



Climate change risks and Mortgage Pricing: i) Energy efficiency U.S. CRE; ii) Casualty fire insurance for CA RES RE

CEPR: Climate Change: Financial Implications for Households  
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# Sources

- “The Pricing Risk of Energy Use Intensity for Office and Multifamily Mortgage” Paulo Issler,\* Paul Mathew,\*\*\* Nancy Wallace\* (<https://buildings.lbl.gov/cbs/energy-factors-commercial-mortgages>)
- Mortgage Markets with Climate-Change Risk: Evidence from Wildfires in California, Paulo Issler, Richard Stanton\*, Carles Vergara-Alert\*\*, Nancy Wallace\* (<https://papers.ssrn.com/abstract=3511843>)

\*\*\*Lawrence Berkeley National Labs, \*\*IESE Barcelona, \*Berkeley Haas

# Energy Efficiency and CRE Mortgages

- **Some Facts:**
  - Energy use is the single largest operating expense representing approximately one-third of typical CRE operating budgets.
  - CRE accounts for almost 20 percent of the nation's annual greenhouse gas emissions.
- Utility cost measurement is **not** part of U.S. CRE underwriting processes.
  - Lenders cannot distinguish efficient vs. inefficient buildings.

# Department of Energy (8-year project) with the Lawrence Berkeley National Labs

- Assess the relationship between energy prices, vols, energy consumption metrics and CRE mortgage default
  - Mortgage origination and performance data (1998 – 2016, TREPP and city benchmarking data)
  - Current effort, Fannie Mae Green Rewards Multi-family program (2000 – 2020).
- Results:
  - There is a strong empirical link between the Energy Use Intensity (EUI) of properties and mortgage default.
  - Mortgage pricing impacts are economically important.

# Pricing implications and next steps

Mortgage and coupon sensitivities to shocks on scaled source EUI ( $\Delta 1.0\%$ )

	<b>Points sensitivity to 1% change in Scaled Source EUI</b>	<b>Coupon sensitivity to 1% change in Scaled Source EUI</b>
Office Loans	7.71 bp	2.10 bp
Multifamily Loans	4.00 bp	0.84 bp

*In principle, an office building with 10% lower source EUI should get ~21bp discount on its mortgage interest rate*

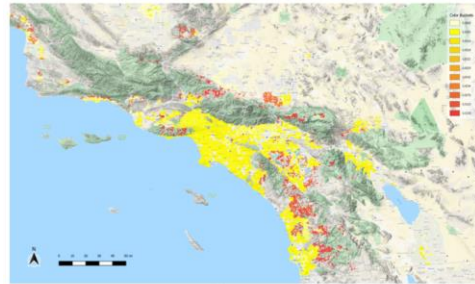
- Pilot project with lenders to develop actuarial tables for debt service coverage ratio cut-offs based on empirical pricing sensitivities – similar to the development of earthquake lending scores.

# Fire Casualty Insurance and CA California Residential Mortgage Market Risks

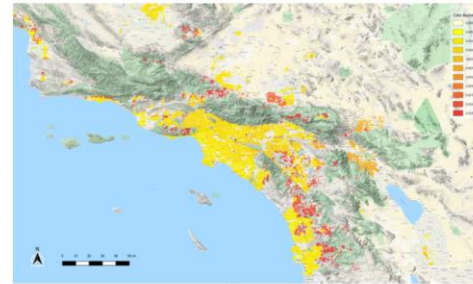
- **Some Facts:**

- U.S. securitized residential mortgage markets have more than a \$1.5 trillion exposure to CA and its environmental risks, especially fire – more than 1.42 million acres burned in last two weeks.
- Mortgages require fire casualty insurance.
- California Department of Insurance
  1. Prohibits the use of probabilistic wildfire models for pricing.
  2. Relies on a deterministic factor structure that is too flat.
  3. Prohibits the inclusion of reinsurance margins as an expense in the rate-approval process.

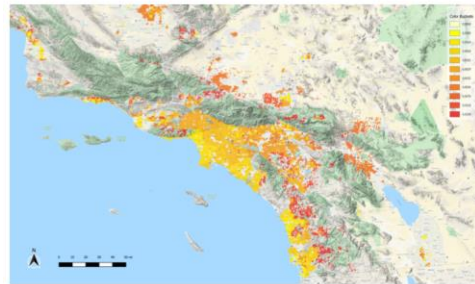
# Risks are dynamic over time and seasons



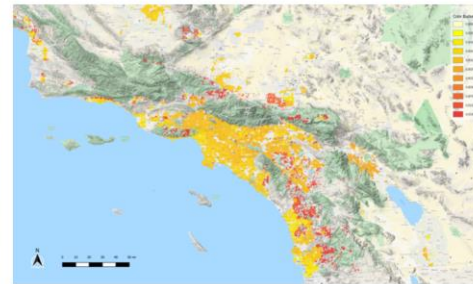
(a) January



(b) April



(c) July



(d) October

# Large scale loan-level default analysis (2000-2018, 7M+ mortgages)

- The larger the wildfire the lower the level of mortgage default.
  - Policy payout incentives lead to large scale rebuilding in burned areas.
- CDI pricing-policy evaluation:
  - Prohibitions on probabilistic wildfire models --- not justified.
  - Lack of allowed rate variation by dynamic wildfire risk --- valuation exercise suggests **\$14.98 billion annual of expected big fire losses** and these do not track the Hazard Zone risks.
  - Prohibitions on the inclusion of reinsurance costs in rates --- unsustainable if reinsurance prices rises by 30%--70% in 2020!
  - Incentivizes carriers to cancel policies not to price risk.



# Conclusions

- Requires long-term commitments for data development with co-operation from market participants (lenders), agencies (DOE, Calfire, city benchmarking, EPA, private metering firms, NOAA), data providers (TREPP, Fannie Mae, ATTOM, McDash/Equifax), and energy market providers and researchers (ISOs, Platts, LBNL).
- To be effective requires participation of financial market participants (real lenders) and pilot experiments "re-underwriting real portfolio loans."

QUESTIONS?

