An Empirical Analysis of Travel and Housing Costs in the Greater Toronto Area

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ABSTRACT

This paper presents an empirical investigation of household annual travel and housing costs within the Greater Toronto Area (GTA) during the time period 1986-1996. The analysis is based on data obtained from local travel surveys, the Canadian census and the Toronto Real Estate Board, which were combined with transportation network assignment models and travel cost models for the GTA to compute average annual travel and housing costs by zone within the region. Key findings include: both travel and housing costs tend to increase as one moves away from the city center; the City of Toronto is much more "efficient" than the surrounding suburban regions in terms of having lower combined average travel plus housing costs; and combined housing plus travel costs have increased over time within the region (principally due to increased housing costs), with the result that GTA households on average spent just over a third of their total income on travel plus housing in 1996.

INTRODUCTION AND BACKGROUND

Housing and transportation are the two biggest budget items for most households. In 1998 the average American household spent 19.0¢ on housing and 17.9¢ on transportation out of every $1.00 spent (*1*). The importance of housing and transportation markets for urban planning and the evolution of urban form is also clear. Issues of urban sprawl, roadway congestion, air quality, greenhouse gas emissions, social equity, and, more generally, the economic, social and environmental sustainability of urban areas are all tied directly to the way our housing and transportation markets cause urban form and travel behavior to evolve over time.

Rudimentary spatial economic theory tells us that households will trade off housing and transportation costs in an effort to maximize their overall utility (*2*). By choosing different types of housing at different locations, and by choosing different daily travel patterns and modes of transportation, each household can attempt to optimize its individual utility or well-being. This optimization, however, is not unconstrained. Each household has a budget constraint, defined by its overall income. Thus, expenditures on housing, transportation and all other goods and services must equal income.

It is generally believed that many households choose to live in suburban locations either because housing costs are lower there or because they can obtain "more house" for a given expenditure. What is not clear is the extent to which transportation costs are being factored into these decisions. That is, it may be that people in suburbs on average spend more on travel than people living in more central locations, and that this difference might more than compensate for differences in housing costs between these locations. If this is the case, then it is possible that alternative residential location patterns (and associated travel patterns) might exist which would be superior from both the individual household and societal perspectives.

Social equity issues also exist, in that it may be that low income households are forced to live in suburban locations if these are the only places in which "affordable" housing exists. They may, however, then be required to spend a considerable portion of their income on auto-based transportation, leaving very little money for expenditure on other necessities. Again, an alternative distribution of affordable housing that resulted in less costly travel patterns for such households would be highly desirable.

The purpose of this study is to investigate these issues empirically through a time-series analysis of housing costs, travel costs, and income within the Greater Toronto Area (GTA). Emphasis is placed throughout the study on the spatial patterns of these quantities, as well as on their temporal trends.

This paper begins with a definition of the study scope and data. The next four sections then deal, respectively, with income, travel costs, housing costs, and combined costs of housing and travel. The paper concludes with a brief summary of its main findings.

STUDY SCOPE AND DATA

Three primary sources of information are used in this study. These are:

- **Transportation Tomorrow Survey (TTS) data**. TTS is a cross-sectional travel survey conducted on 5% of GTA households every five years. In this study, TTS data are used to compute household expenditures on travel for a typical weekday.
- **Toronto Area Car Ownership Survey (TACOS) data**. TACOS is a retrospective survey of approximately 800 GTA households that was undertaken by the University of Toronto in 1998 (*3*). This information is used to estimate household auto ownership costs.
- **Census data**. The Canadian Census provides income and housing cost information in this study.

The study period is 1986-1996. 1986 is the first year for which TTS data are available. 1996 is the most recent year for which detailed travel and housing data were available at the time this work was undertaken. The study area, shown in Figure 1, is the Greater Toronto Area (GTA), including the City of Hamilton.

In addition to data available from existing sources, many of the key variables of interest within this study were constructed, typically through the use of some form of model (see (*4*) for details).

Household daily vehicle-kilometers-traveled (VKT) - Household vehicle operating costs are directly proportional to the household's VKT. VKT for each household observed in TTS for a given survey year for a "typical" autumn weekday was computed by assigning the household's observed auto trips to EMME/2-based road network representations.

Household daily vehicle operating costs - Given the number of kilometers driven each day by a household, the average daily vehicle operating costs were estimated using extensions of GTA vehicle cost models (*5*).

Household daily transit expenditures - Given observed transit usage for households in the TTS samples, and given known transit fares by origin-destination pair and transit service, total daily household transit expenditures for a typical weekday were constructed.

Household annual travel costs by mode - The computed daily auto and transit expenditures were summed and expanded to yield estimates of annual transportation expenditures.

INCOME

Figure 2 displays 1996 GTA average household income by census tract. Within the City of Toronto, two key features to note are: (1) the high income areas in north-central Toronto (along the Yonge Street corridor, north of Bloor Street; note that the Toronto CBD lies immediately south of this area) and in the west end in central Etobicoke; and (2) the broad band of lower income neighborhoods lying in the "Industrial U", an area of traditional heavy manufacturing and low-income housing that follows the main railway lines from the north-west corner of the city, through the downtown and out along a north-east axis though Scarborough.

Average incomes generally rise outside the City of Toronto (especially in York Region to the north of Toronto and in older communities along the western lakeshore in south Mississauga and Oakville), although central and/or manufacturing areas of other GTA cities (e.g., Oshawa, Mississauga, Brampton and Hamilton) also all have lower average incomes.

Thus, a very consistent pattern for average GTA incomes exists, in which lower income households are found in traditional city centers and manufacturing districts, and higher income households are located in both older established residential neighborhoods (typically well connected to the Toronto CBD by both rail and road facilities) and newer, more remote suburban communities.

Note, however, that gentrification trends in the "old" City of Toronto in a broad band along the lake, south of Bloor Street, are somewhat obscured by the use of tract average incomes. That is, higher income households for some time have been moving into these neighborhoods, raising the tract incomes over time in this area.

TRAVEL COSTS

Spatial Patterns and Trends in GTA Auto Ownership and Travel Behavior

Table 1 summarizes household auto ownership levels over the period 1986-1996. Average household auto ownership actually declined slightly across the GTA between 1991 and 1996. This is likely due to the severe recession of the early 1990's that significantly increased unemployment levels and decreased consumer confidence/spending. This decline is anomalous relative to long term trends in the GTA (*6*). It is expected that in the longer run, auto ownership levels will continue to rise within the GTA as real incomes grow and the region continues to suburbanize (*7*).

VKT and household auto ownership levels obviously co-vary. Hollingworth, *et al*. (*8*) present a simultaneous equations regression model in which 1991 average household daily VKT increases by 0.68 km/day for every kilometer further the household lives from the Toronto CBD, and by 15.1 km/day for every additional car owned by the household.

Car ownership, in turn, also increases on average by 0.0045 cars/hhld for every kilometer it is located away from the Toronto CBD. Note that these distance effects exist even when controlling for other factors, including household size, which tends to increase as well as one moves to more suburban/rural locations.

Clearly, daily transit trip rates are much higher within the City of Toronto than elsewhere within the GTA due to the high level of service provided within the City by the Toronto Transit Commission (TTC). Both average daily household transit trip rates and mode shares have consistently declined during this time period across the GTA, including the City of Toronto. As is discussed in greater detail by Miller and Soberman (*7*), declining transit usage reflects shifts in GTA travel patterns, reductions in transit service levels and changing GTA demographics, among other factors.

Spatial Patterns and Trends in GTA Travel Costs

Figure 3 shows total (auto plus transit) household 1996 average annual travel costs averaged by traffic zone. Total household travel costs are dominated by the auto costs (see Table 1). As a result, **a very strong pattern exists in which average annual travel costs increase as one moves away from the city centers**, consistent with spatial trends in car ownership and VKT.

Table 1 includes a summary of changes in average auto, transit and total travel costs over the 1986-1996 study period. Points to note include:

- On average, over 95% of GTA household annual expenditures on intra-urban travel are auto-based. Even in the City of Toronto with its strong transit system, well over 90% of travel costs are auto-related.
- City of Toronto residents spend considerably less on transportation than other residents of the GTA. The difference is very large –Toronto households, on average, spent approximately 60% of the amount spent by households in the rest of the GTA in 1996. In general, the rank ordering of expenditures makes sense, given the relative quality of transit services, income levels and travel patterns in each of the regions.
- 1991 travel costs are consistently higher across the GTA than in either 1986 or 1996. This likely reflects the decline in auto ownership levels between 1991 and 1996 previously discussed. In general, 1996 expenditures appear to have returned to about the 1986 levels, which is plausible given the macroeconomic trend for the GTA over this time period.

Total daily household travel costs were regressed versus a number of household and zonal variables. Table 2 summarizes the results for the three analysis years, 1986, 1991 and 1996**.** Points to note from Table 2 include the following.

- Not surprisingly, households with more cars, more licensed drivers and more workers all tend to spend more on travel.

- The presence of children in the household increases the amount and cost of daily household travel significantly.
- Travel expenditures increase with income.

The key point to note from Table 2, however, is that, after controlling for all of these factors, **average household travel costs systematically increase as the household's place of residence moves away from the Hamilton or Toronto city centers**. In the case of Toronto, this effect is approximately 10 ¢/km per day. Thus, in the case of two households with exactly the same attributes (number of cars, income, etc.), one of which lives in the city center and one of which lives 20 km from the city center, the later will, on average, spend $2.00 per day or approximately $700 per year more on travel. This, however, actually represents a significant underestimate of the difference in travel costs, since these two households are also likely to have different auto ownership levels.

HOUSING AND LOCATION ATTRIBUTES

Dwelling Unit Attributes

Table 3 summarizes trends in selected dwelling attributes from 1986-1996. Very little net change has occurred in GTA-wide average values during the analysis period. The City of Toronto, however, seems to be moving in a different direction from the rest of the GTA. The percentage of rental units increased slightly across the City, but generally declined elsewhere. Similarly, average dwelling sizes, as measured by rooms per dwelling, have declined slightly within Toronto and increased slightly elsewhere.

Persons per room provides a different measure of dwelling size in terms of "how much house" a given household has relative to the number of persons in the household. Using this measure, Toronto residents "consume" less housing per person than other GTA residents.

GTA Owner-Occupied Housing Prices

Since 60% of GTA households lived in owner-occupied dwellings in 1996, the price of these dwellings fundamentally determines housing costs within the GTA. Further, the tradeoffs in which households engage among dwelling attributes (size, structure type, etc.), location and travel manifests themselves in the market values that households are willing to pay for dwellings of a given type at a given location.

Figure 4 plots average 1996 dwelling market values as reported in the Census. Not surprisingly, housing prices generally mimic income distributions (cf. Figure 2), with higher priced homes being found in well established residential neighborhoods and higher-end suburban estates, and older central areas and manufacturing districts having lower priced houses (again, rising prices in central Toronto due to gentrification is a notable exception to this rule). In general, housing prices tend to rise as one moves

further from the Toronto and Hamilton CBDs, until the fringe (and still largely agricultural) regions are reached, where average prices tend to fall once again.

Spatial Patterns and Trends in GTA Housing Costs

Housing **prices**, however, do not tell the whole story. In order to be compared with travel costs, the actual annual expenditures by households on housing must be computed. Figure 5 combines average gross monthly rent and average owners' monthly payments as reported in the Census to yield the spatial distribution of average annual 1996 housing **costs** for GTA households. This figure is obtained by taking a weighted average of owner-occupied and rental monthly costs, multiplied by 12 to yield an estimated annual cost.

From this figure, it is observed that:

- Downtown Toronto emerges as a high cost location, due to its large number of high cost rental units.
- With the exception of most of the "high price" areas discussed above, much of the remainder of the City of Toronto shows a surprisingly uniform distribution of average annual housing costs.
- While still clearly a relatively high housing cost location, York Region has a more "uniform" distribution of total housing costs than is implied by the map of housing values (cf. Figure 4).
- The distribution of total housing costs in Durham, Peel and Halton is also somewhat different than the housing price distributions previously considered. Some zones have relatively higher costs than are implied by the price maps, while others appear to have relatively lower costs.

The fact that Figure 5 shows a somewhat different pattern than the map of housing prices, reflects differences in mortgage levels, property taxes, maintenance costs, etc. This emphasizes the importance of considering total annualized costs as the measure of housing "cost", rather than just recent sales prices or current market values.

Table 3 summarizes GTA trends in monthly housing costs over the analysis period. Points to note from these statistics include:

- As with travel costs, housing costs rose between 1986 and 1991, and then declined somewhat between 1991 and 1996, although in this case, the decline is generally relatively small. Thus, the 1991-1996 period might be characterized as a period of relative stagnation in housing costs, again reflecting the weak GTA economy during this time period.
- Over the 10-year period 1986-1996 GTA housing costs increased, on average, by 16.6%. Owner-occupied housing costs, however, increased on average by nearly 25%, while rental housing costs increased by just under 3%. As a result, the ratio

of average rental costs to housing ownership costs steadily decreased over this period from 86% in 1986 to 71% in 1996.

Housing prices tend to decline as the dwelling's location moves further from the Toronto CBD (*9*), once one accounts for dwelling structural attributes and accessibility to major transportation facilities. This is consistent with urban spatial economic theory, which indicates that land prices should fall as one moves away from the city center.

Figure 5, however, displays a more complicated spatial pattern, in which average annual housing costs are relatively low and relatively uniform throughout much of the City of Toronto, and then tend to **rise** as one moves beyond the city boundary. This increase in housing costs as one moves away from the city, despite falling land values is explained by increases in average dwelling unit size (and possibly other dwelling attributes) that also tends to occur as one moves outwards from Toronto (cf. Table 3).

This pattern of rising average annual housing costs as one moves away from the Toronto urban center is captured in simple linear regression models for the three analysis years, shown in Table 4. In these models zonal average housing costs are regressed against various zonal attributes, including variables intended to capture spatial form effects (principally the distance to the Toronto and Hamilton CBDs). Points to note from Table 4 include:

- Higher income people spend more on houses.
- Not surprisingly, larger houses tend to be more costly. On average, each additional room added $469 more to the annualized 1996 cost of a house.
- Dwellings in higher density zones cost more on average. This may be a proxy for high land prices in "downtown" areas.

After accounting for these other factors, however, it is found that **average annual housing costs do, indeed, tend to rise as distance from the CBD increases**. In 1996, for example, all else being equal, average annual housing costs increased by about $22 per year for every additional kilometer that the house is located away from the Toronto CBD. Given that we know that land values *per* se fall as one moves away from the Toronto CBD, this means that the "premium" that households are actually paying for dwellings located in more suburban regions is, in fact, larger than the decrease in land values.

HOUSING AND TRAVEL COST TRADEOFFS

Comparison of Housing and Transportation Costs

As previously discussed (see Figure 3), household travel costs tend to be significantly lower in the Cities of Toronto and Hamilton and to increase significantly as the

household's place of residence moves further from the city centers. Thus, with only relatively minor exceptions, both housing and travel costs tend to increase together (high travel cost zones also tend to be higher housing cost zones and *vice versa*). That is, on average at least, a "tradeoff" between housing and travel costs does not appear to be the norm: as one moves away from the city center one tends to pay more for **both** transportation and housing. Of course, as has been discussed above, housing sizes (and perhaps other attributes such as access to greenspace) also increase on average as distance from the city center increases**.**

Combining travel and housing costs yields Figure 6. Perhaps the most important additional point to be gathered from this map relative to those already made is the extremely strong monocentric nature of the pattern of combined housing and travel costs: these costs rise significantly as one moves away from the traditional city centers of Toronto, Hamilton, Oshawa and Brampton. Two important caveats to this sweeping statement are:

- Clearly, there are some "high cost" areas within the City of Toronto. These areas are in all cases dominated by the very high housing costs/prices in these neighborhoods.
- Central and south-eastern Mississauga have average combined costs that are nearly comparable to those in much its neighbor of Etobicoke in the City of Toronto. This quite possibly is indicative of Mississauga emerging as a "traditional city" with associated travel cost efficiencies, comparable in nature to older regional cities such as Hamilton or the post-war portions of the City of Toronto.

Table 5 includes a summary of average annual household travel, housing and combined expenditures for the1986-1996 study period within the GTA. **Overall, the range in combined costs is dramatic, with GTA households outside the Cities of Toronto and Hamilton on average paying 43% more for housing and travel combined than residents of either Toronto or Hamilton**.

Region-wide, combined housing and travel costs have increased by a relatively modest $1,300 per annum on average over the 1986-1996 time period, representing a 7% increase. This overall change, however, has been driven entirely by increased housing costs (17% increase 1986 to 1996), while GTA-wide average travel costs actually declined marginally over this time period. Housing prices appreciated significantly throughout the GTA, while travel costs only increased on average for York Region and the City of Hamilton.

Household Costs Versus Income

The significance of the absolute magnitudes of these annual expenditures is difficult to judge without comparing them to household income levels. It is common in the housing

literature to compute housing cost to income ratios. A more comprehensive and informative measure, however, is the ratio of housing plus travel costs to income, since travel costs are an inherent and necessary component of the residential location "choice bundle". Figure 7 plots these ratios for the 1996 case.

The pattern displayed in this map retains elements of the total cost distribution (Figure 6) in that the total cost to income ratio does tend to rise with distance from the Toronto and Hamilton city centers. An interesting difference between the two maps, however, is the emergence of the traditional industrial areas in both Toronto (the "Industrial U") and Hamilton (the industrial east end of the City) as areas of high cost to income ratios. That is, despite these areas being relatively low housing (Figure 5) and travel (Figure 3) cost areas, residents in these neighborhoods have incomes (Figure 2) that are on average sufficiently low that their cost to income ratios are among the highest in the GTA. Similarly, most of the very high cost neighborhoods such as central Etobicoke, central-north Toronto and portions of southern York region "disappear" in Figure 7, reflecting the very high incomes of residents in these neighborhoods.

Figure 7 also reinforces the discussion earlier concerning the relative effectiveness of more rural/urban fringe areas in terms of "affordability" when transportation costs are factored into the equation. **Generally speaking, housing plus transportation combined consume a greater proportion of household income as one moves away from the more urbanized areas.**

Table 5 includes a summary of GTA trends in household income and cost to income ratios. Points to note from this table include:

- Between 1986 and 1996 the average housing cost to income ratio for the GTA as a whole had increased by 14.4%, from 16.3% of income to 18.6%.
- The average total (i.e., housing plus travel) cost to income ratios have increased throughout the GTA between 1986 and 1996. GTA-wide, the average ratio has increased by 4.6%, from 32.4% to 33.6%. Thus, **on average, a GTA household spent approximately one-third of its income on housing and transportation in 1996.**
- Based on this measure, the City of Toronto was the most "efficient" place to live in 1996 within the GTA, since residents on average spend less of their income on housing and travel than anywhere else in the GTA (31.8%).

SUMMARY AND CONCLUSIONS

Key findings of this study include:

- Average household travel costs systematically **increase** as one moves away from the city center.
- On average, housing costs also **increase** as one moves away from the city centre (although housing sizes, and possibly other amenities, also tend to increase).
- The higher the level of urbanization, the more "efficient" the urban form is, in terms of the combined cost of housing and transportation for its residents.

These results are obviously specific to Toronto and the GTA and may not generalize to other cities. To the extent, however, that Toronto is often held up as a model for other North American cities in terms of its transit orientation and land use policies, these results may provide some indication that such policies do, indeed, "work". It must be noted, however, that these policies were largely operative historically rather than currently and were focussed within the amalgamated City of Toronto (formerly Metropolitan Toronto). As is illustrated by this analysis (see also (*6,7,8*)), the City appears to be much more "efficient" than its suburban neighbors, both due to the much greater usage of transit and due to its higher density of development (where, of course, these two factors work hand in hand). This, again, illustrates the effectiveness of these historical policies relative to more recent, much weaker attention to transit orientation and urban design in the GTA's emerging suburban regions.

To put this another way, these results provide no support for the hypothesis that "edge cities" are more "efficient" than traditional cities since they allow households to locate "closer" to jobs, stores, etc. York and Peel Regions both represent typical edge city developments. Travel costs, however, are higher, on average, in these regions than within the City of Toronto, even before one accounts for the personal "cost" of travel delays due to congestion or the social costs of pollution, greenhouse gas emissions, etc. (which have not been factored into this analysis). Again, whether these results generalize to other cities remains to be seen.

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TABLE 1 Household Travel Cost Trends (1996 $CAN)

	City of Toronto			City of Hamilton			Rest of GTA			GTA Total		
	1986	1991	1996	1986	1991	1996	1986	1991	1996	1986	1991	1996
Car Ownership												
% 0 Car Households	20.9%	21.1%	25.8%	14.7%	14.5%	16.1%	4.6%	4.3%	5.8%	14.8%	14.1%	16.9%
% 2+ Car Households	32.1%	31.5%	26.8%	40.0%	42.3%	41.1%	60.9%	63.0%	60.1%	42.5%	44.4%	41.4%
Avg # Cars / Household	1.21	1.18	1.07	1.38	1.38	1.36	1.77	1.77	1.71	1.41	1.42	1.35
Transit Usage												
Avg Daily Transit Trip Rate / Household	1.30	1.21	1.13	0.55	0.44	0.35	0.40	0.42	0.35	0.92	0.83	0.74
Avg Daily All-purpose Transit Mode Share	25.7%	22.4%	22.7%	9.6%	7.8%	6.4%	6.3%	6.0%	5.5%	16.5%	13.9%	13.3%
Average Annual Travel Costs												
Automobile Cost ($1996)	7703	8039	6474	12475	13150	11738	11992	13275	11370	9109	10100	8577
Automobile (% of Total)	97.9%	97.1%	92.5%	98.4%	98.4%	97.3%	98.4%	98.4%	97.1%	98.1%	97.9%	95.3%
Transit Cost ($1996)	167	236	526	262	488	257	201	220	337	174	222	421
Transit (% of Total)	2.1%	2.9%	7.5%	1.6%	1.6%	2.7%	1.6%	1.6%	2.9%	1.9%	2.1%	4.7%
Average Annual Travel Costs ($1996)	7870	8275	7000	12736	13638	11995	12193	13495	11707	9283	10322	8998

TABLE 2 Regression Models of GTA Daily Household Travel Costs

	YEAR		
VARIABLE	**1986**	**1991**	**1996**
Intercept	-4.258	-4.223	-4.631
TO_CBD	0.079	0.106	0.099
HAM_CBD	0.035	0.040	0.015
Income_CT(K96$)			0.029
N_vehicle	10.818	15.598	11.523
N_license	7.406	1.192	1.991
N_children	0.328	0.579	0.739
N_Adults			0.730
N_prof			0.900
N_fulltime	0.056	2.671	2.997
N_Othermode	-0.100	0.083	-0.100
Adjusted R-square	0.796	0.742	0.703

***Variables**:*

TO_CBD *straight-line distance from residence zone to Toronto CBD (km)*
HAM_CBD *straight-line distance from residence zone to Hamilton CBD (km)*
Income_CT *average residence zone 1996 household income, thousands of $1996*
N_vehicle *number of vehicles in the household*
N_license *number of licensed drivers in the household*
N_children *number children (under 16 years old) in the household*
N_adults *number of adults (16+ years old) in the household*
N_prof *number of professional/managerial/technical workers in the household*
N_fulltime *number of full-time workers in the household*
N_Othermode *number of trips made by modes other than auto and transit by household members*

TABLE 3 Monthly Housing Cost Trends (1996 $CAN)

	City of Toronto			City of Hamilton			Rest of GTA			GTA Total		
	1986	1991	1996	1986	1991	1996	1986	1991	1996	1986	1991	1996
Dwelling Attributes												
% Rental Units	48.8%	51.8%	52.0%	36.7%	37.0%	36.7%	25.9%	25.9%	25.0%	39.9%	40.4%	39.8%
Average Rooms / Dwelling	5.51	5.42	5.33	5.92	6.13	6.2	6.68	6.93	6.95	5.94	6.07	6.06
Average Persons / Room	0.49	0.49	0.50	0.46	0.44	0.42	0.48	0.46	0.45	0.48	0.47	0.48
Monthly Cost Trends												
Average Gross Monthly Rent ($1996)	719	771	734	580	616	590	770	867	817	719	779	740
Average Owners Monthly Payments ($1996)	782	966	972	680	831	818	938	1174	1145	834	1046	1039
Average Monthly Housing Costs ($1996)	752	863	844	643	752	733	894	1093	1060	787	938	918
Average Annual Housing Costs ($1996)	9028	10356	10128.1	7716	9024	8796	10726	13118	12724	9444	11256	11016

TABLE 4 Average Housing Cost Regression Models

Coefficient	1986	1991	1996
Intercept	2720.0	2752.1	3775.6
HamCMA	-580.3	-935.8	-1284.3
OshawaCMA	-930.0	-1379.3	-1550.6
TO_CBD_km	24.61	30.56	21.83
Ham_CBD_km	46.87	8.19	27.55
AvgHhldIncome	76.6	71.0	64.3
AVGROOMS	266.2	664.3	469.4
dwellDens	0.1618	0.1389	0.0822
Adjusted R-square	0.5902	0.5493	0.6996

Variables:

HamCMA = 1 if residence is in the Hamilton CMA; = 0 otherwise
OshawaCMA = 1 if resident is in the Oshawa CMA; = 0 otherwise
TO_CBD = straight line distance from the residence zone to the Toronto CBD (km)
Ham_CBD = straight-line distance from the residence zone to the Hamilton CBD (km)
AvgHhldIncome = average household income for the residence census tract (1000's $1996)
AVGROOMS = average number of rooms in a dwelling in the residence census tract
dwellDens = average density of dwelling units in the residence census tract (dwellings/ha)

TABLE 5 Housing and Travel Cost Trends (1996 $CAN)

	City of Toronto			City of Hamilton			Rest of GTA			GTA Total		
	1986	1991	1996	1986	1991	1996	1986	1991	1996	1986	1991	1996
Housing and Travel Cost Trends												
Average Annual Travel Costs	7900	8300	7000	7600	9200	8300	12200	13500	11750	9300	10300	9000
Average Annual Housing Costs	9000	10400	10100	7700	9000	8800	10700	13100	12750	9400	11300	11000
Average Travel + Housing Costs	16900	18700	17100	15300	18200	17100	22900	26600	24500	18700	21600	20000
Housing and Travel vs Income												
Average Annual Income	55700	58400	53800	47000	50400	49200	64900	70100	68300	57800	61900	59100
Average (Travel Costs) / Income	14.2%	14.2%	13.0%	16.2%	18.3%	16.9%	18.7%	19.2%	17.1%	16.1%	16.6%	15.2%
Average (Housing Costs) / Income	16.2%	17.8%	18.8%	16.4%	17.9%	17.9%	16.6%	18.8%	18.7%	16.3%	18.3%	18.6%
Average (Travel + Housing Costs) / Income	30.3%	32.0%	31.8%	32.6%	36.1%	34.8%	35.4%	38.0%	35.8%	32.4%	34.9%	33.8%

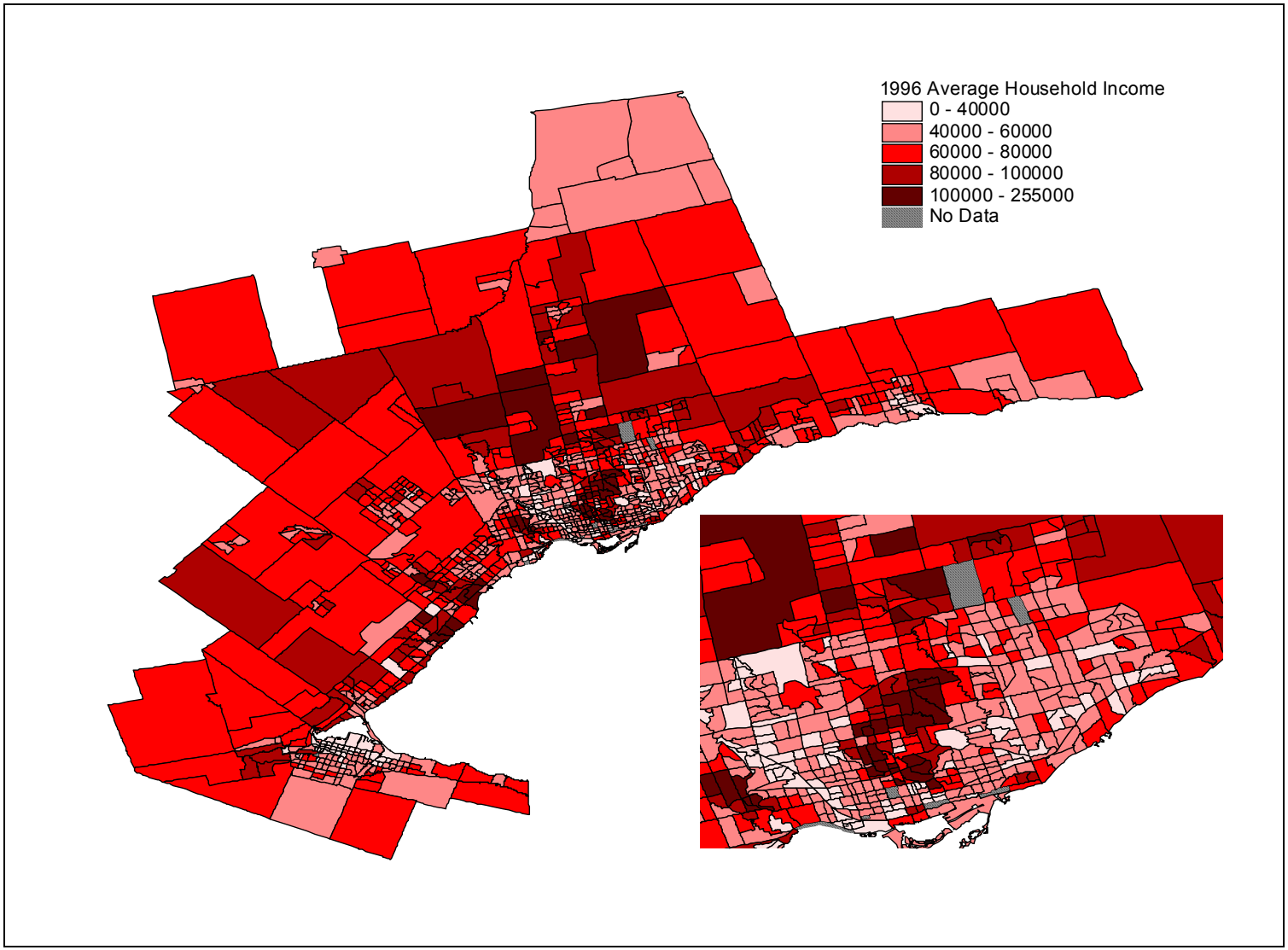

FIGURE 2 Average Household Income, 1996 (1996 $CAN)

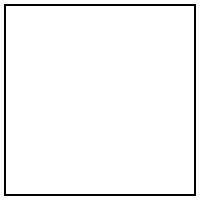

FIGURE 3 Average Annual Transportation Cost, 1996 (1996 $CAN)

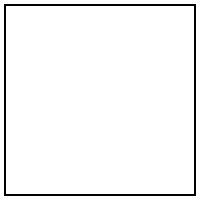

FIGURE 4 Average Dwelling Values, 1996 (1996 $CAN)

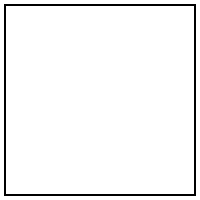

FIGURE 5 Average Annual Housing Costs, 1996 (1996 $CAN)

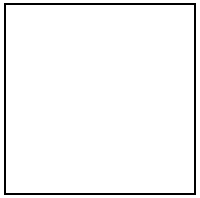

FIGURE 6 Average Annual Transportation and Housing Cost, 1996 (1996 $CAN)

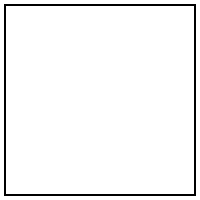

FIGURE 7 Average Housing + Transportation Cost as a Proportion of Average Income, 1996 (1996 $CAN)