Climate shocks, financial shocks and economic development

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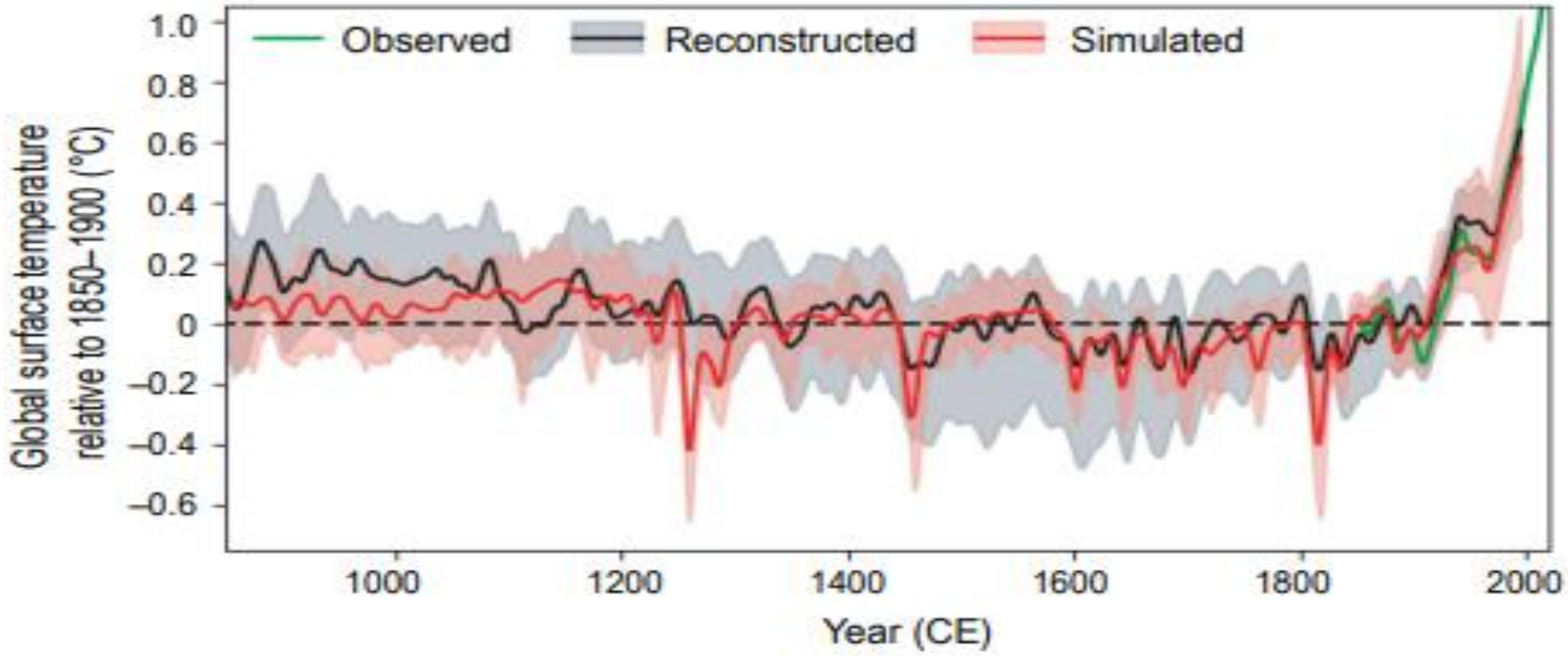
Presentation outline

1. Introduction
2. Physical risks, financial risks
3. Energy transition risks and development challenges
4. Conclusion

1. Introduction

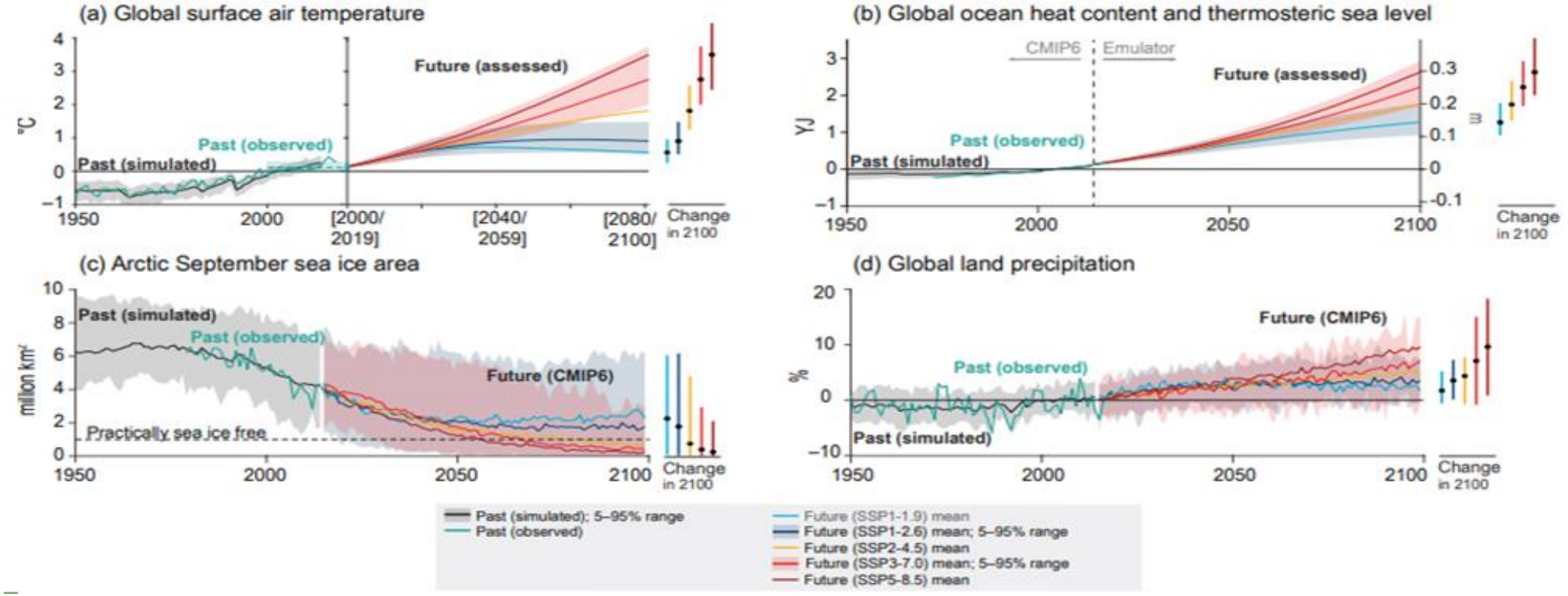
Introduction

Climate change: rising temperatures (IPCC, 2022)



Introduction

Climate change: increase in the heat level of the oceans, increase in precipitation levels, loss of ice in the Arctic (IPCC, 2022)



Types of climate risks

Climatic hazards induce different types of risks. These climatic risks can be broken down into two categories (Banque de France, 2020):

- physical risks**:** include economic and financial losses associated with the increased frequency and intensity of extreme weather events and long-term changes in climate trends
- transition risks**:** arising from the financial consequences of public policies, technological disruptions or brakes, or changes in social norms and individual preferences related to carbon-based activities

Climate risks pose particular constraints for society as a whole, and of course for the macro-financial system and economic development.

Climate risks: new challenges for economies

The intensity and frequency of physical and transition risks increases.

Several questions emerge:

- How do these risks (physical and transition) relate to financial stability?

- What are the implications at the international level?

- How is the management of the resources needed for the energy transition done? What is the role played by economic policies?

2. Physical risks, financial risks

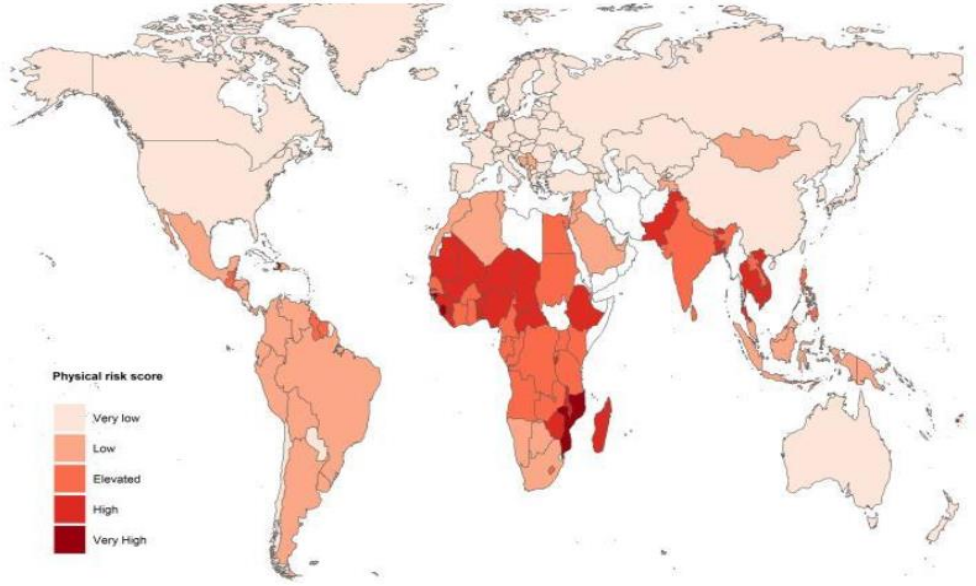
Physical risks

The reports of many international institutions (IMF, IPCC, NGFS) suggest that physical risks are becoming more frequent and violent.

This is due to the increase in the number of extreme climatic events (heat waves, drought, fires, floods, cyclones), in addition to the existing geophysical shocks (earthquakes, tsunamis).

These shocks have an undeniable economic cost: the European Systemic Risk Board (ESRB, 2016), for example, estimates that financial losses from natural disasters have increased fourfold in the past 30 years.

The financial impact of physical risks (natural disasters) is less studied although banks play a key role in financing the development of economies.



Physical risks (2010-2017).
Source : European Investment Bank (2021)

Physical risks and banking activity

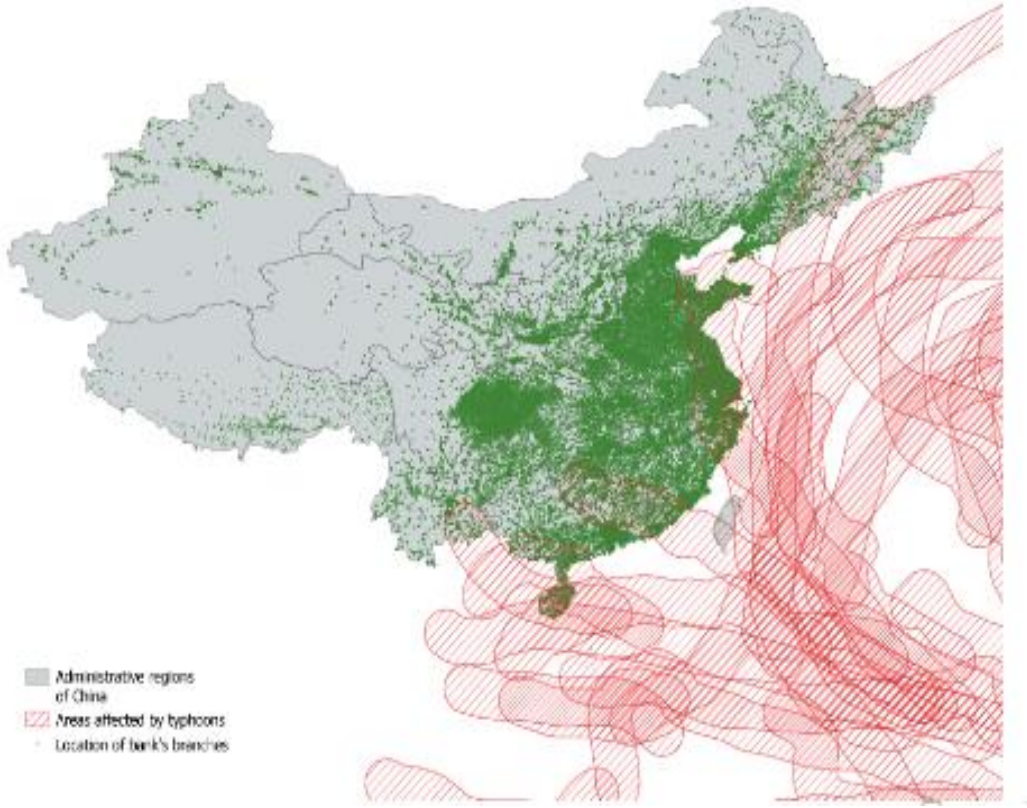
What is the impact of natural disasters on bank lending activity?

Original study based on a difference in difference methodology, on the impact of typhoons on 371 banks (rural and commercial) in China, over the period 2004-2019.

The typhoons caused a decrease in loans in China of about 21 billion yen, an increase in non-performing loans of 0.34% and a decrease in deposits of 9 billion yen.

Decline in lending observed on the commercial bank side ⇒ "shock amplifier".

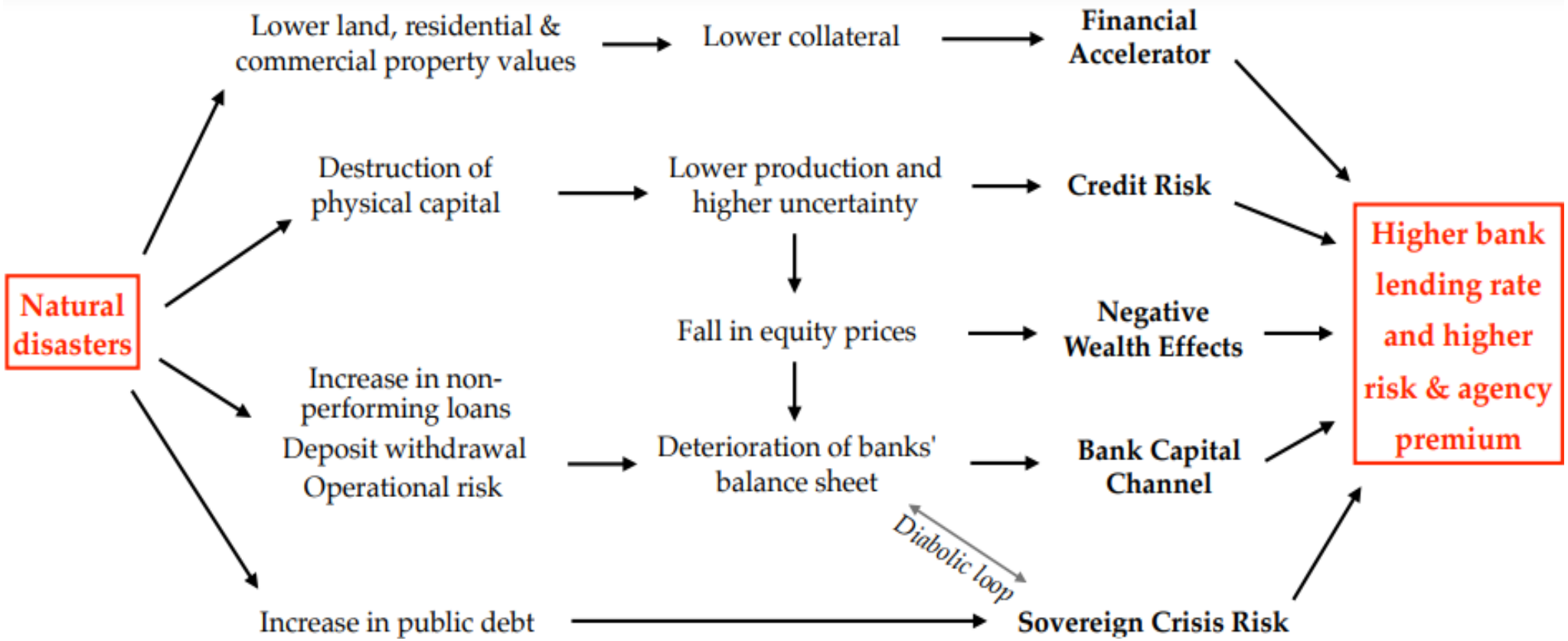
No decline in credit (and increase in non-performing loans) on the rural bank side ⇒ "shock absorber".



Banks affected by typhoons in 2019, in China

Avril, Levieuge and Turcu (2022b)

How do physical risks impact financial stability?



Avril, Levieuge and Turcu (2022b)

Physical risks and credit conditions

What is the impact of natural disasters on financing conditions and what role for macroprudential policy?

Study of the impact of natural disasters on the external finance premium (EFP), conditional on the stringency of macroprudential regulation and using a Local Projection approach.

The intensity of natural disasters is measured by geophysical indicators, over a sample of 88 countries and for the period 1996-2016.

Following storms, EFP increases significantly when the macroprudential framework is lax: 0.5 to 2 pp increase in EFP on average 2 years after a Katrina-type hurricane.

On the contrary, a rigorously regulated financial system would facilitate the financing, on relatively advantageous terms, of the replacement of destroyed capital by more productive capital.

Macroprudential policy seems to be less crucial for the financial impact of floods, whose predictability would drive self-discipline.

Avril, Levieuge and Turcu (2022a)

3. Energy transition risks and development challenges

Energy transition and development

Economies are vulnerable to physical risks but they must also be able to strengthen their energy transition to limit the adverse effects of climate change = > snowball effects emerge.

The technologies assumed to power the shift to clean energy are significantly **more resource intensive** than the traditional fossil fuel-based energy system (Vidal et al., 2013).

The development of low-carbon energies requires the exploitation of **metals** such as copper, silver, aluminum, nickel, zinc and *rare earths* (scandium, yttrium), which are available in developing or emerging countries.

Transition risk, finance and development

What is the role of rare earth prices in the energy transition?

- Strong demand for these metals => a rise in prices that could slow down the development of renewable energies => slow down the reduction of CO2 emissions, although this reduction is essential.
- If the price of rare earths increases (e.g. China export restrictions) => the consumption of renewable energy can be delayed = > the fossil fuel market continues to be solicited => increase in CO2 emissions (a VAR approach)

Kirat and Turcu (2023)

Energy transition and institutions

What is the impact on growth of exploiting resources needed for the energy transition? Does institutional quality play a role?

Original study on 18 Latin American countries and their regions (2010-2018), using a Panel Smooth Transition regression: the quality of institutions (e.g. less corruption) at the regional level seems to stimulate economic growth in regions where there are discoveries of the minerals needed for the energy transition.

Real prospects for sustainable development may emerge in these countries.

Location of mines (related to the metals needed for the energy transition) in South America

Bacouel, Benavides Riascos, Levieuge and Turcu (2022)

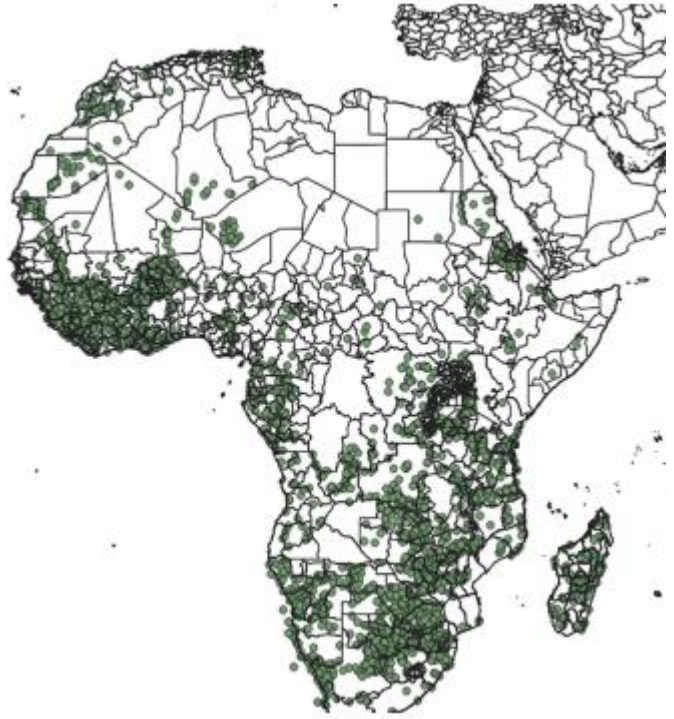
Energy transition and international aid

Has the natural resource endowment needed for the energy transition become a determining factor in the allocation of development aid?

Many of these resources are located in developing or emerging countries.

Particular emphasis is placed on China, which has begun to play a proactive role in international aid.

Is China increasingly providing development assistance to African countries endowed with the natural resources needed for energy transition?



Location of copper mines in Africa

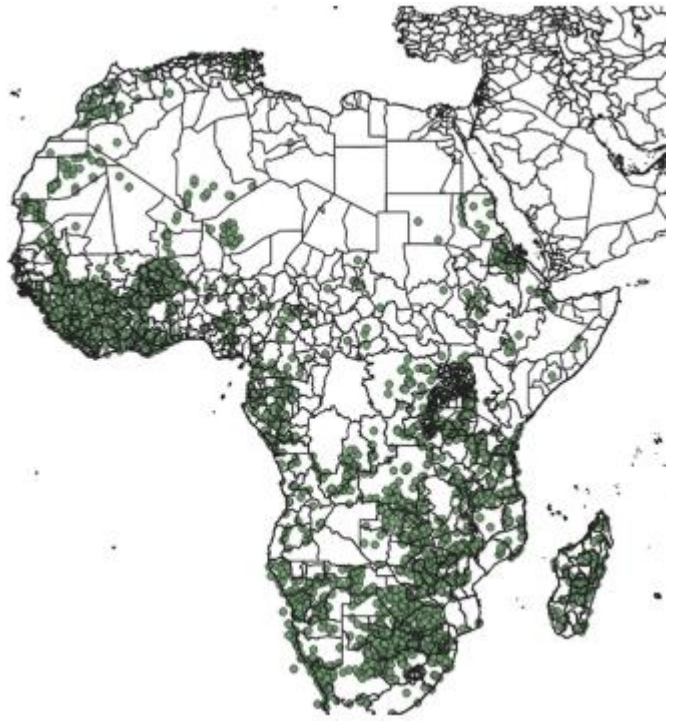
Togbetse and Turcu (2022)

Energy transition and international aid

Has the natural resource endowment needed for the energy transition become a determining factor in the allocation of development aid?

Over the 2010-2018 period, using difference approaches (PPML, logit) at macroeconomic level and at a dissagregated level (e.g. aid projects located within regions within African countries) this appears to be the case.

A crowding out effect of Chinese aid is seen in relation to the development aid coming from other parts of the world on the African continent.



Location of copper mines in Africa

Togbetse and Turcu (2022)

4. Conclusion

Conclusion

Climate change poses new risks that can have major macro-financial consequences.

Different approaches can be used to assess these climate risks (physical and transition) and their link with sustainable development within the global economy.

In this context, other questions may emerge: are these risks becoming systemic? What is the link between physical risk and transition risk in the short and long term?

Thank you for your attention!

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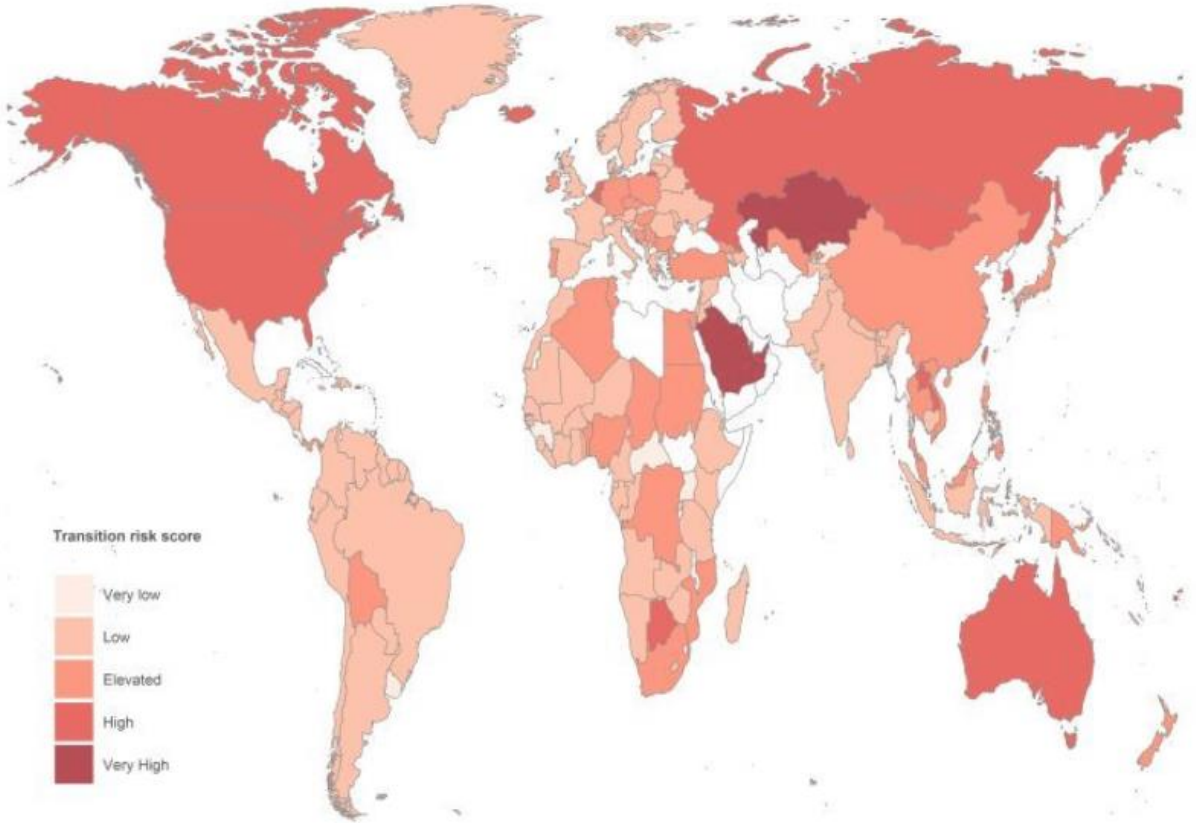
Climate risk ranking by country



Transition risks (2010-2017)

European Investment Bank (2021)