



CANADIAN STUDENT HOUSING DATA ANALYTICS

Identifying universities with the greatest need for
purpose-built student housing

Course: CSDA 1050 – Capstone Project

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EXECUTIVE SUMMARY

The Canadian university student population has grown significantly in the last 20 years, and with it, an increasing demand for off-campus student housing. This demand has presented new investment opportunities for companies in the real estate market. However, identifying opportunities that will produce the greatest ROI has proven challenging in this relatively unexplored market. With our help, our client, Domus Inc.¹, sought to identify Canadian universities with the greatest gap between student growth and availability of affordable off-campus housing for students in need of accommodation, thus identifying profitable opportunities for investors.

Our research discovered that while all universities show a significant gap, the universities with the greatest need are clustered in the country's major cities, with the top 5 being University of Toronto, York University, Simon Fraser University, Ryerson University and University of Victoria. It is our recommendation that Domuc Inc. and their investors focus on providing purpose-built housing to universities within major cities before investing in smaller ones. In doing so, a return on investment will be guaranteed at a much faster pace, and competition within the rental market will be reduced.

KEY BUSINESS OBJECTIVES

The following business objectives were explored during the project:

- **Business Objective #1:** Compare the population growth of universities across Canada since the 1990's, separated by Province.
- **Business Objective #2:**
 - a) Determine the on-campus housing capacities of the universities of interest
 - b) Assess the availability of off-campus housing within a 30-minute public transit commute from the universities
 - c) Compare the availability of housing for these universities with the number of enrolled students in need of accommodation to find the gaps
- **Business Objective #3:** Determine the average price per bed for these units
- **Business Objective #4:** Identify the top five universities where the availability does not meet the demand, according to the previous criteria.

¹ Domus Inc. - Real Estate Investment and Management Solutions. <https://www.domushousing.com/>

METHODOLOGY

All data used to produce insights for this project are publicly available on the internet, and are cited in Appendix A. These data were compiled and structured to meet our analytical needs prior to loading the files into our Python workspace, where all analysis was conducted. All raw data files were retained in their original formats, and can be found attached to this document, along with all reformatted data and a PDF of our python code file. Data related to on-campus housing capacities was compiled using a mixture of email correspondence and estimates published on individual university websites. While unused in our final analysis, the data has also been included and can also be found attached.

LIMITATIONS AND ASSUMPTIONS

Business Objective 1 and some of 2 used data obtained from Statistics Canada [1] and Universities Canada [2], while the data used for the other objectives were scraped from RentSeeker.ca [3], RentBoard.ca [4] and Kijiji [5]. While reliable, these data are relatively incomplete for our purposes, and thus have limitations in accuracy. Data related to individual university on-campus housing (such as the number of housing applicants and rejections, and the ratio of international to domestic) is not publicly available, and thus we reached out to all of the universities within the four provinces of interest to get more information. The COVID-19 shutdown hindered our success by limiting communication – most universities did not respond to our requests, and those who did often cited privacy restrictions or only provided estimates. A fraction of universities published their on-campus housing capacities online.

To overcome these challenges our team made the following assumptions:

- The proportion of international students and domestic students for the 2019/2020 school year follow trend of last decade
- Each scraped real estate listing counts as one unit, unless otherwise specified
- All international students require housing

INSIGHTS

THE PROVINCES WITH THE GREATEST STUDENTS GROWTH IN CANADA

Our preliminary research, using historical student enrollment data obtained from Statistics Canada [1], revealed that 4 provinces, Ontario, Quebec, British Columbia and Alberta, have had the greatest amount of growth in both domestic and international student populations in Canada since 1992 (see Figures 1a

and 1b). All other provinces have shown little to no domestic student growth, remaining below 50,000 over 25 years. While all provinces (excepts the Territories) have shown steady and consistent growth in international students since 2008, by 2018 only the Ontario, Quebec, British Columbia and Alberta grew to over 10,000 students. An interesting note is that domestic student growth in these 4 provinces begins to stagnate within the same time frame that international student growth begins to rise steeply.

To supplement the Statistics Canada data, we also used data obtained from Universities Canada [2], which provided individual university enrollment data for the current school year. From this data we were able to show not only that the current year appears to follow the trend of the previous, but also how universities are distributed across the country (see Figures 2a and 2b). Given that approximately 60% of all Canadian universities reside in Ontario, Quebec and British Columbia, it is not surprising to see higher growth in these provinces. Alberta is an exception to this rule, likely owing to other economic factors.

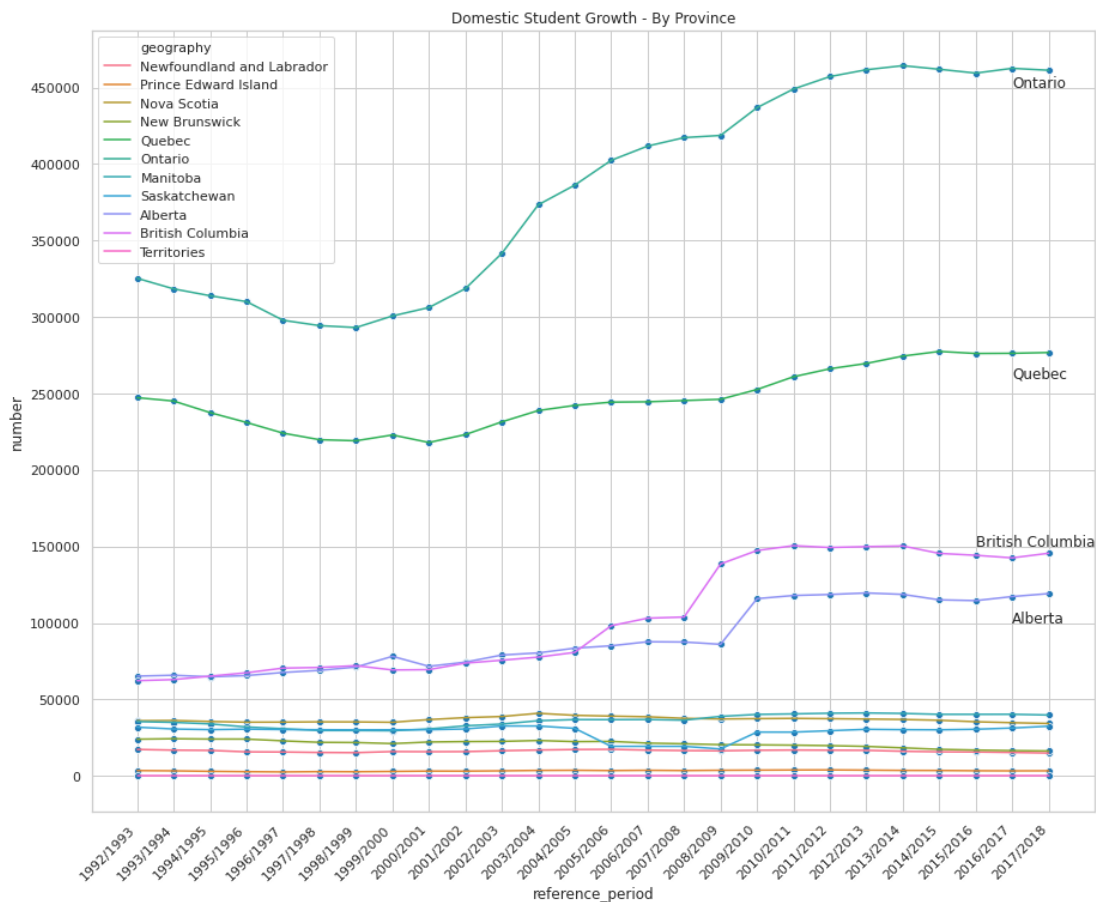


Figure 1a: Domestic Student Growth (1992 to 2018)

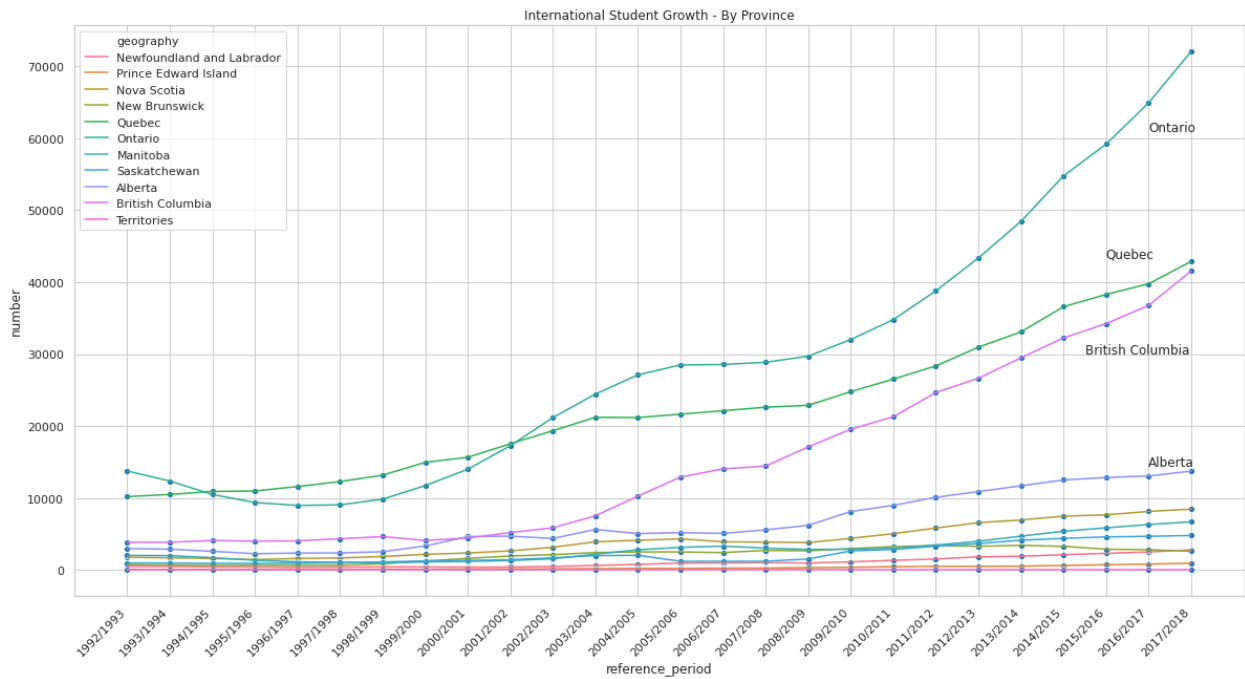


Figure 1b: International Student Growth (1992 to 2018)

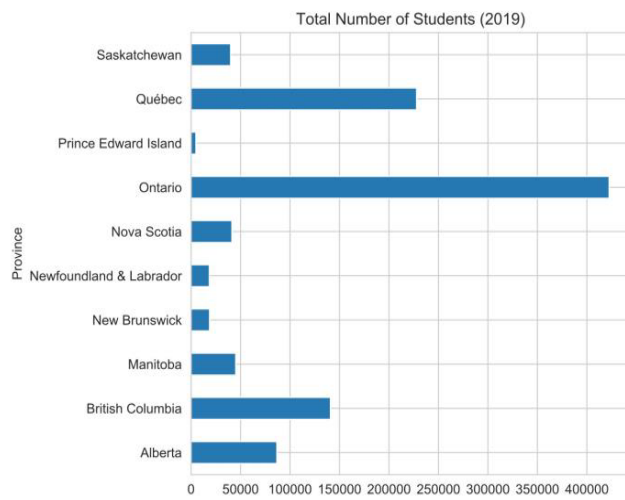


Figure 2a: Number of Students Enrolled in 2019

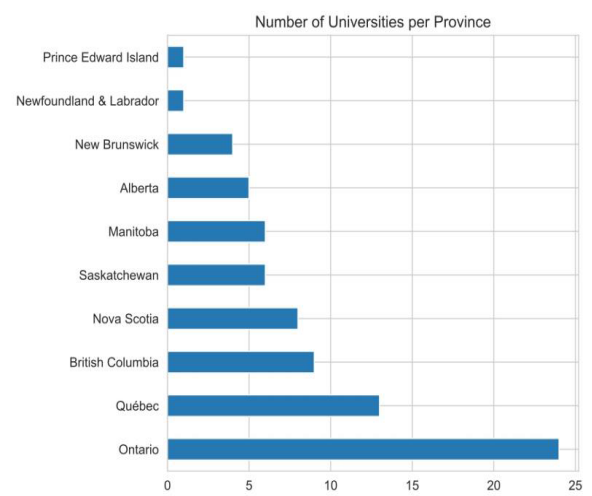


Figure 2b: Distribution of Universities in Canada

THERE IS A HOUSING GAP FOR ALL UNIVERSITIES

Our core goal was to determine which universities have the greatest gaps between the demand and supply of student housing. We hoped to do this by adding the on-campus capacities with the off-campus unit availabilities, then compare that value with the number of students in need of housing (see Business Objective 2). Due to the previously cited limitations, we were unable to collect enough data from individual universities to accomplish this in its entirety, thus using only off-campus availabilities to find the gap. It should be noted that having established that Ontario, Quebec, British Columbia and Alberta have seen the largest growth, from here on our research concentrates on them.

Since the number of on-campus housing applicants could not be obtained, we based our determination of the gap on the assumption that all international students enrolled would require housing. Since the Universities Canada enrollment data for the current school year was not segmented into domestic and international proportions, a linear regression was performed on the Statistics Canada data to predict the proportion of the total number of enrollments that would be international in 2019 (see Appendix B for more details). The predicted 2019 provincial proportions were then multiplied by the total enrollments of universities within the respective provinces to obtain a reasonable estimate of the number of students to compare with off-campus housing availabilities.

The off-campus housing data, scraped from RentSeeker.ca [3], Rentboard.ca [4] and Kijiji [5], was highly unstructured and required a significant amount of cleaning and compiling before it could be used – RentSeeker.ca listed units by university, while the others listed units by city. Each listing was treated as a single unit, and since we wanted to determine availability by university, care was taken to assign listings to specific universities based on proximity. Care was also taken to screen for duplicate listings as the data was compiled. Relevant data extracted included University, City, Address, Number of Beds and Price. It should be noted that major cities are home to multiple universities, which share the same housing market, therefore creating overlap.

Our preliminary analysis, using just data scraped from RentSeeker.ca, revealed a shortage of available units. It is therefore not surprising that a significant gap between supply and demand was revealed for all universities in all 4 provinces once the data was fully compiled and analyzed. In order to properly visualize the extent of the gap, the number of international students and number of beds were plotted on a log-scale, as seen in Figure 3 below.

CANADIAN STUDENT HOUSING DATA ANALYTICS

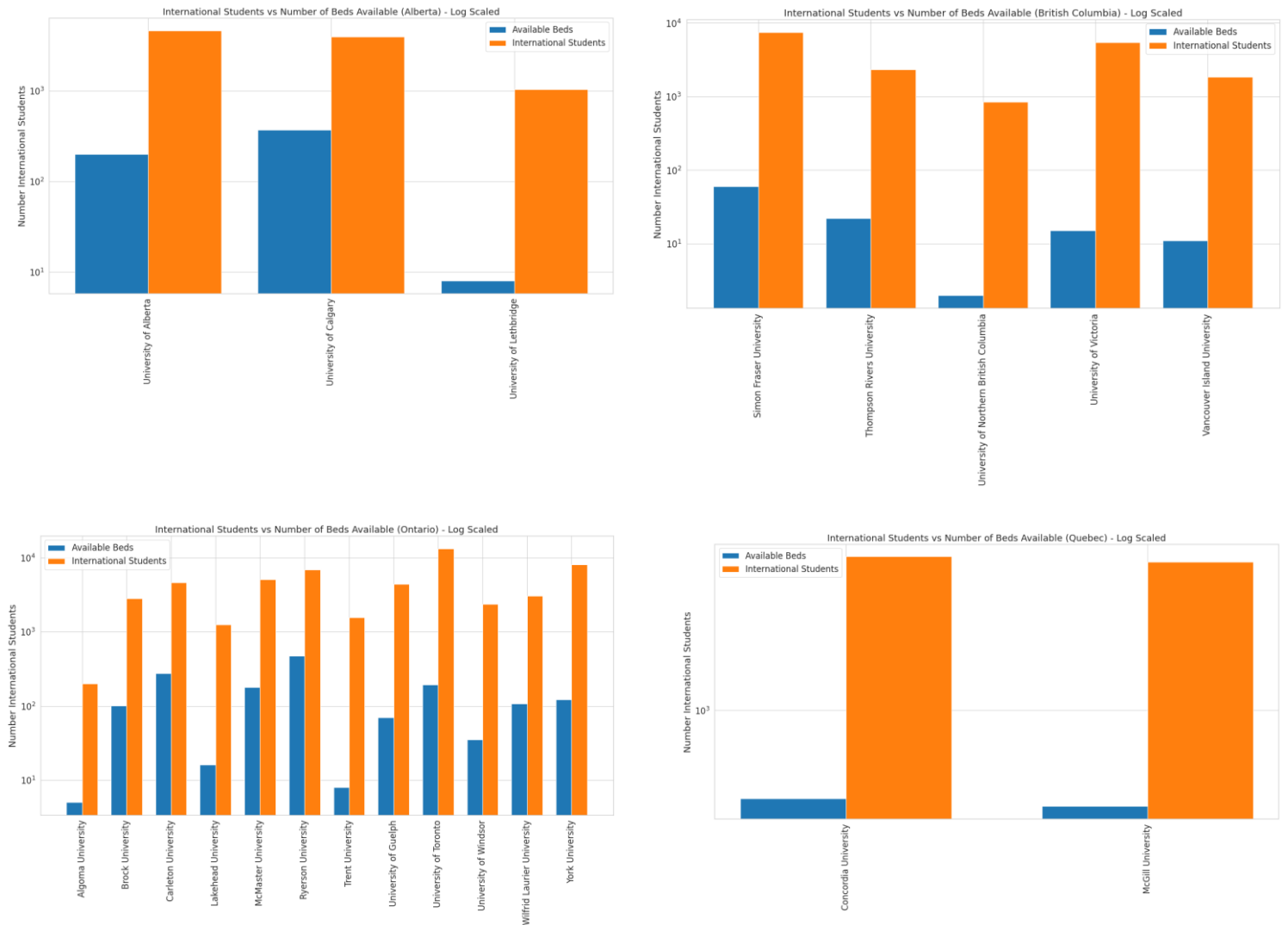


Figure 2: Gap Between Number of Students and Number of Beds (By Province)

AVERAGE/MEDIAN PRICE PER BED

The provincial rental listings data frames created in the previous step were further manipulated to calculate the average prices per bed per university. Upon inspection, it was discovered that the average prices vary by city and region, as well as how densely populated the areas in question are. That is, the more densely populated a city is (and the more universities that reside within them), the higher the prices will be. The table below summarizes these prices based on region or major city – it can be seen that major cities, such as Vancouver, Toronto, Ottawa and Montreal, that are home to several universities average over \$1000.00 per bed, while smaller cities with one or 2 universities or smaller populations average in the \$700 to \$800 range per bed. This is an indication of higher demand and greater competition in major cities.

It should be noted that while the average prices per bed give an overview of the trend, it does not account for price outliers, such as Kwantlen Polytech University, which has substantially lower prices than its counterparts in the Greater Vancouver Area. To obtain a more accurate representation of market prices that will be useful to investors, we calculated the median price per bed, which can be seen to be noticeably higher than the averages. The average and median price breakdown by university was exported from Python into a csv file called Prices.csv and has been included in the attachment.

Province	Region/Major City	University	Average Price per bed	Median Price per bed
British Columbia	Greater Vancouver Area	Capilano University, Simon Fraser University, University of British Columbia, Kwantlen Polytechnic University (outlier)	\$1332.79	\$1775.25
	Vancouver Island	University of Victoria, Vancouver Island University	\$770.20	\$975
	Remote areas: Prince George Kamloop Okanagan	University of Northern British Columbia (Prince George), Thompson Rivers University (Kamloop), UBC – Okanagan (Okanagan)	\$776.67	\$1342
Ontario	Toronto	Ryerson, U of T, and York	\$1409.20	\$1851.50
	Ottawa	Carleton, U of Ottawa, and U of Quebec - Ottawa	\$1139.93	\$1655
	Eastern Ontario	Queens, Trent, Lakehead - Orillia	\$893.83	\$1340
	Western Ontario	McMaster, Western, Brock, Laurier, Windsor, Waterloo, Guelph	\$852.86	1250
	Northern Ontario	Lakehead, Laurentian, Algoma	\$670.09	1002
Alberta	Calgary	University of Calgary, Mount Royal University	\$896.33	\$1187.50
	Edmonton	Grant MacEwan University, University of Alberta	\$746.97	\$1000
	Lethbridge	University of Lethbridge	\$557.42	\$962.50
Québec	Montreal	Concordia, École De Technologie Supérieure, McGill, Université De Québec – Montreal, Université de Montreal	\$1121.95	\$1495
	Quebec City	Université Laval, Université du Québec	\$765.44	\$1025.50
	Gatineau	University of Ottawa, University du Quebec – Ottawa	\$520.37	\$1074

THE TOP FIVE UNIVERSITIES WITH THE GREATEST GAP

As previously determined, all universities across the Ontario, Quebec, British Columbia and Alberta show a substantial gap between demand for housing and the available supply. To determine the universities with the greatest need, the difference between the estimated number of international students and the number of available beds (the gap) was calculated for each university and arranged in descending order. The results were plotted in Figure 4 and can be used by Domus Inc. and their investors to strategically plan where to make investments.

The top 5 universities with the greatest need for housing are:

1. University of Toronto
2. York University
3. Simon Fraser University
4. Ryerson University
5. University of Victoria.

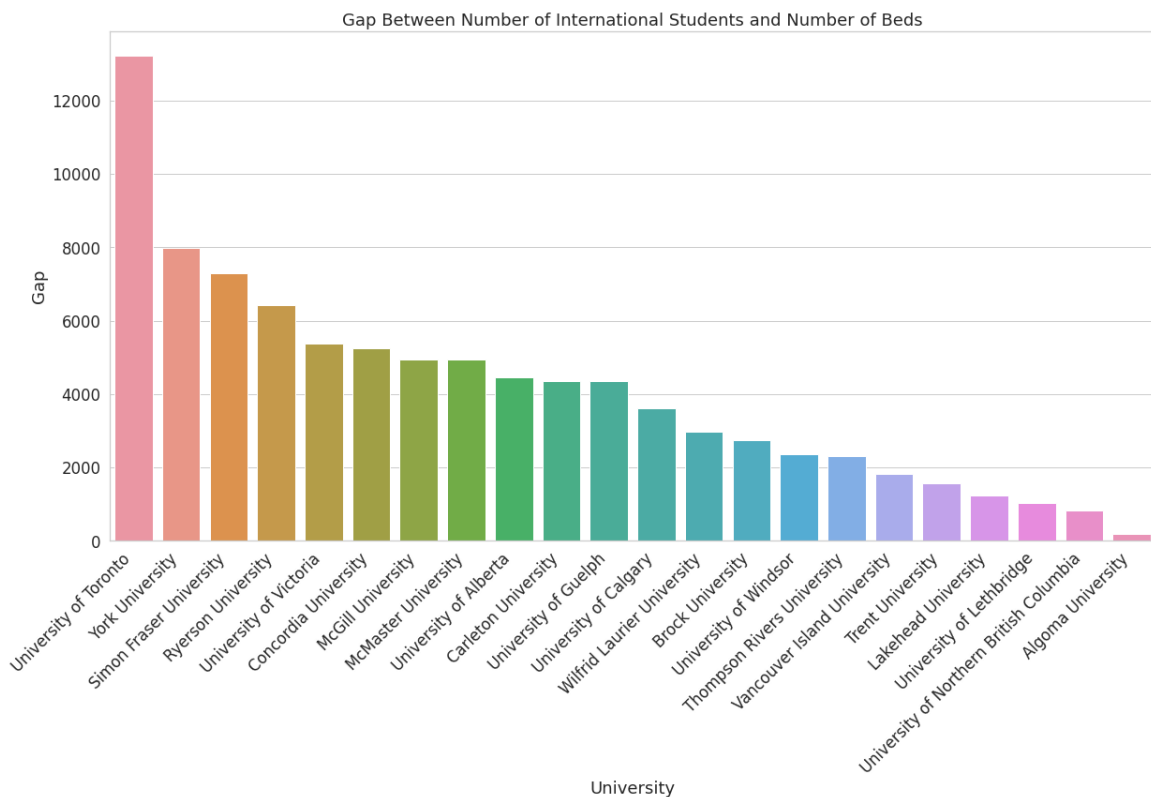


Figure 4: The Gap Between Supply and Demand (by University)

It is most notable that the top 4 all fall within major, densely populated cities (Toronto, and Burnaby). These are followed very closely by Concordia University and McGill in Montreal, which is home to a total of 5 universities, all of which share the same market.

RECOMMENDED ACTION

Based on the developed insights, it is our recommendation that investors focus their efforts on opportunities within major cities before meeting the demand of smaller cities. Due to the growth trends countrywide, it can be reasoned that investment opportunities outside of Ontario, Quebec, British Columbia and Alberta will not provide any significant return on investment.

Major cities are densely populated, not only with students from various universities and colleges, but also with the general population, all competing for housing options within the same market. This competition leads to the inflation of prices, creating a situation where students cannot afford housing. By investing in purpose-built student housing within continually growing major cities first, investors can guarantee that all beds will be occupied, thus guaranteeing a quick return on their investment. This approach will also alleviate the competition within the rental market, making it more affordable for students in the long run. Profits from these investments can be used to provide more student housing for universities in lesser need in the future.

As a real estate sector in its infancy, it is recommended that more focused research be conducted to ensure that the market remains up to date on growth trends and housing needs. Establishing a working relationship with universities can be mutually beneficial in creating better housing options for students – universities can focus their funds elsewhere, rather than on the expansion of their on-campus housing options, thus creating more opportunities for investors to fulfill that need.

APPENDIX A – DATA SOURCES

1. Statistics Canada Table 37-10-0018-01 Postsecondary enrolments, by registration status, institution type, status of student in Canada and gender
DOI: <https://doi.org/10.25318/3710001801-eng>
2. Universities Canada, Enrolment by University, 2019 full-time and part-time fall enrolment at Canadian universities
<https://www.univcan.ca/universities/facts-and-stats/enrolment-by-university/>
3. Rent Seeker, 2020, www.rentseeker.ca
4. Rent Board, 2020, www.rentboard.ca
5. Kijiji, 2020, www.kijiji.ca
6. Canadian Universities websites and email correspondence

APPENDIX B – LINEAR REGRESSION

From the data obtained from Statistics Canada, a subset covering the period of 2008 to 2018 was selected to create a new data frame. The period selected reflects the noted uptick in international student growth and stagnation of domestic growth nationwide (see Figures 1a and 1b). This new table was transformed to calculate the proportion of the whole that made up international students for each year. A linear regression was applied to the data, producing the plot below. They were separated by province as each have experienced a different growth rate in international students (British Columbia having the steepest in the last decade). The equations of the regression lines, along with their slope and intercept, were extracted and used to estimate the international proportion (as a percentage of the whole) for the 2018 and 2019 school years (see the table below). The 2019 provincial percentages were then multiplied by the total number of enrolled students in universities in their respective provinces to obtain a reasonable estimate of the number of international students in each university.

