

# SOME LIKE IT HOT: THE IMPACT OF CLIMATE CHANGE ON HOUSING MARKETS

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*Eoin Campbell uses examples from cities in the United States to provide an interesting and thoughtful discussion of the effect of climate change on housing markets. He finds that house prices in many cities, such as Miami, do not reflect the serious risks of impending climate change and shows that behavioural biases and heuristics can explain this phenomenon. He also argues that the private insurance industry is in a unique position to remedy this and to warn markets of the potentially disastrous consequences of failing to act.*

## Introduction

Climate change is a hot topic. Estimated average global temperatures will increase by 2.6-4.8C between 2080 and 2100 if emissions remain unchecked, contributing to more frequent extreme weather events such as hurricanes, flooding, wildfires, heat waves and droughts (IPCC, 2013). If this trend continues there will be potentially dire implications for homeowners.

Climate change has the potential to affect many aspects of the urban environment including house prices, insurance premiums, residential mobility and urban spatial arrangements. Housing is often the largest kind of consumption good individuals will spend their income on, representing nearly one-third of US CPI basket, and an important investment asset, representing over half of US household wealth (Lyons and Mullbauer, 2013). Thus our understanding of housing is paramount to our understanding of society and individual welfare. Market volatility, through wealth depreciation or negative equity, has direct welfare effects for property owners. There is strong evidence of the link between housing markets and broader economic outcomes particularly through its links with the financial sector (ibid). Furthermore, as economists we care about why properties are valued and how they vary. Will a house in Portland differ if it was relocated to Miami? If so, by how much does it vary and why?

This paper examines whether climate change is changing perceptions within the real estate industry and what prospective consequences may arise for cities. Insights into future property markets are drawn upon mostly within the United States<sup>1</sup>. The inquiry into this topic starts with a discussion of ignorance in the Miami real estate market.

## The Miami Paradox

In 2013 Rolling Stone Magazine published an article arguing that rising sea levels will bring about 'imminent doom' to Miami (Goodell, 2013). Miami Beach, for example, is only 1.2m (4 feet) above sea level (City-Data.com, 2014). Rappaport and Sachs (2003) further point that this threat is not isolated: the majority of US population and wealth is located in coastal and great lake areas. Despite the supposed impending doom of Miami, house prices have rapidly increased over the past 30 years (financial crisis aside) at the same pace as in-land Denver (City-Data.com, 2014). Certain Miami districts like Miami Beach and Coral Gables are experiencing even more pronounced booms (ibid). The non-responsiveness of Miami real estate poses a puzzle: Why do owners of property in Miami not face a price discount with the heightened climate risk?

Climate change's impact on physical capital rather than human capital may partially explain this puzzle (Bunten and Khan, 2014). In the US, the ratio of total value of lives lost to total damage to physical capital is strikingly low. In the case of Hurricane Sandy in 2012, 117 people were killed. If we valued each of these lives at \$6m, summing to \$702m, this figure would still be swamped by the total physical property damage of \$65bn (Mulvihill, 2013). Comparably the total number of homicides in New Jersey (state most damaged by Hurricane Sandy) was 409 (Star-ledger Survey, 2013). A former president of the Detroit Association of Realtors seems dismissive of climate change potential impacts on Detroit as an attractive city, arguing that there are more immediate concerns facing the housing market such as crime (quoted in Kingson, 2014). The point here is that unless climate related threats are a significant threat to life (like crime) it is not enough to prompt mass panic in the property market.

As long as the rich are rich enough they will choose to remain in high-amenity Miami, New Jersey and New York. In order to enjoy these amenities, the wealthy are willing to rebuild their houses after an extreme event that poses no serious effect to their life, such as flooding or a Hurricane (Bunten and Kahn, 2014). Market rebounds following natural disasters seem to support this theory.<sup>2</sup>

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1. This is for two reasons. 1) Most research thus far has focused on the US. 2) The US has a varying climate and labour and capital is free to move to any location, meaning potential competition over a wide array of cities. It would be interesting to extend research to other trading blocs or areas with competitive cities and free movement of factors of production such as China and the European Union but this is beyond the scope of this study.

2. Lawrence Yun, chief economist of the National Association of Realtors notes that after the initial slump associated with a natural disaster, insurance money begins to flow in and the market gets elevated to levels

In addition, as long as the increase in costs of climate catastrophes (future and uncertain) are smaller than the costs of moving and establishing a new social network (immediate and known), Miami residents may rationally choose to remain in the city (Bunten and Khan, 2014). This theory provides a useful starting point but does not completely explain the apparent ignorance of the property and insurance markets in Miami and elsewhere. For this we must take a closer look at risk assessment.

## A New Assessment of Risk

The puzzle of Miami's house price figures suggests that it is plausible that imperfect capitalisation is a product of imperfect risk assessment. Hedonics, the neoclassical theory for conceptualising the relationship between house prices and environmental disasters (see Harrison et al, 2001), tells us that risk is calculated from the perceived expected value of utility lost from extreme weather events. This approach suggests differential premiums across properties varying in climate hazards and that they should be fully capitalised into house prices insofar as information about frequency and severity of risk of location is known (Macdonald et al, 1987). If this theory was to be realised, Miami would be in decline while Detroit would be experiencing a boom. The approach fails to offer convincing explanations of the current geography of market prices. Several studies appear to contradict the approach, suggesting relatively rapid rebounds of housing prices in the wake of environmental disasters (see footnote 2).

However, we can draw on behavioural economics and the psychology of risk to explain these phenomena. Insights from alternative risk literature lead us to expect market actors will assess climate risk on the basis of:

1. Myopia or hyperbolic-discounting (see Hillman, 2009, Pryce et al, 2011) – discounting risk from anticipated future events, with the discount rate rising progressively when the event is further into the future.
2. Amnesia (see Pryce et al, 2011) - discounting information from past events, with the discount rate rising progressively as time lapses.

Both these factors mean perceived risk can diverge considerably from actual risk. Empirical studies show strong evidence of individuals having a skewed short-term outlook. Della Vigna (2009, p. 201), for example, concludes stock returns across a variety of industries are “consistent with inattention to information further than approximately five years into the future... information that is further into the future... is likely to be less salient”. Burningham et al. (2008) relate this to climate risk, claiming future flood risks past a certain

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even higher than before the storm. With natural disasters, the inventory level is reduced and demand tends to outweigh supply (new construction is delayed so housing stock isn't growing as fast as the population) causing a price rebound (Brennan, 2012).

time period are 'invisible' and thus ignored, hence we may expect predictions of flood risk 5 or 10 years into the future to be met with dismissal, and as a result future risk may have little perceptible impact on current market prices.

Other examinations of decision-making reach similar conclusions on skewed risk perception. 'Self-attribution bias' is explained as basing perceptions on one's personal experience (Della Vigna, 2009) and since anthropogenic climate change is an unprecedented phenomena previous temperatures may not be an indicator of what is to come. Unusual future events are more difficult to imagine and identify with and hence have little impact on our current perceptions of risk. But what happens when these unusual weather events become more frequent? Studies show that an individual may assess the likelihood of an event as higher when examples come to mind more readily providing an 'availability heuristic' (Tversky and Kahneman, 1973). As extreme weather events become more frequent, perceived risk is likely to converge into actual risk resulting in risk-adjusted house prices.

Perversely, amnesia can be exacerbated by actions of public institutions like local authorities granting planning permission in high-risk zones (Pryce et al., 2011). This artificial safety created by the actions of institutions leads to 'herd behaviour' according to Kousky and Zeckhauser (2006).

Alternatively, public myopia may occur as a result of the failure of institutions themselves to acknowledge and communicate the true risks of climate change: "in situations of high uncertainty, organisations deploy science and technology in combination with misplaced faith in their capabilities (including presumed infallibility) so as to redefine risks as more manageable and acceptable" (Williams, 2008, p.117). This may explain the investment in protection of New Orleans, Miami and New York.

Human cognition may influence individual and public acceptance of climate risk. Climate models are often highly technical and outputs probabilistic, while human "attention is a limited resource" (Della Vigna, 2009, p. 349). Della Vigna notes that humans respond to complex problems by "processing only a subset of information" emphasising 'simplifying heuristics', and because of this individuals may tend toward 'caricatured extremes', such as denial, making behavioural change less likely. Such a response may be a form of 'cognitive dissonance' (Festinger, 1957) – an attempt to justify past or planned decisions about house purchase and consumption choices. Dissonance arises from apparent conflict between the belief that a person has made the right decision to purchase a house in, say, Miami and the scientific evidence to the contrary. To overcome this internal conflict, homeowners may deny evidence of climate risks resorting to conspiracy theories and scepticism, rather than admitting the mistake, acknowledging risk and taking corrective action by relocating,

## Sending out the Right Signals

Imperfect risk assessment feeds into insurance markets sending out misleading indicators to consumers. Nicolas Schofield, an economist at Allianz, Europe's biggest home-insurance provider, says that insurance rate setting is not a forward projecting exercise but rather based upon the nature and impacts of claims over a long period of time (Sweeney, 2013). It is estimated that Allianz stands to see losses from extreme weather events increase by 37 per cent within a decade (ibid).

Thus, with key footholds in finance and risk management, the insurance industry is uniquely positioned to further society's understanding of climate change and advance creative solutions to minimise impacts (Mills, 2007). If insurers do not manage their investments sensibly, they risk jeopardising their return and long-term capacity to meet liabilities (Lubber, 2014). In the last 10 years alone direct losses in real estate infrastructure as a result of climate change have tripled, totalling \$150bn in 2013.

The Chairman of Lloyd's of London said that climate change is the number one issue for the insurance firm, showing a growing acknowledgement of the risks associated with the issue. Some insurers such as Allstate have already taken significant steps by cancelling or not renewing home-insurance policies in South Eastern US states, citing climate change as its primary motive. The company cut their number of homeowner policies in Florida from 1.2m to 400,000 with an ultimate target of less than 100,000 policies in the area (Mills, 2007). This drop in policies is sure to be reflected in market prices if other insurers follow suit. What is more difficult to detect than formal withdrawals or price spikes is the 'hollowing out' of coverage through reduced limits, increased deductibles and exclusions. This tactic maintains a profit level for insurers whilst bearing less of the cost in the event of an extreme weather event. The 'hollowing out' also creates an illusion of safety, where the ultimate losers are homeowners not the insurers. Mills (2007) stresses the importance of aligning terms and conditions with risk reducing behaviour calling for increased liability of corporate directors and officers regarding risk management.

Due to the varying geographical spread of climate risk, households in low risk areas are effectively cross-subsidising the in high-risk areas. Home insurance in these high-risk areas could be viewed as sub-prime and potentially damaging to the insurance industry as a whole (Bunten & Kahn, 2014). As insurance rationing becomes more prevalent, mortgage lenders may refuse to offer such reckless lending. Insurance rationing is likely to increase the likelihood of credit rationing and even if neither are an issue at the time of purchase (as is the case currently in Miami), today's buyers face the risk that they will have problems upon resale, creating an added threat of negative equity. This creates a 'lock-in effect' where homeowners are required to purchase further loans in order to move (Mills, 2007).

Ross et al. (2007) claim that if government does not allow insurance industry to engage in price discrimination then the costs of adaption will be higher in the aftermath

of a disastrous event<sup>3</sup>. Policies to discourage full insurance, may initiate a tipping point in home price risk adjustment. This tipping point would represent an insurance industry sending out the right signals. If a fully functional insurance industry is allowed to freely allocate risks then this may provide greater protection than that of sea walls or disaster relief. Khan (2009) points out the irony of championing a free market solution: capitalism, arguably the cause of global warming, becomes the solution.

## Is Alaska The New Florida?

In this section the spatial implications of emerging climate risk is examined. If the insurance market sends out the correct signals and house prices become risk-adjusted where can we expect to see future development and property booms? Competition between cities will intensify as people vote with their feet (Kahn, 2009). Mora, quoted in (Kingson, 2014), proclaims “Alaska is going to be the next Florida by the end of the century”. According to Sinclair (2012) the Pacific North West could fair very well. Vineyards are already beginning to spring up around Washington State, with many calling it the next Napa Valley (Kingson, 2014). Canada could experience population growth due to better weather conditions (Bunten and Kahn, 2014). Worryingly, a recent study of residential mobility by United Van Lines outlined North Carolina, South Carolina, Florida and Washington DC within the top in-bound states. Comparably climate safe states Illinois and Connecticut were named among top outbound states (ibid). This study suggests that people are moving into harm’s way, from relatively safe places to places along the south east coast.

How will New York, the USA’s most populous city fare? Andrew Cuomo, the NY governor, remarked the state now has a 100-year flood every two years (Sinclair, 2012), but noted that the city “has such a concentration of wealth and assets that I expect we will invest to defend the region from sea level rise and flooding, and there is already a movement in that direction” (Strauss quoted in Kingson, 2014). Sea level rises may not be the driving factor behind future house price dynamics in NYC, however. Instead increased temperatures may be the key factor. Mora (in Kingson, 2014) projects 2047 as the year when NYC weather becomes ‘extraordinarily’ and ‘unbearably’ hot by today’s standards.

The rising temperatures could have an earlier impact on South Western cities such as Los Angeles, San Diego and Phoenix, with the latter with the worst prospects: “If cities were stocks, you’d want to short Phoenix” (deBuys, 2013). Climate change will likely push Phoenix’s days in the year above 35C from 116 today to as many as 205 by

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3. This cost of adaption could harm the US Treasury and subsequently the American taxpayer. In the US the federal government is responsible for selling most flood insurance policies through the National Flood Insurance Programme (NFIP). The NFIP isn’t required to buy reinsurance, instead any claims exceeding reserves are borrowed directly from the US Treasury. In the event of increased flooding and widespread claimants, the US Treasury could be adversely affected.

2099 (Risky Business, national report, 2013).

Rising temperatures, particularly in the South West could instigate an air-conditioning boom (Cox, 2012). Climate change would in this case affect the type of property demanded as well as locational choice. Energy costs of air-con could stimulate demand in smaller homes. Annie Macbeth elaborates on this explaining that a house's self-efficiency will increase its price; "Urban lifestyles are beginning to be affected by water and heat restrictions, although the real impact has not yet been felt by most city dwellers, properties that are water and energy conscious will have a well-recognised added value" (Sweeney, 2007). McIlwain believes that large inefficient mansions in the "outer edge of the suburbs are the most susceptible to a drop in value as the world changes, traffic congestion gets worse and the cost of driving around rises". If energy costs get too expensive it may drive consumers to revisit the location issue (Kingson, 2014).

Finally, the risks associated with climate change may carry elements of social injustice. Population sorting may occur resulting in future high-risk cities such as Miami and New Orleans, attracting the poor as well as risk lovers. If the poorest are unable to bid their way out of low-amenity and high-risk cities, then they will bear the brunt of climate change (Bunten and Kahn, 2014).

## Conclusion

Overall, property has a significant effect on individual welfare through direct channels but also through general economic and non-market channels. Hence understanding fundamentals of housing markets can help us improve societal welfare. However, relatively little academic research exists examining the impact of climatic changes on property transactions. This is reflected in property markets remaining thus far largely unresponsive to underlying systemic risk, as is the case in Miami. It is clear that this must change, as failure to act is likely to be very costly. In order to reassess risk considerations, behavioural economics and psychology must be considered. Markets turn, at least in part, on big shifts in public thinking (Sinclair, 2012). The private insurance industry is in a unique position to send out risk-adjusted market signals providing such a shift. House prices reflect where people want to go, and it may be that the property booms of the future could take place in the Pacific North-West of the US - in Portland, Seattle and even Anchorage.

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