

DISCUSSION

Does Climate Change Affect Investment Performance?

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INTRODUCTION

- ▶ The paper seeks to understand the impact of climate change on the commercial real estate market (CRE).
- ▶ Exposure to extreme temperatures reduces average realized total returns in CRE.
 - ▶ Effect can be attributed entirely to a valuation channel.
 - ▶ Exactly offsetting effect on operating income and expenses.
 - ▶ Consistent with time-varying CRE risk premium.
- ▶ Heterogeneity: by property type, location and time period.
(associated with Kyoto agreement)

- ▶ An emerging field.
- ▶ The facts, as seen through the lens of this paper:
 - ▶ Average temperature rising from 14.5C to 16C between 1980 and 2020.
 - ▶ Extreme readings: above 30C (18% to 20%), and below 0C (18% to 13.5%).
- ▶ Literature review: Is there a valuation premium?
 - ▶ Eichholtz et al. (2010): Prices of green buildings are higher by about 16 percent.
 - ▶ Bernstein et al. (2019): Homes exposed to sea level rise sell for 7% less.
 - ▶ See Bardhan et al. (2013) on imperfect information and loan market failures, Jaffee et al. (2019) on energy prices, Baldauf et al. (2021) on beliefs, Murfin and Spiegel (2021) and Ilhan (2021) on sea level rise.

COMMENT 1: DEFINITION OF PERFORMANCE

Holding period returns

- ▶ Key observation: Holding period matters.
- ▶ But is it not an additional adjustment margin?

	Holding period return		Log holding period ($t - t_0$)	
Initial purchase from a same-nationality seller ($i = j_0$)	0.138*** (0.016)	0.081*** (0.015)	0.144*** (0.031)	0.189*** (0.031)
Location (submarket) fixed effects	No	Yes	No	Yes
Transaction year fixed effects	No	Yes	No	Yes
Property-level hedonic controls	No	Yes	No	Yes
Number of obs.	23,790	23,790	23,790	23,790
Adjusted R ²	0.011	0.127	0.004	0.184

Badarinza, Ramadorai and Shimizu (2022)

- ▶ What do we gain from looking at the holding period return, as opposed to measuring the valuation premium directly?
- ▶ Current specification assumes reference dependence:
 - ▶ Initial purchase price matters for subsequent price outcomes.
 - ▶ Feasible to estimate unrestricted version.
- ▶ Results are consistent with the view that extreme temperatures matter only *at the time* of ownership transfer.

COMMENT 2: ASSET PRICING FRAMEWORK

Taking a clearer stance:

is the increase in risk associated with climate change *anticipated* or not?

- ▶ The estimated specification assumes they are not:
 - ▶ Backward-looking measure of weather conditions.
- ▶ But the interpretation of the results leaves room for ambiguity:
 - ▶ “Exposure to extreme temperatures is being priced in the cross-section of CRE returns.”

COMMENT 3: PREDICTABILITY CHANNEL

- ▶ Very convincing results that exploit heterogeneity:
 - ▶ Extreme temperatures affect retail and hospitality most.
 - ▶ Consistent with NOI channel.
- ▶ But is it an NOI *risk* channel?
 - ▶ Your current assumption: Past standard deviation (SD) good proxy for future SD.
 - ▶ How can this be reconciled with the only modest observed adaptation?
 - ▶ Identify surprise component.
 - ▶ Put differently: We need more evidence for time variation in risk.

- ▶ Exploit dynamics of vacancy rates.
- ▶ Do we see gradual or sudden increase in climate-related sources of uncertainty?
 - ▶ Kyoto protocol is an awareness shock, or does it have a more fundamental nature?
 - ▶ In principle, its passing can imply a *reduction* in risk.
- ▶ Time variation in SD of other variables such as CapEx.

... and SDs by property type!

COMMENT 4: LOOKING AHEAD – NORTH VS. SOUTH

- ▶ Section 4.4 (“Effect of *average* temperatures on total returns”) seems very important for the overall interpretation of results.
- ▶ Shows that only extreme weather conditions matter.
- ▶ But: all effects still appear to be strictly temporary.
 - ▶ Reduction in both income and expenditure. (Just like a “lockdown”).
 - ▶ What do we learn about the prospect of the market, once more permanent large-scale effects of climate change materialize?

- ▶ The paper clearly shows that climate change can be **beneficial** in the North, because of an increase in average temperature.
 - ▶ Portland, Chicago and Boston “are net beneficiaries of global warming so far.”
- ▶ All the same time, the South suffers in all scenarios.

- ▶ The paper proposes a disaggregated value-based approach to identify the impact of climate change on the commercial real estate market.

Discussion:

- ① Understanding performance: Holding periods.
 - ② Asset pricing framework: Anticipation effects vs. cross-sectional pricing.
 - ③ Predictability: Consistency across cash flow measures.
 - ④ North vs. South: Tipping points.
- ▶ Thank you!