Economics of Central Business District Parking

David Stambrook, Virtuosity Consulting

Parking in central business districts (CBD) is of considerable importance for sustainable transportation policy in terms of modal choice relative to transit use. This paper examines data for parking supply, demand and pricing. Interviews with municipal parking official were conducted for 22 Census Metropolitan Areas (CMAs) across all provinces (except Quebec). There is a strong positive relationship between CMA population size and municipal parking rates. It is theorized that as CMA population grows land values in the CBD rise and the opportunity cost of parking space increases. As the higher cost of parking and limited supply of parking spaces (relative to demand) impact on parking price there is greater incentive for the private sector to provide more parking. Municipal off-street parking rates are negatively related to the percentage of CBD parking that is municipally provided and positively related to per worker parking availability in the CBD; and are positively related to transit ridership shares for commuter journey to work.

Introduction

The importance of parking policies on urban development has been stated most forcefully by Shoup (2005)[1]:

> *"Parking affects both transportation and land use, but its effects are often overlooked or misunderstood. Many people see urban problems – congestion, pollution, decay, and sprawl – but even the most ferocious critics of cars often fail to connect these problems with parking policies….*

[1] Shoup (2005) pp.3, 8 (Chapter 1).

> *A major flaw… is the way planners estimate demand: they do not estimate it as a function of price. Instead, they make the unstated (perhaps even unconscious) assumption that all parking is free. They estimate the demand for free parking and then require enough spaces to meet this demand."*

This study looks at the parking availability of municipal paid parking – both off-street and on-street – as well as privately provided parking in the CBD. The study compares data on parking availability to a measure of parking demand and also looks at the role of parking price in determining how well the private sector responds to parking requirements as well as transit ridership in Canadian CMAs.

This paper is based on work undertaken for Transport Canada – Economic and Environmental Analysis and Research. It reflects the view of the author and does not necessarily reflect the views or policies of Transport Canada

Methodology

There are 33 Census Metropolitan Areas (CMAs) as of 2006 with a combined population of 21.5M (or 68% of Canadian population). The majority of municipal off-street parking is related to parking in the Central Business District (CBD). Municipal parking administration contacts were approached in 28 CMAs and interviews were conducted with 22 of these for a response rate of almost 80%.

For most CMAs, a single municipal government is responsible for the majority of the population of the urban core. Notable CMA exceptions are Toronto (which also includes Mississauga) and Vancouver (which includes Burnaby, Richmond and North Vancouver).

Information on recent parking studies, the availability of parking data (e.g. geo-coded locations and inventory), and baseline data on the number of on-street and off-street municipal paid parking was sought in telephone interviews along with a description of parking data availability in geo-coded form.

Data for a parking demand indicator (i.e. 'central workers') and the transit share of commuters were obtained from the Census 2006.

Results

Table 1 shows on-street and off-street municipal parking facilities and spaces for 2010. The data exclude privately administered parking which may be available to the public or for the exclusive use of building tenants/owners. The majority of municipal off-street parking is related to parking in the CBD. A significant portion of municipal on-street parking relates to parking outside of the CBD in other commercial or institutional districts (e.g. Business Improvement Areas).

Municipalities do not maintain an inventory of private parking providers although some monitor parking rates at private operators for comparative purposes. Only in certain cases (i.e. where a downtown parking study is conducted) are the overall number of CBD parking spaces available (municipal and private). Table 2 shows (where known) the 'market share' of municipal parking.

There appears to be an inverse relationship (rank correlation = -0.45) between CMA population size and the reliance on municipally provided parking in the CBD[2] (see Figure 1) whereby:

- in some large CMAs (e.g. Vancouver, Ottawa, Calgary, Edmonton, Winnipeg), the municipal share of parking supply ranges from 15-33% of the market; and

- in smaller CMAs (e.g. Peterborough, Brantford, Sudbury), the municipal share of parking supply is generally higher, ranging from 28-66% of the market

[2] The rank correlation is -0.45 between the rank by CMA population and the rank by percentage of CBD parking supply comprised of municipal paid parking.

Table 1 – Municipal On-Street & Municipal Off-Street Parking Facilities				
Census Metropolitan Area	Off-Street Parking		On-Street Parking	
	No. Facilities	No. Spaces	No. Machines	No. Spaces
Toronto (ON) Toronto Parking Authority[9]	23 garages 207 lots	37,400	2,500 P&D 1,000 Meters	18,500
Vancouver (BC) EasyPark	21 garages 35 lots	11,019	8,500 Meters	8,500
Burnaby (BC)[10]	2 garages 8 lots	510	750 Meters	1,345
Ottawa (ON)	5 garages 12 lots	2,697	9 P&D 4,000+ Meters	4,263
Calgary (AB) Calgary Parking Authority	7 garages 38 lots	7,500	830 ParkPlus Zones	5,200
Edmonton (AB)	5 garages 5 lots	3,277	3,084 Meters	3,084
Winnipeg (MB) Winnipeg Parking Authority[11]	2 garages 5 major lots	1,880	631 P&D	3,757
Hamilton (ON)	2 garages 65 lots	4,700	Meters	2,500
Halifax (NS)	2 garages 9 lots	1,950	Meters	1,850
Oshawa (ON)	3 garages 7 lots	2,418	213 Meters & 109 P&D	670
Victoria (BC)	5 garages 5 lots	2,500	Meters & 250 Pay-by-Space	1,900
Windsor (ON)	3 garages 28 lots	2,983	Meters	1,500
Saskatoon (SK)	5 lots	215	Meters	2,500
St. John's (NF)	1 garage 6 lots	406	Meters	1,200
Barrie (ON)	1 garage 23 lots	1,905	700 Meters & P&D	1,000
Sudbury (ON)	12 lots	1,200	350 Meters	350
Kingston (ON)	4 garages 16 lots	2,300	500 Meters & 140 P&D	1,400
Guelph (ON)	2 garages 10 lots	1,620	Meters	800
Moncton (NB)	1 garage 14 lots	800	Meters	800
Brantford (ON)	1 garage 3 lots	1,170	Meters	480
Thunder Bay (ON)	2 garages 12 lots	1,800	Meters	1,150
Saint John (NB)[12]	35 lots	2,100	150 Meters & P&D	750
Peterborough (ON)	2 garages 9 lots	1,737	Meters	624
Source: Interviews				

[9] Toronto figures do not include TTC Park & Ride facilities (one garage and 23 surface lots) with 11,500 spaces.
[10] Burnaby figures do not include parking lots for City recreational facilities.
[11] Winnipeg has a total of 120 municipal parking lots, including those for all City recreational facilities and offices.
[12] Saint John figures include 7 regional 'park & ride' lots integrated with the transit system.

Table 2 – Municipal (On-Street & Off-Street) and Private CBD Parking				
Census Metropolitan Area	Municipally Provided	CBD Privately Provided	Total Parking	Municipally Provided
	No. Spaces	No. Spaces	No. Spaces	% of Spaces
Toronto (ON)	55,900	n/a	n/a	n/a
Vancouver (BC)	19,519	40,981	60,500	32%
Burnaby (BC)	1,855	n/a	n/a	n/a
Ottawa (ON)	6,960	23,040	30,000	23%
Calgary (AB)	12,700	39,375	52,075	24%
Edmonton (AB)	6,361	38,639	45,000	14%
Winnipeg (MB)	5,637	33,161	38,800	15%
Hamilton (ON)	7,200	8,725	15,925	45%
Halifax (NS)	3,800	n/a	n/a	n/a
Oshawa (ON)	3,088	n/a	n/a	n/a
Victoria (BC)	4,400	6,600	11,000	40%
Windsor (ON)	4,483	n/a	n/a	n/a
Saskatoon (SK)	2,715	n/a	n/a	n/a
St. John's (NF)	1,606	4,020	5,626	29%
Barrie (ON)	2,905	n/a	n/a	n/a
Sudbury (ON)	1,550	1,300	2,850	54%
Kingston (ON)	3,700	n/a	n/a	n/a
Guelph (ON)	2,420	n/a	n/a	n/a
Moncton (NB)	1,600	7,150	8,750	18%
Brantford (ON)	1,650	2,015	3,665	45%
Thunder Bay (ON)	2,950	n/a	n/a	n/a
Saint John (NB)	2,850	7,520	10,370	27%
Peterborough (ON)	2,361	1,237	3,598	66%

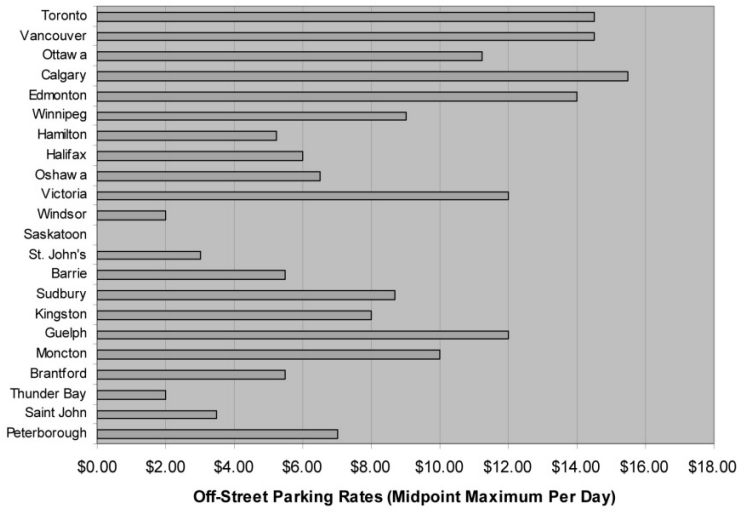
Source: Interviews and reports cited in footnotes. Note that the privately provided estimate generally comes from the subtraction from the total CBD parking of the municipally provided estimates from Table 1. While some of the municipally provided parking is likely outside of the CBD, we have chosen to include the full total of municipally provided parking for this comparison, as there is no consistent (across CMAs) breakdown of the distribution of municipally provided parking between CBD and non-CBD locations. Generally, privately provided parking includes parking facilities open to the general public as well as parking provided for the exclusive use of office/retail building tenants. It excludes residential parking for owners and tenants of housing in the CBD.

We theorize, in terms of an economic dynamic model, that as the CMA population grows, land values in the CBD rise and the opportunity cost of parking space increases. As the higher cost of parking and limited supply of parking spaces (relative to demand) impact on the parking price, there is greater incentive for the private sector to provide more private parking. Therefore, the negative relationship we find between CMA population size and the proportion of CBD parking provided by municipal paid parking is expected.

Another metric of interest is the relationship between overall CBD parking supply (both municipally provided and privately) and a parking demand indictor – the employment level of the CMA. This is expressed in terms of 'CBD parking availability per 100,000 central workers'[3]. Perhaps surprisingly, there is *no* relationship (rank correlation = -0.02) between CMA population size and the availability of total CBD parking[4].

A parking rate indicator was developed for off-street municipal paid parking (daily maximum). For simplicity, a mid-point of the range between minimum and maximum 'daily maximum' for off-street municipal lots in the CBD was used (see Figure 1).

Figure 1 – Off-Street Parking Rates (Mid-Point – Rate Per Day)



[3] 'Central workers' (Census 2006) are workers in the CMA 'central municipality' as defined in SC (2008) p.18.

[4] The rank correlation coefficient is -0.02 between the population rank and the rank for total CBD parking per 100,000 workers in the central municipality.

There is a strong positive relationship (rank correlation = 0.55) between CMA population size and off-street parking rates[5]. As larger municipalities are generally more reliant on private parking for CBD parking supply we expect that parking rates are higher for larger CMAs.

As parking rates are positively related to CMA population size and the percentage of CBD parking that is municipally provided is negatively related to CMA size, we expect to see a negative relationship (rank correlation = -0.37) between parking rates and the percentage of CBD parking that is municipally provided[6].

The economics of CBD parking suggest that private parking is profit-driven and will respond to price signals. The evidence confirms that in (generally larger) CMAs with higher off-street parking rates the private sector tends to provide a greater share of the parking capacity.

When we confine our analysis to larger CMAs where we expect to see the private parking market to be most developed we see a positive relationship (rank correlation = 0.58) between off-street municipal parking rates and parking availability in the CBD (see Figure 2)[7].

For two of the outliers, contextual information is useful in explaining their positioning so far off the regression line: 1) Calgary actively suppresses the construction of private parking within the CBD in favour of Calgary Parking Authority construction of municipally

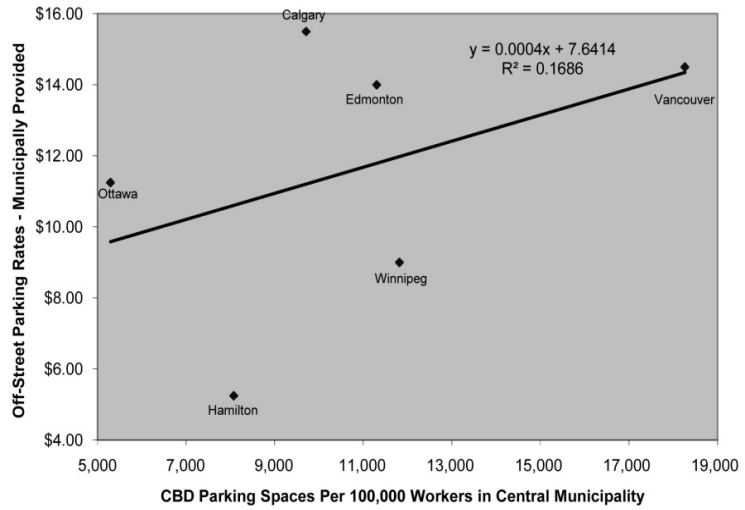
[5] The rank correlation coefficient is +0.55 between the CMA population rank and the rank for off-street parking midpoint maximum rates per day. Similar results were also found for on-street parking rates per hour (rank correlation = 0.65).

[6] The rank correlation coefficient is -0.37 between the rank for municipal off-street maximum rates per day and the rank of the percentage of CBD parking which is municipally-provided. It should be noted that we are using a measure of off-street parking rates for municipally-provided parking that underestimates the private parking rate.

[7] The rank correlation coefficient is +0.58 between the rank for municipal off-street rates per day and the rank of CBD parking availability (per 100,000 workers in the central municipality). The regression equation has a weak fit with the explanatory power of the regression (R^2) at 0.17.

provided parking on the fringe of the CBD; and 2) Hamilton has had a relatively stagnant CBD over many years, and a large share of the CBD parking is municipally provided, indicating that the private sector (experiencing low parking rates and abundant municipal parking supply) is not incentivized to offer more parking capacity.

Figure 2 – Linear Regression Relationship Between Off-Street Municipal Parking Rates & the Availability of CBD Parking (per 100,000 Worker in Central Municipality)

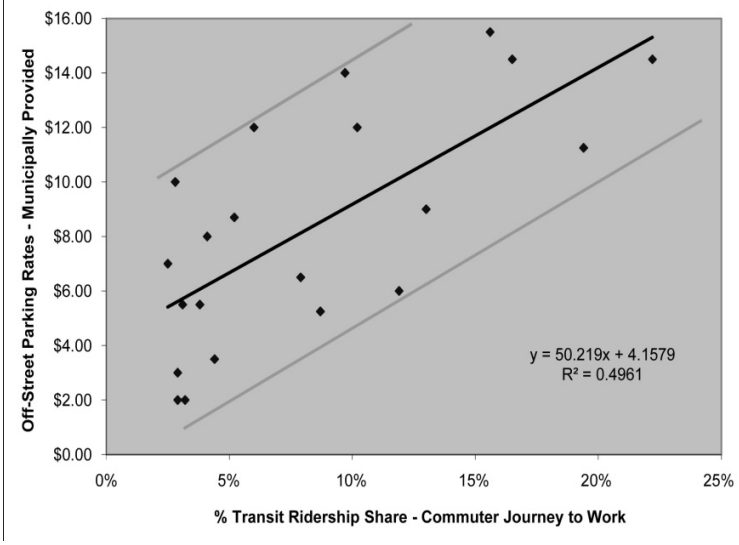


Initially, we failed to find any relationship between CBD parking availability and transit ridership percentage for commuters. Now, with a pricing signal, we find a strong positive relationship (rank correlation = 0.60) between off-street municipal parking (daily maximum) rates and transit ridership shares for commuters (see Figure 3)[8].

[8] The rank correlation coefficient is +0.60 between the rank for municipal off-street rates per day and the rank of transit ridership share of commuters (journey to work). The regression equation has a good fit with the explanatory power of the regression (R^2) at 0.50.

All of the relevant observations fall into a bounded area (between parallel lines) that mirrors the regression line. While there are other factors which determine transit ridership shares (e.g. transit system characteristics, network scale and scheduling, transit cost, CMA configuration) the role of parking price is important and positively related to transit ridership.

Figure 3 – Linear Regression Relationship Between Off-Street Municipal Parking Rates & the Transit Ridership Share for Commuter Journey to Work



From an economic perspective, City policies which address parking availability may be less important than those policies that determine parking price (although parking availability and parking price are linked through the market).

The economics of parking would suggest that private parking is profit-driven and responds to price signals. Municipal off-street parking rates are negatively related to the percentage of CBD parking that is municipally provided and positively related to per worker parking availability in the CBD (for larger CMAs).

Case Study – Calgary

The Calgary Parking Authority (CPA) is responsible for on-street and off-street parking and maintaining rates at market levels. City By-Law requires that CPA be self-sustaining from revenues. City Council approves both the capital plan and annual operations plan. In 2008, CPA had annual revenues (and expenses) of $64.1M. The CPA controls about 25% of CBD parking in Calgary with the bulk provided by private operators and a small share from shopping centres.

A Downtown Parking Strategy determined that:

- 50% of the (zoning) parking requirement in the CBD 'restricted area' will be provided by the developer; and

- 50% will be provided by the CPA, using 'cash-in-lieu of parking' (CILP) funds along with 30-year debt finance.

Cash-in-lieu of parking' (CILP) payments to the City are collected from downtown building developers so that the CPA can fund and operate municipally-operated parking facilities (generally on the fringe of the CBD).

Twice a year, CPA conducts a parking market study to determine the range of parking rates in the CBD and works to set CPA rates at 'mid-range' relative to the commercial market. The municipal off-street parking rate (midpoint of range for daily maximum) is almost three times that of the adult transit fare. Calgary's transit ridership share for commuters is almost 16%.

Conclusions

The results of this paper suggest that *parking price* is important in influencing transit ridership – at least on the basis of cross sectional analysis of parking data for Canadian CMAs. There is not yet full acceptance by city politicians and officials of the importance of parking pricing policy and there is a lack of public acceptance of the

benefits of higher parking prices. Shoup (2005) concluded his critique of North American parking policies with the observation that:

> *"...we can let prices do the planning…"*

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