

Department of Economics and Finance

Climate Physical Risk and Asian Stock Market Returns

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Abstract

This study provides new evidence on the impact of climate physical risk (as measured by the Global Climate Risk Index (CRI) from Germanwatch) on stock market returns. Specifically, a panel model with fixed effects is estimated using annual data from 2007 to 2021 for a set of 65 countries as well as for a subset of 18 Asian ones, which are also divided in two clusters on the basis of their degree of market capitalisation. The results suggest a negative impact of climate physical risk on stock markets; this effect is more pronounced in Asian countries with lower market capitalisation

1. Introduction

Climate change is a global phenomenon which represents

urbanisation poses significant environmental challenges. Amran et al. (2014) found that Asian companies are improving their climate change reporting system practices and disclosure, whilst Ozdemir (2022) reported that climate change is affecting agricultural productivity in Asia, where growing crops and raising livestock are becoming more challenging.

The latest

Table 3 shows the results for the full set of countries as well as the Asian subgroup. Note that a fixed effect (rather than a random one) specification has been estimated on the basis of the results of the Hausman test. Further, cross-sectional weights have been used to correct for potential cross-sectional dependence.

Please insert Tables 2 and 3 about here

The coefficient on CRI is positive and significant both for the full sample (0.09) and for the Asian subgroup (0.20); as noted before, a positive value implies a negative impact on stock returns, which is consistent

significant impact of the CRI on financial markets in the cluster labelled as Low (0.32) compared to the one named High (0.13). This is consistent with the generally held view that, since investment in large-cap stocks concerns well established companies, it poses less of a risk (though it has a lower growth potential) – our evidence suggests that indeed climate risk is also perceived differently.

However, whether climate risk is sufficiently reflected in stock prices remains an open question, most financial experts believing that it is at least partially mispriced (see Bauer et al., 2024). Finally, the effect of the VIX is again negative and significant as expected.

Please insert Table 5 about here

4. Conclusions

This study investigates the impact of climate physical risk on stock market returns. Specifically, a panel model with fixed effects is estimated using annual data from 2007 to 2021 for a set of 65 countries and then also for a subset of 18 Asian ones, so as to identify possible distinguishing features of the latter. This focus is motivated by the fact that, as argued by Gaspar et al (2021), the Asia-Pacific region is pivotal in the global climate fight due to its large population, significant carbon emissions, and vulnerability to extreme weather. It also holds the world's biggest population, two of the top three carbon dioxide emitters, and is a leader in green technology. Further, it is increasingly integrating climate change-related investments into financial markets (Aggarwal et al., 2023). As a measure of climate risk we use, for the first time in this context, the Global Climate Risk Index (CRI) from Germanwatch, which includes extensive information concerning the impact of extreme weather events.

Our results indicate

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Table 1: List of Countries and Stock Market Indices

Argentina	MERVAL	Malawi	MASI
Australia	S&P/ASX200	Malta	MSE INDEX
Austria	ATX	Mexico	MEXBOL
Belgium	BEL 20	Netherlands	AEX
Brazil	BOVESPA	New Zealand	NZX 50
Bulgaria	SOFIX	Nigeria	NSE ALL-SHARE*
Canada	S&P/TSX	Norway	OBX INDEX
Colombia	COLCAP	Panama	BVPSI
Costa Rica	CRSMBI	Peru	S&P/BVL
Croatia	CROBEX	Poland	WIG20
Czech Republic	PX INDEX	Portugal	PSI-20
Denmark	OMXC20	Romania	BET
Ecuador	BVQ INDEX*	Slovak Republic	SAX
Finland	OMXH25	Slovenia	SBI TOP
France	CAC 40	South Africa	JSE ALL SHARE
Germany	DAX	Spain	IBEX 35
Greece	ATHEX	Sweden	OMXS30
Hungary	BUX	Switzerland	SMI
Ireland	ISEQ OVERALL	Uganda	ALSI
Italy	FTSE MIB	United Kingdom	FTSE 100
Jamaica	JSE MARKET	United States	S&P 500
Kenya	NSE 30	Uruguay	BVMBG*
Latvia	OMX RIGA	Venezuela	IBC*
Lithuania	OMX VILNIUS		

Asian Countries and Stock Market Indices

High Market Capitalisation		Low Market Capitalisation	
China	CSI 300	Georgia	GSE INDEX
India	SENSEX	Israel	TA-32*
Indonesia	IDX COMPOSITE	Kazakhstan	KASEX

Notes: The selection of countries is based on the availability of the CRI index. The panel is unbalanced and it includes 65 countries and 947 observations. The Asian market panel consists of 18 countries and 266 observations. Asian countries have been clustered by market capitalisation in US dollars (Tan et al., 2021). Indices calculated by Bloomberg are denoted by an asterisk.

Table 3: Panel estimation results

	Full Sample	Asian Markets
Intercept	19.56 (0.00)	7.67 (0.27)
CRI	0.09 (0.01)	0.20 (0.00)
VIX	-0.87 (0.00)	-0.44 (0.07)
Hausman Test	8.30 (0.01)	6.00 (0.04)
Countries	65	18
Obs.	947	266
F-Statistics	1.88 (0.00)	0.96 (0.04)

Notes: The full panel is unbalanced and includes 65 countries and 947 observations; the Asian subgroup is again an unbalanced panel and comprises 18 countries and 266 observations. P-values are reported in round brackets. The Hausman test comparing fixed effect and random effect estimates is also included.

Table 4: Descriptive statistics and Unit Root Test - Asian markets

Variables	High Market Capitalisation				Low Market Capitalisation		
	Mean	S.D.	Min	Max	Mean	S.D.	Min

Table 5: Panel estimation results – Asian markets clustered by market capitalisation

	High Market Capitalisation	Low Market Capitalisation
Intercept	9.65 (0.03)	5.00 (0.02)
CRI	0.13 (0.01)	0.32 (0.01)
VIX	-0.40 (0.02)	-0.58 (0.01)
Hausman Test	3.25 (0.09)	5.92 (0.05)
Countries	9	9
Obs.	132	134
F-Statistics	0.76 (0.03)	1.19 (0.01)

Notes: see the notes to Table 3. Asian countries have been clustered by market capitalisation in US dollars (Tan et al., 2021).

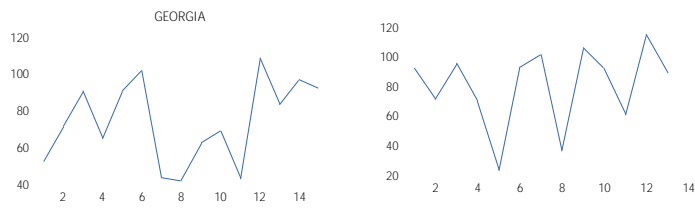
Figure 1a: Stock Market Returns - Asian Markets with High Market Capitalisation

**Figure 1b: Global Climate Risk Index (CRI) –
Asian Markets with High Market Capitalisation**

Figure 2a: Stock Market Returns – Asian Markets with Low Market Capitalisation

Notes: This figure displays stock market returns for the 9 Asian countries with low market capitalisation as specified in Table 1.

**Figure 2b: Global Climate Risk Index (CRI) –
Asian Markets with Low Market Capitalisation**



Notes: This figure displays the CRI for the 9 Asian countries with low market capitalisation as specified in Table 1.