effect of capital buffer

We also examine the moderating effect of capital buffer on the relationship between financial stability and sustainable development. Capital buffer is bank capital in excess of the regulatory minimum capital. The financial stability literature associates high capital buffer with greater financial stability (Bui et al, 2017; Bahaj and Malherbe, 2020). For example, Bui et al (2017) show that a large bank capital buffer helps to maintain financial system stability even during economic downturns. Dikau and Volz (2018) and Neisen et al (2021) show that banks that have strong capital buffer can absorb unexpected losses arising from extraordinary activities. Bahaj and Malherbe (2020) also show that higher capital buffer makes the financial system, or the banking system, safer and induces banks to increase lending. These studies suggest that capital buffer

enhances financial stability. Therefore, we control for the effect of capital buffer in the empirical model.

The purpose of introducing 'capital buffer' into the model in the heterogeneity analysis is so that capital buffer can serve as an additional measure of financial stability. It enables us to determine whether greater financial stability together with high capital buffer have a significant effect on the realization of the sustainable development goals.

Such analysis can provide valuable insights into whether a strong capital buffer enhances the safety of the financial system and improves financial institutions' contribution to the realization of the sustainable development goals. The implication of such analysis is that it can provide financial regulators and supervisors with insights into whether capital buffer is the missing link that would enable financial institutions increase their support for the realization of the sustainable development goals.

In the analysis, we argue that since the pursuit of the sustainable development goals by banks is a non-core banking activity, banks that have high capital buffer will have incentives to contribute to the realization of the SDGs because their high capital buffer would allow them to withstand any shock or unexpected losses that may arise from financing SDG activities. Therefore, we predict that high capital buffer is a necessary condition for financial stability to lead to better sustainable development outcomes. We introduce the capital buffer variable (BUFF) into the model. We interact the BUFF variable with the FSI variable to determine its moderating effect on the relationship between the FSI variable and the SDI variable. The result is reported in column 4 of table 3. The BUFF*FSI variable is not significant in column 4 which indicates that capital buffer does not have a significant effect on the relationship between the financial stability index and the sustainable development index. The result is not in line with our expectation that a well-capitalized financial (or banking) system would provide additional safety from potential unexpected losses that may arise from banks' financing of SDG activities (Dikau and Volz, 2018; Neisen et al, 2021). However, a possible explanation for the result is that high capital buffer gives stable banks an incentive to increase their risk-taking in business opportunities that are not related to sustainable development activities.

Table 3. Baseline results: Effect of financial stability index on the sustainable development index (system GMM regression estimation)

	SDI	SDI	SDI	SDI
	1	2	3	4
	Coefficient (Std.Err)	Coefficient (Std.Err)	Coefficient (Std.Err)	Coefficient (Std.Err)
c	0.087*** (0.02)	-0.276 (0.26)	0.081** (0.03)	0.096** (0.05)
Lag	1.000*** (0.01)	0.915*** (0.09)	0.998** (0.05)	0.926 (0.05)
FSI	0.045*** (0.01)	-0.008 (0.02)	.0052 (0.01)	0.037 (0.02)
AFR		0.548 (0.52)		
AFR*FSI		0.053** (0.02)		
ASN		0.678** (0.32)		
ASN*FSI		-0.096** (0.04)		
EUR		0.304* (0.18)		
EUR*FSI		0.016 (0.66)		
BOOM			-0.031*** (0.01)	
BOOM*FSI			0.038*** (0.01)	
REC			0.084*** (0.02)	
REC*FSI			0.056*** (0.02)	
BUFF				0.001 (0.002)
BUFF*FSI				0.0003 (0.001)
COST	-0.001 (0.002)	0.003* (0.002)	-0.007 (0.005)	-0.002 (0.020)
DCP	-0.001** (0.00)	-0.002*** (0.00)	-0.001** (0.00)	-0.001** (0.00)
GDPR	-0.017*** (0.002)	-0.014*** (0.002)	-0.003 (0.004)	-0.015*** (0.003)
ISI	-0.029 (0.03)	0.020 (0.05)	-0.028 (0.04)	-0.056* (0.03)
Fixed effect?	Yes	Yes	Yes	Yes
Sargan test statistic	24.501 [0.54]	16.723 [0.82]	21.107 [0.73]	21.943 [0.69]
AR(1) p-value	-2.181 [0.02]	-2.280 [0.02]	-2.33 [0.01]	-2.037 [0.04]

*, **, *** denote statistical significant at the 10%, 5% and 1% levels.
Values in ( ) and [ ] are the standard errors and the probabilities, respectively.

5.2. Further analyses

This section presents the result for the impact of financial stability on the individual sustainable development indicators namely SDG3, SDG4, SDG7 and SDG10. It also presents the result of the moderating effect of regional differences, fluctuating economic cycles and capital buffer on the relationship between financial stability and the individual sustainable development indicators.

5.2.1. Effect of financial stability on the individual sustainable development indicators

The FSI variable is significant and negatively associated with SDG3 in column 1 of table 4. This result indicates that greater financial stability is significantly associated with a reduction in current health expenditure relative to GDP leading to a decrease in sustainable development in terms of poorer health and wellbeing. The explanation for this result is that financial institutions operating in a stable financial system are more likely to fund other profitable areas rather than funding expenditures geared towards good healthcare and wellbeing. This can occur if financial institutions consider health expenditures to be less profitable or risky to finance with loans. In terms of economic significance, the FSI coefficient is economically significant such that a unit increase in FSI leads to a 11.9 percent decrease in current health expenditure as percentage of GDP.

The FSI variable is significant and positively associated with SDG7 in column 3 of table 4. This result indicates that greater financial stability is significantly associated with higher renewable energy consumption which contributes to achieving the goal of affordable and clean energy. The result implies that financial institutions in a stable financial system will likely fund and invest more in affordable and clean energy towards greater sustainable development. The explanation for this is that a stable financial system would increase investors' confidence and make responsible investors and financial institutions increase funding and investment in renewable energy towards attaining the sustainable development goal of affordable and clean energy (SDG7). This result also supports our hypothesis (H1) that financial stability has a positive significant effect on sustainable development. In terms of economic significance, the FSI coefficient is economically significant such that a unit increase in FSI leads to a 30.3 percent increase in SDG7 or renewable energy consumption. The result is also in line with studies that emphasize the positive role of

financial institutions in increasing funding and investment in renewable energy towards greater sustainable development (see Fangmin and Jun, 2011; Hall et al, 2016).

The FSI variable is not significantly associated with SDG4 and SDG10 in columns 2 and 4 of table 4. This indicates that financial stability does not have a significant effect on current education expenditure and the vulnerable employment ratio. This might be because financial institutions and investors in a stable financial system may be less interested in funding and investing in quality education because of government's undue involvement in the education sector. They may also be less interested in funding and investing in programs aimed at reducing inequalities (SDG10) because such programs may not yield positive returns to financial institutions and investors. These findings are also in line with studies which argue that investors consider sustainable-development-investments to be less profitable because of their high-risk low-return profiles (see Cunha et al, 2020; Taghizadeh-Hesary and Yoshino, 2020). Therefore, it is natural for financial institutions and investors to avoid some sustainable development investments such as education expenditures and inequality reduction programs.

5.2.2. Regional effects on the individual sustainable development indicators

We also take into account regional differences and how it might affect the individual indicators of sustainable development (Roberts, 2006; Liu et al, 2013). We examine whether regional differences affect the relationship between financial stability and the individual sustainable development indicators. The results are reported in columns 5 to 8 of table 4.

The EUR*FSI and ASN*FSI variables are negative and significantly associated with SDG10 in column 8. The explanation for the two results is that greater financial stability is significantly associated with lower vulnerable employment thereby increasing inequality in European and Asian countries. The two results imply that a stable financial system decreases vulnerable employment which increases inequality and lowers sustainable development in European and Asian countries. This can occur if the goal of preserving financial stability in European and Asian countries is not aimed at reducing inequality.

The AFR*FSI variable is not significant in columns 5 to 8. This indicates that financial stability does not have a significant effect on the attainment of good health and well-being (SDG3), quality education (SDG4), clean and affordable energy (SDG7) and reduced inequalities (SDG10) in African countries. This implies that financial stability does not have a significant effect on the four individual sustainable development indicators in African countries. A possible explanation for this is that the goal of preserving financial stability may not be linked to attaining good health, quality education and reduction in inequality in African countries.

Also, the AFR, EUR and ASN binary variables have a positive coefficient and are significantly associated with SDG7 in column 7. The explanation for this result is that the countries in the African, European and Asian regions in our sample have high level of renewable energy consumption relative to total energy consumption. This result is in line with studies that show a high level of renewable energy consumption in Asian, European and African countries (Kelsey and Meckling, 2018; Marra and Colantonio, 2021). The ASN coefficient is negative and significantly associated with SDG3 in column 5. This implies that the Asian countries in our sample have low level of good health and wellbeing. This result supports the studies that show a low level of quality healthcare in Asian countries (see Hasnisah et al, 2019).

Overall, the implication of the regional results is that regional differences have a significant moderating influence on the relationship between financial stability and the individual sustainable development indicators.

Table 4. Regional effects of financial stability on the individual sustainable development indicators (system GMM regression estimation)

	1	2	3	4	5	6	7	8
	SDG3	SDG4	SDG7	SDG10	SDG3	SDG4	SDG7	SDG10
	Coefficient (Std.Err)	Coefficient (Std.Err)	Coefficient (Std.Err)	Coefficient (Std.Err)	Coefficient (Std.Err)	Coefficient (Std.Err)	Coefficient (Std.Err)	Coefficient (Std.Err)
C	0.754*** (0.23)	61.241** (23.24)	1.669*** (0.17)	1.890*** (0.18)	2.265** (1.02)	90.09 (314.83)	-4.927 (3.84)	2.737* (1.41)
Lag	0.813*** (0.04)	0.320 (0.27)	0.995*** (0.01)	0.942*** (0.00)	0.772*** (0.09)	1.239 (1.77)	0.854*** (0.08)	0.931*** (0.03)
FSI	-0.119*** (0.03)	-0.033 (0.55)	0.303*** (0.05)	-0.023 (0.05)	-0.114 (0.26)	9.450* (4.76)	0.883 (2.61)	3.759 (2.52)
AFR					-1.653 (1.07)	-71.819 (9.11)	16.406** (7.62)	-1.382 (2.09)
AFR*FSI					0.004 (0.27)	-7.851 (18.53)	-0.011 (2.62)	-3.874 (2.57)
EUR					0.355 (0.58)	-98.049 (99.78)	13.864** (6.46)	.1369 (0.70)
EUR*FSI					0.136 (0.53)	-13.438 (12.17)	1.918 (3.75)	-7.013* (4.32)
ASN					-3.764*** (1.09)	-29.116 (311.37)	12.601*** (3.91)	1.818 (1.25)
ASN*FSI					0.313 (0.22)	-11.951 (11.22)	-1.124 (4.25)	-4.365* (2.58)
COST	-0.018 (0.02)	0.037 (0.06)	0.033 (0.02)	-0.019** (0.01)	0.004 (0.02)	-0.155 (0.35)	-0.011 (0.06)	0.036 (0.03)
DCP	0.004*** (0.00)	0.024 (0.05)	-0.014*** (0.00)	-0.002 (0.001)	0.009*** (0.003)	-0.188 (0.16)	-0.016 (0.01)	-0.022** (0.01)
GDPR	0.049*** (0.01)	0.085 (0.08)	-0.206*** (0.02)	-0.021** (0.01)	0.049*** (0.01)	-0.399* (0.23)	-0.178*** (0.04)	0.001 (0.02)
ISI	0.744*** (0.23)	-2.841*** (0.97)	1.104*** (0.22)	-0.618*** (0.19)	-0.487 (0.67)	-14.018 (21.28)	-1.074 (2.21)	-1.021 (1.08)
Fixed effect?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Sargan test statistic	21.25 [0.72]	10.239 [0.99]	22.411 [0.66]	19.193 [0.82]	15.871 [0.86]	0.267 [1.00]	17.470 [0.78]	14.399 [0.91]
AR(1) p-value	-2.10 [0.04]	-0.664 [0.51]	-2.142 [0.03]	-1.911 [0.05]	-2.193 [0.03]	-0.253 [0.79]	-2.123 [0.03]	-1.685 [0.09]

*, **, *** denote statistical significant at the 10%, 5% and 1% levels.
Values in ( ) and [ ] are the standard errors and the probabilities, respectively.

5.2.3. Effect of fluctuating economic cycles

The result for the moderating effect of fluctuating economic cycles on the relationship between financial stability and sustainable development is reported in columns 1 to 4 of table 5. The REC*FSI and BOOM*FSI variables are both negative and significantly associated with SDG3 proxied by current health expenditures in column 1 of table 5. This indicates that greater financial stability is significantly associated with lower current health expenditures during periods of economic recession and economic prosperity. A possible explanation for this is that financial institutions operating in a stable financial system will likely decrease funding and investment in health expenditures during economic boom or recession and this will decrease good health and wellbeing. This is possible because financial institutions operating in a stable financial system may not consider the health sector to be a very profitable sector. As a result, they are more likely to fund other profitable sectors instead of funding health expenditures with loans during recessions or booms.

The REC*FSI and BOOM*FSI variables are both positive and significantly associated with SDG7 or renewable energy consumption in column 3 of table 5. This indicates that greater financial stability is significantly associated with higher renewable energy consumption during periods of economic recession and economic prosperity. A possible explanation for this is that financial institutions operating in a stable financial system will increase funding and investment in renewable energy which will increase renewable energy consumption irrespective of whether the economy is experiencing a recession or a boom since renewable energy investment is considered to be a relatively profitable sector (Richter, 2013). The implication is that the positive effect of financial stability on clean and affordable energy through renewable energy consumption holds true regardless of the fluctuation in the economic cycle.

The REC coefficient is negative and significantly associated with SDG3 in column 1 of table 5. This implies that the countries in our sample had poorer health and well-being during periods of economic recession. This result is in line with studies that show that recessions are associated with a deterioration in people's health (e.g. Ozili and Arun, 2020; Ozili, 2022b). The REC coefficient is also positive and significantly associated with SDG7 in column 3. This implies that

the countries in our sample had better clean energy through higher renewable energy consumption during periods of economic recession. This result is in line with studies that show that recessions are associated with a greater focus on renewable energy consumption (e.g. Shekhar et al, 2021; Tsai, 2021).

The BOOM coefficient is positive and significantly associated with SDG3 in column 1 of table 5. This implies that the countries in our sample have better health and wellbeing during periods of economic prosperity. The BOOM coefficient is also negative and significantly associated with SDG7 and SDG10 in columns 3 and 4 of table 5 respectively. This implies that the countries in our sample have low renewable energy consumption and low equality during periods of economic prosperity.

5.2.4. Effect of capital buffer

We also consider the moderating role of capital buffer on the relationship between financial stability and the individual indicators of sustainable development. The literature shows that banks with strong capital buffer can absorb unexpected losses arising from extraordinary activities (Dikau and Volz, 2018; Neisen et al, 2021). We then argue that since the pursuit of sustainable development goals by banks is a non-core banking activity, banks that have high capital buffer will have incentives to contribute to the realization of the SDGs since they can withstand unexpected losses that may arise from financing SDG activities due to their high buffer capital that provides additional level of safety. In the model, we interact the BUFF variable with the FSI variable to determine its moderating effect on the relationship between financial stability and the four indicators of sustainable development. The results are reported in columns 5 to 8 of table 5.

The BUFF*FSI variable is positive and significantly associated with SDG3 and SDG7 in columns 5 and 7 of table 5 respectively. The two results suggest that greater financial stability is significantly associated with greater renewable energy consumption (SDG7) and good health and wellbeing (SDG3) in countries where the banking system have high capital buffer. The explanation for these results is that high capital buffer is a necessary condition for financial stability to lead to better sustainable development outcomes. This is because financial institutions that have high capital

buffer and operate in a stable financial system would be willing to provide funds to support renewable energy consumption and good health and wellbeing even if such funding is risky since their high capital buffer gives them an additional level of safety. This result is in line with studies that show that well-capitalized banks can engage in non-core banking activities because their capital buffer provide additional safety to absorb unexpected losses that may arise from engaging in non-core banking activities (Dikau and Volz, 2018; Neisen et al, 2021).

The BUFF binary variable is negative and significantly associated with SDG3 and SDG10 in columns 5 and 8 of table 5. The BUFF binary variable is also positive and significantly associated with SDG4 in column 6. The two results imply that the countries whose banking sectors have high capital buffer have high quality education, low healthcare and low equality.

Table 5. Effect of fluctuating economic cycles and capital buffer (system GMM regression estimations)

	1	2	3	4	5	6	7	8
	SDG3	SDG4	SDG7	SDG10	SDG3	SDG4	SDG7	SDG10
	Coefficient (Std.Err)	Coefficient (Std.Err)	Coefficient (Std.Err)	Coefficient (Std.Err)	Coefficient (Std.Err)	Coefficient (Std.Err)	Coefficient (Std.Err)	Coefficient (Std.Err)
c	0.776***	45.639*	2.696***	1.506***	1.717***	100.016***	1.533***	2.030***
	(0.26)	(26.14)	(0.35)	(0.26)	(0.38)	(29.23)	(0.35)	(0.24)
Lag	0.837***	0.457	0.995***	0.938***	0.707***	-0.164	0.989***	0.946**
	(0.04)	(0.29)	(0.01)	(0.01)	(0.04)	(0.36)	(0.01)	(0.01)
FSI	-0.034***	0.001	-0.199	0.103	-0.250***	-0.728	-0.759***	0.069
	(0.49)	(1.00)	(0.13)	(0.27)	(0.04)	(1.73)	(0.09)	(0.14)
REC	-0.530***	0.722	0.999**	0.132				
	(0.13)	(5.32)	(0.47)	(0.63)				
REC*FSI	-0.271***	-2.334	1.275***	-0.505				
	(0.08)	(3.64)	(0.25)	(0.74)				
BOOM	0.115**	-1.721	-0.639***	-0.211**				
	(0.04)	(2.47)	(0.15)	(0.09)				
BOOM*FSI	-0.106***	-0.201	0.430***	-0.126				
	(0.03)	(1.61)	(0.09)	(-0.17)				
BUFF					-0.031***	0.25*	0.027	-0.022**
					(0.01)	(0.15)	(0.03)	(0.01)
BUFF*FSI					0.0220***	0.018	0.115***	-0.013
					(0.002)	(0.16)	(0.01)	(0.01)
COST	-0.021	0.009	-0.097***	0.040	-0.012	0.175*	0.016	-0.018**
	(0.03)	(0.18)	(0.03)	(0.07)	(0.02)	(0.10)	(0.02)	(0.01)
DCP	0.004**	0.037	-0.020***	0.001	0.003***	0.060	-0.015***	-0.002*
	(0.00)	(0.08)	(0.004)	(0.00)	(0.001)	(0.04)	(0.002)	(0.001)
GDPR	-0.016	0.308	-0.141***	0.032	0.036***	0.0433	-0.178***	-0.027***
	(0.02)	(0.71)	(0.04)	(0.05)	(0.01)	(0.08)	(0.03)	(0.01)
ISI	0.409	5.907	1.643***	-0.822**	1.068***	0.287	1.001***	-0.480**
	(0.27)	(9.43)	(0.35)	(0.36)	(0.24)	(4.98)	(0.24)	(0.22)
Fixed effect?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Sargan test stat	14.361 [0.96]	8.254 [0.99]	15.904 [0.94]	15.451 [0.94]	18.99 [0.83]	7.147 [0.99]	17.473 [0.89]	17.721 [0.88]
AR(1) p-value	-2.303 [0.02]	-0.447 [0.65]	-2.114 [0.04]	-1.912 [0.05]	-2.022 [0.04]	0.446 [0.65]	-2.072 [0.04]	-1.903 [0.05]

*, **, *** denote statistical significant at the 10%, 5% and 1% levels.

Values in ( ) and [ ] are the standard errors and the probabilities respectively.

5.3. Robustness test

To check whether the results are sensitive to alternative estimation, we re-estimate the entire regression results using the feasible generalized least squares (FGLS) estimator. The FGLS estimator addresses the issues of cross-sectional dependence, clustering problems, inappropriate variable selection, cross-sectional correlation, heteroscedasticity and endogeneity in the data (Hansen, 2007; Bai et al, 2021). We compared the system GMM results with the FGLS results and found that some of the FGLS results remain statistically significant with the system GMM results even though they report conflicting signs.

Regarding the sustainable development index (SDI) analysis, the FSI variable is significantly associated with SDI in the FGLS estimation in column 1 of table 6. The FSI variable is also significant in the GMM estimation in column 1 of table 3 even though the FSI variable reports mixed signs in relation to SDI in the GMM and FGLS estimations. This indicates that the FSI variable remains significant in both the GMM and FGLS estimations; therefore, we conclude that the FSI variable is significantly associated with SDI in the two estimations. This implies that financial stability has a significant effect on the level of sustainable development. Also, the ASN*FSI variable is negative and significantly associated with SDI in the FGLS estimation in column 2 of table 6. This result is consistent and robust with the earlier result obtained in the GMM estimation in column 2 of table 3 which is also negative and significant. This result confirms that greater financial stability is significantly associated lower levels of sustainable development in Asian countries. Also, the ASN and EUR binary variables are positive and significantly associated with SDI in the FGLS estimation in column 2 of table 6. This result is consistent with the earlier result obtained in the GMM estimation in column 2 of table 3 which is also positive and significant. The two results confirm that Asian and European countries have a high sustainable development index.

Regarding the individual sustainable development indicators, the FSI variable is significantly associated with SDG3 in the FGLS estimation in column 1 of table 7. The FSI variable is also significant in the GMM estimation in column 1 of table 4 even though the FSI variable reports mixed signs in relation to SDG3 in the GMM and FGLS estimations. This indicates that the FSI

variable remains statistically significant in both the GMM and FGLS estimations; therefore, we conclude that the FSI variable is significantly associated with SDG3 in the two estimations. This implies that financial stability has a significant effect on SDG3. The ASN*FSI variable is negative and significantly associated with SDG10 in the FGLS estimation in column 8 of table 7. This result is consistent with the earlier result obtained in the GMM estimation in column 8 of table 4 which is also negative and significant. The result confirms that greater financial stability does not reduce inequality rather it increases inequality in Asian countries. The results also imply that a stable financial system does not translate to improved equality in Asian countries.

The BOOM*FSI variable is negative and significantly associated with SDG3 in the FGLS estimation in column 1 of table 8. This result is consistent with the earlier result obtained in the GMM estimation in column 1 of table 5 which is also negative and significant. The result confirms that greater financial stability is significantly associated with lower health and wellbeing during periods of economic prosperity. The BUFF*FSI variable is positive and significantly associated with SDG3 and SDG7 in the FGLS estimation in columns 5 and 7 of table 8. This result is consistent with the earlier result obtained in the GMM estimation in columns 5 and 7 of table 5 which is also positive and significant. The result confirms that greater financial stability is significantly associated with higher renewable energy consumption, good health and wellbeing in countries where the banking system have high capital buffer.

The AFR binary variable is positive and significantly associated with SDG7 in the FGLS estimation in column 7 of table 7 and is consistent with the GMM result in column 7 of table 4 which is also positive and significant. This result confirms that there is significant improvement in affordable and clean energy in African countries. The ASN binary variable is negative and significantly associated with SDG3 in the FGLS estimation in column 5 of table 7 and is consistent with the GMM result in column 5 of table 4 which is also negative and significant. This result confirms that there is low health and wellbeing in Asian countries. The BUFF variable is positive and significantly associated with SDG4 in the FGLS estimation in column 6 of table 8 and is consistent with the result obtained in the GMM estimation in column 6 of table 5 which is also positive and significant. This result confirms that countries whose banking sectors have high capital buffer also have good health and wellbeing.

Table 6. Sustainable development index as the dependent variable (Feasible Generalized Least Squares)

	1	2	3	4
	Coefficient (Std.Err)	Coefficient (Std.Err)	Coefficient (Std.Err)	Coefficient (Std.Err)
c	-0.151 (0.22)	-0.720*** (0.18)	-0.165 (0.23)	-0.734*** (0.28)
FSI	-0.393*** (0.06)	-0.261*** (0.09)	-0.382*** (0.08)	-0.622*** (0.14)
AFR		1.193*** (0.17)		
AFR*FSI		-0.121 (0.14)		
ASN		0.757*** (0.16)		
ASN*FSI		-0.236* (0.13)		
EUR		0.697*** (0.21)		
EUR*FSI		1.003*** (0.19)		
BOOM			0.258 (0.19)	
BOOM*FSI			-0.032 (0.11)	
REC			-0.009 (0.46)	
REC*FSI			-0.015 (0.41)	
BUFF				0.055*** (0.02)
BUFF*FSI				0.022 (0.02)
COST	-0.083*** (0.03)	-0.038* (0.02)	-0.077*** (0.02)	-0.082*** (0.03)
DCP	-0.005*** (0.002)	-0.004** (0.002)	-0.005*** (0.002)	-0.004** (0.002)
GDPR	0.201*** (0.02)	0.129*** (0.02)	0.163*** (0.04)	0.199*** (0.02)
ISI	-0.827*** (0.10)	-0.904*** (0.10)	-0.819*** (0.12)	-0.891*** (0.11)
Fixed effect?	Yes	Yes	Yes	Yes
Wald test	557.58 [0.00]	1062.18 [0.00]	565.51 [0.00]	597.20 [0.00]

*, **, *** denote statistical significant at the 10%, 5% and 1% levels.
Values in ( ) and [ ] are the standard errors and the probabilities respectively

Table 7. Regional effects of financial stability on the individual sustainable development indicators (FGLS regression estimation)

	1	2	3	4	5	6	7	8
	SDG3	SDG4	SDG7	SDG10	SDG3	SDG4	SDG7	SDG10
	Coefficient (Std.Err)	Coefficient (Std.Err)	Coefficient (Std.Err)	Coefficient (Std.Err)	Coefficient (Std.Err)	Coefficient (Std.Err)	Coefficient (Std.Err)	Coefficient (Std.Err)
c	6.609*** (0.49)	93.664*** (1.78)	31.918*** (5.78)	35.834*** (4.36)	7.362*** (0.40)	91.358*** (1.61)	20.651*** (4.96)	27.656*** (3.85)
FSI	1.104*** (0.14)	2.491*** (0.57)	-1.980 (1.68)	-7.071*** (1.27)	1.369*** (0.20)	6.865*** (1.245)	-0.119 (2.47)	-1.885 (1.92)
AFR					-1.555*** (0.37)	-0 .108 (1.75)	27.586*** (4.55)	13.926*** (3.53)
AFR*FSI					-0.616*** (0.30)	-6.436*** (1.71)	-1.473 (3.71)	-7.168** (2.88)
EUR					-1.755*** (0.47)	3.339* (1.89)	6.064 (5.73)	11.564** (4.44)
EUR*FSI					-1.196** (0.43)	-2.542 (1.72)	17.684*** (5.26)	17.039*** (4.08)
ASN					-3.591*** (0.35)	-3.172*** (1.83)	-2.502 (4.24)	10.201*** (3.29)
ASN*FSI					-0.449 (0.28)	-2.542 (1.45)	-1.252 (3.48)	-10.867 *** (2.71)
COST	0.357*** (0.06)	0.309*** (0.22)	0.508 (0.69)	-1.545*** (0.52)	0.157** (0.05)	0.141 (0.19)	0.513 (0.64)	-1.001** (0.49)
DCP	-0.002 (0.004)	-0.029* (0.02)	-0.161*** (0.05)	-0.104*** (0.03)	0.010*** (0.003)	0.012 (0.02)	-.0434 (0.04)	-0.062* (0.03)
GDPR	-0.349*** (0.05)	-0.202 (0.20)	1.914*** (0.62)	4.149*** (0.46)	-0.108** (0.04)	-0.065 (0.24)	1.403** (0.58)	3.236*** (0.45)
ISI	2.644*** (0.23)	0.613 (0.86)	-8.722*** (2.66)	-9.093*** (2.01)	2.142*** (0.23)	-2.303** (0.99)	-11.319*** (2.81)	-12.917*** (2.18)
Fixed effect?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Wald test	493.00 [0.00]	22.91 [0.00]	162.07 [0.00]	352.03 [0.00]	976.13 [0.00]	64.62 [0.00]	363.99 [0.00]	610.35 [0.00]

*, **, *** denote statistical significant at the 10%, 5% and 1% levels.
Values in ( ) and [ ] are the standard errors and the probabilities respectively

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Table 8. Effect of fluctuating economic cycles and capital buffer (FGLS regression estimation)

	1	2	3	4	5	6	7	8
	SDG3	SDG4	SDG7	SDG10	SDG3	SDG4	SDG7	SDG10
	Coefficient (Std.Err)	Coefficient (Std.Err)	Coefficient (Std.Err)	Coefficient (Std.Err)	Coefficient (Std.Err)	Coefficient (Std.Err)	Coefficient (Std.Err)	Coefficient (Std.Err)
c	6.368*** (0.51)	91.638*** (1.79)	32.256*** (6.12)	33.545*** (4.61)	7.091*** (0.63)	88.466*** (2.14)	11.391*** (7.09)	33.307*** (5.72)
FSI	1.518*** (0.17)	1.697** (0.78)	0.185 (2.16)	-5.981*** (1.62)	0.631** (0.30)	-0.996 (1.15)	-16.193*** (0.38)	-6.804** (2.73)
REC	0.994 (1.001)	5.875* (3.08)	-5.448 (12.14)	10.221 (9.13)				
REC*FSI	-0.248 (0.88)	0.870 (3.06)	-4.017 (10.70)	1.312 (8.05)				
BOOM	-0.763* (0.42)	-7.111*** (1.84)	4.101 (5.12)	2.052 (3.83)				
BOOM*FSI	-0.880*** (0.23)	1.424 (1.03)	-4.437 (2.80)	-2.785 (2.11)				
BUFF					-0.064 (0.04)	0.547*** (0.15)	1.777*** (0.45)	-0.022** (0.37)
BUFF*FSI					0.065** (0.32)	0.314** (0.12)	1.588*** (0.36)	-0.012 (0.29)
COST	0.322*** (0.05)	0.125 (0.21)	0.591 (0.71)	-1.579*** (0.53)	0.365*** (0.05)	0.251 (0.20)	0.623 (0.68)	-1.557*** (0.52)
DCP	-0.0003 (0.004)	-0.019 (0.01)	-0.147*** (0.04)	-0.091*** (0.03)	-0.003 (0.004)	-0.0162 (0.01)	-0.104** (0.04)	-0.096** (0.03)
GDPR	-0.218** (0.09)	1.121** (0.42)	1.067 (1.13)	4.169*** (0.85)	-0.316*** (0.05)	-0.405** (0.19)	2.121*** (0.59)	4.081*** (0.47)
ISI	2.333*** (0.24)	-0.051 (0.89)	-10.052*** (2.87)	-9.499*** (2.16)	2.893*** (0.24)	-0.009 (0.88)	-9.102*** (2.69)	-9.741*** (2.17)
Fixed effect?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Wald test	552.91 [0.00]	43.82 [0.00]	168.10 [0.00]	364.03 [0.00]	518.84 [0.00]	46.14 [0.00]	215.98 [0.00]	353.81 [0.00]

*, **, *** denote statistical significant at the 10%, 5% and 1% levels.
Values in ( ) and [ ] are the standard errors and the probabilities respectively

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6. Conclusion

This study examined the effect of financial stability on sustainable development for 26 diverse countries using yearly data from 2011 to 2018. We argued that financial stability is an important precondition that incentivize and enable financial institutions to perform their roles as financial intermediaries and to fund activities that lead to the realization of the sustainable development goals in a sustainable way. In the absence of a stable financial system, financial intermediation for sustainable development would be difficult. In the empirical analysis, a composite financial stability index was constructed and its effect on the sustainable development index and selected SDG indicators were examined. The GMM and FGLS estimation techniques were applied to examine the effect of financial stability on sustainable development. We extend the literature by linking financial stability to sustainable development and using a composite sustainable development index as well as individual indicators of sustainable development.

The findings of the sustainable development index analysis show that financial stability has a significant effect on the level of sustainable development and the effect is negative in Asian countries. European and Asian countries have a high sustainable development index compared to African countries. The result of the individual SDG analyses show that financial stability has a significant effect on SDG3. Financial stability has a negative effect on SDG10 in Asian countries and a negative effect on SDG3 during periods of economic prosperity. Financial stability has a positive effect on SDG3 and SDG7 in countries where the banking system have high capital buffer. The findings are robust to alternative estimation techniques. These results show that the effect of financial stability on sustainable development depends on how sustainable development is measured.

These results call on policymakers to incorporate financial stability as a determinant of sustainable development. They should take into account the influence of other moderating factors influencing the relationship between financial stability and sustainable development. The findings of this study contribute to the ongoing debate about the financial stability implications of financial institutions' effort to support the realization of the sustainable development goals. Our findings add to this debate by showing that the significant impact of financial stability on

sustainable development could be positive in countries where the banking sector have strong capital buffer while the effect could be negative when we consider the influence of fluctuating economic cycles and regional characteristics on the individual SDG indicators. While financial analysts and economists seem to agree that the financial system play an important role in achieving the sustainable development goals, the conditional positive or negative effect of financial stability on sustainable development as shown in our study should guide policy makers and bank regulators in developing financial stability frameworks that align with sustainable development policies while taking into account the necessary institutional infrastructure that is needed to support the attainment of the SDGs. The findings are also important to financial institutions and investors seeking to identify the areas of sustainable development that they want to fund or invest in. By gaining a perspective on the likely effect of financial stability on different indicators of sustainable development as shown in our study, these financial institutions and investors will be able to decide how best to contribute to the goals of sustainable development. Furthermore, there is a need for sustainability-related financial disclosures to provide financial institutions and investors with greater transparency and information for better decision-making in financing the realization of the sustainable development goals. The disclosure of material information about financial institutions' significant sustainability-related risks and opportunities is necessary for investors to assess the enterprise value of financial institutions. Such disclosures also enable financial regulators to assess whether the sustainability-related risks borne by financial institutions could threaten the stability of the financial system.

One limitation of the study is the choice of financial stability indicator. We used a composite measure of financial stability rather than single measures of financial stability (e.g. nonperforming loans ratio) that may provide new insights. However, the problem with using single measures of financial stability is that they often yield conflicting effects on sustainable development. Another limitation relates to the choice of proxy variables for the selected SDGs. Another limitation of the study is that the SDG proxies used in the study do not fully capture the complex nature of the sustainable development goals. Also, each of the SDGs have many targets and it is possible that financial stability may have a different impact on the targets at a micro

level. Our study did not capture these effects. These limitations open up some fruitful areas for future research.

Future studies can extend this study by investigating the effect of financial stability on each of the targets of the SDGs. Future studies can also examine the effect of financial development on the SDG targets. Future studies can also extend our study by including other countries, additional measures of financial stability and other SDG proxy indicators that can provide additional valuable insights to this line of research. Future studies can also use qualitative methods such as interviews to elicit the opinion or perception of finance professionals about what they think is the effect of financial stability on the level of sustainable development. Such analysis can provide interesting and in-depth insights in understanding the effect of financial stability on sustainable development from the practitioner perspective.

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Appendix

Table 9. Pearson correlation for the variables

Variables	SDI	SDG3	SDG4	SDG7	SDG10	FSI	DCP	COST	ISI	BUFF	GDPR
SDI	1.000										

SDG3	-0.651***	1.000									
	(0.00)	-----									
SDG4	0.02	0.075	1.000								
	(0.84)	(0.47)	-----								
SDG7	0.850***	-0.206**	0.137	1.000							
	(0.00)	(0.05)	(0.19)	-----							
SDG10	0.956***	-0.505***	-0.025	0.821***	1.000						
	(0.00)	(0.00)	(0.81)	(0.00)	-----						
FSI	-0.126	0.114	0.295***	-0.051	-0.149	1.000					
	(0.23)	(0.28)	(0.00)	(0.62)	(0.15)	-----					
DCP	-0.519***	0.321***	-0.166	-0.484***	-0.468***	0.316***	1.000				
	(0.00)	(0.00)	(0.11)	(0.00)	(0.00)	(0.00)	-----				
COST	0.195***	-0.133	0.125	0.232***	0.119	-0.411***	-0.614***	1.000			
	(0.06)	(0.21)	(0.23)	(0.03)	(0.25)	(0.00)	(0.00)	-----			
ISI	-0.696***	0.664***	-0.097	-0.525***	-0.564***	0.164	0.732***	-0.524***	1.000		
	(0.00)	(0.00)	(0.36)	(0.00)	(0.00)	(0.12)	(0.00)	(0.00)	-----		
BUFF	0.102	0.173*	0.386***	0.248**	0.129	0.423***	0.044	-0.154	0.203*	1.000	
	(0.33)	(0.09)	(0.00)	(0.02)	(0.22)	(0.00)	(0.67)	(0.14)	(0.05)	-----	
GDPR	0.601***	-0.584***	-0.018	0.359***	0.568***	0.185*	-0.156	-0.077	-0.304***	0.255**	1.000
	(0.00)	(0.00)	(0.86)	(0.00)	(0.00)	(0.08)	(0.13)	(0.46)	(0.00)	(0.01)	-----

P-values are in parenthesis. ***, **, * denote statistical significance at the 1%, 5% and 10% level.