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Green-Inclusive-Finance: The Case of Selected MENA & SSA Countries

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Abstract

Using System General Method of Moments approach estimation methodology on annual data 73 developed and developing countries including 12 Middle East and North African (MENA) and 45 Sub-Saharan African (SSA) countries, the study estimates the impact of green finance on the eradication of extreme poverty by 2030, the first goal of the Sustainable Development Goals (SDGs). Using green bond issuance as a measure of green finance, the results indicate that the penetration of green finance measure has a positive, statistically significant impact on reducing extreme poverty for the full sample, but not in the MENA and SSA countries. Policy considerations can be directed towards developing and promoting the infrastructure needed for the widespread delivery and usage of green inclusive financial tools, especially for the MENA and SSA regions lagging the extreme poverty target.

JEL Classification Numbers: C23; G21; O43

Keywords: Green Inclusive Finance; Extreme Poverty; MENA Region SDGs; ARDL Approach

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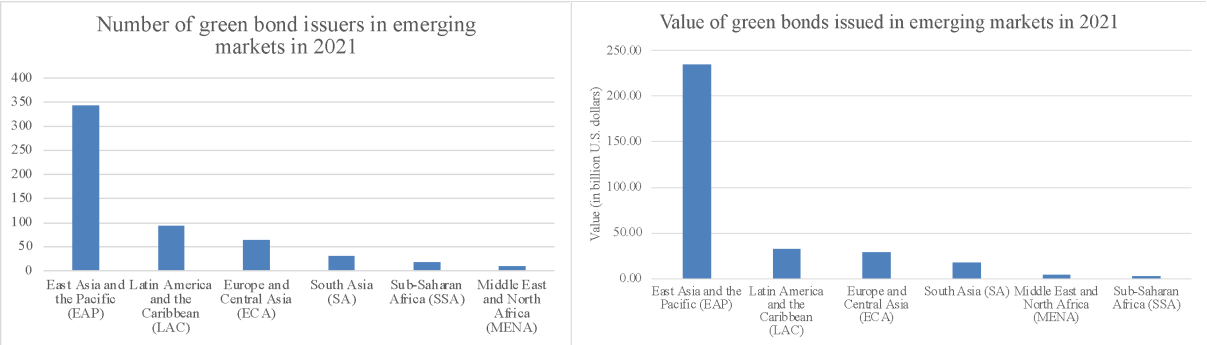
1. Introduction

Countries globally and especially in the MENA region have experienced significant growth and development yet are still challenged by combating and eradicating extreme poverty. In fact, the World Bank (2022) estimated that economies in the MENA region will grow at the fastest rate since 2016 with a projected increase of 5.2% this year. However, efforts to reduce extreme poverty have not been as successful. This is evident from empirical evidence such as the fact that the rate of extreme poverty rose from 3.8% to 7.2% between 2015 and 2018 (World Bank, 2020a) and that the World Bank (2022) estimates that the number of people living in poverty in the MENA region will increase by 9 million by the end of this year. The challenges the region faces against extreme poverty are created by a multitude of factors including conflict, economic and environmental inequities that exist within the region, and the lasting economic effects of the COVID-19 pandemic.

The 17 Sustainable Development Goals (SDGs) were created in 2015 with the efforts to call countries to action to implement sustainable, equitable, and effective policies and strategies to improve lives, promote peace, and protect the planet (United Nations, 2015). The first goal includes eradicating all forms of poverty and the others range from increasing access to affordable and clean energy to climate action. Throughout each of the goals, sustainability is highlighted as building processes, systems, and infrastructure that can be maintained long-term. This is an important topic to consider in regard to the MENA region considering its oil and gas-rich land yet underdeveloped use of sustainable and renewable resources and energy. Considering the effect that the oil and gas industry has on the environment, the population living in poverty in the MENA region suffer more from these effects than those living out of poverty. As a result, it has become important to explore how to help those living in poverty mitigate the effects of climate change.

Green-Inclusive-Finance (GIF) offers a variety of financial tools and solutions to help reduce the vulnerabilities those living in poverty have to climate change. More specifically, Lindenberg (2014) aggregated various definitions of green finance from multiple sources and proposed that green finance consists of public policy and actions that focus on goods, services, systems, and projects that are environmentally friendly, prevent, minimize, or help reduce damages to the environment and the climate. Inderst, et al. (2012) describes green investments as committing capital to ventures of varying asset classes which are committed to environmentally friendly and climate change preventing projects. It is important to keep the distinction of asset classes in mind when determining the methodology to measure the level of green investments within a country or the region.

Figure (1): Number of Issuers and Value of Green Bonds in Emerging Markets in 2021



Source: International Finance Corporation: Emerging Market Green Bonds Report 2021

While green loans seem to have a positive outlook, green bonds appear to have some more concerns. Ehlers and Packer (2017) studied green bonds and its growth in recent years and found that while they have higher pricing on average than standard bonds, their performance is similar, and many green bonds are in sectors subject to environmentally related credit risks. As a result, to measure green bonds it will be important to assess the effects green bonds have by sector to account for this. Based on the above information, GIF can be measured by the levels of investment by asset class, the number of green loans issued, and the number of green bonds issued by sector.

Given the fact that GIF is a relatively new topic, there is limited data about the levels of green finance globally. However, given the data that does currently exist, MENA and SSA regions appear to be falling behind other emerging markets when it comes to investing in GIF.

Based on Figure (1), MENA and the SSA are the two regions with the lowest number of green bond issuers and lowest value of green bonds issues amongst emerging markets in 2021 (IFC, 2021). Given the large disparity between the investments that regions such as EAP and LAC have made in comparison to MENA and SSA, there is an opportunity to explore how investing more resources into GIF can aid MENA and SSA with economic development.

Therefore, the purpose of this study is to examine the effects of green finance on the level of extreme poverty for a group of the MENA region, the latter which is characterized by increasing rates of poverty despite economic growth and availability of oil and natural resources.

As interest in GIF continues to grow, this study will attempt to add data and information regarding the impact of GIF on eradicating extreme poverty in the MENA region. In order to explore the influence of GIF, there are several questions that this study will seek to answer such as; do green investments, green loans, and green bond issuances have an impact on extreme poverty? If there is an impact, is it the same for all countries within the MENA and SSA regions and the full sample? What policy recommendations can be derived from the results of this study? The rest of this paper will be divided as follows. The next section will discuss existing literature on the topic, Section 3 will describe the data used, Section 4 will describe the methodology used in addition to the model selection, Section 5 will include a presentation of the results, Section 6 will conclude the findings, Section 7 list references, and the appendix will follow.

2. Literature Review

The disparity in the level of effect seen by green finance based on its level of development within a country is particularly interesting regarding the distribution of energy poverty within the MENA region. El-Katiri (2014) studied energy poverty in the MENA region due to the fact that it is frequently overlooked in this topic due to the abundance of oil and gas. The author used access to electricity as the primary measure of energy poverty and found that energy access in the MENA region is typically segmented by income and geography. More specifically, countries with higher incomes and/or higher rates of urbanization have more access to electricity. This is interesting because countries with lower incomes and lower rates of urbanization most likely have less access to green finance, so extending this to the MENA region, we would expect rural and lower-income countries experiencing less effects from implementing green finance systems than higher-income and more urbanized countries would.

In addition to disparities seen in the effect of green finance based on its level of development and country/region characteristics, the effect of green finance can possibly vary based on the needs of different countries and/or regions. Wang and Wang (2020) studied provinces in China from 2005-2019 to explore green finance and concluded that green finance had a significantly positive impact on inclusive economic growth, however the regions experienced different effects based on different inputs of green finance. For example, the authors discuss how the eastern region in China experienced economic growth with a general focus on green focus while the central region was able to increase inclusive economic growth through resource optimization and infrastructure improvements. This coupled with the disparity based on income and urbanization levels provides interesting factors to study when examining the relationship between green finance and eradicating poverty.

Lastly, a common thread throughout the literature mentioned thus far is the recommendation by the authors that countries that seek improvement in poverty should implement policies that will encourage and assist the growth of green finance. Chardeffine and Kahia (2019) studied the impact of renewable energy consumption and financial development on CO_2 emissions and economic growth in the MENA region. While they had weakly significant data that displays a slight impact of renewable energy consumption and financial development on CO_2 emissions and economic growth, the authors recommend that countries pursue policy that targets the financial sector and the renewable energy sector.

Against the above background, green finance appears to be a promising tool for eradicating extreme poverty in the MENA and SSA regions due to the positive impact on economic growth and reduction of energy poverty. Our goal for this study is to fill the gaps in literature by exploring the relationship between green finance and eradicating poverty in selected MENA and SSA countries to examine how effects of green finance vary by geography, level of urbanization, and other factors.

3. Data

A panel dataset on a sample of 73 developed and developing countries over the period 2005-2021. Table A1 provides the list and classifications of countries in our dataset. The data on all relevant macroeconomic variables are collected from the World Development Indicators (WDI) database and IMF Climate Change Indicators Dashboard (climatedata.imf.org).

The focus of our study is however on 12 MENA and 45 SSA countries. The list of selected MENA and SSA countries included in the sample are reported in Table A1 of the Appendix. The

dependent variable in the model is the poverty headcount ratio at $1.90 a day as a percentage of the population. The set of explanatory variables contains common determinants of poverty, including real GDP per capita growth rate, inflation rate, trade openness as a percentage of GDP, population growth, and green bonds issuances. Table A2 provides the definition and abbreviations of all variables.

4. Estimation Methodology

In this section, we estimate the poverty model using panel System GMM panel estimation methodology proposed by Arellano and Bover (1995), Blundell and Bond (1998), and Blundell, Bond, and Windmeijer (2001)[2] to examine the impact of changes in the macroeconomic variables and green inclusive finance on poverty alleviation. Our main model is as follows,

$$pov_{i,t} = \alpha + \rho pov_{i,t-1} + \beta X_{i,t} + \delta lgb_{i,t} + \varepsilon_{i,t} \quad (1)$$
$$i = 1, 2, \ldots N,\ t = 2005, \ldots 2021$$

Where pov_{it} denotes the Poverty headcount ratio at $2.15 a day of country i, at time t, pov_{it-1} is the lagged poverty variable, X_{it-1} is the vector of explanatory variables which includes the annual GDP growth rate, inflation rate, openness as a percentage of GDP, and the annual population growth rate. The variable lgb_{it} represents the log of green bonds issuances in country i at time t, and ε_{it} is the error term.

Next, a dummy variable for the countries of the MENA and SSA regions, MENASSA, is added to the model in order to estimate the impact of financial inclusion in those two regions, as follows,

$$pov_{i,t} = \alpha + \rho pov_{i,t-1} + \beta X_{i,t} + \delta lgb_{i,t} + \theta MENASSA_{i,t} + \varphi (MENASSA_i * lgb_{i,t}) + \varepsilon_{i,t} \quad (2)$$

The total effect of the impact of green bonds issuances is estimated by adding up the coefficients δ and φ, where the statistical significance is estimated using the standard errors of these two coefficients.

5. Estimation Results

To estimate the impact of green bonds issuances on poverty we begin by estimating the model for the full sample, then we outline our results for the MENA and SSA sample. For all regression tables[3], the Arellano and Bond serial correlation test as well as the Hansen overidentification test are presented. The tests confirm that there is no serial correlation in second order and that the set of instruments used is overidentified.

Table A3 shows the estimation results for the full sample using all the macroeconomic explanatory variables and green bonds issuances variable. The poverty variable, "*pov,*" is regressed on the set of explanatory variables, namely GDP growth rate, "*gr,*" inflation rate, "*inf,*" openness, "*op,*" population growth rate, "*popgr,*" and the lagged poverty variable, "*l.pov.*" The

[2] For more details on the estimation methodology, check Emara and El Said (2021).

[3] It is important to note that the p values of the Inverse Chi-squared statistic of the Fisher-type unit-root test (based on augmented Dickey-Fuller tests) confirm the absence of unit root in our panels under the given test conditions (panel means and time trend). Hence our model is trend stationary.

results of Column (6) shows that a one percent increase in poverty last year leads to an increase in poverty of the current year of about 0.86% of the population, consistent with Viadero (2011).

The results also show that a one percent increase in economic growth reduces poverty head count ratio by 0.13% of the population, consistent with the empirical evidence provided in Emara and Moheildin (2020) and Emara (2022). It also aligns with the findings of similar studies conducted in other regions (Sehrawat and Giri, 2017; World Bank et al., 2004; Fanta and Upadhyay, 2009; Cruces et al., 2017).

Additionally, a one percent increase in inflation leads to a decrease in poverty headcount ratio by about 0.087% of the population, in line with the empirical findings of Talukdar (2012). Next, a ten percent increase in trade openness increases poverty in the range of around 0.09% of the population. This result goes in line with the MENA findings of Neaime and Gaysset (2018) and Emara and Moheildin (2020). Additionally, the results show that a one percent increase in population growth rate results in about 0.38% decrease in poverty headcount ratio, consistent with the findings of Birdsall (1980) and Ahlburg (1996) that population growth increases incidences of poverty.

To estimate the impact of green finance on poverty alleviation, the results show that a one percent increase in green bonds issuances, "*gb,*" reduces poverty head count ratio by about 0.13% of the population, all else equal. In conclusion, green bonds issuances have a statistically significant impact on reducing extreme poverty for the full sample.

Table A4 shows the estimation results for the MENA and SSA region. The results confirm that neither the "*afmena*" dummy nor the interaction term "*lgb_afmena*" have a statistically significant effect on reducing poverty. In other words, issuances of green bonds have a statistically Insignificant total effect on poverty alleviation in the MENA & African countries.

6. Conclusion and Policy Implications

Using the system GMM dynamic panel estimation methodology on annual data for 73 developed and developing countries including 12 MENA and 45 SSA countries over the period 2005-2021. To analyze the relationship between green inclusive finance and extreme poverty, the results of the study show that a 1% increase in green bonds issuances leads to a 0.13% decrease in poverty headcount ratio for the population of the full sample.

For the MENA and SSA sample, the results show a statistically insignificant impact of green bond issuances on poverties in those areas, so we are led to believe that countries in these areas do not have any additional impact on reducing extreme poverty beyond the baseline estimate we saw from the full sample results. Therefore, for the MENA and the African countries, the study concludes that relying on the increase in green bonds issuances will be insufficient to achieve the UN's goal of complete eradication of extreme poverty by 2030. However, it is still an important topic for these countries to examine and begin investing in, in order to benefit from the evident relationship between green bonds and poverty eradication.

For next steps, to expand the model as it currently exists, we plan to analyze the potential non-linearity in the impact of green inclusive finance on poverty alleviation in the full sample as

well as in MENA and African countries. Exploring this potential non-linearity could potentially provide even more insight into policies these countries can use to reduce extreme poverty.

7. References

Ahlburg D.A. (1996) Population Growth and Poverty. In: Ahlburg D.A., Kelley A.C., Mason K.O. (eds) The Impact of Population Growth on Well-being in Developing Countries. Population Economics. Springer, Berlin, Heidelberg.

Arellano, M., & Bover, O. (1995). Another look at the instrumental variable estimation of error-components models. *Journal of econometrics*, 68(1), 29-51.

Blundell, R., & Bond, S. (1998). Initial conditions and moment restrictions in dynamic panel data models. *Journal of econometrics*, 87(1), 115-143.

Birdsall, N. (1980). Population and Poverty in the Developing World. Population and Development Review, 6(4), 670.

Blundell, R., Bond, S., & Windmeijer, F. (2001). Estimation in dynamic panel data models: improving on the performance of the standard GMM estimator. *Emerald Group Publishing Limited.*

Cruces, G., Fields, G. S., Jaume, D., and Viollaz, M. (2017). Growth, employment, and poverty in Latin America. Oxford University Press.

Ehlers, T., & Packer, F. (2017). Green Bond Finance and certification. *BIS Quarterly Review.*

El-Katiri, L. (2014). The Energy Poverty Nexus in the Middle East and North Africa. *OPEC Energy Review,* 38(3), 296-322.

Emara, N. (2022). Asymmetric and Threshold Effects of Fintech on Poverty in SSA Countries, Journal of Economic Studies, Vol. ahead-of-print No. ahead-of-print. https://doi.org/10.1108/JES-03-2022-0158.

Emara, N. and El Said, A. (2021). Financial Inclusion and Economic Growth: The Role of Governance in Selected MENA Countries. International Review of Economics and Finance, Vol. 75 No. 5, pp. 34-54.

Emara, N., and Mohieldin, M. (2020). Financial inclusion and extreme poverty in the MENA region: a gap analysis approach. Review of Economics and Political Science, 5(3), 207–230.

Fanta, F., and Upadhyay, M. (2009). Poverty reduction, economic growth and inequality in Africa. Applied Economics Letters, 16(18), 1791–1794.

Inderst, G., Kaminker, C., & Stewart, F. (2016). Defining and measuring Green Investments. *OECD Working Papers on Finance, Insurance and Private Pensions*, 24.

International Finance Corporation & Amundi (2022). Emerging Market Green Bonds Report 2021.

Lindenberg, N. (2014, April). *Definition of Green Finance*.

Neaime, S. and Gaysset, I. (2018). Financial Inclusion and Stability in MENA: Evidence from Poverty and Inequality. Finance Research Letters 24, 230-237.

Rother, B., Pierre, G., Lombardo, D., Herrala, R., Toffano, P., Roose, E., Auclair, G., & Manasseh, K. (2016). The economic impact of conflicts and the refugee crisis in the Middle East and North Africa. *International Monetary Fund.*

Sehrawat, M., and Giri, A. K. (2017). The impact of financial development, economic growth, income inequality on poverty: evidence from India. Empirical Economics, 55(4), 1585–1602.

Talukdar, S. (2012). The effect of inflation on poverty in developing countries: A panel data analysis. Texas Tech University Libraries.

Tang, D. Y. (2020). The effects of green and social finance on firms, markets, and the economy.

United Nations. Transforming our world: The 2030 agenda for sustainable development | department of economic and social affairs.

Viadero, D. (2011). Rural Poverty; "education in chronically poor rural areas lags across generations". Education Week, 30(27), 5, April 6.

Wang, X., & Wang, S. (2020). The impact of Green Finance on Inclusive Economic Growth. *Open Journal of Business and Management,* 8(5).

World Bank Group. (2020a). Fragility and conflict: On the front lines of the fight against poverty.

World Bank Group. (2020b). Global action urgently needed to halt historic threats to poverty reduction.

World Bank Group. (2020c). MENA: Global action is urgently needed to reverse damaging jumps in extreme poverty.

World Bank Group. (2020d). Poverty and shared prosperity 2020.

World Bank, Dollar, D., Glewwe, P., and Agrawal, N. (2004). Economic Growth, Poverty, and Household Welfare in Vietnam. Regional and Sectoral Studies.

Appendix

Table A1 – List of Countries

Argentina	Greece	Panama
Australia	Hungary	Peru
Austria	Iceland	Philippines
Bangladesh	India	Poland, Rep. of
Belgium	Indonesia	Portugal
Bermuda	Ireland	Romania
Brazil	Israel	Russian Federation
British Virgin Islands	Italy	Serbia, Rep. of
Canada	Japan	Seychelles
Cayman Islands	Korea, Rep. of	Singapore
Chile	Latvia	Slovak Rep.
China, P.R.: Hong Kong	Liechtenstein	Slovenia, Rep. of
China, P.R.: Macao	Lithuania	South Africa
China, P.R.: Mainland	Luxembourg	Spain
Colombia	Malaysia	Sweden
Costa Rica	Marshall Islands, Rep. of the	Switzerland
Czech Rep.	Mauritius	Thailand
Denmark	Mexico	Turkey
Egypt, Arab Rep. of	Morocco	Ukraine
Estonia, Rep. of	Namibia	United Arab Emirates
Fiji, Rep. of	Netherlands, The	United Kingdom
Finland	New Zealand	United States
France	Nigeria	Vietnam
Georgia	Norway	
Germany	Pakistan	

Table A2 - Definitions of Economic Variables

Variable Name	Definition	Abbreviation
Poverty	Poverty headcount ratio at $2.15 a day (2017 PPP) (% of population).	*pov*
Growth	Annual percentage growth rate of GDP at market prices based on constant local currency.	*gr*
Inflation	Change in the log of Consumer price index (2010 = 100) (Authors computation).	*inf*
Openness	The sum of Exports of goods and services and Imports of goods and services as a percent of GDP (constant 2010 US$).	*op*
Population Growth	Change in the log of Population (Total).	*popgr*
Green Bonds Issuances	A self-labelled fixed income instrument where the proceeds directed exclusively in part or in full, new and/or existing green projects.	*gb*

Table A3: Poverty Benchmark Model

VARIABLES	(1) pov	(2) pov	(3) pov	(4) pov	(5) pov	(6) pov
L.pov	0.775***	0.760***	0.755***	0.756***	0.749***	0.861***
	(0.039)	(0.041)	(0.045)	(0.045)	(0.040)	(0.048)
gr		0.035*	0.062***	0.004	-0.004	-0.134**
		(0.018)	(0.024)	(0.017)	(0.014)	(0.064)
inf			0.002**	0.002	0.000	0.087*
			(0.001)	(0.001)	(0.000)	(0.049)
op				0.511**	-0.161	0.085
				(0.258)	(0.233)	(0.182)
popgr					0.807***	0.377**
					(0.300)	(0.154)
lgb						-0.129*
						(0.068)
Observations	605	605	587	574	574	134
Number of countryid	48	48	47	47	47	37
ar1p	0.0148	0.0111	0.00812	0.0430	0.0428	0.0230
ar2p	0.583	0.758	0.999	0.416	0.444	0.305
hansenp	0.0759	0.222	0.0612	0.210	0.430	0.385

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table A4: Poverty Benchmark Model: AF & MENA

VARIABLES	(1) pov	(2) pov
L.pov	0.888***	0.877***
	(0.058)	(0.058)
gr	-0.114	-0.118
	(0.166)	(0.162)
inf	0.025	0.061
	(0.082)	(0.095)
op	0.297	0.251
	(0.416)	(0.417)
popgr	0.169	0.171
	(0.184)	(0.150)
lgb	-0.219*	-0.204*
	(0.114)	(0.119)
afmena	-0.229	5.140
	(0.631)	(4.673)
lgb_afmena		2.740
		(2.555)
Total Effect		2.536
		(2.621)
Observations	134	134
Number of countryid	37	37
ar1p	0.275	0.257
ar2p	0.334	0.338
hansenp	0.342	0.548

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1