

## What explains the emergence and diffusion of climate-related financial policies in G20 countries?



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*This policy brief analyzes the factors that influence polities' decision to adopt climate-related financial policies in G20 countries by summarizing the main findings of D'Orazio 2021a. The study reveals the existence of three waves of adoption using a cluster analysis considering 93 policies adopted from 2000 to 2018. Multiple factors play a role in this process. First, economies' carbon intensity and exposure to climate change matter, but the climate-related financial policy response to these factors is heterogeneous across clusters. Second, climate strategies and fiscal instruments are relevant only for first-wave adopters in high-income countries. Third, political characteristics, particularly the presence of an autocratic regime, are relevant for the Chinese case, calling "authoritarian environmentalism" to mind. Fourth, a bandwagon, or geographical learning effect, plays a relevant role in all clusters.*

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## Introduction

Although the awareness about the climate-related financial risks and the need to scale up green finance is now widespread globally, engagement in “active” climate-related financial policymaking varies across countries. Academic research has focused on the diffusion of green policies implemented by central banks and financial regulators in the past years. However, despite understanding the types of policies available at the country level, our knowledge of which factors influence the decision to adopt climate-related financial policies remains limited. The investigation proposed in D’Orazio 2021a takes a broader perspective, builds on the evidence provided by existing literature on policy diffusion, and proposes an empirical analysis of the adoption and diffusion of such policies. It investigates the experiences of the G20 countries as they are responsible for roughly 80 percent of global energy use and CO2 emissions and are thus key players in climate policy. Cluster analysis is used to learn which clusters exist and which factors differentiate them and drive the adoption of climate-related financial policies in 2000-2018 within the individual groups.

Doing so contributes to existing literature that mainly focused on the analysis of the global diffusion of green central banking, on the one hand, and the factors affecting the adoption of carbon prices and taxation, climate change mitigation policies, environmental and technological innovation, or green bonds, on the other hand.

## Analysis

The analysis considers G20 countries over the period 2000-2018. The primary variable is the adoption of climate-related financial policies which are classified according to four categories (i.e., Policy Types) as shown in Figure 1. Other control variables are classified into five categories that consider the domestic and international dimension of the problem, namely, (1) economic and financial features, (2) carbon intensity of the economy, and exposure to climate change, (3) climate strategy and fiscal instruments, (4) political characteristics, and (5) diffusion factors (i.e., the geographical location).

**Figure 1: Overview of the four policy areas used in the analysis.**

Financial Policy Area	Category	Instrument	Objective	Example
<b>Green Prudential Regulations:</b> to promote the development of green macroprudential frameworks	<i>Quality and level of capital</i>	CAR with GSF/BPF CCyB Sectoral Leverage Ratios Sectoral Capital Requirements	Mitigate and prevent excessive credit growth and leverage	
	<i>Risk management and supervision</i>	Climate-related stress test (macro)	Evaluate effect of economic or financial shocks to the financial system	<b>UK</b> , 2019, General Insurance Stress Tests (GIST) Cover Natural Catastrophe Scenarios and Climate Change Risks (Largest banks and insurers), Prudential Regulatory Authority
	<b>Capital</b>	Green Asset Ratio	Assess exposure of banks' portfolios to carbon-intensive assets	
		ICAAP	Internal Process of Capital Adequacy Assessment: Include social and environmental risks when assessing their capital needs	<b>Brazil</b> , 2011, Circular No. 3,547/2011, Banco Central do Brazil
	<i>Enhanced risk disclosure and market discipline</i>	Climate-related disclosure requirements	Inform about concentration of carbon-intensive assets in the financial sector	<b>China</b> , 2013, China's Green Credit Statistics System, China Banking Regulatory Commission (CBRC)
<b>Liquidity</b>	<i>Liquidity</i>	LCR NSFR	Mitigate and prevent market illiquidity and maturity mismatch	
<b>Large exposures</b>	<i>Lending limits</i>	Large exposures limit	Mitigate systemic risk by limiting the concentration of certain exposures	
<b>Green Financial Principles:</b> to create green financial markets				<b>Australia</b> , 2015, Environmental, Social, and Governance (ESG) Reporting Guide, Financial Services Council
<b>Other disclosure requirements:</b> to promote the public disclosure of climate risks (also for non-financial institutions)				<b>France</b> , 2001, New economic regulations Act requires publicly traded companies to disclose environmental information, Government
<b>Green Credit Allocation Policies:</b> to directly promote green credit measures and investments				<b>India</b> , 2015, Priority Sector Lending, Reserve Bank of India

Source: D’Orazio 2021a.

The empirical analysis shows the existence of six defined clusters, as reported in Figures 2 and 3. Their differences relate to the timing and the different shares of adopted financial policy types, as shown in Figure 2. Two clusters are identified in the first wave of adoption, namely Clusters I and II. Two clusters can be classified in the second wave: Cluster III and V. Finally, a group of latecomers is observed in Clusters IV and VI. An overview of the three waves and the clusters belonging to each wave is provided in Figure 4.

The cluster analysis emphasizes many forces that have influenced the adoption of climate-related financial policies in the G20, indicating that different variables have driven the polities’ decisions.

Regarding the choice of the type of financial policy, we observe that it is an essential feature for all clusters. Indeed, we find that (i) first-wave adopters focus mainly on policy types III and IV; (ii) second-wave adopters focus on a richer set of policies and display the highest (aggregate) share of policy type I; (iii) latecomers have a stronger preference for policy type IV.

**Figure 2: Climate-related financial policymaking in G20 countries: cluster structure, number of policies and share of policy adoption by type.**

	CLUSTER I		CLUSTER II		CLUSTER III		CLUSTER IV		CLUSTER V		CLUSTER VI	
	polity	# policies adopted	polity	# policies adopted	polity	# policies adopted	polity	# policies adopted	polity	# policies adopted	polity	# policies adopted
	France	9	Brazil	9	Australia	9	India	4	China	8	Russian Federation	5
	UK	8	Indonesia	5	Japan	4	Indonesia	1	Indonesia	1	Turkey	2
	Italy	6	Mexico	3	Korea, rep.	4			South Africa	1		
	Germany	4	South Africa	2	USA	3						
	Canada	2	Argentina	1	Canada	1						
	Saudi Arabia	1										
	<b>Policy adoption: total</b>	<b>30</b>		<b>20</b>		<b>21</b>		<b>5</b>		<b>10</b>		<b>7</b>
	<b>Policy adoption: share</b>	<b>32.25%</b>		<b>21.5%</b>		<b>21.58%</b>		<b>5.37%</b>		<b>10.7%</b>		<b>7.52%</b>
<b>Adoption by type: share</b>	<b>Policy type I</b>	1.07%		2.15%		1.07%		0		6.54%		1.07%
	<b>Policy type II</b>	1.07%		5.37%		2.15%		1.07%		0		0
	<b>Policy type III</b>	12.9%		9.6%		12.9%		0		2.15%		3.22%
	<b>Policy type IV</b>	17.2%		4.3%		6.54%		4.3%		2.15%		3.22%

Source: D’Orazio 2021a.

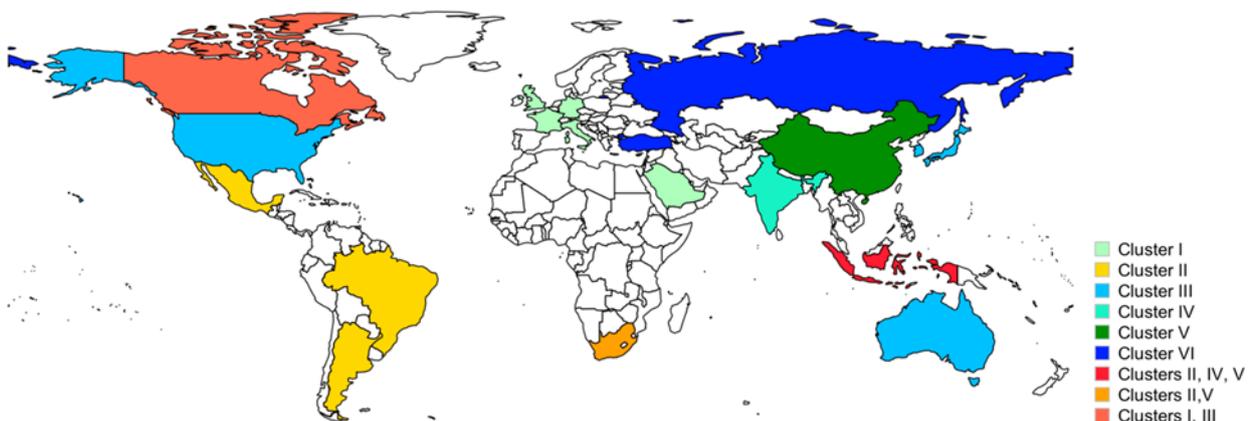
Cluster I comprises “*innovators*,” as this group features countries that adopted climate-related financial policies for the first time in the considered period. They are mostly oriented towards market-shaping policies and disclosure requirements for companies or financial institutions other than banks. This group features high-income and financially open countries, mainly located in Europe, and shows the highest adoption rate of climate-related financial policies (total of all policy types). Together with countries classified in Cluster II (early adopters), they constitute the first wave of adoption.

Cluster II consists of middle-income countries. The earliest date of adoption is recorded for 2008; therefore, they are classified as “*early adopters*” belonging to the first wave. This group features the highest adoption rate of promotional credit measures among all clusters. Cluster II is characterized by a high vulnerability index and one of the highest exposure indexes among the 6 clusters; interestingly, emissions per capita are low compared to other groups.

Cluster III comprises countries classified as “*early majority*” belonging to the second wave. They are mainly oriented to “soft” climate-related policies, such as principles and other disclosure requirements. Countries

belonging to this group are financially open with high-income levels and are mostly located in East Asia and the Pacific. It is characterized by the highest CO2 emissions per capita and relatively high exposure. It scores the highest economic and governance readiness and a strong preference for CO2 taxes.

**Figure 3: Overview of clusters. To account for the peculiarities of Canada, Indonesia and South Africa which appear in more than one Cluster as shown in Figure 2, they are displayed separately.**

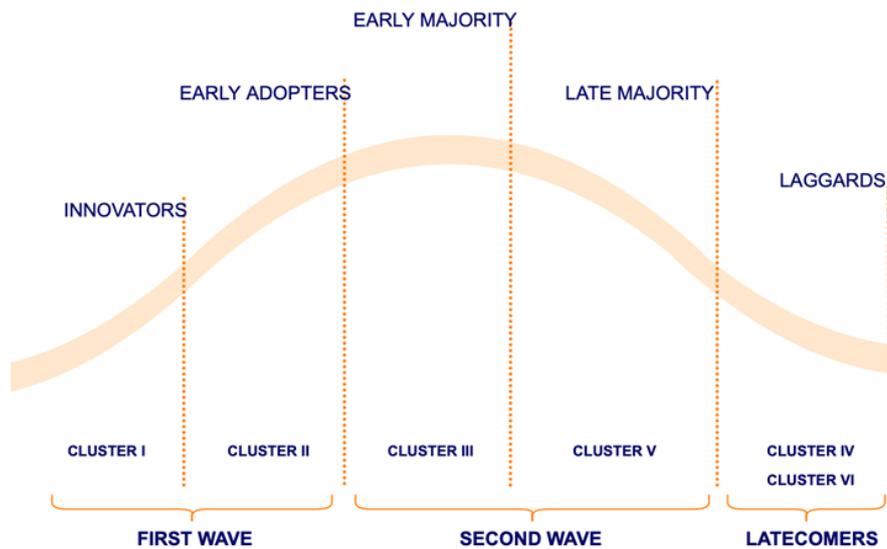


Source: D’Orazio 2021a.

Cluster IV constitutes a group of latecomers, which we also label as “*laggards*.” It features the highest exposure, vulnerability, and sensitivity to climate change, increasing the intensity and possibly the frequency of climate-related hazards. However, it reports the lowest average emissions per capita. This cluster is mainly oriented towards policy type IV.

Cluster V comprises second-wave adopters labeled as “*late majority*.” The most common policy type is climate-related prudential regulations, for which the largest share of adoption is reported among all clusters. This cluster covers mainly policies developed and implemented in China, which adopted climate-related banking regulations in 2007. Regarding carbon intensity, this group is characterized by relatively high emissions per capita, exposure, sensitivity, and overall vulnerability. The economic and governance readiness values are very similar to those observed in Cluster II; however, in this case, we observe the lowest polity value pointing to a mostly authoritarian government.

Finally, polities in Cluster VI are middle-income countries located in Europe and Central Asia. In this group, we find the Russian Federation and Turkey, which implemented mainly policy types III and IV. They also stand as latecomers because, although Turkey records adopting a policy already in 2003, the rest were adopted after 2014. This cluster peculiarity relies on the high emissions per capita and high exposure but no international commitment or climate strategy, nor the adoption of fiscal instruments.

**Figure 4: Overview of the different waves of adoption.**

Source: D'Orazio 2021a.

## Relevance of the analysis

The relevance of this study is fourfold.

First, it offers the first empirical analysis of climate-related financial policies' adoption. Other streams of research have focused on factors affecting the adoption of carbon prices and taxation, climate change mitigation policies, environmental, technological innovation, or green bonds. Limited empirical knowledge is available regarding policies tackling climate-related financial risks and scaling up green finance to the best of our knowledge.

Second, considering a comprehensive set of climate-related financial policies, the study finds three waves of adoption in the G20s and shows that the factors that led to the adoption have varied over time and across continents.

Third, the cluster analysis shows some interesting insights on the role of the factors considered in the study. First, economic and financial features are not relevant for the adoption. Second, the economy's carbon intensity and exposure to climate change matter, but the policy response to these factors is heterogeneous across clusters. Third, climate strategies and fiscal instruments are relevant only for early adopters in high-income countries.

Fourth, political characteristics, particularly the presence of an autocratic regime, are relevant for the Chinese case, calling to mind the "authoritarian environmentalism" (see Beeson 2010; Gilley 2012; Li et al. 2019, among others). Fifth, the bandwagon, or geographical learning effects, play a relevant role in all clusters.

Finally, adopting a broader and yet theoretically grounded taxonomy of climate-related financial policies and a longer investigation period, our study enriches two common narratives found in the literature. On the one hand, our results contrast with the usual narrative that sees developing countries and emerging economies as latecomers in adopting green policies (Pegels and Altenburg 2020; Lema et al. 2020). Indeed, we show that the adopters of more stringent climate-related financial policies, i.e., banking regulations and credit policies, are mostly emerging economies. On the other hand, thanks to the longer period used in our analysis, we find that advanced economies have leaded the adoption of climate-related financial policies. In contrast, most emerging economies engaged in green financial policymaking only in a "second wave".

## Conclusions

The empirical analysis carried out in this study points to the existence of six clusters that differ according to the timing and type of policies adopted and allows us to identify three waves of adoption. The cluster analysis highlights that the factors that lead to the adoption of climate-related financial policies have changed over time and across continents because of strong bandwagon effects active at the regional level. Moreover, the analysis supports the hypothesis that higher CO<sub>2</sub> emissions would correspond to a higher adoption rate of climate-related prudential regulations because of the severe impact and risks caused by increased CO<sub>2</sub> emissions.

However, besides the positive trend of the adoption rate in the past decades, financial markets in the G20 are mostly misaligned with the Paris Agreements goals, posing concerns for their ability to tackle the materialization of climate-related financial risks. Only countries classified in the second adoption wave show some predisposition to policymaking tackling climate risks (policy area I), although a lot remains to be done.

Moreover, the findings discussed in the study imply that financial markets in G20 countries are affected by a so-called “carbon bias” in that existing financial policies tend to favor short-term carbon-intensive assets at the expense of longer-term “green” assets, thus contributing to carbon lock-in and path dependence in the financial sector (Unruh 2000; Van der Meijden and Smulders 2017, D’Orazio 2021b). Consequently, it is hard to achieve the objective of scaling up green finance and promoting an ordered low-carbon transition, thus affecting the implementation of adaptation and mitigation strategies as they strongly depend on the availability of financial resources.

The investigation results thus call for early and timely adoption of policies to address climate risks and increase green finance as they can generate considerable benefits in reducing the severity of disruptions to the economy and financial markets from climate change. ■

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