Monitoring and modeling the causes and consequences of urban intensification in Waterloo Region

Prof. Dawn Cassandra Parker

Collaborators: Jeff Casello, Jennifer Dean, Region of Waterloo, Cities of Waterloo and Kitchener, Kitchener-Waterloo Association of Realtors, Coldwell Banker Peter Benninger Realty, plus many undergraduate and grad student team members
Conceptualizing our models:
What relationships explain intensification/recentralization?
Research Hypothesis: “Public transit development can cause land use intensification.”

The hypothetical stages of transit driven intensification:

- Development of new transit service improves accessibility levels.
- Changes attractiveness of areas for different activities and residence classes.
- Changes the demand for commercial and residential properties.
- Transforms land uses and or densities through redevelopment activities.

Prerequisites:

- Adjustment of zoning and land use transformation policies.
- Adaptation of social norms.
Operationalizing the Model:

WARM

Land Market Model

Residential Location Choice Model
- Homebuyers and Sellers
- Renters and Landlords

Land Development Model
- Developers

Transportation Model
- Households
Research structure for our group

- Focused sub-projects (student theses) create model building blocks
- Agent-based model brings building blocks together
- Student projects show examples of this work
  - Statistical land value model (Robert Babin)
  - *Renter survey (Xinyue Pi)
  - Buyer/seller survey (Yu Huang)
  - Travel model (Kevin Yeung)
  - Developer model (Jinny Tran)
  - *Realtor interviews/focus groups (Justin Cook)
Understanding the Kitchener-Waterloo Rental Market – Results from a 2016 Survey

Xinyue Pi | Master of Environmental Studies
School of Planning | University of Waterloo
Thesis Objectives and Research Questions

Objective 1:
To understand the structure of rental housing demand in Kitchener-Waterloo.

Objective 2:
To investigate the relationship between rental prices and housing related characteristics.
Study Area: Kitchener-Waterloo

- **Location**: Southern Ontario
- **Demographics** (2016, census)
  - 233,222 in Kitchener; 104,986 in Waterloo
  - Higher population growth rate
  - Younger average age
  - Aging population
- **Public transport**
  - Upcoming LRT
Demand and Supply Dynamics: Supply

- **Waterloo student housing surge**
  - A surplus of 1,200 bed
  (Town and Gown Committee, 2015)

“Growth rate of student housing has exceeded the enrolment increase” -CMHC(2017)
Demand and Supply Dynamics: Demand

• Demand gradually matches supply
  – Immigration
  – Senior renters
  – International students
  – Fewer moving to ownership
  – Stabilized vacancy rate
    • 2015: 2.4%
    • 2016: 2.2%
    • 2017: 1.9%

“Growth in demand matched unprecedented growth in supply. An improving job market for younger people, eroding affordability and strong immigration raised rental demand.”

Erica McLerie
Senior Market Analyst, CMHC
**Objective 1**: To understand the structure of rental housing demand in KW.

**Method 1: Survey Method**

**Design the Survey**

- Structure of the questionnaire (51 questions)

<table>
<thead>
<tr>
<th>Part</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Part A</td>
<td>Residential characteristics</td>
</tr>
<tr>
<td>Part B</td>
<td>Residential location choice</td>
</tr>
<tr>
<td>Part C</td>
<td>Renting behaviours</td>
</tr>
<tr>
<td>Part D</td>
<td>LRT and location choice</td>
</tr>
<tr>
<td>Part E</td>
<td>Household characteristics and travel behavior</td>
</tr>
</tbody>
</table>
Conduct the Survey

- Time period: June – November, 2016
- Total number of respondents: 290

<table>
<thead>
<tr>
<th>Recruitment approaches</th>
<th>Respondents recruited</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mailing recruitment posters</td>
<td>176</td>
</tr>
<tr>
<td>Facebook</td>
<td>90</td>
</tr>
<tr>
<td>Public libraries and outreach</td>
<td>9</td>
</tr>
<tr>
<td>KW Neighbourhood Associations</td>
<td>2</td>
</tr>
</tbody>
</table>
Demographics of Respondents: Age Distribution

Percentage of all survey respondents
Percentage of mailing responses only
Percentage of census

<table>
<thead>
<tr>
<th>Age groups (years)</th>
<th>Percentage of all survey respondents</th>
<th>Percentage of mailing responses only</th>
<th>Percentage of census</th>
</tr>
</thead>
<tbody>
<tr>
<td>18-19</td>
<td>4%</td>
<td>2%</td>
<td>5%</td>
</tr>
<tr>
<td>20-24</td>
<td>17%</td>
<td>16%</td>
<td>13%</td>
</tr>
<tr>
<td>25-29</td>
<td>20%</td>
<td>13%</td>
<td>16%</td>
</tr>
<tr>
<td>30-34</td>
<td>16%</td>
<td>12%</td>
<td>10%</td>
</tr>
<tr>
<td>35-39</td>
<td>10%</td>
<td>8%</td>
<td>7%</td>
</tr>
<tr>
<td>40-44</td>
<td>8%</td>
<td>6%</td>
<td>5%</td>
</tr>
<tr>
<td>45-49</td>
<td>7%</td>
<td>6%</td>
<td>4%</td>
</tr>
<tr>
<td>50-54</td>
<td>8%</td>
<td>7%</td>
<td>4%</td>
</tr>
<tr>
<td>55-59</td>
<td>2%</td>
<td>2%</td>
<td>2%</td>
</tr>
<tr>
<td>60-64</td>
<td>3%</td>
<td>4%</td>
<td>3%</td>
</tr>
<tr>
<td>65-69</td>
<td>3%</td>
<td>3%</td>
<td>4%</td>
</tr>
<tr>
<td>70-74</td>
<td>2%</td>
<td>1%</td>
<td>1%</td>
</tr>
<tr>
<td>75-79</td>
<td>2%</td>
<td>1%</td>
<td>2%</td>
</tr>
<tr>
<td>80+</td>
<td>1%</td>
<td>1%</td>
<td>3%</td>
</tr>
</tbody>
</table>
Demographics of Respondents: Household Type

Other household: two or more people sharing a private dwelling, but do not constitute a census family
Demographics of Respondents: Income

<table>
<thead>
<tr>
<th>Household income bracket</th>
<th>Percentage of respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;$29,999</td>
<td>23%</td>
</tr>
<tr>
<td>$30,000-$49,999</td>
<td>27%</td>
</tr>
<tr>
<td>$50,000-$74,999</td>
<td>21%</td>
</tr>
<tr>
<td>$75,000-$99,999</td>
<td>15%</td>
</tr>
<tr>
<td>$100,000-$149,999</td>
<td>12%</td>
</tr>
<tr>
<td>$150,000-$249,999</td>
<td>2%</td>
</tr>
</tbody>
</table>
Q14. What reasons have motivated you to move to and live in your current residence? (Please select all that apply)

- More affordable: 37%
- Better accessiblity to transit: 31%
- Better accessibility to facilities: 31%
- Better environmental quality: 24%
- For my or my partner's education: 17%
- Getting a new job: 14%
- Downsize: 12%
- Upsize: 11%
- Closer to my/my partner's workplaces: 9%
- Getting married/partnership: 7%
- Seeking new job opportunities: 4%
- For child's education/childcare: 3%
- Expanding family size: 3%
- Relationship status: 3%
Q15-1. Please rate the importance of each residential characteristic in your renting decision

<table>
<thead>
<tr>
<th>Residential Characteristic</th>
<th>Percentage of Respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rental price</td>
<td>4.6</td>
</tr>
<tr>
<td>Ease of maintenance</td>
<td>3.8</td>
</tr>
<tr>
<td>Housing type</td>
<td>3.8</td>
</tr>
<tr>
<td>Size of room/residence</td>
<td>3.8</td>
</tr>
<tr>
<td>Number of bedrooms</td>
<td>3.7</td>
</tr>
<tr>
<td>Availability of parking</td>
<td>3.5</td>
</tr>
<tr>
<td>Flexibility of lease/contract</td>
<td>3.5</td>
</tr>
<tr>
<td>Number of full bathroom</td>
<td>3.4</td>
</tr>
<tr>
<td>Central air</td>
<td>3.3</td>
</tr>
<tr>
<td>Private bathroom</td>
<td>3.2</td>
</tr>
</tbody>
</table>

Legend:
- Not at all important
- Not important
- Neutral
- Important
- Very important
Neighbourhood Characteristics:
Q16-1-a: Please rate the importance of each Built Environment characteristic in your renting decision

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Percentage of respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ease of walking</td>
<td>4.2%</td>
</tr>
<tr>
<td>Traffic noise</td>
<td>3.7%</td>
</tr>
<tr>
<td>Land use mix</td>
<td>3.5%</td>
</tr>
<tr>
<td>Ease of cycling</td>
<td>3.2%</td>
</tr>
<tr>
<td>Density of housing</td>
<td>3.0%</td>
</tr>
</tbody>
</table>

Legend:
- Not at all important
- Not important
- Neutral
- Important
- Very important
Neighbourhood Characteristics:
Q16-1-a: Please rate the importance of each Socio-Demographic characteristic in your renting decision

- Safety level/crime rate: 4.5
- School quality: 3.5
- Similarity of education level to yourself: 3.0
- Similarity of age to yourself: 3.0
- Similarity of household income to yourself: 2.9
- Similarity of household size to yourself: 2.8
- Similarity of ethnicity to yourself: 2.0
Neighbourhood Characteristics:
Q16-1-a: Please rate the importance of each Accessibility characteristic in your renting decision

<table>
<thead>
<tr>
<th>Accessibility Characteristic</th>
<th>Percentage of respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Commuting Time</td>
<td>4.4</td>
</tr>
<tr>
<td>Accessibility to Workplace</td>
<td>4.2</td>
</tr>
<tr>
<td>Commuting Cost</td>
<td>4.1</td>
</tr>
<tr>
<td>Accessibility to Retail and Services</td>
<td>4.0</td>
</tr>
<tr>
<td>Accessibility to School</td>
<td>3.9</td>
</tr>
<tr>
<td>Accessibility to Bus Stops</td>
<td>3.8</td>
</tr>
<tr>
<td>Accessibility to Public Open Space</td>
<td>3.7</td>
</tr>
<tr>
<td>Accessibility to Urban Center</td>
<td>3.4</td>
</tr>
<tr>
<td>Distance to Family/Friends</td>
<td>3.4</td>
</tr>
<tr>
<td>Distance to Highway Exits</td>
<td>3.1</td>
</tr>
</tbody>
</table>

Legend:
- Not at all important
- Not important
- Somewhat important
- Important
- Very important
Housing Types: Current vs. Ideal

Percentage of respondents

- Single-detached: 12% (Current), 35% (Ideal)
- Semi-detached: 3% (Current), 5% (Ideal)
- Row house: 10% (Current), 13% (Ideal)
- Apartment <=4 storeys: 30% (Current), 20% (Ideal)
- Apartment >=5 storeys: 40% (Current), 27% (Ideal)
- Duplex: 6% (Current), 0% (Ideal)
Housing Types: by Subgroups

**Current**

- 18-24 and 55+ age groups mostly live in apartment buildings.

- The *higher the income* is, a higher the percentage of respondents of the group lives in high-rise apartments.

**Ideal**

- Couples with children have the greatest desire towards renting a house, especially single-detached.

- Retired, seniors and students generally prefer apartments to houses.
Number of bedrooms: Current vs. Ideal

<table>
<thead>
<tr>
<th>Number of bedrooms</th>
<th>Current</th>
<th>Ideal</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-bedroom</td>
<td>17%</td>
<td>9%</td>
</tr>
<tr>
<td>2-bedroom</td>
<td>35%</td>
<td>39%</td>
</tr>
<tr>
<td>3-bedroom</td>
<td>31%</td>
<td>17%</td>
</tr>
<tr>
<td>4-bedroom</td>
<td>7%</td>
<td>17%</td>
</tr>
<tr>
<td>5-bedroom</td>
<td>21%</td>
<td>3%</td>
</tr>
<tr>
<td>6-bedroom</td>
<td>3%</td>
<td>3%</td>
</tr>
<tr>
<td>7-bedroom</td>
<td>1%</td>
<td>0%</td>
</tr>
</tbody>
</table>

Percentage of Respondents

WATERLOO ENVIRONMENT
Ideal Housing Size

- < 1000 sqft: 23%
- 1000 - 1499 sqft: 47%
- 1500 - 1999 sqft: 19%
- 2000 - 2499 sqft: 9%
- > 2500 sqft: 2%
Ideal Yard Size

- Very large yard: 2%
- Large yard: 6%
- Medium yard: 17%
- Small yard: 26%
- No outdoor space: 10%
- Patio or deck or balcony: 39%

- **Medium/small yards:**
  - Couples with children
  - Couples without children
  - Lone-parent families

- **Patio/deck/balcony:**
  - Students
  - Seniors
  - One-person households
Renting vs. Buying

• 60% respondents plan to buy a home in the future
  – Student households have the highest tendency
  – Retired households generally do not have the plan
  – Those who have the plan estimate to buy in 6 years on average

• 24% respondents have owned a home before. But many of them choose renting for:
  – Less responsibility (58%)
  – Downsizing (42%)
Q24. Why do you choose renting instead of buying? (Please select all that apply)

<table>
<thead>
<tr>
<th>Reason</th>
<th>Percentage of Respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Short term housing needs</td>
<td>51%</td>
</tr>
<tr>
<td>Can't afford mortgage/down payment</td>
<td>51%</td>
</tr>
<tr>
<td>Less responsibility (e.g. repairs and maintenance)</td>
<td>47%</td>
</tr>
<tr>
<td>Easy to move</td>
<td>41%</td>
</tr>
<tr>
<td>Convenience or renting process versus buying...</td>
<td>30%</td>
</tr>
<tr>
<td>No debt</td>
<td>23%</td>
</tr>
<tr>
<td>Downsizing</td>
<td>11%</td>
</tr>
<tr>
<td>Can't keep up with monthly payments</td>
<td>9%</td>
</tr>
</tbody>
</table>
LRT and Location Choice

• Central Transit Corridor (CTC)

Area within around 800 meters or roughly a 10-minute walk distance from LRT stops
Q27. Is your current residence inside the CTC area?

- In CTC, Kitchener: 20%
- In CTC, Waterloo: 33%
- Outside CTC, Kitchener: 30%
- Outside CTC, Waterloo: 17%
Q30. What is your general attitude towards the LRT system in Kitchener-Waterloo

**IN CTC**
- Very positive: 20%
- Positive: 31%
- Neutral: 33%
- Negative: 10%
- Very negative: 6%

**OUTSIDE CTC**
- Very positive: 20%
- Positive: 31%
- Neutral: 33%
- Negative: 10%
- Very negative: 5%

**TOTAL**
- Very positive: 17%
- Positive: 27%
- Neutral: 30%
- Negative: 21%
- Very negative: 5%
Q34. For what trip purposes might you use the LRT system (Please select all that apply)

- Social activities: 66%
- School/Work activities: 59%
- Grocery shopping: 48%
- Other shopping activities: 47%
- Recreational activities: 46%
- Service activities: 40%
- I will not use LRT: 19%
- Chaperone activities: 10%
Objective 2: To investigate the relationship between rental prices and housing related characteristics.

Method 2: Hedonic Modelling

- Hedonic Model:
  - Statistical model to **deconstruct** housing price/rental price
  - Identifying relationship between rental prices and each **individual** characteristic
Model Specification

Logged adjusted rent$_i$

= $\alpha + \beta_0 \times \text{Household} + \beta_1 \times \text{Residential} + \beta_2 \times \text{Neighbourhood} + \beta_3 \times \text{Behavioural} + \varepsilon$

Household$_i =$

- Household with children$_i$
- One – person household$_i$
- Other household$_i$
- Retired household$_i$
- Student household$_i$
- Unemployed household$_i$
- Household income$_i$

Residential$_i =$

- Number of bedrooms$_i$
- Number of bathrooms$_i$
- High – rise apartment$_i$
- Low – rise apartment$_i$
- Age of residence$_i$

Behavioural$_i$

= Renting a room$_i$

Neighbourhood$_i =$

- Walkability$_i$
- School quality$_i$
- Perception of safety$_i$
- Open space access$_i$
- Open space adjacency$_i$
- Regional road adjacency$_i$
- Transit access$_i$
- $\ln\text{CTC}_i$
### Hedonic Model Result

<table>
<thead>
<tr>
<th>Category</th>
<th>Significant variables</th>
<th>Effect per unit increase</th>
<th>Level of significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Household variables</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Student household</td>
<td>10.34%</td>
<td>**</td>
<td></td>
</tr>
<tr>
<td>Household with children</td>
<td>-9.12%</td>
<td>*</td>
<td></td>
</tr>
<tr>
<td>One-person household</td>
<td>-8.53%</td>
<td>**</td>
<td></td>
</tr>
<tr>
<td>Household income (per $1,000)</td>
<td>0.12%</td>
<td>***</td>
<td></td>
</tr>
<tr>
<td>Structural variables</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of bathrooms</td>
<td>18.02%</td>
<td>***</td>
<td></td>
</tr>
<tr>
<td>Number of bedrooms</td>
<td>15.02%</td>
<td>***</td>
<td></td>
</tr>
<tr>
<td>High-rise apartment</td>
<td>7.83%</td>
<td>*</td>
<td></td>
</tr>
<tr>
<td>Low-rise apartment</td>
<td>-8.39%</td>
<td>*</td>
<td></td>
</tr>
<tr>
<td>Neighbourhood variable</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>In CTC</td>
<td>7.48%</td>
<td>**</td>
<td></td>
</tr>
<tr>
<td>Behavioural variable</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Renting a room</td>
<td>12.04%</td>
<td>*</td>
<td></td>
</tr>
<tr>
<td>R-squared</td>
<td>0.85</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Planning Implications

“Vibrant urban and rural communities require a range and mix of housing options”

– Region of Waterloo (2010)

- Increase the variety of rental housing options
  – Especially for couples with and without children

- Monitor the development of student rental housing

- Promote social inclusion and integration within renters
Limitations

• **Survey:**
  – Underrepresentation of renters with lower education level
  – Rental housing address collection on Kijiji
  – Answers to ideal questions may not reflect the “true” preferences

• **Model:**
  – Data limitation (e.g. living area and yard size)
    • Use rent per sqft as dependent variable
Thank you!

• Advisor: Dr. Dawn Parker
• Committee: Dr. Xiongbing Jin
• Reader: Dr. Kevin Curtis
• Research Team: Yu Huang and Robert Babin
ION LRT Impacts on Real Estate in the Region of Waterloo

- Realtor Perspectives

SCHOOL OF PLANNING

WATERLOO ENVIRONMENT

environment.uwaterloo.ca

Justin Cook - Master’s Candidate
Dr. Jennifer Dean
Dr. Dawn Parker
Background

Qualitative Approach

- Deeper understanding of why people are buying in the CTC
- Complementing quantitative research to draw stronger conclusions

Why Realtors?

- Key informants with specialized knowledge
- Emotional/cultural interpreters
Engagement Process

Participant Realtors

– Partnership with Kitchener Waterloo Association of Realtors
– 25 Realtors from the Region of Waterloo with 2 to 33 years of experience

Engagement Format

– Focus groups had 3 to 15 Realtors present in each
– Semi-structured format allowed for flexibility
Sample Questions

- Will the LRT will affect the real estate market in the Region?
- How is the LRT considered for its:
  - proximity to potential homes?
  - commuting options (for you/your family)?
  - investment opportunity?
- What is the process that you go through with clients to narrow down and decide on a home?
- Do your clients look for specific a type of home or neighbourhood? What is it that most look for? (driven by demographics?)
Key Discussion Points

Three broad themes emerged from discussions:

1. CTC development and investment
2. Resident perception of attractiveness of CTC
3. CTC creating connections within region and beyond
Findings: 1. CTC Development and Investment

Encouraging Investment in Real Estate

• Understood as stimulating land value uplift

• Investors primarily from within the Region and GTA

• CTC Investment potential more desirable than long term residence
Findings: 1. CTC Development and Investment

“Tech Hub” Development

• Key piece of infrastructure supporting growth

• Connecting residents with emerging employment trends
Findings: 1. CTC Development and Investment

Regional Image

• Signifier of Region’s status as “the Silicon Valley of the north”

• Symbol of the Region being “world class”
  – Allowed for comparison with many other international centers
Findings: 1. CTC Development and Investment

“We're seeing investment, local people that are buying in uptown, or downtown just for investment purposes. I think the families, the 30 plus demographic, that are now looking for more investment opportunities, they realize [the CTC] is something they can grasp and they realize that's an up and coming area.”
Findings: 2. Resident Perceptions

Lifestyle Choice

• More attractive to new residents than long term

• CTC is attractive for relative affordability of services and amenities

• Reflected the services and amenities available in other cities
Findings: 2. Resident Perceptions

Aging Populations

• View the CTC as desirable due to amenities

• Lack of affordable/appropriately sized options preventing downsizing
Findings: 2. Resident Perceptions

Long Term Residents

• Viewed more favourably as construction nears completion

• Few long-term residents show interest in using it

• Compared to Conestoga Parkway as likely to be more appreciated/used over time
Findings: 2. Resident Perceptions

“Even some of the older demographics, I think they are really looking forward to [the LRT]. They are definitely buying to be close to it, not right on it but somewhat close to it, within a block or two. So it will be really good. I think it will impact [the Region] in a positive way.”
Findings: 3. Creating Connections

Connecting the Region

- Bringing Kitchener and Waterloo together as a seamless urban environment
- Extension to Cambridge will bring the Region together as a unified whole
Findings: 3. Creating Connections

Connecting Southern Ontario

• Seen as a localized connection to Toronto and other nearby municipalities

• Increased connectivity with GO/high-speed rail essential next step
“In a real estate perspective, all the condos, the Google building… the Zehr group building; those are only there because of the LRT. They're looking at it as it’s not just a north and south train, it’s connection to Barrie, Hamilton, Niagara. All these places are going to have LRT that lead to these fast trains that all spine into Toronto. That's what [people are] investing on.”
Future Research

Ongoing Interviews with Realtors

• Additional depth

• Financialization of housing

• Decision making processes

After the ION is in operation?
Questions?