Affordable Housing Across Time and Space

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Introduction and Research Question

U.S. centered research on affordable housing primarily focuses on the convergences between public housing policy, availability of property, and the financial ability for individuals and families to secure housing within their economic means. In much of this research government census data is used to gain insight within a U.S. geography, where changes in income, housing ownership or rental properties are traced within a single residential zone, a city, a county or state. Despite that this type of research and data set assists the specificity with which city planners, policy makers, and legislatures may respond to locally-based needs around housing, the prevalence of this research lacks a global perspective which may yield a questioning and understanding of how worldwide, economic fluctuations interact with local tensions that comprise the issue of housing affordability. In using the term "affordable housing"--and alternatively "housing affordability" or simply "affordability"--we position ourselves at the crossroads of economic, scholarly, and quotidian data referring to the disparities between household income and the seemingly incessant, ubiquitous trend of rising housing prices in both rental and homeownership markets.[1] From this position we view affordability not only as the financial ability for individuals or families to secure and maintain housing, whether in rental or ownership markets, but also as a discursive site through which political agendas, economic changes, and social or class conflicts negotiate the availability of space and financial assets required in securing housing without foregoing all other fundamental needs. While affordability

[1] In this study, housing refers to properties owned or rented by individuals and families. It must be noted that this notion of housing aligns with the administrative, official concepts of residential properties and thereby exludes housing types that emerge outside properties managed by real estate agents, household owners, or government housing administrations, including but not limited to slum dwellings, favelas, etc. Although arguable, these "non-official" forms of housing are indeed housing for many individuals and families who cannot participate within the economic transactions required in attaining housing, this is housing nonetheless.

is a representative signpost or measure of economic changes, such as in housing studies where the median price of a house in a given city or metropolitan area is measured against its median income, affordability is also a tool through which economic changes and struggles from diverse groups of people coalesce. Thus we are interested in exploring how "affordable housing" conversations manifests in regional zones to compare their specific terms across a global scale. We ask: what are the underlying political, social terms of the discourse and data on affordability within specific regions around the world? How do these political, social terms in turn present alternative, or more sophisticated nuances of what is often called "affordability crisis" or "housing crisis"?

Methods, Tools, and Connections to Other Scholarly Research

To address these questions our methodologies required flexibility between distant and close readings where we traced the economic measures and discursive language of affordability in local and global scales. Our first step in working towards these distant and close readings was to select key cities across different regions of the world and collect data on average income and average housing cost. In our attempts to collect data in a uniform, consistent manner it became apparent that cities across distinct geopolitical zones--even in centralized data systems like the United Nations Statistics Division in Housing--yielded incompatible sets of data that did not fit into the time ranges we were interested in exploring. A uniform set of data was difficult to compile and clean up within the time constraints of this course. Thus, the difficulties of collecting consistent data that we could then transfer into a visualization lead us to select a single data source sponsored by an urban planning consultancy firm, Demographia, based in St. Louis, Missouri. The Demographia International Housing Affordability Survey provides a measure of

housing affordability across seven different countries worldwide, including Australia, Canada, Hong Kong, Ireland, Japan, New Zealand, Singapore, the United Kingdom, and the United States. While the amount of countries and housing markets included in this data set are by no means accurately representative, or even inclusive, of a more diverse set of countries--for example the global south is notably absent from this collection, along with many so called "developing" nations--the consistency of the data seemed most immediately helpful in allowing us to visualize affordability over time.[2] The specific data in the eleven reports from Demographia's annual survey across the years 2005 to 2015 includes the following data for each country noted above: country, major markets according to urban zones, the median multiple, median income, and median house price. In addition, this dataset features an international affordability ranking for each country listed, allowing us to compare affordability from country to country. Finally, this dataset also includes a national ranking for cities within a given nation, which allows us to focus into the specific data across major markets in a specific country. With this dataset, we can move across global to local scales that mirror distant to close readings. The importance of this type of method emerges from the lack of studies that account for a more global reading of "affordability" and the ways it manifests in local contexts. Although our data is not comprehensive, as iterated above, we believe it is a step towards creating a mode of inquiry that can move swiftly between numeric data, discursive data, and across scales to track changes.

To provide a distant and close reading from this data, as well as demonstrate change over time, we sought to create a data visualization that exhibited the fluctuations of affordability.

[2] By "consistent dataset" we mean that this particular data set provided the same types of data, such as median housing income, median housing price, for the same sets of cities and countries over time. This particular dataset also includes data beyond the range of In many of the other datasets we attempted to use, there were gaps across data where a city or country might have extremely detailed information for one year and then have altogether missing data over the next few years, or no additional data at all.

Mapping the idea became a key technique in creating this visualization. To create a map, the dataset described above was imported from tables within Demographia's survey PDF files into discrete CSV files and cleaned up to only include the information we were interested in visualizing with Carto. Using a Google Maps API, the data was geotagged with locations to include latitudes and longitudes of each city and with CartoDB, we generated a map with data points that include a scale of affordability across nations and within cities. The data on this map included median house prices, median income, median multiple, city name, and country for each city listed in the original survey data. After some difficulties with attempting to map out the data across multiple years directly within the Carto editor, we opted for creating our own publicly available website using JavaScript web technologies that integrated directly with Carto's API's to display the map. This allowed us to more easily control the layout and interactions of the visualization, and the end result uses an interactive time slider to transition between data for different years. Our map is viewable at the URL https://larry-xu.github.io/housing/. We used this data visualization as a backdrop from which to first examine how economic, numerical data on affordability reveals specific trends on affordability from region to region around the world. Secondly, this map allowed us to examine how discursive data complicated these trends on affordability on how housing affordability manifests from place to place worldwide.

In order to provide an additional lens on the conversations around housing affordability, we used a dataset from BBC containing 415041 documents from April 21, 2010 to April 29, 2014. Using SumUp we searched three sets of query terms in distinct phases to allow us to locate content related to, or explicitly about, each of the nine regions we selected. These queries included: including housing + location, affordable housing + location, house price + location,

and a few other variations where more specific housing terms relevant to the country were required, such as “council housing” for the UK and Ireland. For each of these queries SumUp returned over 116 relevant topic models, of 10 terms each. Although our dataset has a global scope, there was significantly more topics for the UK and Ireland, while other countries such as Singapore, New Zealand, and Japan had much less topics available. However, with this set we were able to get a closer look into the discussion around affordability for our nine regions.

Relation to Other Scholarly Research

In designing our research, we examined past literature that explored the issue of affordable housing and mapped its evolution across countries over time. Sifting through literature, we found a dearth in mappings of worldwide housing data with the focus placed on issues such as urban development and policy in the United States. For example the Urban Institute in Washington, D.C. created extensive visualizations drilled down to individual counties of the housing crisis in the United States. One of these visualizations included a map with each county outlined and a tooltip associated with each data point. The tooltip contained information on the number of affordable and adequate housing units available for the extremely low-income individuals (ELI) and the number of ELI individuals who require housing in the county. The data was from seven years: 2000, 2005, 2006, 2007, 2011, 2012 and 2013. The overall trend seen in the data was a drastic reduction in the amount of housing units available for ELI individuals, particularly in states located in the North, Southeast and Southwest of the United States. States in the Northeast showed consistent rates of unaffordability with some of the lowest numbers of housing units available for ELI individuals. Low rates of availability were also seen in California, with counties such as San Bernardino County having only 15 units for every 100 ELI

individuals. Neighboring states, such as North Dakota and South Dakota, showed differing patterns with North Dakota exhibiting the decline in housing availability for ELI individuals and South Dakota showing extremely affordable housing throughout the years measured. From this research, we were able to gauge a general decline in housing availability for extremely low-income individuals.

Research, such as Jairaj Kapadia's work on housing finance in India in 1992 and Din and Moise's policy mapping approach in 2012, examined the effect housing policy had on housing availability. Kapadia focused his research on the approval, availability and disbursement of housing loans in India. In 1992, housing loans decreased and the loan disbursements reduced in value (Kapadia, 1992). These trends were particularly alarming because of the reduction in housing available in the country, coupled with the lag in the allocation of public sector funds for housing. Despite the pressure placed on banks to disburse more housing loans, sanctions and disbursements had continued to decline. This irony, according to Kapadia, arise from the lack of recognition of the importance of housing investment in economic development. Kapadia's research showed us a wedge in the perception of the housing crisis by the public and the authorities in charge, which led us to engage in a contextual analysis of the housing data we found.

Din and Moise (2012) utilized Fuzzy Cognitive Mapping (FCM), a computational method of graphically representing a perception of a given system (Din and Moise, 2012), to create a model that would help a policy maker in their decision maker. In particular, the model would be able to generate the best housing policy for an area to support housing affordability. FCMs are capable of mapping and modeling scenarios in terms of several concepts and their

effects. As a result, it can incorporate several stakeholders on housing policy issues and model their perception. Through this research, we were able to gauge which concepts, such as financial literacy, trading, housing demand and house building, had the greatest effect on housing affordability. The model was able to work within several scenarios by proposing policies, after which the change in affordability, measured by a combination of the average house price and average household income, was examined. The greatest amount of negative change on affordability was measured with policies that affect the job market, housing demand and manufacturing. On the other hand, offers of lenders and community attitudes shaped positive change in housing affordability (Din and Moise, 2012).

Hypotheses

Using the previous research as a starting point, we generated a few hypotheses and trends we expected to see in our visualizations and topic modelling. Firsty, as income inequality grows, there would be less affordable housing over time. These times of income inequality arise during periods of economic uncertainty and as a result, we expected to see a sharp decline in affordability around the recession and housing crises. As Kapadia (1992) mentioned, income inequality can arise due to limited governmental support and disbursement of public funds to housing issues. As a result, we expected to see a lot of discussion linked to government and policy in areas of high unaffordability. Our second hypothesis centered around the idea of different geographic regions having varying affordability rates over time but there being some sort off of global trend across the world. We also expected to cities on our map within the same country and neighboring regions fluctuating more closely together in terms of their affordability. This could be attributed to similar economic activity within the region causing changing

unemployment rates, public funds for housing and disposable income to spend on property. Fluctuations in demographics with the global movement of individuals, both temporarily as tourists or permanently as immigrants would show greater unaffordability in regions most affected. For example, coastal cities and tourist hubs would have higher median multiples due to the large influx of individuals buying property there or visiting for leisure, leading to bustling economic activity. In general, we expected to see a correlation between economic activity and affordability with the conversation surrounding the housing issue to focus on the state of the economy.

Data and Analysis

Our analysis begins with a look at some global trends in housing affordability that seem prevalent over time, followed by an in-depth look at more regional changes and their deviations from these global phenomenon. Median multiples seem to be increasing in cities across the globe, evidenced by an overall trend of housing prices outpacing the increase of incomes. A few cities exhibit extreme measures of unaffordability, and these can be found all over the world, in regions such as coastal America, UK, Hong Kong, Australia, and New Zealand. The most affordable cities are located in the mid-US, Canada, and Ireland. Coastal cities seem to be less affordable, which can potentially be explained due to coastal areas as historically being economically more bustling. Areas with larger economic activity due to industry activity such as trade, finance, tech, tourism, etc. seem to have less affordable housing overall. Coupled with physical land area, we see that the densest locations like Hong Kong are the most unaffordable, while on the converse areas like mid-America have huge swaths of land available with not as much population or economic activity to compete for it.

Focusing on affordability in the US, the housing bubble is quite apparent from looking at differences between 2007 and 2008, with 2008 showing a substantial drop in median multiple across many cities in the US. Further exploration shows this is largely due to decreased housing prices with relatively little change in household income. In 2012 many American cities start seeing turnarounds as housing prices steadily rise, and it seems housing prices are nearing or surpassing peak housing bubble (2006) levels by today. Even for cities where housing prices seem to fluctuate heavily, median multiples are fairly stable due to corresponding fluctuations in income. As noted in the analysis of global trends, coastal areas in the US exhibit the highest median multiples which include cities in areas such as California, New England, Florida, and Hawaii.

It's interesting to look at the other primary North American country represented in this dataset, Canada, and analyze how it compares relative to some of the trends shown by the US. Cities in Canada have exhibited a steady increase in housing price by 1.5-2x between the years 2005-2015, while incomes have not increased nearly as much. Thus median multiples have been increasing consistently over time, leading to some of the highest in the world especially in the Vancouver and Toronto areas. Canadian cities do not appear to exhibit much fluctuation during the US housing bubble years, and instead seems unaffected.

Shifting focus now on the other side of the world to the Asia-Pacific region, our dataset comprises three of Asia's most economically active cities: Hong Kong, Tokyo, and Singapore. Between the years 2010-2015, Hong Kong housing prices seem to have doubled leading to astronomically high prices compared to the rest of the world. Hong Kong exhibited the highest median multiple throughout those years largely due to the increasing housing prices with

relatively little change in incomes. Tokyo, which has a similar population density as Hong Kong does not have nearly as high of a median multiple. Both housing prices and income are much less than in Hong Kong. It's somewhat surprising to see that Tokyo doesn't even scratch the top 10% of expensive cities measured by median multiple affordability. Singapore is similar to Tokyo in terms of population density, but with slightly higher median multiples. Both median housing price and median income are larger in Singapore than Tokyo. How can we compare and contrast Hong Kong, Tokyo, and Singapore, 3 very populous international Asian cities showing different affordability trends? Our topic model analysis explained further down might lead to some clues.

Between the years 2007-2015, cities in Ireland seem to have become more affordable over time as shown by decreasing median multiples across all the cities. Interestingly, both housing prices and incomes seem to have decreased, with the housing prices having a 50% average decrease. This seems to be the only region surveyed that has experienced a consistent decrease in housing prices compared to much the rest of the world. Conversely, cities in the UK have had fairly constant median multiples during the years 2005-2015. It seems unlike Ireland, both housing prices and incomes have increased at a similar rate leading to a stable median multiple for affordability. This contrast between the two neighboring countries is fairly striking, and speaks in large part to Ireland's inabilities to recover economically from a downturn which has continually driven housing prices downwards.

Overall it seems that cities in Australia are less affordable than other parts of the world judging by median multiple. Interestingly, some cities exhibit a decreasing trend between the years 2012-2015. Almost all of Australia's cities/urban areas lie along the coasts, with the few cities in the central area exhibiting lower median multiples. In Australia's close neighbor New

Zealand, cities' median multiples seem fairly constant over time, with a few exceptions such as Auckland showing rapidly increasing housing prices over time. Affordability in New Zealand seems very similar to Australian cities, a sign of shared economic and social stability between the two neighboring regions.

On a general level, the topic models we generated reflected groupings around economics, which was anticipated. Across each of these terms, three general areas arose. The biggest area included conversations around economics in relation to government activity in management of public or private housing markets, the issues housing faces in political transitions of power from party to party, and the discussion of agendas made to address affordability crisis. There was also a few topics in this area that discussed public welfare in connection to housing affordability. A second area included economics in relation to both public and private financial institutions that managed either rental or ownership properties. Banks, loan agencies, and federal banking institutions were the most mentioned in this area and were evident by the heavy use of words such as "interests," "loans," "mortgages," "debt," and "payments." These first two general areas of topics arise somewhat evenly across the nine regions. The third area was of economics in relation to more abstracted, globalized circulation of money and markets. In this area, there was mention mostly of various industries, including energy and consumer industries such as coal, food, and general shopping. Out of all the countries, Australia was heavily linked to coal and the energy sector and was frequently discussed as having a thriving market in terms of consumer industry. It was also more consistently talked about as having a growing housing market overall.

Some of the more interesting nuances around affordability came beyond the language of economics. These topic models arose more sporadically than the economic topic models, and at

times persisted in bursts over time. Our data on the nine regions was uneven, due to the main focus of the BBC on the UK and Ireland, but was nonetheless useful in naming greater detail around the conversations of affordability from region to region. A few of the key areas that arose in connection to affordability included: changes in population, whether through forced migration, emergencies, or returning to family homes (especially for young people); and contestations over basic human rights and activism, which reflects whom affordability issues effects the most severely. For example, in Australia and Canada, aboriginal and indigenous struggles around housing emerged as topics and both exhibit the terms "protest." In Hong Kong, a discourse of protest is implied, where the topic reveals the emotions and attitudes towards affordability, such as "anger" and "corruption." Similarly, the protests around affordability in San Francisco showed up as a topic in the areas for the US. The topics for Japan, which were some of the smaller ones because of the data's main focus on the UK, discussed housing primarily in connection to natural disasters or emergencies. New Zealand, in a similar way to the UK, yielded a topic on who is affected most by affordability, including children. Ireland's topics also reflected who was affected most by affordability and also supported the financial observations made around affordability, where one of Ireland's topics refers to "poverty." Singapore's topic yielded very little information, but we were able to configure that affordability affected immigrant laborers the most, as is evident in the topic around "foreign," "domestic" "helpers." Through the combination of data analysis that are both discursive and financial, we point to the complexities of affordability as connected to issues beyond itself. Our data supports both an more formal account of how affordability is an issue worldwide, but also how it is discussed and unevenly. Except for Australia and the UK, it seems that the nine regions have more explicitly talked about

affordability crisis on national levels. Ireland, is an interesting case however, since the discursive data from the topic models shows that even in discussing affordability outside economic terms, its proximity to the UK seems to complicate how affordability asymmetrical affects Ireland rather than the UK.

Connections with Scholarly Research

Our results were able to display several parallels with the scholarly research we conducted and cited. Although the scholarly research focused on the United States or on policy issues, our findings followed the general trends we observed and hypothesized. As Din and Moise (2012) found, manufacturing and housing demand had significant negative impact on affordability. Manufacturing and housing demand can stem from a rise in economic activity, such as increased tourism and construction. In our results, we found a strong correlation between economic activity and housing affordability where the former seems to have had an enormous impact on the latter. This was seen in coastal regions of the United States, U.K. and Australia which all exhibited some level of unaffordability possibly due to bustling tourist and economic activity. Housing demand was illustrated by our visualization of Hong Kong. As a densely populated region, there is an incredibly high demand for housing. As Kapadia (1992) noted, availability of housing is linked to the amount of public funds available for housing projects. With the topic models of Hong Kong, it can be seen that ‘corruption’, ‘anger’ and ‘inequality’ seem to be reoccuring, which shows a negative attitude toward the authorities and their negligence. Furthermore, our results support Din and Moise’s idea that there are several stakeholders involved in housing policy and affordability, with the nuances in our topic models that extended beyond economics. Immigration seems to have influenced affordability rates in

Singapore, which had a high median multiple throughout the years visualized. These changes in population further emphasize the need for adequate housing policy, with loan approvals and disbursements as evidenced by Kapadia (1992).

Larger Relevance and Future Directions

With recent fluctuations in local and global movements, there is an increased need for housing, especially for extremely low-income individuals. As seen in the United States itself, there is great disparity in the number of adequate and available housing for these individuals. Movements can be voluntary, in the case of immigrants migrating for employment and individuals traveling for tourism. Movement can even be involuntary, as evidenced by the recent refugee crisis growing rapidly all over the world. The issue of housing affordability can no longer be seen with a singular focus as these global movements have repercussions around the world. Aftershocks of the housing crisis in the United States were felt around the world with various regions dealing with it in different. Ireland became more affordable while the United States and the UK became less affordable. With a visualization utilizing a map, the viewer can see how global housing affordability actually is. There are general trends across the world that can be extracted. Furthermore, the same patterns are seen in regions of similar economic activity, particularly those linked to tourism.

Further directions for this topic would incorporate more data points to create a holistic view of the issue across the globe. With our current dataset, we were limited by what was available which did not encompass countries in Africa, for example. Therefore, in the future, we would use the same methodology with median house prices and median household incomes from other countries. In addition, to provide a more robust quantitative analysis of the issue, we would

include more diverse data points, such as employments rates and number of housing units available. What struck us through our literature review was the issue of housing loans, particularly in who gets an approval and who gets a rejection. There is clearly a disconnect in how citizens and government authorities have reacted to the housing crisis. In the future, it would be worthwhile to explore the discrimination in housing loan approvals. In addition, our contextual analysis provided us with insight on the implications of immigration, particularly on human rights. It would be worthwhile to explore this issue in a visual format to identify a trend in the loss of land or cultural sites due to the rising unaffordability as a result of increased immigration. Conversely, immigration has often led to the creation of vibrant and diverse communities within a country. Visualizing the integration of a culture within a community, through parks and murals for example, would provide a refreshing perspective on the global impact of movement across space and time.

Sources

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