



NORTHERN
POLICY INSTITUTE

INSTITUT DES POLITIQUES
DU NORD

Commentary No. 21 | January 2018

Taking Off: Factors Impacting Thunder Bay's Air Traffic

Who We Are

Some of the key players in this model, and their roles, are as follows:

Board: The Board of Directors sets strategic direction for Northern Policy Institute. Directors serve on operational committees dealing with finance, fundraising and governance, and collectively the Board holds the CEO accountable for achieving our Strategic Plan goals. The Board's principal responsibility is to protect and promote the interests, reputation, and stature of Northern Policy Institute.

President & CEO: Recommends strategic direction, develops plans and processes, and secures and allocates resources to achieve it.

Advisory Council: A group of committed individuals interested in supporting, but not directing, the work of Northern Policy Institute. Leaders in their fields, they provide advice on potential researchers or points of contact in the wider community.

Research Advisory Board: A group of academic researchers who provide guidance and input on potential research directions, potential authors, and draft studies and commentaries. They are Northern Policy Institute's formal link to the academic community.

Peer Reviewers: Ensure specific papers are factual, relevant and publishable.

Authors and Research Fellows: Provide independent expertise on specific policy areas as and when needed.

Standing engagement tools (general public, government stakeholders, community stakeholders): Ensure Northern Policy Institute remains responsive to the community and reflects THEIR priorities and concerns in project selection.

President & CEO

Charles Cirtwill

Board of Directors

John Beaucage	Dr. George C. Macey (Vice-Chair)
Pierre Bélanger	Dawn Madahbee Leach
Thérèse Bergeron-Hopson (Chair)	Hal J. McGonigal
Terry Bursey	Gerry Munt
Dr. Harley d'Entremont (Vice-Chair)	Emilio Rigato
Alex Freedman	Dr. Brian Tucker (Secretary)

Advisory Council

Kim Jo Bliss	Seppo Paivalainen
Don Drummond	Allyson Pele
John Fior	Ogimaa Duke Peltier
Ronald Garbutt	Peter Politis
Jean Paul Gladu	Tina Sartoretto
Audrey Gilbeau	Bill Spinney
Peter Goring	David Thompson
Frank Kallonen	

Research Advisory Board

Dr. John Allison	Dr. Livio Di Matteo
Dr. Hugo Asselin	Dr. Morley Gunderson
Dr. Randy Battocchio (Chair)	Dr. Anne-Marie Mawhiney
Dr. Gayle Broad	Leata Ann Rigg
George Burton	S. Brenda Small
Dr. Robert Campbell	J.D. Snyder
Dr. Iain Davidson-Hunt	Dr. Lindsay Tedds

This report was made possible through the support of our partners Lakehead University, Laurentian University and Northern Ontario Heritage Fund Corporation. Northern Policy Institute expresses great appreciation for their generous support but emphasizes the following: The views expressed in this commentary are those of the author and do not necessarily reflect the opinions of the Institute, its Board of Directors or its supporters. Quotation with appropriate credit is permissible.

Author's calculations are based on data available at the time of publication and are therefore subject to change.

Edited by Mark Campbell.

© 2018 Northern Policy Institute
Published by Northern Policy Institute
874 Tungsten St.
Thunder Bay, Ontario P7B 6T6

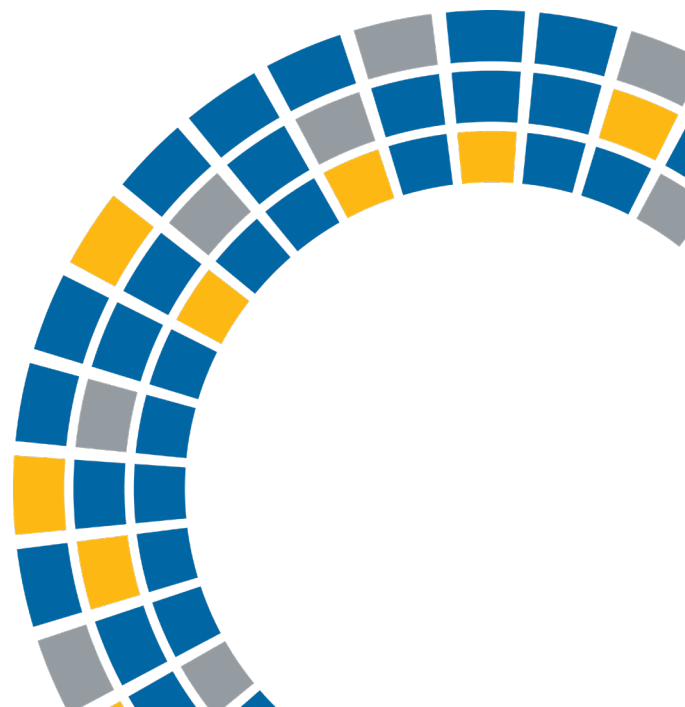
ISBN: 978-1-988472-78-2

About the Author

Curtis McKnight



Curtis was born and raised in Sherwood Park, Alberta. He has recently graduated from Queen's University with a BAH, majoring in applied economics and minoring in political studies. During his time at NPI as a Research Analyst, Curtis was able to apply qualitative and quantitative techniques of analysis to make a positive impact on the unique policy environment of Northern Ontario. Some research interests of his include policy implications of business cycle dynamics, and the importance of natural resource development as it relates to economic growth. Currently, Curtis works as a financial advisor with Scotiabank.



Contents

5	Summary
6	Introduction Definitions
7	Analysis
8	Regression Analysis
9	Gold Industry
11	Population Demographics and Air Travel
15	Post-secondary Enrolment
18	Conclusions
19	Key Results
20	References
22	Related Research

Summary

As communities in Northern Ontario experience various economic, social and demographic shifts, busy airports like the Thunder Bay International Airport (TBIA) must also experience shifts in air traffic patterns. Or do they? To answer this question, this study examines three factors that are thought to have had an impact on air travel in and out of the TBIA over the past two decades: gold prices, population demographics and post-secondary enrolment.

Taking a quantitative approach, this commentary identifies a number of key findings that reveal notable relationships between these three indicators and total Thunder Bay air traffic.

Gold Prices

High international gold prices and a growing Northern Ontario gold mining sector tend to increase total Thunder Bay air traffic. The results indicate that total Thunder Bay air traffic has a significant correlation with gold prices and employment in the Northern Ontario mining sector, and a less significant but still positive correlation with mining activity.

Demographics

While Thunder Bay's demographic shift to larger middle age and old age populations has resulted in an increase in total air traffic, the share of the population ages 20 to 29 does not correlate with the total number of passengers flying in and out of Thunder Bay's airport. People in the age 40-69 demographic have generally developed careers, therefore increased work travel opportunities and more disposable income are a few reasons why people in this age range would be positively correlated with air traffic.

Post-Secondary Enrolment

Students enrolled at Lakehead University who come from other parts of Ontario tend to positively relate with Thunder Bay's total air traffic. One possible explanation is that students who are not from Thunder Bay often fly in and out of the community more frequently to visit family. There does not seem to be any relationship between Confederation College students and air traffic.

Introduction and Definitions

The purpose of this commentary is to study indicators which have been thought to have some degree of influence on Thunder Bay air traffic. In this paper, air traffic is defined as the total arriving and departing passengers at the Thunder Bay International Airport (TBIA). The majority of this commentary will be an analysis of three variables and their relationships with air traffic: international gold prices, Thunder Bay population and age demographic, and Thunder Bay postsecondary enrolment. The analysis will take a quantitative approach to reveal some of the important statistical relationships between these three variables and total Thunder Bay air traffic. This commentary will then summarize the findings of the analysis and present four key results.

Before beginning the analysis, it is important to define two key terms:

1. Natural Logarithm: The natural logarithm of value x , $\ln(x)$, is the logarithm having base “ e ”, where,

$$e=2.718281828\dots$$

$$\text{Example: } \ln(500) = 6.21 \text{ and } e^{6.21} = 500$$

For this commentary, the author converted natural numbers to natural log values because coefficients on the natural log scale are directly interpretable as approximate proportional differences. Using natural log values scales down very large numbers and makes the visual relationships between variables clearer when graphed.

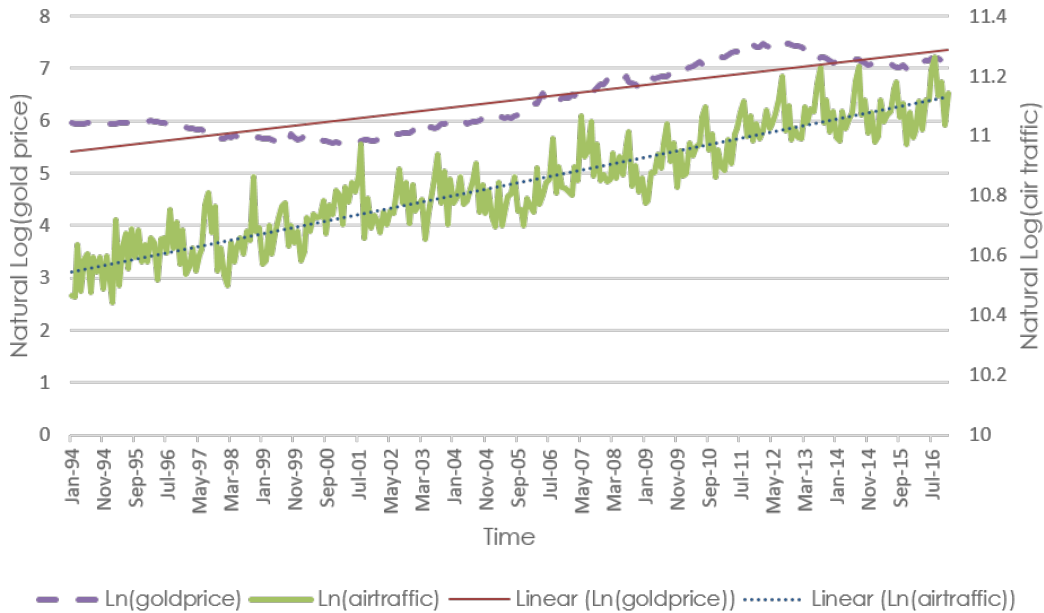
2. Elasticity of Demand: Refers to how changes in a range of variables, such as prices and consumer income, impact the demand for a particular commodity.



Analysis

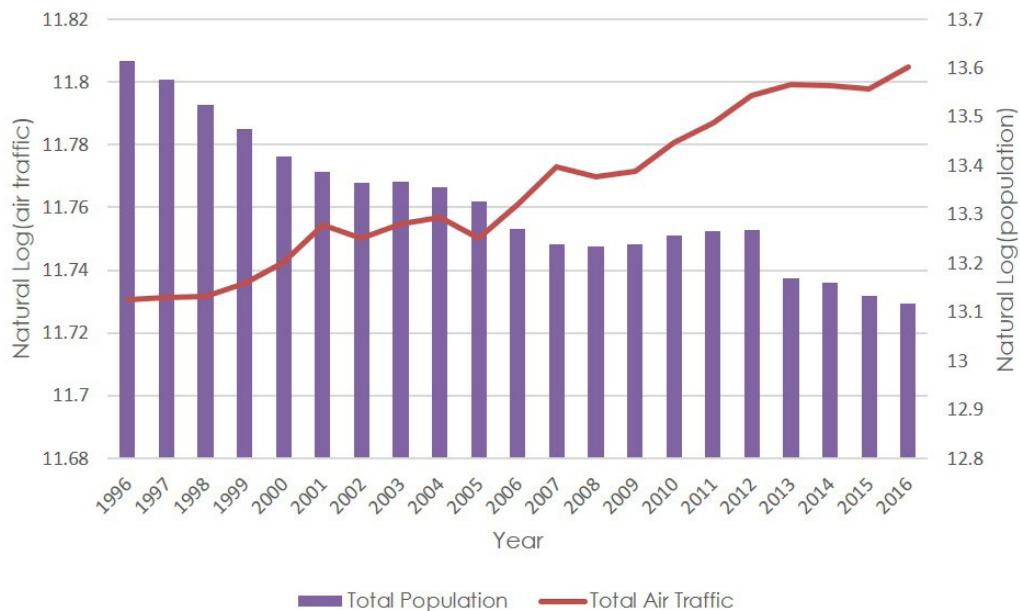
According to historical data from 1994 to 2016, the movements in Thunder Bay air traffic and in the international price of gold are notably similar. This indicates that there may be some degree of correlation¹ between gold prices and air traffic. As well, air traffic appears to be growing at a faster rate than gold prices. Finally, it appears that there is a negative correlation between annual trends in the Thunder Bay population and in total air traffic. This could be the result of more people deciding to migrate away from the Thunder Bay metropolitan area.

FIGURE 1: INTERNATIONAL GOLD PRICES VERSUS AIR TRAFFIC



Sources: Thunder Bay International Airports Authority Inc., Passenger History 1994 to 2016; ICE Benchmark Administration Limited (IBA), Gold Fixing Price 10:30 A.M. (London time) in London Bullion Market, based in U.S. Dollars [GOLDAMGBD228NLBM]

FIGURE 2: TOTAL THUNDER BAY POPULATION VERSUS AIR TRAFFIC



Sources: Thunder Bay International Airports Authority Inc.; Statistics Canada, Table 051-0046 and Table 051-0056

¹ Correlation refers to the relationship between two sets of variables used to describe or predict information. Causation, on the other hand, is when an observed event or action causes a second event or action.



Regression Analysis

The relationships between gold prices and air traffic and between total population and air traffic were the starting points for the regression analysis. The linear regression model accounts for international gold prices, total Thunder Bay population, and total air traffic. Additionally, control variables are included for Canadian inflation and GDP growth. Regression~1 describes the outcome of the linear regression model.

TABLE 1: LINEAR REGRESSION MODEL OLS² (ORDINARY LEAST SQUARES) ESTIMATED COEFFICIENTS

	Regression~1 b/se
total_pop	-4.361*** (0.97)
gold_price	0.114*** (0.03)
inflation	-0.298 (1.63)
gdp	0.708 (0.74)
constant	63.892*** (11.52)
R-sqr	0.944
dfres	15
BIC	-61.7

* p<0.05, ** p<0.01, *** p<0.001

Sources: The author's calculations are based on data from Statistics Canada; Thunder Bay International Airports Authority Inc.; ICE Benchmark Administration Limited (IBA); the Organization for Economic Co-operation and Development; and the World Bank

Both gold prices and population variables are highly significant at the 0.1 per cent level³, and the overall fit of the model is quite good at 94 per cent. What is interesting is the fact that, as the Thunder Bay area population increases, the overall air traffic at the TBIA decreases. The regression coefficients can be understood as individual elasticities. For example, this model suggests that a 1 per cent change in total population will lead to a negative 4.361 per cent change in air traffic. Similarly, a 1 per cent change in gold prices will lead to a positive 0.114 per cent change in air traffic. Therefore, international gold prices do have some explanatory power for the movements in air traffic. This relationship could be partially due to the fact that as international gold prices rise, activity in the Northern Ontario gold industry increases and generates more employment opportunities.

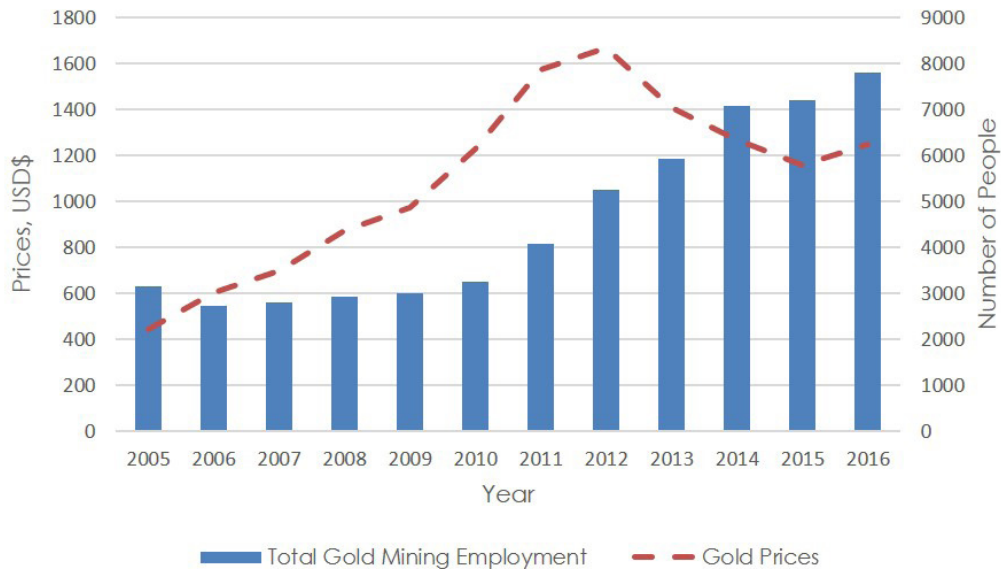
²Ordinary Least Squares (OLS) is a statistical method used to estimate the unknown parameters in a linear regression model.

³Statistical significance at the 1 per cent level means that there is a 1 per cent probability of rejecting the null hypothesis when it is true. The null hypothesis is that the OLS estimated coefficient is equal to zero.

Gold Industry

A common narrative is that as gold prices increase, mining activity tends to increase and therefore gold firms will hire new employees to expand their operations.

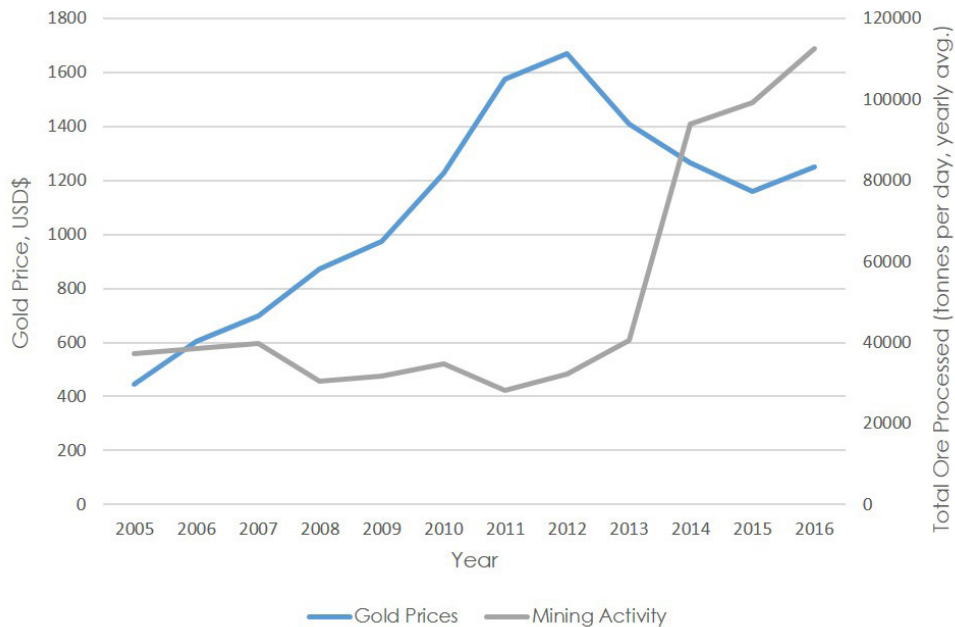
FIGURE 3: GOLD MINING EMPLOYMENT VERSUS GOLD PRICES



Sources: Ontario Prospectors Association, Ontario Mining & Exploration Directory; ICE Benchmark Administration Limited (IBA)

Although there does appear to be a positive relationship between international gold prices and total gold mining employment in Northern Ontario since 2005, this does not mean that there is a positive relationship between gold prices and mining activity (Figure 4). In fact, there does not appear to be any clear relationship between the two from 2005 to 2016. A simple correlation analysis between mining activity and international gold prices produced a statistically insignificant correlation coefficient of 0.1491.

FIGURE 4: INTERNATIONAL GOLD PRICES VERSUS GOLD MINE ACTIVITY



Sources: Author's calculations based on Ontario Prospectors Association data and ICE Benchmark Administration Limited (IBA) data

As demonstrated by figure 4, as gold prices tend to increase for the period of 2005 to 2012, gold mining activity remains relatively stable. However, from 2012 to 2016, as gold prices drop, we see a significant increase in mining activity, indicating that the two variables are negatively correlated (2012 to 2016).

Since 2005, however, this tends not to be the case. On the contrary, as gold prices tend to increase, gold mining activity remains relatively stable (2005 to 2012). As gold prices drop, we see a significant increase in mining activity (2012 to 2016). This is important in the context of Thunder Bay air traffic because it suggests that gold prices are an overall better predictor of air traffic than Northern Ontario mining activity. Table 2 tests for correlations between air traffic, gold prices, employment in the gold mining industry, and mining activity. Mining activity is measured as the yearly total amount of gold ore processed daily at 24 gold mines in Northern Ontario since 2005. The results indicate that total Thunder Bay air traffic has a significant correlation with gold prices and employment in the Northern Ontario mining sector, and a less significant but still positive correlation with mining activity. Additionally, there is a significant and positive correlation between gold mining employment and gold mining activity.⁴ It is not unreasonable to believe that the mines will hire additional employees if they seek to expand on their mining operations. However, for future studies, these relationships ought to be further explored as they relate to Thunder Bay air traffic.

TABLE 2: PAIRWISE CORRELATION MATRIX, TOTAL AIR TRAFFIC AND GOLD VARIABLES

	airtra~c	goldpr~e	employ~t	activity
airtraffic	1.0000			
goldprice	0.8701*	1.0000		
employment	0.8908*	0.6336	1.0000	
activity	0.5840		0.7847*	1.0000

Sources: Author's calculations based on Thunder Bay International Airports Authority Inc. data; ICE Benchmark Administration Limited gold price data; and the Ontario Prospectors Association's Ontario Mining & Exploration Directory data

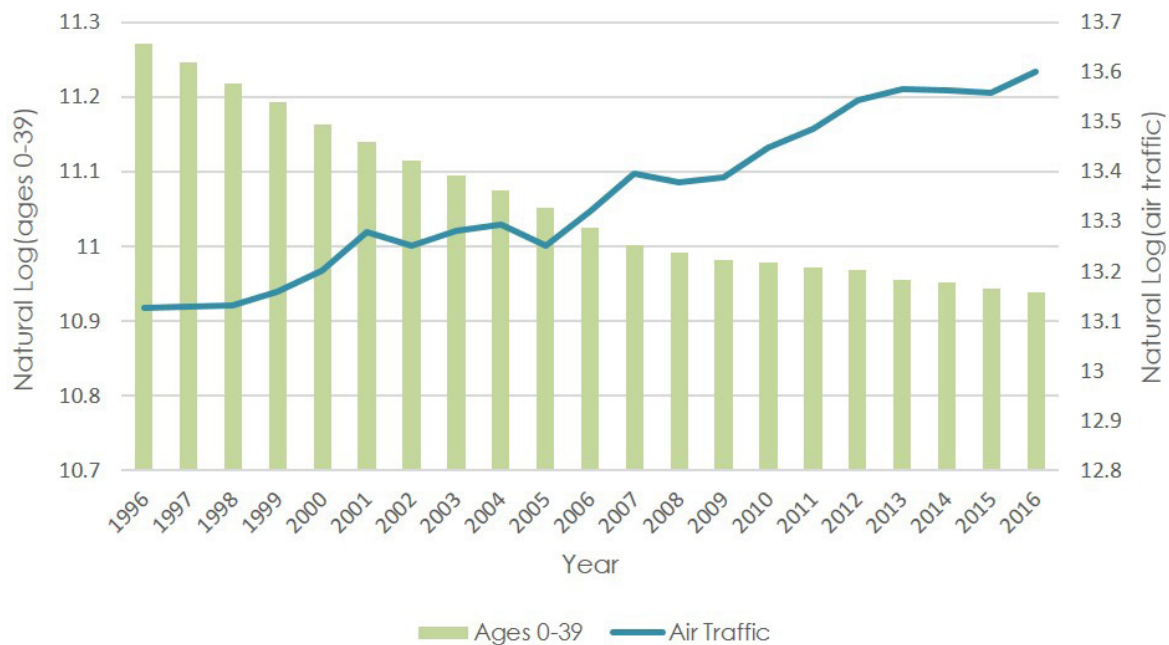


⁴ Starred correlation coefficients indicate a significance level of 1 per cent. Correlation coefficients which are reported, but not starred, are significant at the 5 per cent level.

Population Demographics and Air Travel

As shown in the analysis of the regression model, total population tends to be negatively correlated with air traffic in Thunder Bay. However, it has been suggested that there is a strong correlation between Thunder Bay's aging population and total air traffic. Therefore, the following analysis decomposes the total population of Thunder Bay into three demographic groups: young age, middle age, and old age. The young age category consists of ages 0 to 39, the middle age category consists of ages 40 to 69, and the old age category consists of ages 70 and older. It is important to note that due to high levels of multicollinearity⁵ between age subgroup variables and small sample sizes, conducting a second regression analysis that includes the age subgroups as independent variables would not be appropriate.⁶

FIGURE 5: TOTAL YOUNG AGE POPULATION VERSUS AIR TRAFFIC, THUNDER BAY



Sources: Thunder Bay International Airports Authority Inc.; Statistics Canada

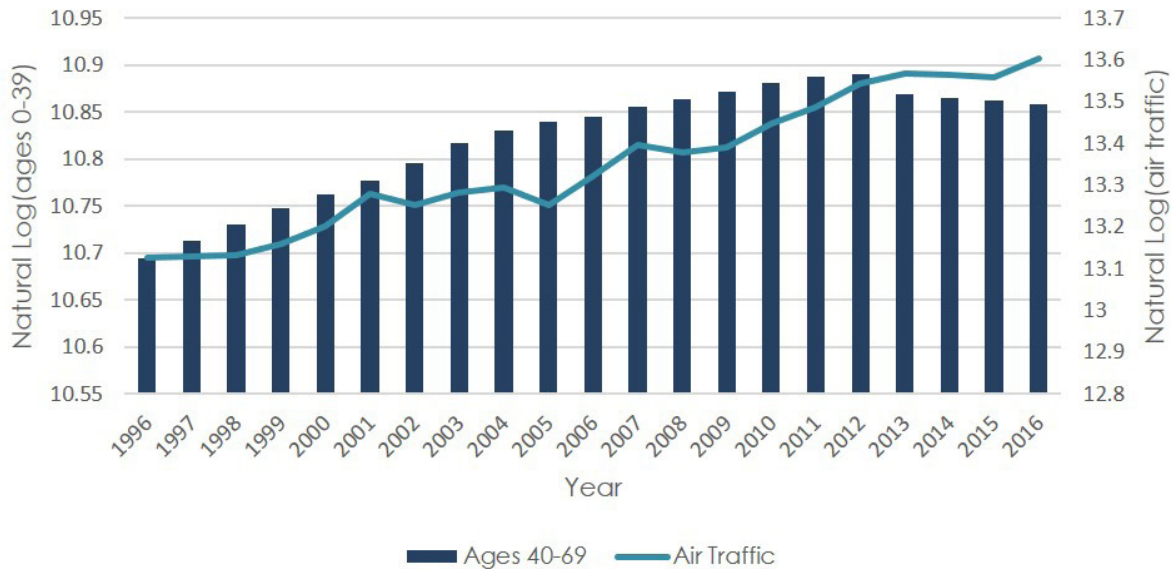
Based on the figure above, there is a strong negative correlation between the total Thunder Bay population ages 0 to 39 and total Thunder Bay air traffic. A simple regression analysis between these two variables reveals an air traffic demand elasticity of -1.39, indicating that for every 1 per cent increase in the ages 0 to 39 population, there is a corresponding decrease in Thunder Bay air traffic by 1.39 per cent. Additionally, a simple correlation test between the two variables revealed a statistically significant correlation coefficient of -0.9378 at the 1 per cent level. There may be intuitive explanations for this result. For example, people in this demographic may be starting families or careers and therefore do not have the necessary disposable income for flights. This demographic also includes very young children and youth (ages 0 to 18) who usually do not, or cannot, fly by themselves.

“...it appears that there is a negative correlation between the Thunder Bay population and total air traffic for each year. This could be due to the fact that more people are deciding to migrate away from the Thunder Bay metropolitan area.”

⁵ Multicollinearity is the phenomenon in which one independent variable in a multiple regression model can be linearly predicted from the other independent variables with a substantial degree of accuracy.

⁶ A pairwise correlation matrix testing at the 1 per cent level was used to test for multicollinearity between the young, middle, and old age variables. The matrix returned highly significant correlations between all three variables.

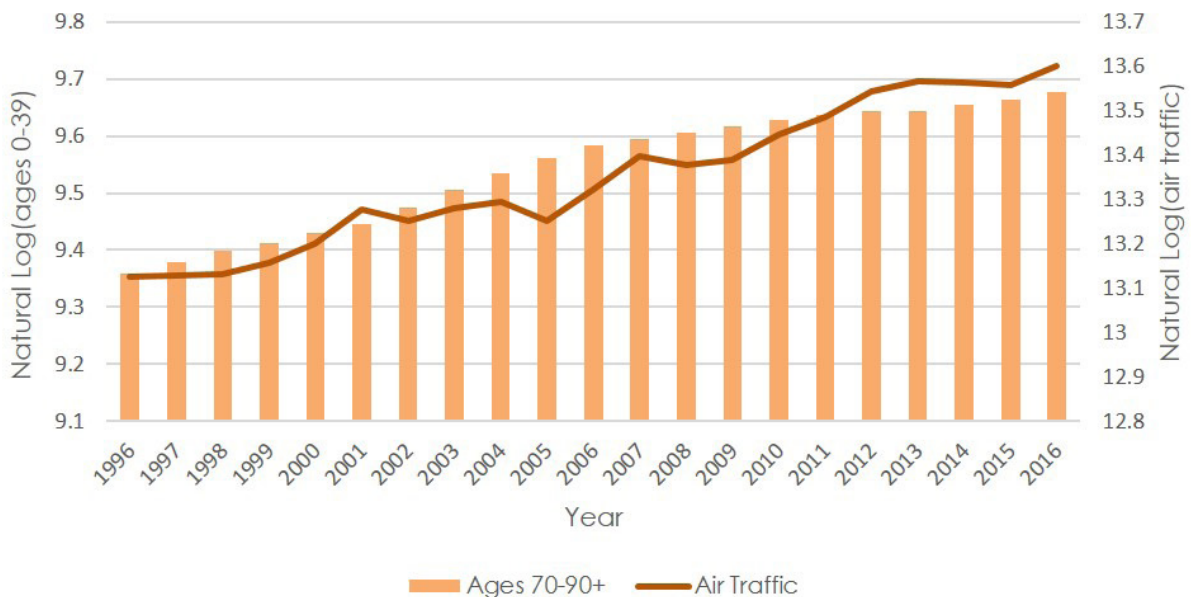
FIGURE 6: TOTAL MIDDLE AGE POPULATION VERSUS AIR TRAFFIC, THUNDER BAY



Sources: Thunder Bay International Airports Authority Inc.; Statistics Canada

For the Thunder Bay population ages 40 to 69, there appears to be a positive relationship with total Thunder Bay air traffic since 1996. Specifically, a simple regression analysis between the total population ages 40 to 69 and total air traffic produces an air traffic demand elasticity of 2.27. This indicates that for every 1 per cent increase in the ages 40 to 69 population, there is a corresponding increase in total air traffic by 2.27 per cent. Additionally, a simple correlation test between the two variables revealed a statistically significant correlation coefficient of 0.8687 at the 1 per cent level. People in this demographic have generally developed careers. Therefore, increased work travel opportunities and more disposable income are a few reasons why people in this age range would be positively correlated with air traffic.

FIGURE 7: TOTAL OLD AGE POPULATION VERSUS AIR TRAFFIC, THUNDER BAY



Sources: Thunder Bay International Airports Authority Inc.; Statistics Canada

Finally, for Thunder Bay's total old age population, there tends to be a positive correlation with Thunder Bay air traffic. Testing a simple linear regression analysis between the ages 70 and older demographic and the total air traffic yields an air traffic demand elasticity of 1.43. This suggests that a 1 per cent increase in the ages 70 and older demographic results in an increase in total Thunder Bay air traffic by 1.43 percent. Additionally, a simple correlation test between the two variables revealed a statistically significant correlation coefficient of 0.9430 at the 1 per cent level. One possible explanation as to why this demographic is strongly correlated with air traffic is that grandparents may attract family visits from those who live outside of Thunder Bay. Alternately, this demographic may have high levels of disposable income to travel and see family, or to go on vacation.

In addition to the above analysis, the next step was to decompose the young, middle, and old age categories into 10 age subcategories. For example, the first category, "age_1" includes the total Thunder Bay population ages 0 to 9, while the tenth category, "age_10" includes the total Thunder Bay population ages 90 and older.

TABLE 3: THUNDER BAY AGE SUBGROUPS AND AIR TRAFFIC REGRESSION ESTIMATES

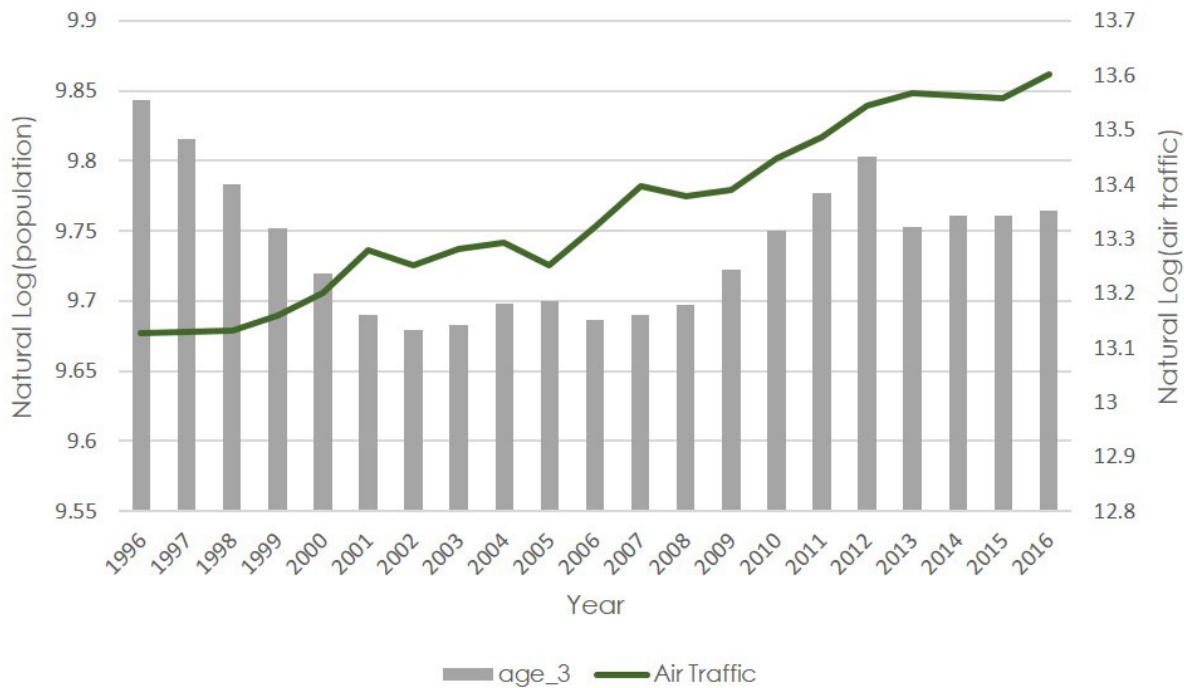
Age Group	OLS Estimated Coefficient	R-Squared
0 to 9	-0.9357495	0.8405
10 to 19	-1.216682	0.9283
20 to 29	0.1025693	0.001
30 to 39	-0.868882	0.8315
40 to 49	-1.18399	0.7333
50 to 59	0.9429955	0.808
60 to 69	0.8676346	0.9038
70 to 79	4.133848	0.7247
80 to 89	0.6493861	0.7715
90 and above	0.3920304	0.9395

Sources: Author's calculations based on Thunder Bay International Airports Authority Inc. data and Statistics Canada data

Table 3 presents individual OLS coefficients for the individual regressions of total Thunder Bay air traffic on age subgroups. For the most part, the ages 0 to 49 demographic negatively correlates with total air traffic. Meanwhile, the ages 50 and older demographic positively correlates with air traffic. There is one outlier, however, which is age subcategory three: the ages 20 to 29 population, or "age_3." Specifically, the OLS estimated coefficient is positive while the R-squared value is essentially zero. The small but positive OLS estimated coefficient means that the ages 20 to 29 population has a positive, but very small, effect on air traffic. Furthermore, the small R-squared value suggests that the estimated model, which includes the ages 20 to 29 population, accounts for nearly 0 per cent of the variance in the observed air traffic data. A pairwise correlation matrix was used to test for multicollinearity between all 10 subcategories; "age_3" was the only variable which did not correlate with other age subcategories. A simple correlation analysis was also conducted on each age subgroup and air traffic, and revealed highly significant correlation coefficients except for age group three.⁷ The sign of each correlation coefficient followed the sign of each regression coefficient.

⁷ Correlation coefficients ranged from 0.8513 to 0.9693 (absolute values).

FIGURE 8: POPULATION AGES 20 TO 29 VERSUS AIR TRAFFIC, THUNDER BAY



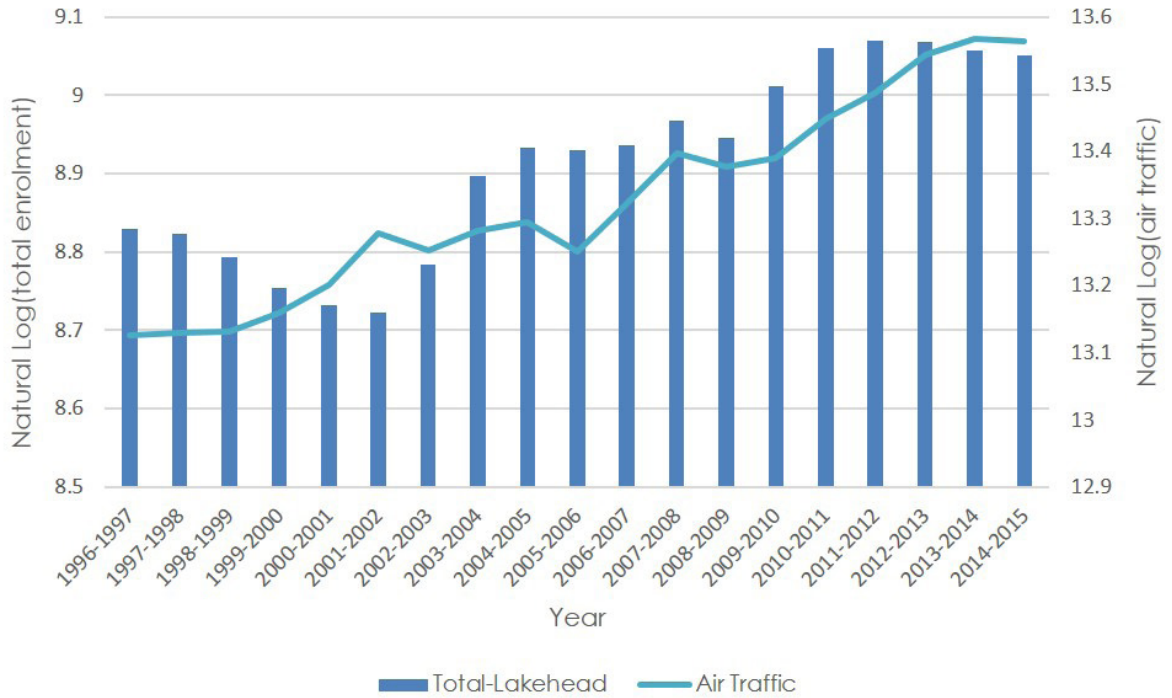
Sources: Thunder Bay International Airports Authority Inc. and Statistics Canada.

The graph indicates that from 1996 to 2002, Thunder Bay's ages 20 to 29 population decreased steadily, followed by a steady increase from 2008 to 2012. The population then declined in 2013 before stabilizing in subsequent years. This pattern is quite different from the other age subcategories in Thunder Bay. During the same period, each subcategory below the age of 50 experienced a consistent trend downward. Meanwhile, the age 50 and older subcategories experienced a consistent trend upward. One possible explanation for this discrepancy is that the subcategories have some correlation with college or university enrolment rates. For example, students in the 20 to 29 subcategory may fly back and forth from their respective postsecondary institutions if they live outside of Thunder Bay.



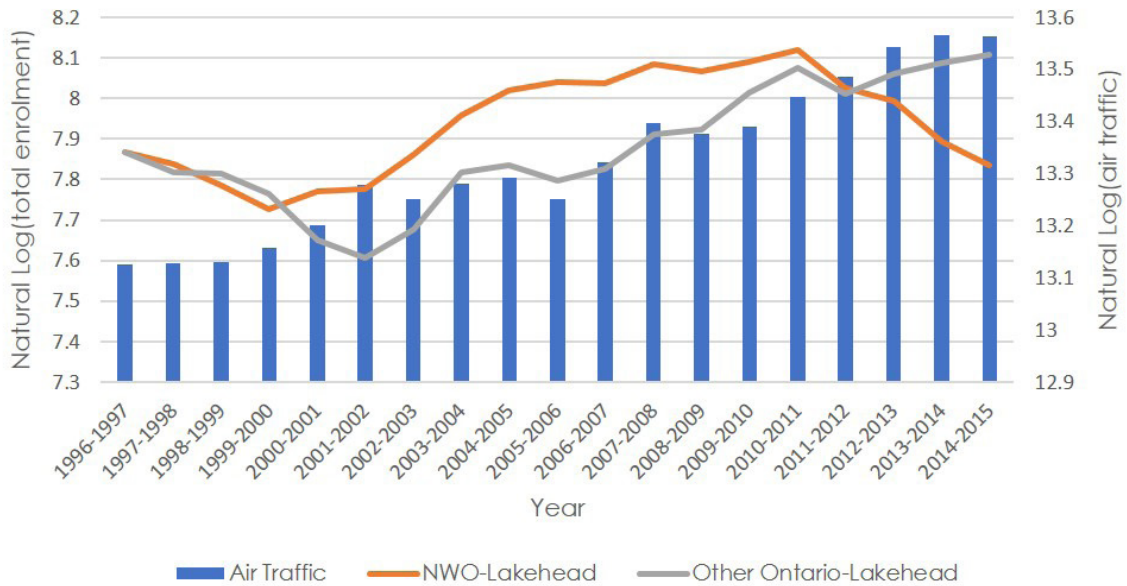
Postsecondary Enrolment

FIGURE 9: TOTAL ENROLMENT AT LAKEHEAD UNIVERSITY VERSUS AIR TRAFFIC



Source: Thunder Bay International Airports Authority Inc.; Lakehead University, Institutional Statistics Book 2005/2006 and Lakehead University, Institutional Statistics Book 2014/2015

FIGURE 10: ONTARIO ENROLMENT AT LAKEHEAD UNIVERSITY VERSUS AIR TRAFFIC⁸



Sources: Thunder Bay International Airports Authority Inc.; Lakehead University

⁸Geographic breakdown of enrolment for Lakehead only takes full-time students into account

FIGURE 11: OUTSIDE OF ONTARIO ENROLMENT AT LAKEHEAD UNIVERSITY VERSUS AIR TRAFFIC



Sources: Thunder Bay International Airports Authority Inc.; Lakehead University

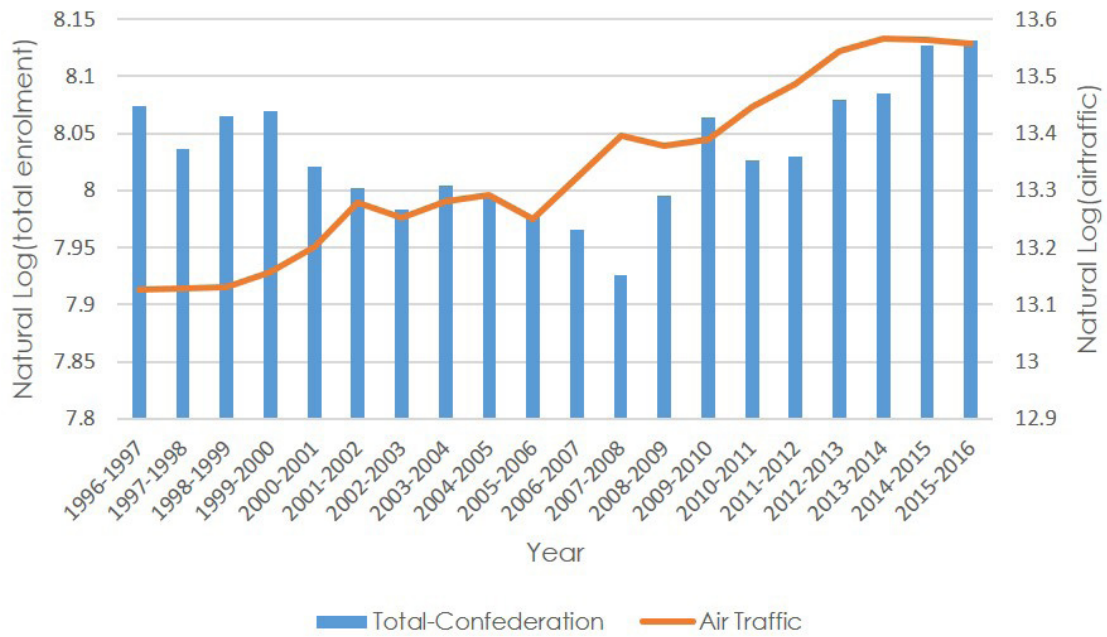
The number of students from Northwestern Ontario enrolled at Lakehead University surpassed the number of students enrolled from other parts of Ontario between 1999 and 2011. Since 2012, however, the number of students from Northwestern Ontario has dropped while the number of students from other parts of the province has grown with total air traffic. These trends could be important in two ways. First, it is not unreasonable to believe that students from other parts of Ontario fly in to Thunder Bay to attend Lakehead University and then occasionally fly home. Second, it may be that students from Northwestern Ontario are deciding to fly away to attend other universities. Also, it is important to note that there was no significant correlation between Thunder Bay air traffic and the share of student enrolment at Lakehead University from outside of Ontario. One possible explanation is that students from outside of Ontario will choose to live in Thunder Bay while attending university there. As a result, these students would choose not to fly home as frequently as students who live in other parts of Ontario.

TABLE 4: PAIRWISE CORRELATION MATRIX, TOTAL AIR TRAFFIC AND LAKEHEAD UNIVERSITY ENROLMENT

	NWO	Other_~t	Outsid~t	airtra~c
NWO	1.0000			
Other_Ont	0.5122	1.0000		
Outside_Ont	0.5207		1.0000	
airtraffic	0.4824	0.7893*		1.0000

Sources: Author's calculations based on Thunder Bay International Airports Authority Inc. data and Lakehead University's Institutional Statistics Books data

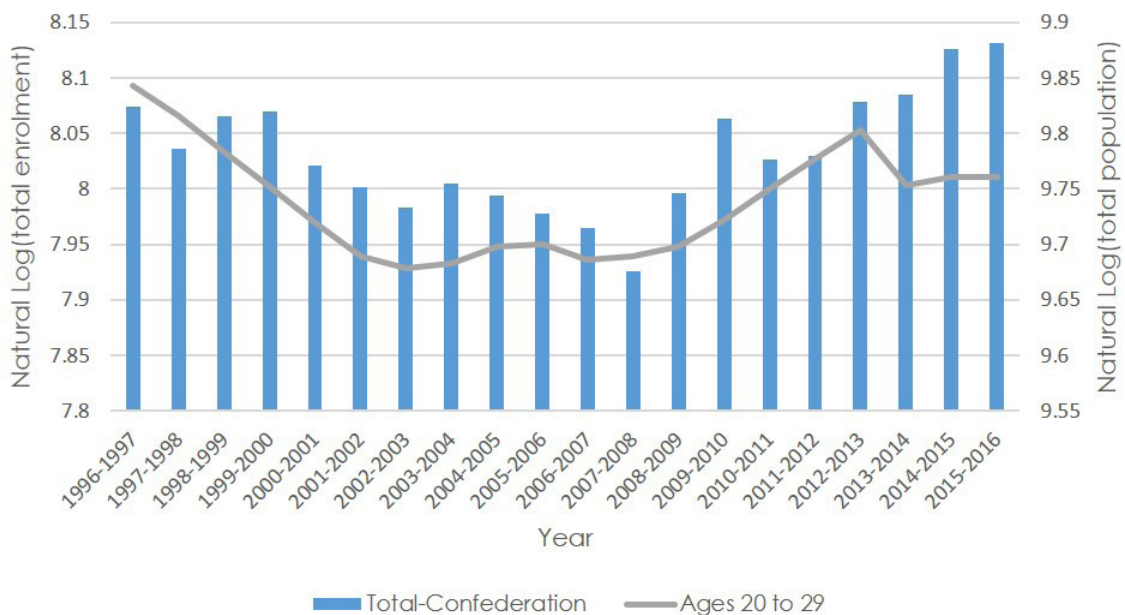
FIGURE 12: TOTAL ENROLMENT AT CONFEDERATION COLLEGE VERSUS AIR TRAFFIC



Sources: Thunder Bay International Airports Authority Inc.; Advanced Education and Skills Development, College enrolment and Advanced Education and Skills Development, College enrolments - 1996 to 2011

One similar feature of Lakehead University and Confederation College pertains to their points of lowest enrolment totals. For Lakehead University, this occurred during 2001-2002, when total enrolment was 6,140. At the same time, however, total Thunder Bay air traffic peaked. A similar phenomenon occurred at Confederation College during 2007-2008, when total enrolment was at its lowest (2,769), but total Thunder Bay air traffic peaked. Overall, total enrolment for students attending Lakehead University correlates more closely with total Thunder Bay air traffic trends than total enrolment at Confederation College. For the latter institution, the pattern in total enrolment numbers tends to align very closely with the "age_3" (20 to 29) age subcategory.

FIGURE 13: TOTAL ENROLMENT AT CONFEDERATION COLLEGE VERSUS THUNDER BAY POPULATION AGED 20 TO 29



Sources: Statistics Canada; Advanced Education and Skills Development

Conclusion

There are several important takeaways from this air traffic analysis. First, the analysis tends to support the idea that there is a high degree of positive correlation between gold prices and total Thunder Bay air traffic. Specifically, the regression model-identified demand elasticity of 0.114, indicating that a 1 per cent increase in gold prices results in a 0.114 per cent increase in air traffic. This coefficient was statistically significant at the 0.1 per cent level. A correlation coefficient of 0.871 was estimated for the statistical relationship between total airport traffic and gold prices. This estimated coefficient was significant at the 1 per cent level. Similarly, significant statistical correlations were identified for the relationships between gold mining employment and air traffic and between gold mining employment and gold mining activity. It is important to note that this analysis also suggests that there is no direct correlation between gold prices and gold mining activity.

The overall population in Thunder Bay also appears to be significantly correlated with Thunder Bay air traffic. Specifically, the regression model revealed a demand elasticity of about 4 per cent, indicating that a 1 per cent increase in Thunder Bay population results in a 4 per cent decrease in Thunder Bay air traffic. The estimated coefficient was statistically significant at the 0.1 per cent level. However, when breaking down the population into young, middle, and old age subcategories, it was revealed that the middle and old age population demographics were positively correlated with air traffic while the young population demographic was negatively correlated with air traffic.

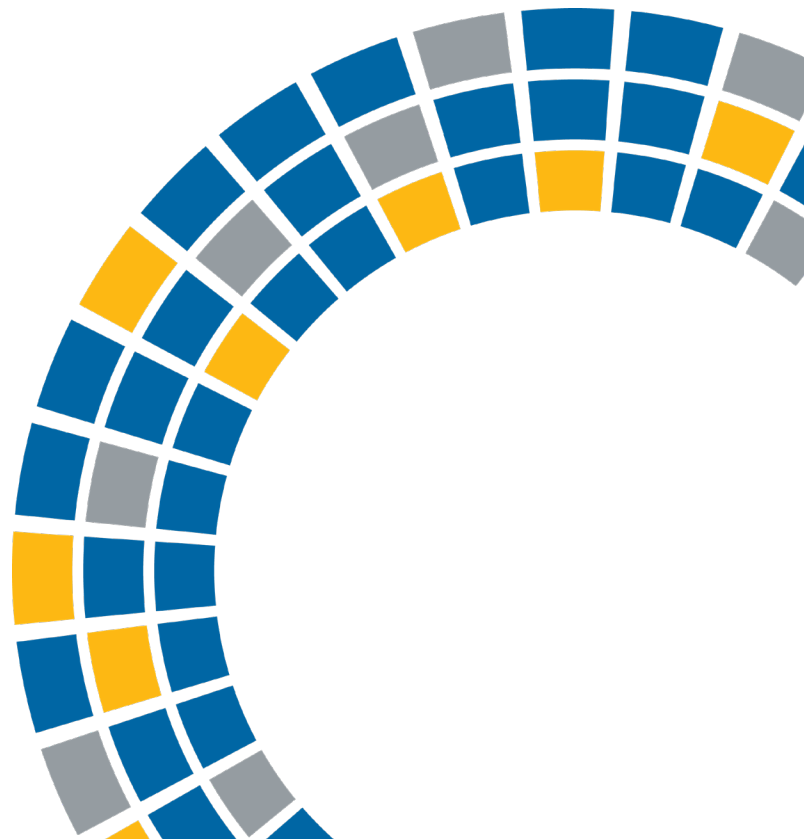
Finally, a simple regression analysis looking at the relationship between 10 age subcategories and air traffic suggested that people ages 0 to 49 negatively correspond with air traffic, while those ages 50 and older positively correspond with air traffic. Age subgroups two, five, and eight yielded the largest demand elasticities (i.e., 10 to 19, 40 to 49, and 70 to 79, respectively). Age subcategories nine and 10 yielded the smallest demand elasticities (i.e., 80 to 89, and 90 and older, respectively). Therefore, although the aging demographic of Thunder Bay is positively correlated with air traffic, the overall effect on air traffic is smallest when compared to younger age demographics.

A pairwise correlation matrix analysis of the 10 age subcategories revealed that age group three, "age_3," was an outlier. Specifically, the "age_3" variable was the only variable that did not correlate with any of the other age subcategories and tended to follow its own unique historical trend. Additionally, the regression analysis of air traffic on "age_3" yielded a small and positive OLS estimated coefficient, and an R-squared value close to zero. The small but positive OLS estimated coefficient means that the ages 20 to 29 demographic has a positive, but very small, effect on air traffic. Furthermore, the small R-squared value suggests that the estimated model which includes the ages 20 to 29 demographic accounts for nearly 0 per cent of the variance in the observed air traffic data. Comparing the total population for age subcategory three to total enrolment rates for Confederation College since 1996 revealed a close correlation. In terms of air traffic, there is no significant correlation between Confederation College enrolment rates and total Thunder Bay air traffic. Finally, a comparison between enrolment rates for Lakehead University and total Thunder Bay air traffic suggests a significant level of correlation. When broken down into enrolment totals from Northwestern Ontario and from the rest of Ontario, there seems to be a higher degree of correlation between enrolment totals from the rest of Ontario and total Thunder Bay air traffic. This seems to make sense if students outside of Northwestern Ontario must fly into Thunder Bay to attend school.



Key Results

1. High international gold prices and a growing Northern Ontario gold mining sector tend to increase total Thunder Bay air traffic.
2. Growth in Thunder Bay's middle aged population appears to increase flight demand at TBIA.
3. Students enrolled at Lakehead University who come from other parts of Ontario tend to positively correlate with total Thunder Bay air traffic. One possible explanation is that students who are not from Thunder Bay often fly in and out of the community more frequently to visit family.
4. The share of the population ages 20 to 29 does not correlate with total Thunder Bay air traffic. This could be due to the fact that a certain percentage of people ages 20 to 29 in Thunder Bay attend Confederation College, and therefore do not fly in and out of Thunder Bay to visit family.



References

- Advanced Education and Skills Development. College enrolment. Retrieved from, <https://www.ontario.ca/data/college-enrolment>
- College enrolments - 1996 to 2011. Retrieved from, <https://www.ontario.ca/data/college-enrolments-1996-2011>
- ICE Benchmark Administration Limited (IBA), Gold Fixing Price 10:30 A.M. (London time) in London Bullion Market, based in U.S. Dollars [GOLDAMGBD228NLBM], retrieved from FRED, Federal Reserve Bank of St. Louis; <https://fred.stlouisfed.org/series/GOLDAMGBD228NLBM>
- Lakehead University. Institutional Statistics Book 2005/2006. Retrieved from, <https://www.lakeheadu.ca/faculty-and-staff/ppm/facts/institutional-statistics-book>
- Institutional Statistics Book 2014/2015. Retrieved from, <https://www.lakeheadu.ca/faculty-and-staff/ppm/facts/institutional-statistics-book>
- Ontario Prospectors Association. Ontario Mining & Exploration Directory 2005. Retrieved from, <http://www.ontla.on.ca/library/repository/ser/94865/2005.pdf>
- Ontario Mining & Exploration Directory 2006. Retrieved from, <http://www.ontla.on.ca/library/repository/ser/94865/2006.pdf>
- Ontario Mining & Exploration Directory 2007. Retrieved from, <http://www.ontla.on.ca/library/repository/ser/94865/2007.pdf>
- Ontario Mining & Exploration Directory 2008. Retrieved from, <http://www.ontla.on.ca/library/repository/ser/94865/2008.pdf>
- Ontario Mining & Exploration Directory 2009. Retrieved from, <http://www.ontla.on.ca/library/repository/ser/94865/2009.pdf>
- Ontario Mining & Exploration Directory 2010. Retrieved from, <http://www.ontla.on.ca/library/repository/ser/94865/2010.pdf>
- Ontario Mining & Exploration Directory 2011. Retrieved from, <http://www.ontla.on.ca/library/repository/ser/94865/2011.pdf>
- Ontario Mining & Exploration Directory 2012. Retrieved from, <http://www.ontla.on.ca/library/repository/ser/94865/2012.pdf>
- Ontario Mining & Exploration Directory 2013. Retrieved from, <http://www.ontla.on.ca/library/repository/ser/94865/2013.pdf>
- Ontario Mining & Exploration Directory 2014. Retrieved from, <http://www.ontla.on.ca/library/repository/ser/94865/2014.pdf>
- Ontario Mining & Exploration Directory 2015. Retrieved from, <http://www.ontla.on.ca/library/repository/ser/94865/2015v2.pdf>
- Ontario Mining & Exploration Directory 2016. Retrieved from, <http://www.ontla.on.ca/library/repository/ser/94865/2016.pdf>
- Organization for Economic Co-operation and Development. Gross Domestic Product by Expenditure in Constant Prices: Total Gross Domestic Product for Canada [NAEXKP01CAQ189S], retrieved from FRED, Federal Reserve Bank of St. Louis; <https://fred.stlouisfed.org/series/NAEXKP01CAQ189S>.
- Statistics Canada. Table 051-0046 - Estimates of population by census metropolitan area, sex and age group for July 1, based on the Standard Geographical Classification (SGC) 2006, annual (persons), CANSIM (database). <http://www5.statcan.gc.ca/cansim/a26?lang=eng&retrLang=eng&id=0510046&pattern=&stByVal=1&p1=1&p2=-1&tabMode=dataTable&csid=>
- Statistics Canada. Table 051-0056 - Estimates of population by census metropolitan area, sex and age group for July 1, based on the Standard Geographical Classification (SGC) 2011, annual (persons), CANSIM (database). <http://www5.statcan.gc.ca/cansim/a26?lang=eng&id=510056>
- Thunder Bay International Airports Authority Inc. Passenger History 1994 to 2016 [Data file]. Unpublished raw data.
- World Bank. Inflation, consumer prices for Canada [FPCPITOTLZGCAN], retrieved from FRED, Federal Reserve Bank of St. Louis; <https://fred.stlouisfed.org/series/FPCPITOTLZGCAN>



About Northern Policy Institute

Northern Policy Institute is Northern Ontario's independent think tank. We perform research, collect and disseminate evidence, and identify policy opportunities to support the growth of sustainable Northern Communities. Our operations are located in Thunder Bay, Sudbury and Sault Ste. Marie. We seek to enhance Northern Ontario's capacity to take the lead position on socio-economic policy that impacts Northern Ontario, Ontario, and Canada as a whole.

Related Research

[Is the North Being Grounded? The Case for Intergovernmental Investment in Northern Ontario's Airports](#)

Erin Estok

[Diversify, Innovate, Invest, and Grow: Population Change by Northern Ontario District 2001-2013](#)

Julien Bonin

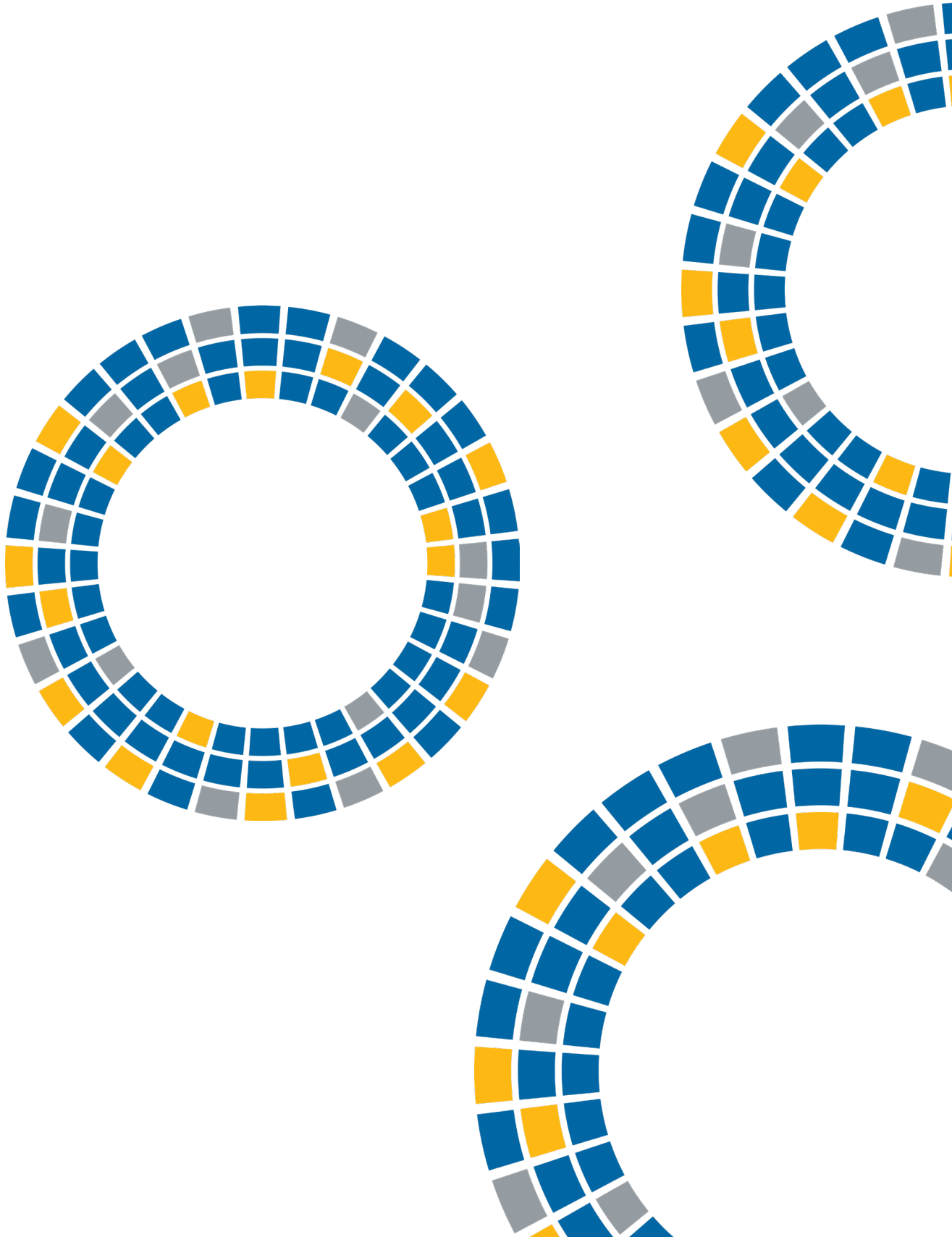
[Actions to move Northern Ontario forward: Response to the Draft 2041 Northern Ontario Multimodal Transportation Strategy. Alternative Methods of Transportation – Airships](#)

Dr. Barry Prentice

To stay connected or get involved, please contact us at:

1 (807) 343-8956 info@northernpolicy.ca www.northernpolicy.ca





NORTHERN
POLICY INSTITUTE

INSTITUT DES POLITIQUES
DU NORD

northernpolicy.ca