

## Climate Policy Evolution and Development of Carbon Finance

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**Abstract:** This paper presents an evaluation of the linkage between climate policy evolution and development of carbon finance. The paper is very necessary for climate risk governance and control since it highlights empirically the fundamental role of climate finance as a foremost tool of action by climate advocacy institutions to curb global climate change risks to promote sustainable economic development. The major objective of the paper was to examine whether climate policy affects the development of climate finance. The paper adopted a quantitative approach by using two different analysis namely the OLS linear regression model and the Granger Causality tests, at an alpha ( $\alpha$ ) of 0.05. Research data were from the World Bank Carbon Finance Unit and from the United Nations Framework Convention on Climate Change archives. Results from the linear relationship analysis using the OLS indicated a positive and significant relationship between climate policy evolution and carbon finance development at a significance of  $P$  value less than 0.05 ( $P < 0.05$ ). Furthermore, using the Granger causality test, the analysis also proceeded to establish the causality between the two variables. Further findings thus showed a unidirectional causality, which is that climate finance has the tendency to galvanise impetus to effective climate policy. This paper thus provides pertinent information for institutions involved with climate finance and policy initiatives – to reposition climate finance as the crux that should precede climate policy to obviate policy setbacks. The paper recommends further study, which expands the time series observation to use more years and to re-evaluate the relationship for further policy information.

**Keywords:** climate risk; climate change; climate finance; carbon finance

**JEL Classification:** Q54; Q56; O19; O13

### 1. Introduction

Similar to other natural or human-induced cataclysms, humans are by nature imbued with the resilience to respond and adapt to any form of threat that challenge their existence on the planet Earth. Often the resources required to respond and adapt threats pervade intellectual, monetary and physical resources such as finance and physical infrastructure. Albeit the natural intuition inherent in humans, when sudden challenges erupt, the response and adaptation initiatives is conditioned on the signal detection prowess (Lynn & Barrett, 2014; Viswanathan et al., 2017), which stimulates control action. This signal might be felt naturally or through human communication from experts or those in position of authority. Such communication might be in a laissez-faire form for a cautionary behaviour or in a policy form requiring some degree of compliance using command control. There is a ubiquitous evidence pointing to human's insatiable needs and concomitant excesses in business operations and habits as contributing heavily to climate change. (Canuel et al., 2017; Dediu, 2013) Hence, businesses are persuaded to improve their green operations. (Ngwakwe, 2012; Ionica, Bilcan & Petrescu, 2017) On recognition of the fact that a myriad of unrestrained human activities has played a role on climate change, the international awareness

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and policy pronouncements began trickling from the late 1980s through the establishment of the Intergovernmental Panel on Climate Change (UNFCCC, 2014), which is a world body overseeing the science of climate change. Accordingly, experts are worried that the fifty years of World Health progress may be vitiated by current spate of climate change. (Dechert, 2015; The Lancet, 2016) Hence the Lancet Commission laments as follows:

*“Effects on health of climate change will be felt by most populations in the next decades and put the lives and wellbeing of billions of people at increased risk. During this century, the earth’s average surface temperature rises are likely to exceed the safe threshold of 2°C above pre-industrial average temperature”. (The Lancet Commissions, 2016, p. 1)*

Amidst burgeoning climate policies, there are calls around the world for improved policies, actions and or initiatives, yet finance remains an impediment to climate initiatives. Despite these, little research has tried to examine how these variables – climate policy and climate finance are related and which of these influence each other. The author thus thinks that this paper is timely as it contributes to the literature by examining both the relationship and causality between climate and climate finance to assist institutions make effective policies and financial provision for climate change mitigation and adaptation. Hence, the objective of this paper is to examine if climate policy emergence has been effect on the development of climate finance.

This paper has been arranged as follows: after this introduction, the next section presents the related literature. The literature is followed by the method section and after the method is the results and discussions. The final section draws conclusion.

## **2. Related Literature**

Growing climate change and the attendant impact on Earth’s environment gave impetus amongst global leaders to seek avenues to address the rising menace resulting from climate change. Such response indicates that the power to instil environmental sustainability resides with the society and in the laws of nations. (Ngwakwe, 2011) The first of such awareness and policy initiative meeting was held in Stockholm in 1972 from June 5 - 16, known as the UN Conference on Human Environment. The main aim of the conference was to garner global cooperation to seek solutions toward halting the increasing environmental problems. (UN, 2017)

The global awareness of changing climate (Oberthur & Ott, 1999) galvanised the initiatives by world bodies such as the United Nations Framework Convention on Climate Change (UNFCCC) and the Intergovernmental Panel on Climate Change. (IPCC) (IPCC, 2017) These and other bodies prepared the grounds that has fashioned existing and continuous climate change policies meant to address the impact and vulnerability of comate change. (Füssel & Klein, 2006) Similar to other human policy interventions to bring succour to societal problems, climate policy implementation entails finance. The sustenance and pragmatism envisaged from climate policy requires enabling finance to support administrative machinery and practical implementation of agreed policies to achieve the goal of sustainable environment and healthy existence for present and coming generations of humans and non-human species on the planet eart. (IFC, 2017; World Bank, 2017) The financial requirement to enhance carbon reduction and a climate resilient earth is huge and runs in the range of trillions. A World Bank estimate puts global carbon finance

requirement at about \$90 trillion in the next fifteen years to install enabling infrastructure. (World Bank, 2017) This thus, means that policies alone are not enough to achieve desired climate resilient earth and sustainable environment – policies must be matched by an action (finance).

Another factor that spurs anticipation and sourcing of climate finance is the growing anticipation of future changes or alterations in national and international climate policy, which apparently is uncertain and yet fraught with inherent risks if neglected. (Hwang et al. 2016; Kennel et al., 2016) The anticipated or forecast changes seem plausible given growing development in climate science. These developments in climate change science would result in attendant shifts in climate policies to improve adaptation and thus reduce vulnerability. (Dessai & Hulme, 2004) However, experts lament that predictive models of future climate policy vary and are not certain regarding their degree of authenticity or validity. (Dessai & Hulme, 2004) This thus affects the degree to which climate finance can be raised, but albeit the uncertainties in predictive authenticity, proactiveness should warrant gathering of climate finance to cushion negative effects of reactionary measures in the case of emergency that may come with unexpected change in climate policy.

Aside from making climate policies, experts have found challenges implicit in monitoring policy implementations. In a research on the obstacles of monitoring climate policy, (Schoenefeld, Hildén & Jordan, 2016) applied a comparative empirical approach with data from the EU climate monitoring scheme to examine the challenges to implementation of the Paris climate agreement. The research found that chief amongst other obstacles includes the burden of reporting and the attendant costs and varied perceptions about whether reporting are actually useful and political issues surrounding the control of climate policy knowledge. It has also been observed that the inconsistencies in reporting and the non-uniformity or unstandardized accounting of climate finance pose a setback to improving the status of climate finance. (Roberts & Weikmans, 2017)

In order to address the rising scourge of climate change, the World Bank took the responsibility to garner and manage carbon finance. It highlights that although carbon finance has increased since the year 2000. However, more is required to enable the actualisation of policies geared toward sustainable development. According to the World Bank Climate Finance Unit, achievement of a resilient low carbon, economy at the global level would require trillions of Dollars. (World Bank, 2017) Through its Carbon Funds and Facilities, the World Bank Carbon Finance Unit manages finance donated by governments and organisations in OECD countries to embark on carbon and other GHG reduction projects in developing and transition economies. Such green finance initiative is a direct offshoot of global climate policy geared toward reducing carbon in developing and transition countries through financial assistance by developed countries. Through the Climate Finance Unit, carbon funds or other climate facilities are used to purchase emission reduction projects for the contributors of the carbon fund, but such purchase has to comply with enabling climate policy such as the Kyoto Protocol Clean Development Mechanism or the Joint Implementation. (World Bank, 2014) The first carbon fund was initiated and by the World Bank, and currently the bank holds in trustee up to 15 different carbon initiative funds and facilities. The Bank documents that up to 75 countries have been supported in varied carbon reduction initiatives spanning over 145 projects and these carbon reduction projects have contributed toward the reduction of about 187 million tons of carbon dioxide pollution. (World Bank, 2014)

Recent contributions in recognition of central role of climate finance on climate policy has emphasised

that achieving internationally envisaged cost-effective reduction of GHG emissions requires, in addition to other measure, that international goals should be reconciled with national policy primacies. (Steckel, 2017) Researchers reiterate the key role that private funding could play in boosting rising demand for climate finance in fostering international coherent policy and pragmatic architecture to achieve sustainable development. Furthermore, the spending dimensions of climate finance desire attention to ensure effective and efficient use of climate funds. (Steckel, 2017; Román et al., 2017)

The implication thus, might be that the global climate policy may have had a somewhat trigger effect on climate finance or vice versa. However, the extent to which this relationship can be asserted has not been examined empirically. Therefore, the following sections of this paper proceeds to evaluate whether climate policy evolution relates with the growth of climate finance and the direction.

### 3. Method and Results

This section presents a quantitative analysis using the regression statistics to check for possible relationship between the climate policy evolution and growth of carbon finance. In addition to regression analysis, the paper also employed the Granger causality test, to measure the direction of causality between climate policy and carbon finance. Data for climate policy evolution was collected from the United Nations Framework Convention on Climate Change. (UNFCCC, 2014) Data representing the climate policy evolution was the number of policy initiatives per year and was collected from the UNFCCC archive of timeline of policy developments. Similarly, the data for climate finance development was collection from the World Bank Carbon Finance for Sustainable Development various annual statements, which contained the financial data for yearly carbon finance. The years of observation was limited to 2003 and 2014 to take advantage of corresponding data availability for both variables. The OLS and Granger Causality test results appear in Table 1 and Table 2.

**Table 1. OLS Result on Relationship between Climate Policy and Carbon Finance**

Model 1: OLS, using observations 2003-2014 (T = 12)					
Dependent variable: CFUS_M					
	<i>Coefficient</i>	<i>Std. Error</i>	<i>t-ratio</i>	<i>p-value</i>	
const	1094.65	378.985	2.8884	0.01615	**
CLP_Evo	415.56	185.664	2.2382	0.04915	**
Mean dependent var	1787.250	S.D. dependent var		885.4039	
Sum squared resid	5745172	S.E. of regression		757.9691	
R-squared	0.333765	Adjusted R-squared		0.267141	
F(1, 10)	5.009717	P-value(F)		0.049151	
Log-likelihood	-95.50104	Akaike criterion		195.0021	
Schwarz criterion	195.9719	Hannan-Quinn		194.6430	
rho	0.696712	Durbin-Watson		0.477566	

**Table 2. Granger Causality Test between Climate Policy (X) and Climate Finance(Y)**

Granger Causality Test: H0: Y = f(X)				
Model	Res.DF	Diff. DF	F	p-value
Complete model	6			
Reduced model	7	-1	2.33176587447638	0.177613279029166

  

Granger Causality Test:H0: X = f(Y)				
Model	Res.DF	Diff. DF	F	p-value
Complete model	6			
Reduced model	7	-1	6.82575848016238	0.0399799799292045

**3.1. Discussion**

The preceding analysis was conducted at two levels. The first level sought in to measure the relationship between climate policy evaluation and carbon finance development (Table 1). Whilst holding other factors constant, the results indicate a significant and positive relationship between climate policy and carbon finance growth at a P value of 0.049, which lower than 0.05. However, although a relationship does exist between climate policy evaluation and carbon development, the direction of causality is unknown with the OLS regression in Table 1. Accordingly, Table 2 presents the causality test in order to determine the direction of causality between climate policy (X) and carbon finance (Y).

From the causality test in Table 2, the P value, P= 0.17 and P = 0.039 from the Granger causality test for the null hypotheses Y = f(X) and X = f(Y) indicate that the relationship between climate policy and climate finance is unidirectional because only one of the tests showed a P value less than 0.05. Therefore, from the P value, it shows on the one hand, that Y does not Granger Cause X, i.e.  $Y \neq f(X)$  given P = 0.17, which is greater than 0.05. On the other hand, Y Granger Cause X, i.e.  $X = f(Y)$ . this means that within the limit of the years examined and between the two variables of study, climate policy does not cause the growth in climate finance, rather climate finance causes initiatives of climate policy (whilst holding other variables constant). This can be interpreted to mean that availability of climate finance prompts climate policies/actions and not policies/action prompting finance. This finding is significant for climate policy institutions to understand why it is important to be sure of availability of climate finance or the potential availability thereof before moving into action in finalising climate policies. If envisaged finance does not have a guaranteed future availability, climate policy and the attendant action might collapse – a case in point is the recent US indication to pull out from originally agreed climate Paris Climate Policy given the financial implications. (CDP, 2017)

The above findings reaffirm the postulates and findings of some previous research about how finance availability may initiate climate action. In line with this reasoning, Kernaghan and da Silva (2014) highlights the influence of city budgets and private sector funding towards initiating climate policy actions and that climate initiatives are constrained by funds. In their research, Kernaghan and da Silva (2014) posits that, climate finance availability galvanises climate policies for a climate resilient economy and development. This therefore means that climate policies can be effective when rested on proven

climate fund availability or the hope thereof. Taken further, it may mean that if climate policies are made before the planning for relevant funding, such policies might be fraught with obstacles along the way. Román et al (2017) concurs with this view and opines that international climate finance is a catalyst for achieving climate action especially for helping to initiate policies to assist developing countries that lack the enabling climate finance to tackle climate change. This becomes a matter of importance given that the needed climate finance is in the range of trillions of US Dollars. (World Bank, 2017) Funding is thus vital for climate policy initiatives, but from all indications the current climate funding managed by the UNFCCC and Official Development Assistance (ODA) count far less than the finance needed to tackle the challenges that climate change pose. (Ayers, 2009; World Bank, 2017) It follows therefore that the incentive that would drive regions into an accord with the global climate change policies requires climate finance transfers especially from North to South and that this transfers has to be made optimal to drive desired incentive from regions. (Román et al., 2017)

#### **4. Conclusion**

Although a lot of literature exists on climate finance and climate policy, but little prior research have focused on establishing the linkage and/or relationship between climate policy and climate finance. This paper contributes to the literature by examining both the relationship and causality between climate policy and climate finance. The main objective of this paper was thus to evaluate if a relationship exists between climate policy evolution and climate finance provision. The review of literature emphasized the importance of climate finance in attracting partnership of regions especially the less financially privileged regions (the South) to join international climate negotiations and agreements toward climate resilient development alternatives. The literature also opine that recognition of developmental priorities of developing and transition countries is an important strategy toward aligning global climate policy and the attendant finance with the policies of developing nations whose climate finance needs pose a huge demand on the international climate finance coffers. Using the OLS statistics, the results show a significant and positive relationship between climate policy and climate finance. The paper proceeded to also change the side of causality between climate policy and climate finance; results from the causality analysis indicate that climate finance give impetus to climate policy. This finding provides an empirical support to ubiquitous theorisation of the importance of climate finance. Drawing support from the literature, the paper rests on the findings to concluded that policies alone are not enough to foster desired climate resilient economic development; there need to be a guaranteed climate finance in view or at hand to bring efficacy to climate policies and to propagate new policies. Thus, climate finance should be the bedrock and pivot for effective climate policy formulation. If policies are formulated without enabling finance in view, there might be disappointments along the way, which may bring futility to envisage action oriented climate policy. The recent indication by the US of potential withdrawal from the Paris climate accord is a practical case in point that climate finance must be on the table or in view (an irreversibly so) to avoid financial setbacks to policies which such unforeseen withdrawal might cause to the global climate policy. Although climate finance has been growing, but indications from the UNFCCC show that trillions of dollars are still needed to bring a little halt to global warming. This means that finance already in place needs effective management to avoid wasting the much sought after climate finance; but as indicated in the literature, the spending aspect of climate finance seem to be silent in

research literature. Therefore, the paper recommends that future research should look at the effectiveness, efficiency and the outcome of already committed climate finance – mostly in developing countries. Such research should also check whether the outcomes of such spending give appreciable impetus to further climate policy commitment by developing nations. Similar to other research work, this research had its limitations. The major limitation of this paper, which other researchers should note is the limited time series covered in the analysis. The period is limited to a period of twelve years, but this arose because of data availability within the disposal of the researcher. Therefore, further research could strive to expand the timing to see whether the trend of relationship might strengthen or lessen.

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