Research Statement

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I am an applied microeconomist who specializes in urban economics and real estate. I am motived by addressing questions that are important to build urban resilience, and related to the construction of house and land price indices. Methodologically, my research relies on OLS, nonparametric and quantile estimation techniques as well as GIS analysis. This research statement consists of three sections that summarize the three current papers related to earthquake hazard disclosure through zoning, constructing house and land price indices and access within school zone, respectively. Each section also includes plans for future research in the respective areas.

Earthquake Hazard Disclosure

"Salience of Hazard Disclosure and House Price: Evidence from Christchurch, New Zealand" (Job Market Paper)

In my job market paper on the impacts of earthquake-induced hazard zoning on property values, I contribute to the broader economics literature of capitalization of seismic risk and risk salience. Researchers around the world have long recommended disclosure of the hazardousness of locations through maps and land use policies to increase public awareness of the potential for natural hazards when households decide on residential locations (Montz 1993). However, hazard disclosure through zone maps can be found not very effective, for 1) hazard zone maps are often provided not at a scale at which the location of individual properties could be located; 2) sometimes the zone themselves do not encompass areas most susceptible to hazard-associated damages; 3) the hazard information is often disclosed at a less sensitive time so that people will not pay attention to it (Palm 1981).

The 2010-2011 Canterbury earthquake sequence and the resulted area-wide liquefaction hazard zoning provide a unique opportunity to overcome the three issues mentioned above and evaluate hazard disclosure and salience of hazard information. First, the location of each house can be easily identified. In addition, liquefaction hazard assessment was performed on an area-wide basis covering flat residential land for the entire city. Moreover, the result of the liquefaction hazard assessment (three-level of Technical Categories, TCs) was disclosed at the most sensitive time, only a few months after the long-lasting earthquake sequence and easily accessible at the property level.

I utilize the 2010-2011 earthquake sequence and the subsequent liquefaction hazard zoning to analyze the impacts of the earthquakes and the long-run and dynamic effects of the three-level TC zoning on property values by implementing a quasi-experimental research design. Using unit transaction data from 2000-2018, I first verify that the pre-earthquake liquefaction information was not accounted for in the property market before the 2010-2011 earthquake sequence. I find that the market had gained some knowledge of the severity of liquefaction hazard through the earthquake sequence. After the three-level TC zoning was announced, average property values declined significantly by about 22% in TC3 (area most susceptible

to liquefaction damage) over seven years, while property values declined by 7% in TC2 (area less susceptible to liquefaction damage) relative to TC1 (area land damage to liquefaction is unlikely). The zoning effects were the largest in the first three years post-zoning and got muted after that. However, it took seven years for the price differential between TC2 and TC1 to disappear. Moreover, the average price in TC3 was still about 20% lower compared to TC1 seven years post-zoning. These findings are validated under the spatial conditionally parametric and semiparametric model and the boundary discontinuity model. They are also robust to alternative specifications for earthquake impact period and falsification tests. Moreover, I find price discounts to proximity to the residential red zones (severely liquefied residential areas) after the earthquake sequence; this proximity penalty is the largest in TC3.

Future work:
Motivated by the question of whether zoning effects are fixed in space, as a natural extension to my job market paper, I will be studying the spatial dependence and spatial spillover effects of the three-level TC zoning on property values. This will complement the understanding of how the market perceives and respond to the zoning policy.

I will also be working on a project that evaluates the impacts of the 2010-2011 Canterbury earthquake sequence on retirement decisions in Canterbury.

Price Index

"House Price and House Price Index Decomposition: Does Land Slope Matter?"

This study attends to the construction of quality-adjusted land price indices. The importance of separating housing structure and land has been well established, but the difficulties of unbundling them remain in practice. Unlike structure, land is not reproducible. Land parcels differ not only by location and size but also by slope and other topographical features. Sloping land adds complexity to construction, hence increases the construction cost of a house. Moreover, the degree of the slope may limit the use and development of a piece of land, hence decrease its value. Hence, to form reliable constant quality land price indices require controlling physical attributes of land that intrinsically confine the use of land. I extend the builder's model developed in Eurostat (2013) to examine the role of terrain slope in constructing constant quality land, structure and aggregate property price indices in selected neighborhoods in Auckland, New Zealand, where sloped terrain is common. Using unit transaction data from 2007 to 2017 for selected neighborhoods in Auckland and land slopes constructed from the Auckland Lidar 1m DEM data, I find that land prices decrease with land slopes. *Ceteris paribus*, a square meter of flat or gently sloped land costs about 131 New Zealand dollars more than a square meter land with a slope of 8 - 15° (14.05 - 26.79%). Adding land slopes as the land-specific topographical attributes as additional land characteristics to land size and the school zone that represents the location and public service associated with a site, the estimated constant quality land price index decreases slightly by 4.57 percentage point (a decrease of 1.6%) at the end of the estimation period than without it. Overall, the results suggest that land slope is an important determinant of land and hence, house price. When the composition of land slope do not differ over time, controlling for land slope has minor effects on the estimated land price indices and hence imputed aggregate

house prices.

Future work:
In a paper I am currently working on, I extend the locally weighted quantile regression proposed by McMillen (2015) to perform a more comprehensive study of price indices within housing markets in selected neighborhoods in Auckland, New Zealand. It provides another piece of evidence to the growling literature by showing rich variations of housing prices at any point or quantile in price distribution and location, even in a small geographical area. Preliminary results from the selected neighborhoods in Auckland show that the recent global credit crunch and Auckland housing boom affected price growth rates non-uniformly across price distribution and space. On average, Meshblocks with higher mean selling prices in 2007 were less negatively affected by the global economic downturn in 2008. During the Auckland housing boom since 2011, initially lowered priced One Tree Hill school zone appreciated more than the other two at the lower, median, and the higher end of their corresponding price distributions.

School Enrollment Zone

"Does Proximity to School Still Matter Once in School Zone?" with Sandy Dall'erba (under revision)

This study develops the existing literature on proximity to school further by assessing the role of proximity to school on housing prices once access to the preferred school has been secured. This study relaxes the assumption of uniform marginal effects of proximity to school and exploits the power of the quantile regression approach to test whether proximity is valued the same at the higher and lower end of the housing market. Using transaction data from four school enrollment zones in Auckland, New Zealand, we find that in the most desired school zones, house prices increase with proximity to school but decrease above 4 km. On average, house prices decrease by about 2.44% per one-kilometer drive from the school in the most desired school zones. Moreover, we find that the nonlinear effects are most prominent at the lower quantile of the sales price distribution. In the other two school zones, proximity to school reduces house prices. These results demonstrate that distance to school still matters within each school enrollment zone.

Future work:
Geographically based state school enrollment zone was abolished in New Zealand in 1991 and brought back in 2000. I plan to examine the impact of the change in school enrollment zone policy on the property market.

To summarize, my research at this stage has been focusing on the application of microeconomic analysis to understand housing market behavior to the provision of urban policy and public good. In the future, I aim to expand my research on urban policy, such as hazard disclosure, to location patterns and environmental gentrification. I also aim to have interdisciplinary collaborations to relate my expertise with other areas of study and address urban social problems such as spatial mismatch and poverty concentration. I look forward to advancing my research agenda as a tenure-track faculty and exploring new research collaborations.