The Effectiveness and Distributional Effects of the Tax Credit for Public Transit

Vincent Chandler[1]
chandlev@econ.queensu.ca

Department of Economics
Dunning Hall, Room 333
94 University Avenue
Queen's University
Kingston, Ontario
K7L 3N6

Abstract

This paper studies the impact of a non-refundable tax credit for public transit introduced in July 2006 in Canada. I find no evidence that this tax credit increased the number of trips done using public transit. There is, however, some suggestive evidence that it did induce commuters to purchase monthly passes. Finally, the paper discusses the distributional effect of this tax credit.

JEL Codes: H23, Q58, R48

June 2014

[1]The author wishes to thank the STM (Montreal), TTC (Toronto), TransLink (Vancouver), Winnipeg, Ottawa, and Edmonton for providing data from this paper. Furthermore, the help from Chris Parsley (Canada Revenue Agency), Owen Jung, Hande Tanerguclu (Edmonton) was much appreciated.

1 Introduction

Car drivers cause harm to others by polluting the air and congesting the road system. In the presence of negative externalities, the role of the social planner is to make agents internalize this cost. One method to do so is to transform the social benefit associated with public transit into a private benefit. With this objective in mind, the Canadian government introduced a non-refundable tax credit for public transit in 2006. This credit allows Canadians to deduct 15 percent of their yearly cost[2] for public transit from their income tax burden. Tax-payers claiming this credit can reduce their income tax burden by about $100 on average. Through this reduction in the private cost of public transit, the government aimed to increase ridership[3] taking advantage of the positive elasticity of demand for public transit (e.g. Graham, Trotte and Anderson, 2009 or Litman, 2004).

This paper studies the effectiveness of this tax measure on public transit use in major Canadian cities, and finds that the policy had no impact on the number of trips done using public transit within major Canadian cities (Montreal, Ottawa, Toronto, Winnipeg, Edmonton and Vancouver). The policy did, however, have an impact on the number of monthly passes sold. There is some evidence in Montreal, Toronto, Winnipeg and Edmonton that the policy encouraged commuters to purchase a monthly pass instead of tickets, because monthly passes were eligible for this tax credit, and tickets, not.

Finally, this paper also documents the use of the tax credit for different income groups. First, as it is a non-refundable tax credit, only individuals paying income tax can benefit from this policy. These individuals are on average wealthier than those not paying any income tax. Second, I show that individuals with modest incomes but paying income tax do not seem to use the tax credit as much as those with high-incomes. For example, the average tax payers with high incomes ($90 000 to $100 000) received 40 percent more from this tax credit than did tax payers with modest incomes ($25 000 and $30 000). This difference may be rooted in differences in use or may be the result of greater awareness on the part of high-income individuals. It is however important to keep in mind that richer households did pay a larger share of income tax than the share they received from this tax credit.

[2]Only the cost of monthly or yearly passes can be deducted.

[3]From the 2006 budget: "This incentive to use public transit will help ease traffic congestion and improve the environment."

2 Literature Review

The purpose of a tax credit on public transit is to reduce the cost of public transit to induce usage. Empirical evidence does suggest that demand for public transit is sensitive to changes in fares. In a meta-study, Finance Canada (2012) finds a median elasticity of -0.40. Graham, Trotte and Anderson (2009) summarize the research in this field with the three following stylized facts. First, rural areas tend to have a higher elasticity than urban areas. Second, discretionary users tend to be more responsive to fare prices than daily commuters. Third, the price-elasticity will depend on the type of public transit. Rail transit, for example, tends to be used by higher-income individuals who may not be very responsive to changes in fares (Pratt, 1999).

Methodology represents an important challenge in this literature. Researchers generally explain variations across time in the number of passengers using variations in fare and interpret the coefficient as a causal estimate. This interpretation is faulty, because the fare is not exogenously determined. Transit corporations could, for example, choose a fare at which they can recover a certain proportion of their cost. If the number of passengers decreases, they may be forced to increase the fare. In such an environment, it is difficult to determine the direction of causality: do variations in fare cause variations in ridership or conversely do variations in ridership cause variations in fare? Changes in policies like the introduction of the tax credit make it possible to identify the direction of the causality channel.

3 Tax Credit for Transit

The Public Transit Tax Credit was announced on May 2nd 2006 in the federal budget, and introduced on July 1st 2006. It allows commuters to reduce their tax burden by deducting 15 percent of the total eligible cost for public transit incurred by themselves or by a family member. For example, if a person paid $1200 per year for transit, this person could reduce his or her income tax by $180 assuming that the income tax due was above $180. Only monthly or annual passes are eligible for this tax credit[4].

[4] As of 2007, weekly passes used consecutively were also eligible.

This tax credit was well publicized from the onset. A website explains the rationale behind the credit and the amount that can be claimed by tax payers[5]. In 2008, 1.5 million tax payers took advantage of the tax credit and claimed $1.1 billion (Canada Revenue Agency, 2012) in transit cost. Since the tax credit reimburses only 15 percent of total cost, the cost of this tax credit was $135 million in 2008 in foregone tax revenues (Finance Canada, 2012)[6]. To give some context to this amount, it represents about 3 percent of the cost incurred by the six major public transit operator[7].

4 Data and Methodology

The tax credit for transit could affect commuters through two channels. First, the change in relative cost between car and public transport could induce car-commuters to take public transportation[8]. This would lead to one extra monthly pass and about 40 or more trips per month assuming one return trip to work per day for 4 weeks. If this channel is important, we should observe a large increase in the number of trips done with public transportation, but a small increase in the number of monthly passes sold. Second, the change in relative cost between monthly passes and tickets could induce ticket-users to buy a monthly pass. These new pass holders may not use public transport significantly more often, but they will contribute to an increase in the number of monthly passes sold. If this second channel is relevant, we would observe no substantial increase in ridership, but an increase in the number of monthly passes sold.

It is impossible to determine precisely the size of both channels, but it is possible to guess their relative importance. If there is a large increase in ridership, and a small increase in the number of passes, the first channel is probably relatively larger. Conversely, if there is a small increase in ridership, and a large increase in the number of passes, the second channel is probably more important.

To study the impact of the policy, I would ideally need a counter-factual:

[5]This information was advertised on the following website: http://www.transitpass.ca/ which is no longer in use.

[6]Some tax-payers may not owe enough income tax to make full-use of the 15 percent.

[7]Total cost for the six cities in the sample in 2012 was close to $5 billion.

[8]It could also induce people who walk, bicycle or car-pool to work, even though these people do not cause negative externalities.

what would have happened in a city had the policy not been introduced. Unfortunately, this policy was implemented in all Canadian cities. Transit systems in American cities could act as counter-factual, but they probably do not have the same shocks as the ones facing Canadian transit systems. Instead, I consider six major Canadian cities: Montreal, Ottawa, Toronto, Winnipeg, Edmonton and Vancouver[9]. If a similar effect can be observed in all these cities, it is probably due to the policy change. More specifically, if the policy had an impact on ridership or on the number of monthly passes sold, there will have been a jump in usage in the months following the introduction of the tax credit in July 2006.

Unfortunately, it is impossible to simply use ridership and the number of monthly passes sold to determine the success of the policy for two reasons: non-stationarity and seasonality. Non-stationarity exists when a certain variable has an upward trend. Both the number of trips and the number of passes sold have an upward trend, because population tends to increase. When conducting regression analysis on non-stationary series, significant results may be spurious, because the estimates of standard errors are incorrect (MacKinnon and Davidson, 2004). Seasonality is present when the value of a variable varies according to the season. Such a phenomenon is present in the use of public transit, because there is generally less usage in summer when commuters are on vacation.

To address both issues, I transform both dependent variables (ridership and number of passes) into a 12-month difference. In other words, the value of a variable in February 2010 is no longer its value in February 2010 but the difference between its value in February 2010 and its value in February 2009. This transformed variable is stationary[10], because the variation has no trend. Furthermore, there is no seasonal effect, because any seasonal effect that would have affected February 2010 would also have affected February 2009.

When using a 12-month difference, the policy no longer creates a permanent jump in the variable, but it leads to a temporary increase for the year following the policy change. If the months in the year following the policy change have on average a greater increase in usage than months outside of this interval, it is possible to say that the policy had a positive impact on

[9]The city of Calgary could not provide monthly data.

[10]Assuming a constant geometric growth rate, there would be a small upward trend over a long period, but within the 16 years of interest, no trend is noticed.

the number of trips or monthly passes sold. This effect can be captured by a dummy variable which takes the value of 1 for the 12-month period following the introduction of the policy and 0 otherwise. To determine the magnitude of the change, I conduct the following regression:

$$\begin{aligned} y_t = \beta_0 + \beta_1 \text{Tax Credit Dummy} + \beta_2 \text{Lag Operators} \\ + \beta_3 \text{Fuel Variation} + \beta_4 \text{Fare Variation} + \beta_5 \text{Events} \end{aligned} \tag{1}$$

- **Tax Credit Dummy** is a dummy which equals "1" for the 12-month period following the introduction of the policy.

- **Lag Operators** is the value of the dependent variable for the previous month.

- **Fuel Variation** is the 12-month variation in the price of fuel.

- **Fare Variation** is the 12-month variation in the fare prices (monthly pass).

- **Events** represents dummy variables to control for major events that may have affected transit usage in a specific city.

Lag operators capture the fact that commuters change their behavior gradually. If there is a short-term trend, it will be captured by the lag. Variations in the price of fuel control for changes in the cost of commuting by car and should be positively correlated with both dependent variables. Fuel prices are taken for Toronto West, because it is the most current measure on gas prices[11]. Even though, the prices are different across the cities, the 12-month variations are highly correlated across major cities. Fare variations capture the cost of taking public transportation and should be negatively correlated with both dependent variables. The fare taken is the price of a monthly pass for each of the six transport corporations. Finally, important

[11] Data available from the Ontario Ministry of Energy.

events may also affect the use of public transport. Strikes, for example, would reduce usage, and major events like the Olympics would increase it.

These regressions are conducted using ordinary least square. The relatively small sample size ($n < 200$) and the large number of explanatory variables make it impossible to use more sophisticated tools like ARIMA. Preliminary analysis has shown the absence of a moving-average component making ordinary least square with lags suitable for this analysis.

The exact choice of the model is guided by the data. I first perform the regression with all explanatory variables. I then remove variables that were not significant at the 10 percent level to verify if the coefficient estimated for the tax credit dummy is robust to this new specification. When a lag is significant at the 10 percent level, I always keep all previous lags.

5 Impact of Tax Credit on Usage in Different Cities

5.1 Montreal

Figures 1 shows the 12-month variations in the number of trips done using the Societe des Transports de Montreal (STM). There is no graphical evidence of the impact of the policy (area between the two vertical lines). Other events might have influenced ridership and the number of monthly passes sold. The extension of the subway to Laval, for example, could have increased ridership. Conversely, the November 2003 strike is probably responsible for the fall in ridership at the end of 2003.

Figure 2 indicates a slight increase in the number of passes sold in Montreal following the introduction of the policy (first vertical line). The drop at the end of 1998 is probably due to the introduction of the CAM hebdo, which is a weekly pass that might have been purchased by some users instead of the monthly pass. This weekly pass is not included in the data, because it was not eligible for the tax credit when it was introduced. The spike in 2002 corresponds to the introduction of the "Carte Privilege", which allowed students aged 18 to 25 to buy a monthly pass at a reduced price. Previously, users aged above 18 would have had to buy the monthly pass at the regular price, so many of them probably preferred buying tickets.

Figures 1 and 2 here

Table 1 provides the regression results for both variables. The regressions take into effect the different events mentioned in the two previous paragraphs. We fail to reject the null hypothesis that the policy had no impact on ridership. However, there is some evidence (p=0.04) that the tax credit may have led to an increase in the number of monthly passes sold. The variation of fuel prices seems to have a positive impact on ridership, but no impact on the number of passes sold.

Table 1 here

5.2 Ottawa

The time span of figures 3 and 4 is restricted to the period before 2009 to avoid problems related with the very long strike endured by commuters of OC-Transpo between December 10th 2008 and February 10th 2009. This strike encouraged commuters to abandon public transport in the following years.

Figure 3 shows the 12-month variations in the number of trips done using OC-Transpo in Ottawa. As in the case of Montreal, there is no evidence that the number of trips increased as a result of the policy. Figure 4 reports the 12-month variations for the number of passes sold. There is some weak visual evidence that the policy would have increased the number of monthly passes.

Figures 3 and 4 here

The regression results provided in table 2 show that the policy did not have any significant impact on either the number of trips or the number of passes sold. As in the case of Montreal, fuel variation has a positive impact on the number of trips, and fare variation has no impact on the number of trips or the number of passes sold.

Table 2 here

5.3 Toronto

Figure 5 shows the 12-month variation in the number of trips undertaken using the TTC. One striking element is the presence of regular spikes (January

and December every 6 years) that either go up (January 2001 and 2007) or down (December 2001 and 2007). These spikes are the result of accounting practices. Since the TTC financial year must end on Saturday, December 2001 included the first five days of 2002, while December 2000 did not include the last days of 2000. These spikes do not reflect any actual increase in usage. To make sure that these events do not affect the results, I use a dummy for both positive and negative spikes. The student discount introduced in September 2010 may also have increased ridership independently of the tax credit. If we abstract from this accounting anomaly and the student discount, figure 5 does not provide any visual evidence that the policy marked by the two vertical lines created a plateau.

Figure 6, however, provides some evidence of a plateau following the introduction of the policy. This evidence would suggest that the number of monthly passes sold in the year following the introduction of the policy increased the number of users purchasing monthly passes.

Figures 5 and 6 here

For both the number of trips and the number of passes, I include dummies to capture the specific accounting practices of the TTC and the fact that a student discount was introduced in September 2010. Table 3 shows that the tax dummy has no significant explanatory power when explaining the number of trips, but does have significant explanatory power when explaining the number of monthly passes sold. The price of fuel has the expected impact of increasing the number of trips and the number of passes sold. Contrary to results in Montreal and Ottawa, an increase in fare, has a significant impact on the number of trips and in the number of monthly passes sold.

Table 3 here

5.4 Winnipeg

While figure 7 shows no distinguishable impact of the policy on the number of trips, figure 8 does show an increase in the number of passes sold following the introduction of the policy.

Figures 7 and 8 here

The regression results in table 4 confirm these findings. The introduction of the tax credit had no significant impact on the number of trips, but did increase the number of monthly passes sold. Similarly to Montreal, variations in fuel only has an impact on ridership, while variations in fare has no significant impact.

Table 4 here

5.5 Edmonton

The city of Edmonton could only provide data for the number of trips starting in 2005 and on the number of passes starting in 2000. For this reason, figures 9 and 10 cover a smaller span than the previous ones. While figure 9 shows no impact of the policy on the number of trips, figure 10 does show a plateau following the introduction of the policy, suggesting that the policy led to an increase in the number of monthly passes sold.

Figures 9 and 10 here

Table 5 shows that the tax credit dummy had no significant impact on the number of trips, but did have one on the number of passes sold.

Table 5 here

5.6 Vancouver

Translink, the organization responsible for the public transit in Vancouver, could only provide monthly data for the number of trips. Two events had a major impact on ridership: the 2001 strike and the 2010 Olympic games. As in the previous cases, figure 11 shows no impact following the introduction of the policy.

Figure 11 here

The regression results in table 6 provide a similar picture. The coefficient on the tax credit dummy is not significant in both specifications.

Table 6 here

6 Redistributive Impact

Not only could this tax credit impact ridership, it could also redistribute income. By definition, a non-refundable tax credit can only be used by people who pay income tax. The poorest segment of the population therefore cannot benefit from this tax credit. Table 7 shows the average credit received for different income groups. Not surprisingly, the average credit per return is fairly low for individuals with incomes between $20 000 and $25 000 ($5.99). Many of these individuals do not pay any income tax and would therefore not claim a tax credit. Individuals with incomes between $90 000 and $100 000 have a higher probability of paying income tax. It is therefore not surprising that they receive on average 88.1 percent more than individuals with incomes between $20 000 and $25 000.

Table 7 here

When we consider the average credit per taxable return, the difference between the average credit received by different income groups should disappear. However, individuals paying income tax with an income between $90 000 and $100 000 still receive on average 44.7 percent more from this tax credit than those individuals paying income tax and earning incomes between $20 000 and $25 000. The difference may stem from a difference in usage across income groups. Even though Munro (2007) shows that that the probability that at least one person in the household uses public transit is similar across different income groups, there could still be some variation in the intensity of use and thus affect the amount claimed. Variations could also be due to difference in awareness. Wealthier households may be better informed and thus more able to take advantage of these tax credits.

Even though richer households claim more than poorer households, the share of the total claimed by richer households is smaller than the share of income tax paid by these households as shown in table 8 making the tax credit progressive.

Table 8 here

7 Discussion

This paper cannot reject the hypothesis that this tax credit for public transit has no impact on ridership. Its only noticeable impact is to induce commuters

to buy monthly passes instead of tickets. Moreover, this tax credit benefits more richer households than poorer ones even if we only consider individuals who paid income tax.

There is therefore no economic justification for this tax credit especially considering the compliance cost associated with tax credits. Its justification, however, may be political. Most Canadians fill out a tax return and see this tax credit every year, making it very visible for voters. Many of them will remember which party introduced this tax credit and may give them some political credit for it. Much research has studied the role of government spending on electoral outcomes, but very little attention has been devoted to the role of tax credits to sway the electorate. With the introduction of tax credits for childrens arts, children fitness, adult fitness and search and rescue volunteers, more attention needs to be devoted to their impact on voting behavior.

8 Bibliography

Canada Revenue Agency. 2012. "T1 Final Statistics 2011." Accessed October 25th 2013. http://www.cra-arc.gc.ca/gncy/stts/gb09/pst/fnl/html/tbl2-eng.html .

Finance Canada. 2012. "Tax Expenditures and Evaluations 2011." Accessed October 25th 2013. http://www.fin.gc.ca/taxexp-depfisc/2011/taxexp11-eng.pdf .

Graham, D.J., A. Trotte, and, R. J. Anderson. 2009. "A dynamic panel analysis of urban metro demand." *Transportation Research Part E: Logistics and Transportation Review* 45(5): 787794.

Litman, T. 2004. "Transit Price Elasticities and Cross-Elasticities". *Journal of Public Transportation* 7(2): 37-58.

MacKinnon, J., and R. Davidson. 2004. *Econometric Theory and Methods*, Oxford: Oxford University Press.

Munro, A. 2007. "Public Transit in Canada." Accessed October 25th 2013. http://www.statcan.gc.ca/pub/16-002-x/2010002/tbl/11283/tbl003-

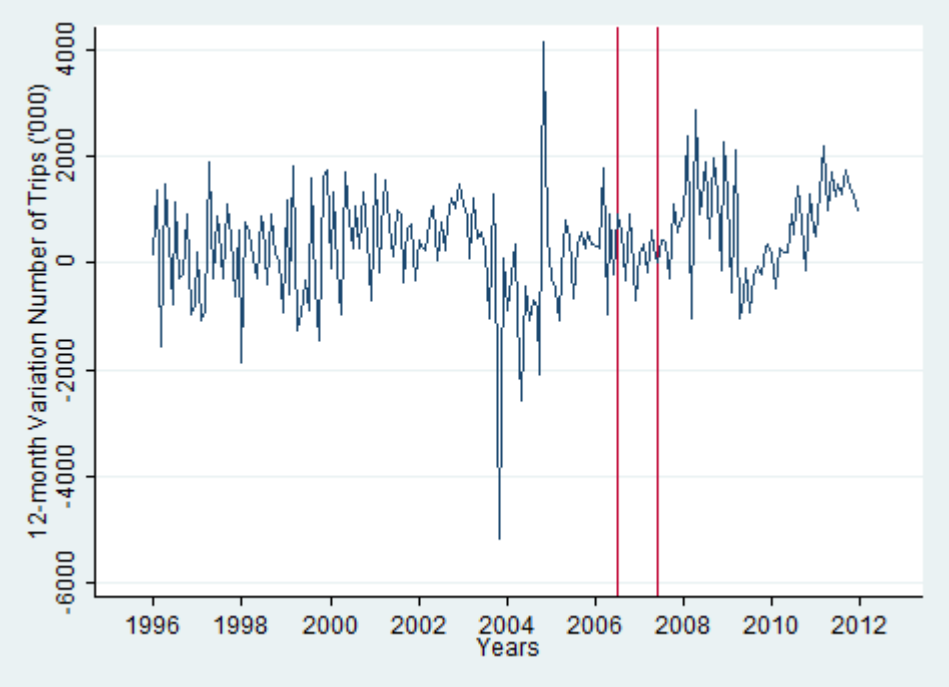
eng.htm.

Ontario Ministry of Energy. 2012. "Fuel Prices." Accessed November 25th 2013. http://www.energy.gov.on.ca/en/fuel-prices/

Pratt, R. 1999. Traveler Response to Transportation System Changes, Interim Handbook. TCRP Web Document 12, DOT-FH-11-9579, National Academy of Science.

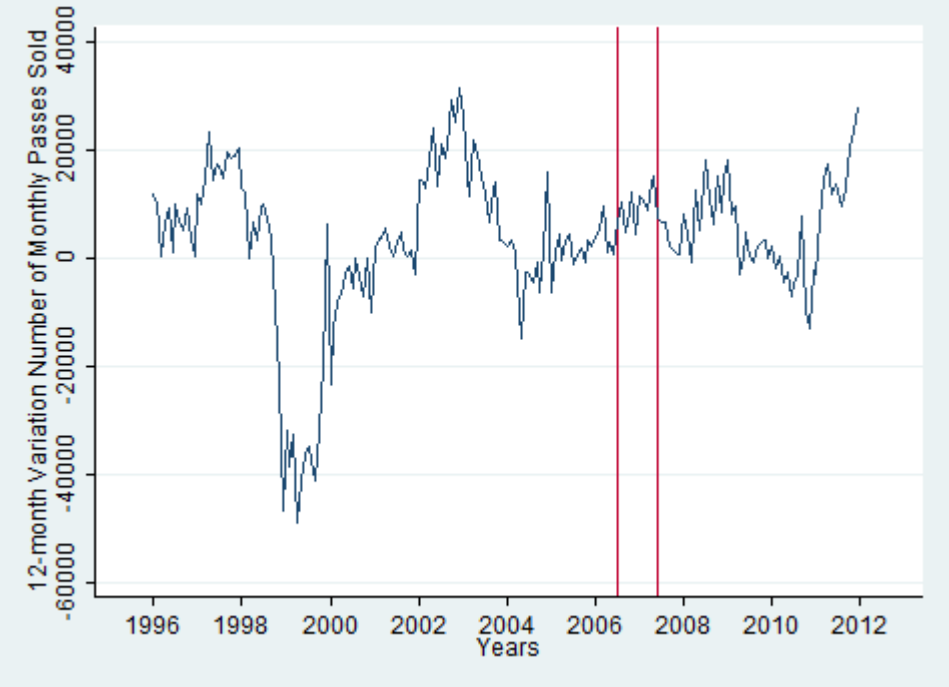
9 Figures

Figure 1: 12-month Variation in the Number of Trips in Montreal



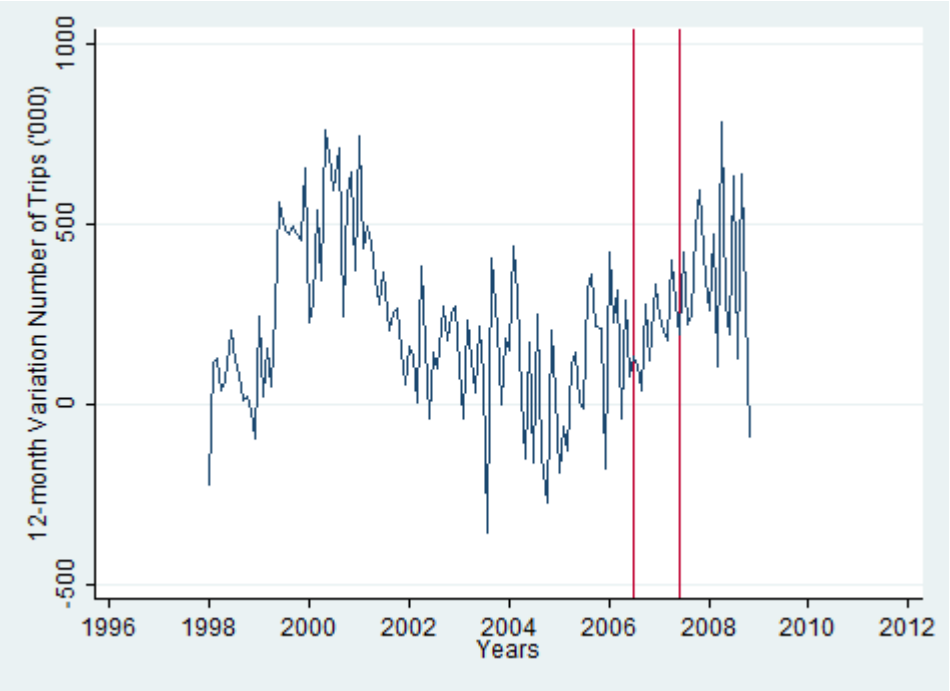
Description: The 12-month variation in the number of trips between 1996 and 2012.

Figure 2: 12-month Variation in the Number of Passes in Montreal



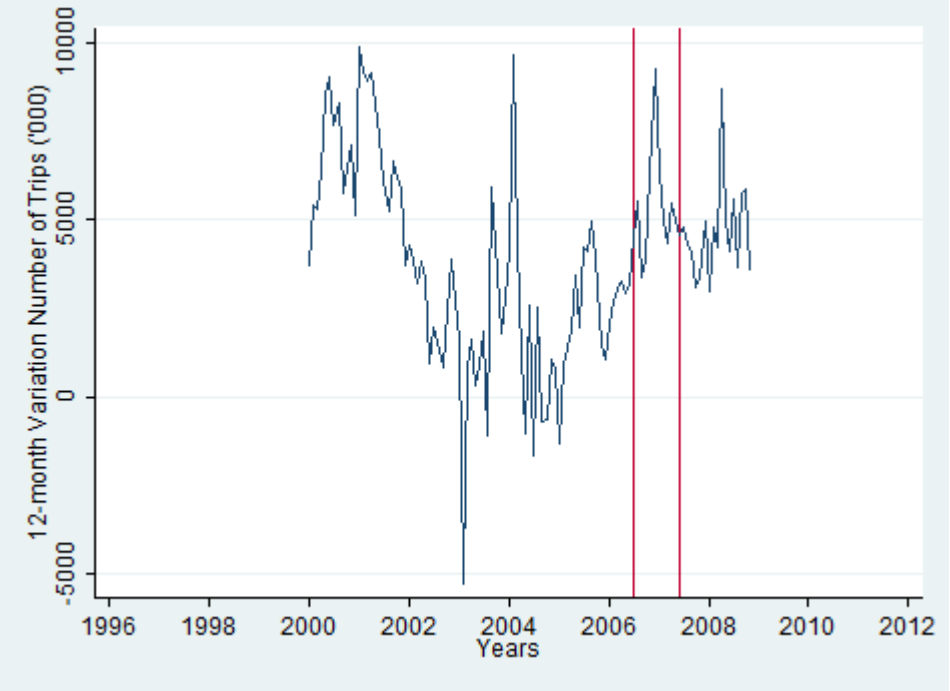
Description: The 12-month variation in the number of passes sold between 1996 and 2012.

Figure 3: 12-month Variation in the Number of Trips in Ottawa



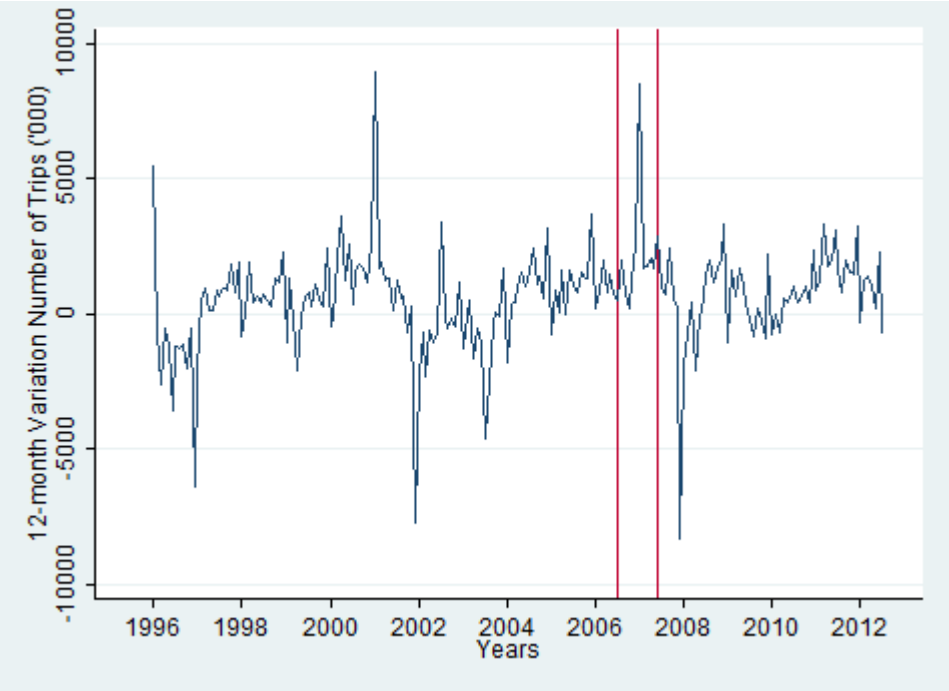
Description: The 12-month variation in the number of trips between 1998 and 2009. The sample was reduced to avoid the two-month strike.

Figure 4: 12-month Variation in the Number of Passes in Ottawa



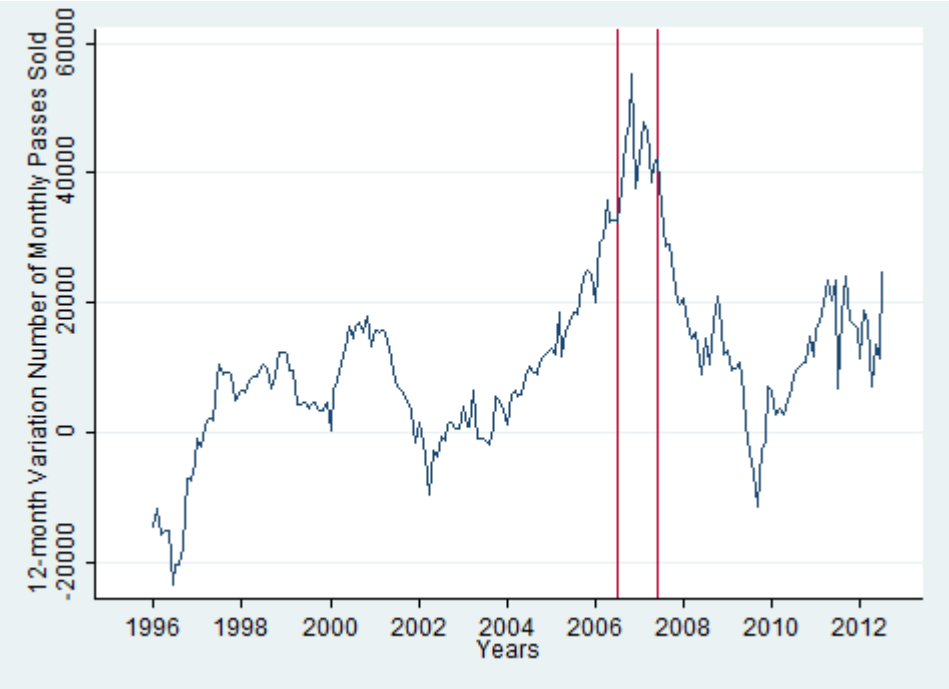
Description: The 12-month variation in the number of passes sold between 1998 and 2009. The sample was reduced to avoid the two-month strike.

Figure 5: 12-month Variation in the Number of Trips in Toronto



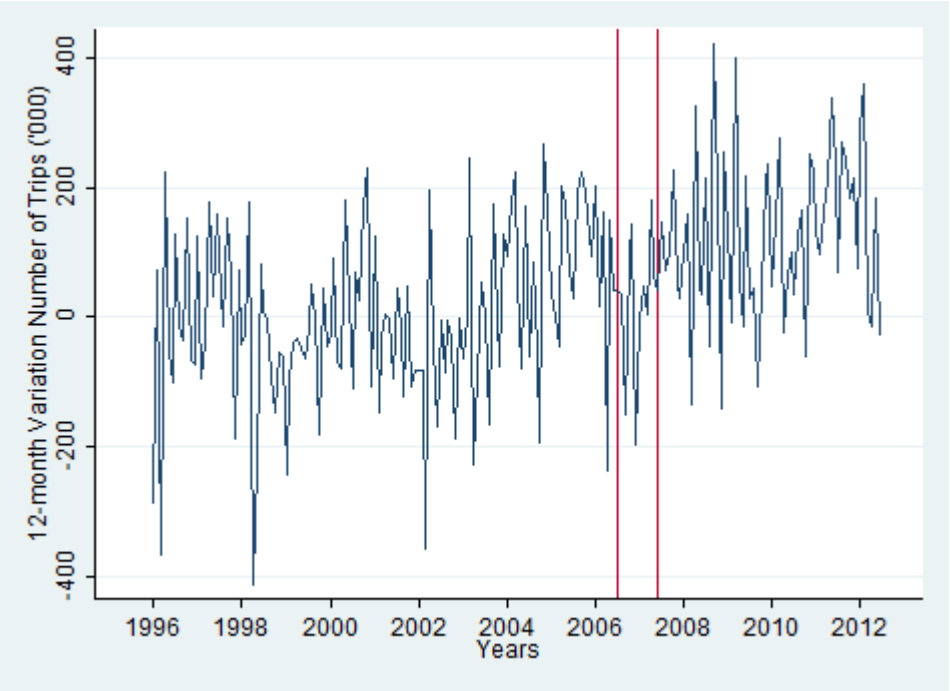
Description: The 12-month variation in the number of trips between 1996 and 2012.

Figure 6: 12-month Variation in the Number of Passes in Toronto



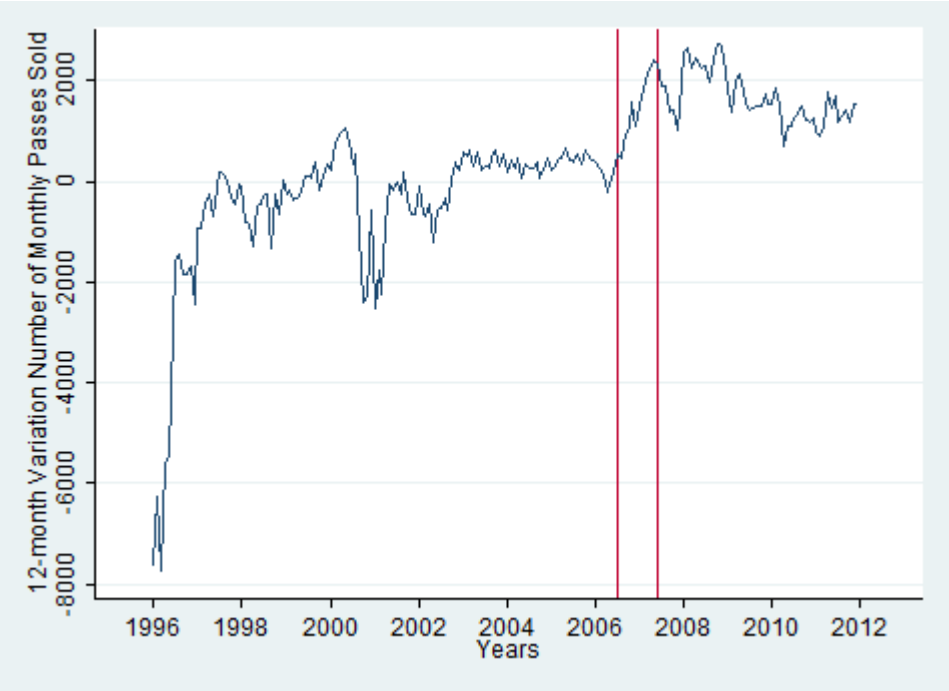
Description: The 12-month variation in the number of passes sold between 1996 and 2012.

Figure 7: 12-month Variation in the Number of Trips in Winnipeg



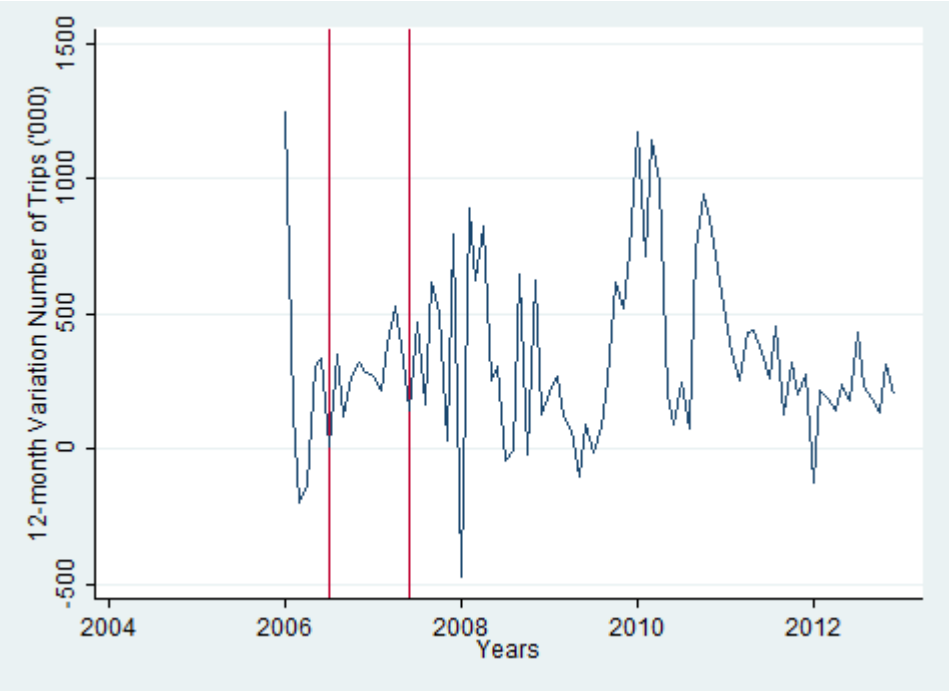
Description: The 12-month variation in the number of trips between 1996 and 2012.

Figure 8: 12-month Variation in the Number of Passes in Winnipeg



Description: The 12-month variation in the number of passes sold between 1996 and 2012.

Figure 9: 12-month Variation in the Number of Trips in Edmonton

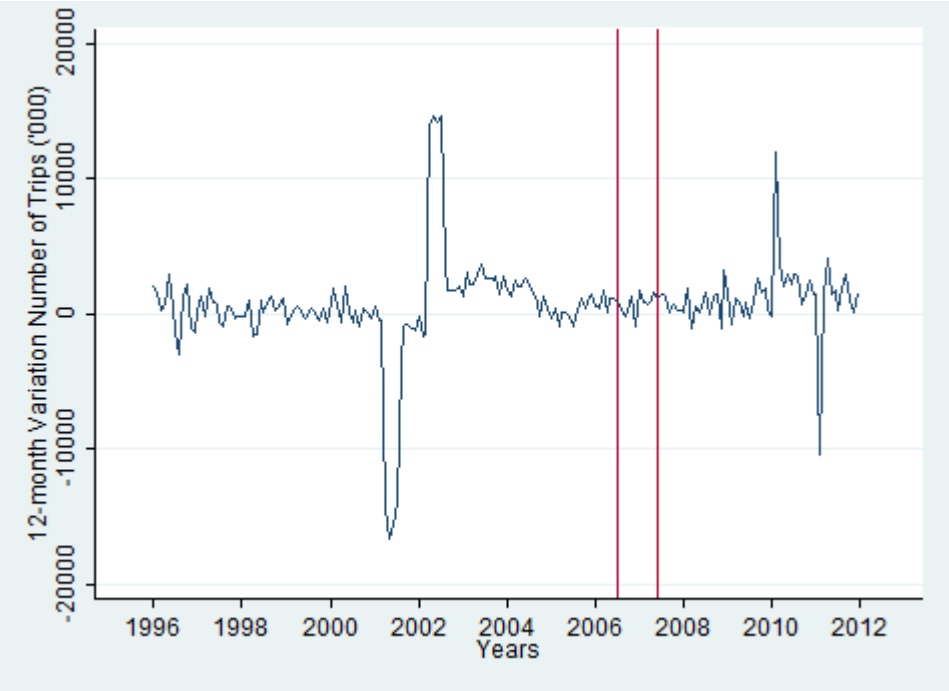


Description: The 12-month variation in the number of passes sold between 2001 and 2012.

Figure 10: 12-month Variation in the Number of Passes in Edmonton

Description: The 12-month variation in the number of passes sold between 2001 and 2012.

Figure 11: 12-month Variation in the Number of Trips in Vancouver



Description: The 12-month variation in the number of passes sold between 1996 and 2012.

10 Tables

Table 1: 12-month Difference in Trips and Passes Sold in Montreal

	(1)	(2)	(3)	(4)
	Trips		Passes	
Tax Credit Dummy	-38.52	77.03	2693.8**	2406.9**
	(0.812)	(0.586)	(0.018)	(0.036)
First Lag Trips	-0.0823	-0.0737		
	(0.269)	(0.400)		
Second Lag Trips	0.111*	0.132*		
	(0.087)	(0.052)		
Third Lag Trips	0.307***	0.346***		
	(0.000)	(0.000)		
Fuel Variation	11.87**	14.68***	40.14	38.01
	(0.014)	(0.006)	(0.149)	(0.166)
Fare Variation	-86.30		-306.8	
	(0.210)		(0.403)	
Dummy Privilege	342.7**	395.1***	7597.6***	7771.4***
	(0.012)	(0.004)	(0.000)	(0.000)
Dummy Laval	347.3		-1330.5	
	(0.255)		(0.234)	
Dummy CAM Hebdo	-344.6		-16938.9***	-16393.0***
	(0.315)		(0.000)	(0.000)
Strike Actual	-2558.0		-2675.9	
	(0.148)		(0.273)	
Strike 12m	1943.3		1235.0	
	(0.251)		(0.532)	
First Lag Pass			0.403***	0.410***
			(0.000)	(0.000)
Second Lag Pass			0.138**	0.140**
			(0.047)	(0.039)
		23		
Third Lag Pass			0.153	0.145
			(0.110)	(0.126)
Constant	341.1**	128.7	2048.7**	1362.5**
	(0.028)	(0.196)	(0.031)	(0.020)
N	189	189	189	189

Table 2: 12-month Difference in Trips and Passes Sold in Ottawa

	(1)	(2)	(3)	(4)
	Trips		Passes	
Tax Credit Dummy	11.17	26.24	352.3	504.0
	(0.895)	(0.489)	(0.648)	(0.301)
First Lag Trips	0.00864	0.00857		
	(0.919)	(0.919)		
Second Lag Trips	0.0629	0.0627		
	(0.306)	(0.307)		
Fuel Variation	5.125**	5.207***	-9.067	
	(0.012)	(0.003)	(0.657)	
Fare Variation	2.997		1.993	
	(0.833)		(0.987)	
O-train	2.630		-815.9*	-539.5
	(0.956)		(0.085)	(0.143)
First Lag Pass			0.476***	0.682***
			(0.000)	(0.000)
Second Lag Pass			0.174	
			(0.148)	
Third Lag Pass			0.130	
			(0.244)	
Constant	171.6***	175.5***	956.0**	1259.9***
	(0.000)	(0.000)	(0.047)	(0.004)
N	131	131	104	106
R^2	0.081	0.081	0.526	0.487

Robust p-values in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 3: 12-month Difference in Trips and Passes Sold in Toronto

	(1)	(2)	(3)	(4)
	Trips		Passes	
Dummy Tax Credit	387.5	353.5	6319.0***	6137.9***
	(0.170)	(0.215)	(0.001)	(0.001)
First Lag Trips	0.166***	0.171***		
	(0.001)	(0.000)		
Second Lag Trips	0.112**	0.117***		
	(0.010)	(0.009)		
Third Lag Trips	0.121**	0.125**		
	(0.019)	(0.016)		
Fuel Variation	16.35**	19.11***	98.80***	100.4***
	(0.014)	(0.002)	(0.000)	(0.000)
Fare Variation	-65.07***	-64.51***	-196.9***	-204.5***
	(0.002)	(0.003)	(0.005)	(0.004)
Dummy Student	462.8		499.6	
	(0.124)		(0.770)	
First Lag Pass			0.659***	0.662***
			(0.000)	(0.000)
Second Lag Pass			0.149	0.182**
			(0.126)	(0.017)
Third Lag Pass			0.0312	
			(0.690)	
Constant	443.3***	453.2***	1666.6***	1638.4***
	(0.002)	(0.001)	(0.000)	(0.000)
N	189	189	189	190
R^2	0.620	0.617	0.928	0.928

Robust p-values in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 4: 12-month Difference in Trips and Passes Sold in Winnipeg

	(1)	(2)	(3)	(4)
	Trips		Passes	
Tax Credit Dummy	12.29	12.29	415.5***	342.2***
	(0.665)	(0.665)	(0.000)	(0.000)
First Lag Trips	-0.0227	-0.0227		
	(0.760)	(0.760)		
Second Lag Trips	0.0753	0.0753		
	(0.161)	(0.161)		
Third Lag Trips	0.404***	0.404***		
	(0.000)	(0.000)		
Fuel Variation	2.385***	2.385***	3.481*	2.908
	(0.001)	(0.001)	(0.100)	(0.146)
Fare Variation			-65.38	
			(0.314)	
First Lag Pass			0.687***	0.659***
			(0.000)	(0.000)
Second Lag Pass			0.233*	0.215
			(0.075)	(0.101)
Third Lag Pass			-0.0969	
			(0.272)	
Constant	15.14	15.14	176.2	53.84
	(0.151)	(0.151)	(0.149)	(0.204)
N	195	195	189	190
R^2	0.254	0.254	0.881	0.886

Robust p-values in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 5: 12-month Difference in Trips and Passes Sold in Edmonton

	(1)	(2)	(3)
	Trips		Pass
Tax Credit Dummy	4.976	-50.67	1265.2**
	(0.947)	(0.378)	(0.012)
First Lag Trips	0.172	0.203	
	(0.247)	(0.187)	
Second Lag Trips	0.303*	0.328**	
	(0.067)	(0.039)	
Third Lag Trips	-0.151	-0.148	
	(0.126)	(0.138)	
Fuel Variation	3.134	2.407	25.47***
	(0.140)	(0.149)	(0.005)
Fare Variation	11.97		-77.43
	(0.330)		(0.149)
First Lag Pass			0.335***
			(0.003)
Second Lag Pass			0.248*
			(0.058)
Third Lag Pass			0.281***
			(0.004)
Constant	167.2***	205.6***	184.8*
	(0.005)	(0.001)	(0.099)
N	81	81	129
R^2	0.242	0.229	0.851

Robust p-values in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 6: 12-month Difference in Trips in Vancouver

	(1)	(2)
	Trips	
Tax Dummy	-256.8	-287.8
	(0.320)	(0.264)
First Lag Trips	0.165***	0.168***
	(0.003)	(0.003)
Second Lag Trips	-0.0567	-0.0576
	(0.248)	(0.261)
Third Lag Trips	0.0862**	0.0862**
	(0.043)	(0.047)
Fourth Lag Trips	-0.00328	-0.00376
	(0.934)	(0.925)
Fifth Lag Trips	0.0805***	0.0844***
	(0.005)	(0.002)
Fuel Variation	6.263	
	(0.388)	
Fare Variation	-61.91**	-55.56**
	(0.025)	(0.037)
Dummy Strike	-13899.9***	-13920.2***
	(0.000)	(0.000)
Dummy Strike 12m	12034.9***	11954.2***
	(0.000)	(0.000)
Olympics	10689.6***	10746.1***
	(0.000)	(0.000)
Olympics 12m	-11346.2***	-11300.6***
	(0.000)	(0.000)
Constant	840.9***	858.7***
	(0.000)	(0.000)
N	141	141
R^2	0.938	0.937

Robust p-values in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 7: Average Amount Received by Tax Filer for Different Income Groups

Income Range	Average Credit per Return ($)	Average Credit per Taxable Return ($)
20 to 25k	5.99	7.80
25 to 30k	7.08	7.88
30 to 35k	7.45	7.84
35 to 40k	8.05	8.30
40 to 45k	8.35	8.51
45 to 50k	8.99	9.11
50 to 55k	9.36	9.46
55 to 60k	9.65	9.73
60 to 70k	9.62	9.67
70 to 80k	10.00	10.03
80 to 90k	10.27	10.29
90 to 100k	11.27	11.29
100 to 150k	11.03	11.06
150 to 250k	8.90	8.93
More than 250k	6.34	6.35

Note: A return is defined as a person filing his/her income tax independently of whether they paid any income tax during the year. A taxable return is defined as a person who has filed and paid income tax during the year. The numbers come from the calculations of the author based on numbers from the Canada Revenue Agency available at this link: http://www.cra-arc.gc.ca/gncy/stts/gb09/pst/fnl/html/tbl2-eng.html

Table 8: Average Amount Received by Tax Filer for Different Income Groups in 2009

Income Range	Share of credit claimed (%)	Share of total income tax paid (%)
20 to 25k	6.95	1.25
25 to 30k	7.06	1.99
30 to 35k	7.17	2.80
35 to 40k	7.25	3.46
40 to 45k	6.77	3.96
45 to 50k	6.08	4.09
50 to 55k	5.41	4.22
55 to 60k	4.70	4.20
60 to 70k	7.52	8.29
70 to 80k	5.78	7.71
80 to 90k	4.36	6.90
90 to 100k	3.20	5.46
100 to 150k	6.11	14.84
150 to 250k	1.87	10.29
More than 250k	0.69	19.67

Note: The share of credit claimed is the ratio between the amount an income group claimed and the total amount claimed. The share of total income tax paid is the ratio between the income tax paid by an income group and the total income tax paid. The sum of the shares does not sum to 100, because the category 0 to 20 was omitted. The raw data used for these calculations can be found at this link: http://www.cra-arc.gc.ca/gncy/stts/gb09/pst/fnl/html/tbl2-eng.html