GOVERNMENT GAMBLING REVENUES IN CANADA 1969-1995

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ABSTRACT

This research proposes an analysis of Canadian lottery over the last 20 years. The main question of this research is : How can one explain the continued rapid growth of lottery revenues over two decades after their introduction ? To answer this question, firstly we examine the lottery and the gambling government revenues over the period of 1969 to 1995. As it shows in this paper, the lottery and especially gambling government revenues grew quickly in the last five years. Then we indicate that lotteries, casinos and video lottery terminals take more place in the economy with some economic indicators. Indeed, we measure those effects with some regressions. Then we observe lotteries from a consumer point of view and we use the « family expenditures survey 1992 » to examine the characteristics of gamblers with a descriptive analysis. After that, we make a multivariate analysis on the percentage of participation in lottery and on the amount spent in lottery to better understand the impact of each gambler's characteristic. We find that income after tax, number of adult and age had a positive effect on the amount spent in lotteries, and that female and education had a negative effect. Finally, we measure the incidence of lottery in two ways and we find that lottery are less regressive in 1992 than in 1984 and 1986.

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INTRODUCTION

The purpose of this master essay is to examine the evolution of government gambling revenues in Canada in the 1970 to 1995 period. Since the beginning of the seventies, lotteries have became more important in Canada as both a expenditure items and a source of government revenues. Furthermore two new games appeared in Canada in the nineties (casinos and video lotteries) changing the lottery market. In this research, we answer to this question : How can one explain the continued rapid growth of lottery revenues over the most recent decade and over two decades after their introduction ? To answer to that question, four secondary questions will be raised: How did government lottery revenues change since 1970 and in particular how did government gambling revenues change with the introduction of casinos and video lotteries ? What is the link between government lottery revenues and some economic indicators ? Who play lotteries and what amounts do they spend in lotteries? Finally, are lotteries a progressive or regressive tax ?

Those questions are important because since 1990, many casinos and video lottery are advent in Canada and they influenced by their introduction the lottery market. It's also important to answer those questions because the governments had each year more and more lottery revenues and anybody hasn't any idea if the lottery market will be saturated soon. Finally, most people play to lottery and spend more and more percentage of their income and anybody never tries to answer « why ».

This research report is divided in two chapters. The first one analyses government gambling revenues from a macroeconomic point of view. Government gambling revenues from lotteries, casinos and video lotteries taken separately and as a whole, are examined for each lottery authority. Then, Canadian lotteries are compared with other lotteries in the world. Third, a brief literature review is done and regressions linking G.D.P., personal expenditures and government gambling revenues estimated. The second chapter examines lottery spending for the population as a whole and for gamblers but from a microeconomic point of view. The analysis will carried out using frequencies, means and regressions. Also in this chapter, another brief literature review is presented

CHAPTER 1 : Government gambling revenues : the evolution 1969-1995

1.1 Government gambling revenues

Lotteries as a source of government revenues have a long history. The first time that government gambling revenues were used appears to be for the extension of the Great Wall of China one century before Christ : « the Chinese government created keno games to raises funds for the army »[1]. During the Roman empire ,the emperor Auguste (63 B-C to 14 A-C) established a public lottery with proceeds used to embellish Rome (Labrosse 1985). Several centuries later, lotteries reappeared in Europe and were brought to America. Captain Sir James Smith introduced gambling in Jamestown, Virginia, in 1607 (Brenner 1990). These activities grew quickly in Canada until the House of Commons prohibited lotteries and games using the criminal code in 1892[2]. In 1969 the House of Commons changed the law. The same year, Loto-Québec was created by the Quebec's National Assembly and began its activities. The Ontario Lottery Corp. followed in 1975 then the Atlantic Lottery Corp. and Western Canadian Lotteries in 1976. Finally, in 1985 British Columbia created British Columbia Lottery Corp. to separate its gambling sector from the Western Lottery Corp. gambling sector.

In 1976, a federal government lottery was created ; it existed three years then stopped its activities following negotiations and an agreement with the provincial governments. According to this agreement, the federal government withdrew from this field but the provinces were to pay out a yearly amount of 24 millions in 1979 to federal government and that payment was adjusted

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[1] Labrosse, Michel.; p. 10
[2] Labrosse, Michel; p. 102

for inflation each year. Thereafter the proportion paid by each province is related to the percentage of its own lottery revenues in a given

FIGURE 1

Share by lottery of the payment to the fed. gov., 1995
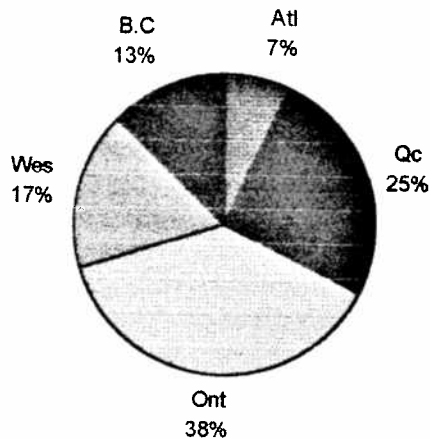
year with regard to the total Canadian revenues from lotteries for the same year. Figure 1 shows the percentage paid by each corporation in 1995. A second agreement signed on June 3rd 1984, led to the federal government definitively withdrawing from gambling. It gave to the federal government a payment of 100$ millions spread over three years by the provincial governments for the Calgary Olympic Games.

Source : Table 2, Calculation by the authors

As table A1 (see appendix) shows the amount received by the Canadian government was higher by 100% between 1985 and 1987 when compared to 1984. After that period it fell back to almost same level as it was in 1984. In 1995 the federal government received 51$ millions from provinces as per the first agreement as table 1 indicates. With regard to the provincial revenues, Ottawa received a small portion of all government revenues from lottery. Since the total amount paid by all lottery corporations to provincial governments was 1.7$ billions in 1995. Table 1 summarizes lottery ticket sales and other lottery items for selected years. To understand the tremendous growth, in 1970 the ticket sales were 51$ millions in Canada and in 1995 the ticket sales were 5,5$ billions. This rise occurred in each lottery authority. For example in 1975, the Ontario Lottery Corp. sold tickets for 97$ millions, in 1995 it sold 2.2$ billions.

TABLE 1

Sales by Canadian lottery authority and used of their revenues, selected years (000$)							
Lottery Authority	Items	1970	1975	1980	1985	1990	1995
Atlantic Lottery Corp.	Ticket sales (gross revenues)	N.E	N.E	52557	152734	258476	436780
	Prizes	N.E	N.E	25217	70694	131376	233035
	Net revenues	N.E	N.E	27340	82040	127100	203745
	Expenses	N.E	N.E	9140	31264	56925	82981
	Payments to can. gov.	N.E	N.E	1697	4965	3249	3565
	Payments to prov. govs.	N.E	N.E	16503	45811	66926	117199
Loto-Québec	Ticket sales (gross revenues)	51436	147892	410554	883121	1273922	1574159
	Prizes	15370	58642	178390	409753	612082	786589
	Net revenues	36066	89250	232164	473368	661840	787570
	Expenses	9680	35879	90418	149900	206240	269715
	Payments to can. gov.	N.E	N.E	6746	20797	11911	12719
	Payments to prov. gov.	26386	53371	135000	302671	443689	505136
Ontario Lottery Corp.	Ticket sales (gross revenues)	N.E	97137	490333	1007830	1379209	2118428
	Prizes	N.E	36095	270324	510965	668333	1087190
	Net revenues	N.E	61042	220009	496865	710876	1031238
	Expenses	N.E	19042	58637	150502	220376	363827
	Payments to can. gov.	N.E	N.E	9372	25666	17126	19243
	Payments to prov. gov.	N.E	42000	152000	320697	473374	648168
Western Canadian Lot.	Ticket sales (gross revenues)	N.E	N.E	200225	317858	551991	616347
	Prizes	N.E	N.E	88805	144733	257518	303092
	Net revenues	N.E	N.E	111420	173125	294473	313255
	Expenses	N.E	N.E	59511	37412	73524	87832
	Payments to can. gov.	N.E	N.E	8700	12755	8166	8669
	Payments to prov. govs.	N.E	N.E	43209	122958	212783	216754
British Columbia Lot. Corp.*	Ticket sales (gross revenues)	N.E	N.E	N.E	330061	603297	797033
	Prizes	N.E	N.E	N.E	150767	293967	416739
	Net revenues	N.E	N.E	N.E	179294	309330	380294
	Expenses	N.E	N.E	N.E	66088	98502	129712
	Payments to can. gov.	N.E	N.E	N.E	9138	5520	6524
	Payments to prov. gov.	N.E	N.E	N.E	104068	205308	244058
Canada	Ticket sales (gross revenues)	51436	245029	1153669	2691604	4066895	5542747
	Prizes	15370	94737	562736	1286912	1963276	2826645
	Net revenues	36066	150292	590933	1404692	2103619	2716102
	Expenses	9680	54921	217706	435166	655567	934067
	Payments to can. gov.	0	0	26515	73321	45972	50720
	Payments to prov. govs.	26386	95371	346712	896205	1402080	1731315

source : table A-1

Note : * Before 1985, British Columbia was part of Western Canadian lotteries ; Net revenues = Ticket sales - Prizes

Since 1980 the payment to provincial government increased by a factor of 399% in Canada as table 2 indicates. However in the same period, ticket sales grew by 380%. Table 1 (table A-1 see appendix) also shows a constant increase across the years as the % of growth per period indicates in table 2. Table 2 presents information on three specific elements : the percentage of each item in government revenues for four selected years, the percentage of each item for each lottery

authority with respect to Canada for two selected years and the growth rates for four selected periods.

<div style="text-align:center">TABLE 2</div>

The evolution of Canadian lottery ticket sales in percentage for selected years

Lottery Authority	Items	% of each item in ticket sales per lottery authority				% of each item with respect to Canadian total per that item by lottery authority		growth rates per period for each items per lottery authority			
		1980	1985	1990	1995	1980	1995	80-95	80-85	85-90	90-95
Atlantic lot. corp.	Ticket sales (gross rev.)	100%	100%	100%	100%	5%	8%	731%	191%	69%	69%
	Prizes	48%	46%	51%	53%	4%	8%	824%	180%	86%	77%
	Net revenues	52%	54%	49%	47%	5%	8%	645%	200%	55%	60%
	Expenses	17%	20%	22%	19%	4%	9%	808%	242%	82%	46%
	Payments to can. gov.	3%	3%	1%	1%	6%	7%	110%	193%	-35%	10%
	Payments to prov. govs.	31%	30%	26%	27%	5%	7%	610%	178%	46%	75%
Loto-Québec	Ticket sales (gross rev.)	100%	100%	100%	100%	36%	28%	283%	115%	44%	24%
	Prizes	43%	46%	48%	50%	32%	28%	341%	130%	49%	29%
	Net revenues	57%	54%	52%	50%	39%	29%	239%	104%	40%	19%
	Expenses	22%	17%	16%	17%	42%	29%	198%	66%	38%	31%
	Payments to can. gov.	2%	2%	1%	1%	25%	25%	89%	208%	-43%	7%
	Payments to prov. gov.	33%	34%	35%	32%	39%	29%	274%	124%	47%	14%
Ontario Lot.	Ticket sales (gross rev.)	100%	100%	100%	100%	43%	38%	332%	106%	37%	54%
	Prizes	55%	51%	48%	51%	48%	38%	302%	89%	31%	63%
	Net revenues	45%	49%	52%	49%	37%	38%	369%	126%	43%	45%
	Expenses	12%	15%	16%	17%	27%	39%	520%	157%	46%	65%
	Payments to can. gov.	2%	3%	1%	1%	35%	38%	105%	174%	-33%	12%
	Payments to prov. gov.	31%	32%	34%	31%	44%	37%	326%	111%	48%	37%
Western Lot.	Ticket sales (gross rev.)	100%	100%	100%	100%	17%	11%	208%	59%	74%	12%
	Prizes	44%	46%	47%	49%	16%	11%	241%	63%	78%	18%
	Net revenues	56%	54%	53%	51%	19%	12%	181%	55%	70%	6%
	Expenses	30%	12%	13%	14%	27%	9%	48%	-37%	97%	19%
	Payments to can. gov.	4%	4%	1%	1%	33%	17%	0%	47%	-36%	6%
	Payments to prov. govs.	22%	39%	39%	35%	12%	13%	402%	185%	73%	2%
British Col. Lot.	Ticket sales (gross rev.)	N.E.	100%	100%	100%	N.E.	14%	N.E.	N.E.	83%	32%
	Prizes	N.E.	46%	49%	52%	N.E.	15%	N.E.	N.E.	95%	42%
	Net revenues	N.E.	54%	51%	48%	N.E.	14%	N.E.	N.E.	73%	23%
	Expenses	N.E.	20%	16%	16%	N.E.	14%	N.E.	N.E.	49%	32%
	Payments to can. gov.	N.E.	3%	1%	1%	N.E.	13%	N.E.	N.E.	-40%	18%
	Payments to prov. gov.	N.E.	32%	34%	31%	N.E.	14%	N.E.	N.E.	97%	19%
Canada	Ticket sales (gross rev.)	100%	100%	100%	100%	100%	100%	380%	133%	51%	36%
	Prizes	49%	48%	48%	51%	100%	100%	402%	129%	53%	44%
	Net revenues	51%	52%	52%	49%	100%	100%	360%	138%	50%	29%
	Expenses	19%	16%	16%	17%	100%	100%	329%	100%	51%	42%
	Payments to can. gov.	2%	3%	1%	1%	100%	100%	91%	177%	-37%	10%
	Payments to prov. govs.	30%	33%	34%	31%	100%	100%	399%	158%	56%	23%

source : table A-1, calculation by the author
Note : N.E. = Not existed

The first thing to observe in table 2 is the share of prizes part which has increased across the years except for Ontario. The second point is the decrease in the payments to provincial governments in the last five years, 34% in 1990 to 31% in 1995 for Canada. This is observed for all lottery authority except the Atlantic Lottery Corporation. The third important point is the higher share of the Atlantic and Western regions (Western Lottery Corp. + British Columbia Lottery Corp. in 1995) in the lottery market in Canada as it goes from 22% in 1980 to 33% in 1995. Finally, one notes the diminution across the years of the growth ticket sales. Between 1980 and 1985, the growth ticket sales in Canada was 133%, from 1985 to 1990 it was 51% and finally between 1990 and 1995, it was 36%. This could be understand by the maturity of the market. The exception for the general growth is for Western Canada lottery corporation whose sales decreased in 1985 with the creation of British Columbia Lottery Corp. Furthermore ticket sales fell by 5% in this region in 1994 as a result of the implementation of video lotteries in Alberta and in Manitoba (see appendix A-1). Figures 2 and 3 describe annual the evolution of the lottery sector between 1969 and 1995. The lottery sales figure present a more constant evolution across the years than payments to provincial governments.

FIGURE 2

Source : Table A-1

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FIGURE 3

Payments to prov. gov. 1969-1995 — (left chart: Cdn, Ont, B.C)
Payments to prov. gov 1969-1995 — (right chart: Qc, Wes, Atl)
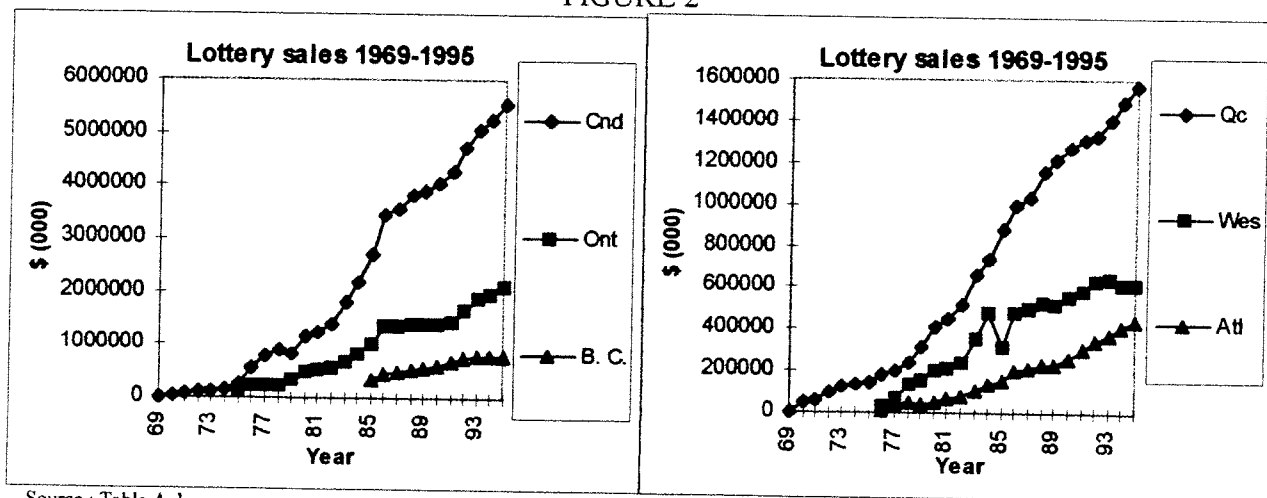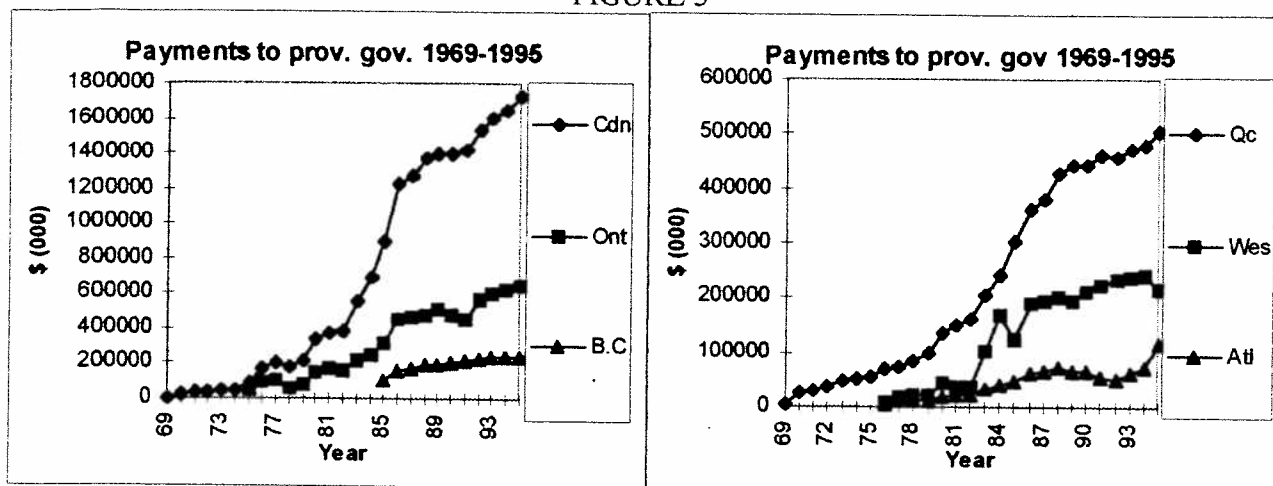
Source : Table A-1

The introduction of casinos and video lottery had a great impact on gambling in Canada. Casinos

appeared in 1985 in Canada but until 1993 Manitoba had the only casino in Canada, the Cristal

Casino in Winnipeg. Since 1993, 13 casinos have opened in the country in Quebec, Ontario,

Nova Scotia and Saskatchewan.

TABLE 3

Opening date of casinos in Canada, 1980 - 1998			
Province	City	Name	Opening date
Nova-Scotia	Halifax	Sheraton Halifax Casino	06/01/1995
	Sydney	Sheraton Sydney Casino	08/01/1995
Quebec	Montreal	Casino de Montreal	10/08/1993
	Charlevoix	Casino de Charlevoix	06/24/1994
	Hull	Casino de Hull	03/24/1996
Ontario	Windsor	Windsor Casino	05/17/1994
	Windsor	Northern Belle Casino	12/13/1995
	Orillia	Rama Casino Resort	07/31/1996
	Niagara	Niagara Casino	12/09/1996
	Windsor	Windsor Casino	07/27/1998
Saskatchewan	Regina	Regina Casino	01/--/1996
	North Battleford	Gold Eagle Casino	02/--/1996
	Prince Albert	Northern Lights Casino	03/--/1996
	White Bear Reserve	Bear Claw Casino	11/--/1996
	Yorkton	Painted Hand Casino	12/--/1996
Manitoba	Winnipeg	Crystal Casino	04/01/1983
	Winnipeg	Club Regent	06/18/1993
	Winnipeg	McPhillips Street Station	06/25/1993

Source : Annual reports, Account by the author

Table 3 gives the opening date of casinos in Canada. One operating casinos in Windsor was replaced on July 27th 1998 by one of the biggest casinos in the world.

The net revenues from casinos increased from 15$ millions in 1990 to more than 1$ billion in 1995 as table 4 shows, while the government casino revenues leaped by 6433% in Canada. Note that tables use net revenues (revenues minus prizes) rather then gross revenues since gross revenues are not available for casinos and also for video lottery for some provinces. The win tax in Ontario and Nova Scotia, in table 3, is a 20% flat tax on the net revenue. Casinos have to pay it at the end of each week

TABLE 4

Revenues and expenses by casino in Canada, 1990-1995							
Province	Items	1990	1991	1992	1993	1994	1995
Nova Scotia	Net revenues						48275
	Expenses						26194
	Payments to prov. gov*						22081
	win(tax)						9655
Quebec	Net revenues				137087	363196	363450
	Expenses				67054	169577	194747
	Payments to prov. gov				70033	193619	168703
Ontario	Net revenues					418950	577285
	Expenses					103042	155066
	Payments to prov. gov*					315908	422219
	win (tax)					83790	115457
Manitoba	Net revenues	15141	21845	27657	79177	98555	100690
	Expenses	6610	8158	9169	21182	30317	31201
	Payments to prov. gov	8531	13687	18488	57995	68238	69489
Canada	Net revenues	15141	21845	27657	216264	880701	1089700
	Expenses	6610	8158	9169	88236	302936	407208
	Payments to prov. gov	8531	13687	18488	128028	577765	682492

Source : Annual reports
* Note : Win tax is included in payments to provincial government.

Video lottery terminals were introduced in Newfoundland and in Nova Scotia at the end of 1990. As the other provinces could see, this new sector was very lucrative because its generated little expenses compared to the level of revenues. They then decided to establish this type of game.

At present all Atlantic provinces (1991), Quebec (1994), Manitoba (1991) and Alberta (1991) are

operating video lottery. Ontario should begin soon[3]. One province, British Columbia,

distinguished itself in the gambling sector, since it doesn't have any plans to establish casinos or

to introduce video lottery terminals. As table 5 shows, the growth in video lottery revenues was

more impressive than the growth of casinos. The net revenues went from 10$ millions in 1990 to

1,2$ billion five years later following the introduction of the industry in seven provinces

TABLE 5

Region	Items	1990	1991	1992	1993	1994	1995
Atlantic (4)	Net revenues	10136	84480	183897	195493	246507	281047
	Expenses	3244	27034	58847	62558	78882	122583
	Payments to prov. gov.	6892	57446	125050	132935	167625	158464
Quebec	Net revenues					59634	310580
	Expenses					36803	150855
	Payments to prov. gov.					22831	159725
Manitoba	Net revenues		8913	61946	115491	177917	185839
	Expenses		4000	19040	37771	57990	62144
	Payments to prov. gov.		4913	42906	77720	119927	123695
Saskatchewan	Net revenues			1281	34816	136848	164658
	Expenses			——	15163	35645	40892
	Payments to prov. gov.			——	19653	101203	123766
Alberta	Net revenues		7899	49308	268896	452591	514514
	Expenses		4800	31886	62304	95857	86490
	Payments to prov. gov.		3099	17422	206592	356734	428024
Canada	Net revenues	10136	101292	296432	614696	1073497	1456638
	Expenses	3244	35834	109773	177796	305177	462964
	Payments to prov. gov.	6892	65458	185378	436900	768320	993674

Revenues and expenses by video lottery, 1990-1995

Source : Annual reports

Finally the expense level and the payments to provincial government level in each region should

be noted for both games . Table 6 indicates that in Quebec the expenses represented half of net

revenues like in Nova Scotia but in Manitoba and in Ontario that level was at 31% and 27%.

There is no visible reasons for this situation in Loto-Québec while it was the first year that

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[3] Ontario Lottery Corporation, annual report, 1996

casinos was introduced in Nova Scotia and may be explain a higher level of expenses. Quebec had again in video lottery the lowest payments to provincial government in relation to its net revenues in 1995. This percentage was around 51% (table 6) and in the other provinces it was 56% for Atlantic region, 67% for Manitoba and 83% for Alberta. On the other hand Loto-Québec's ratio is similar to what it was in the other video lotteries in their second year of existence.

TABLE 6

The percentage of each items in Canada by region or province, 1995		Casino 1995		Video Lottery 1995	
Region or province	Items	% of each item in net revenues per lottery authority	% of each item with respect to the Canadian total for that item per lottery authority	% of each item in net revenues per lottery authority	% of each item with respect to the Canadian total for that item per lottery authority
Atlantic (4)	Net revenues	N.E.	N.E.	100%	22%
	Expenses	N.E.	N.E.	44%	29%
	Payments to prov. govs.	N.E.	N.E.	56%	18%
Nova Scotia	Net revenues	100%	4%	N.E.	N.E.
	Expenses	54%	6%	N.E.	N.E.
	Payments to prov. gov.	46%	3%	N.E.	N.E.
Quebec	Net revenues	100%	33%	100%	24%
	Expenses	54%	48%	49%	36%
	Payments to prov. gov.	46%	25%	51%	18%
Ontario	Net revenues	100%	53%	N.E.	N.E.
	Expenses	27%	38%	N.E.	N.E.
	Payments to prov. gov.	73%	62%	N.E.	N.E.
Manitoba	Net revenues	100%	9%	100%	14%
	Expenses	31%	8%	33%	15%
	Payments to prov. gov.	69%	10%	67%	14%
Saskatchewan	Net revenues	N.E.	N.E.	100%	11%
	Expenses	N.E.	N.E.	25%	9%
	Payments to prov. gov.	N.E.	N.E.	75%	12%
Alberta	Net revenues	N.E.	N.E.	100%	40%
	Expenses	N.E.	N.E.	17%	20%
	Payments to prov. gov.	N.E.	N.E.	83%	49%
Canada	Net revenues	100%	100%	100%	100%
	Expenses	37%	100%	32%	100%
	Payments to prov. govs.	63%	100%	68%	100%

Source : Table 4 and table 5, Calculation by the author

An interesting fact is that Alberta had 40% of the net revenues in Canada but it had only 20% of

the Canadian expenses in video lottery. In casino, Ontario had approximately the same results as

Alberta in video lottery sector.

FIGURE 4

% of payments to prov. gov. over net revenues in Canada, 1990-1995

Legend: ■ Lotteries ■ Casinos □ Video Lot.
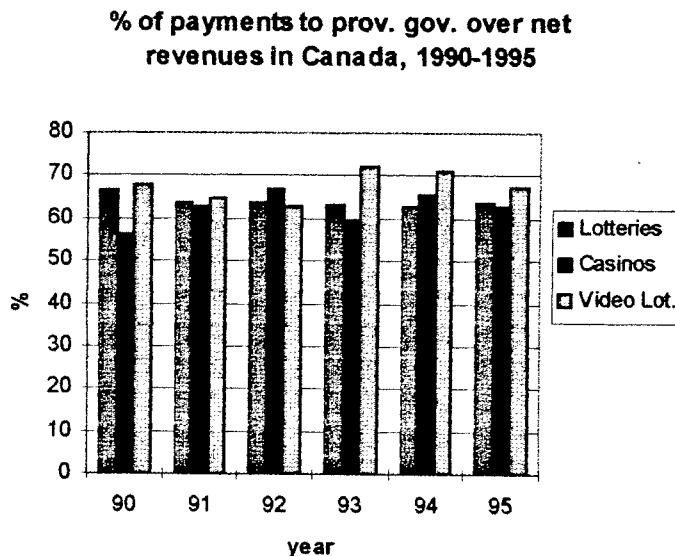
It is interesting to note the different ratio of payments to provincial government / nets revenues rate of the three type of games. As figure 4 shows, in 1995, video lottery was far more profitable then other games with a ratio of 68% compared to 64% for lotteries and 63% for casinos. It's probably for

Source : Table A-1, Table 4 and table 5
Calculation by the authors

that reason, that video lottery is popular with governments .

Figure 5 presents annual revenues from all 3 kinds of games, the data from 1969 to 1990 almost

the same as those in figure 2 since lotteries were the only type of gambling except in Manitoba

during that period. After that period the figures are very different. For example, Atlantic Lottery

Corporation net revenues grew by 100$ millions owing to video lottery in 1991.

Similar jumps were seen everywhere in Canada after 1990, except for British Columbia because

it hasn't established any new types of games. As figure 6 shows, the most impressive increase

occurred in 1994 in Ontario where the payments to provincial government grew by more than

one-third, from 600$ millions to 942$ millions. In 1995, the lottery corporations brought more

than 3.2$ billions to the provincial governments and 156$ millions to the federal government.

Note that in 1990, British Columbia had a net revenue from gambling similar to that of the

Prairies and higher than that of the Atlantic region but now it's revenues less than that of Atlantic

region.

FIGURE 5

Net sales by lotteries, casinos and video lottery in each lottery authority, 1969-1995

Net sales B. C.

Net sales Can.
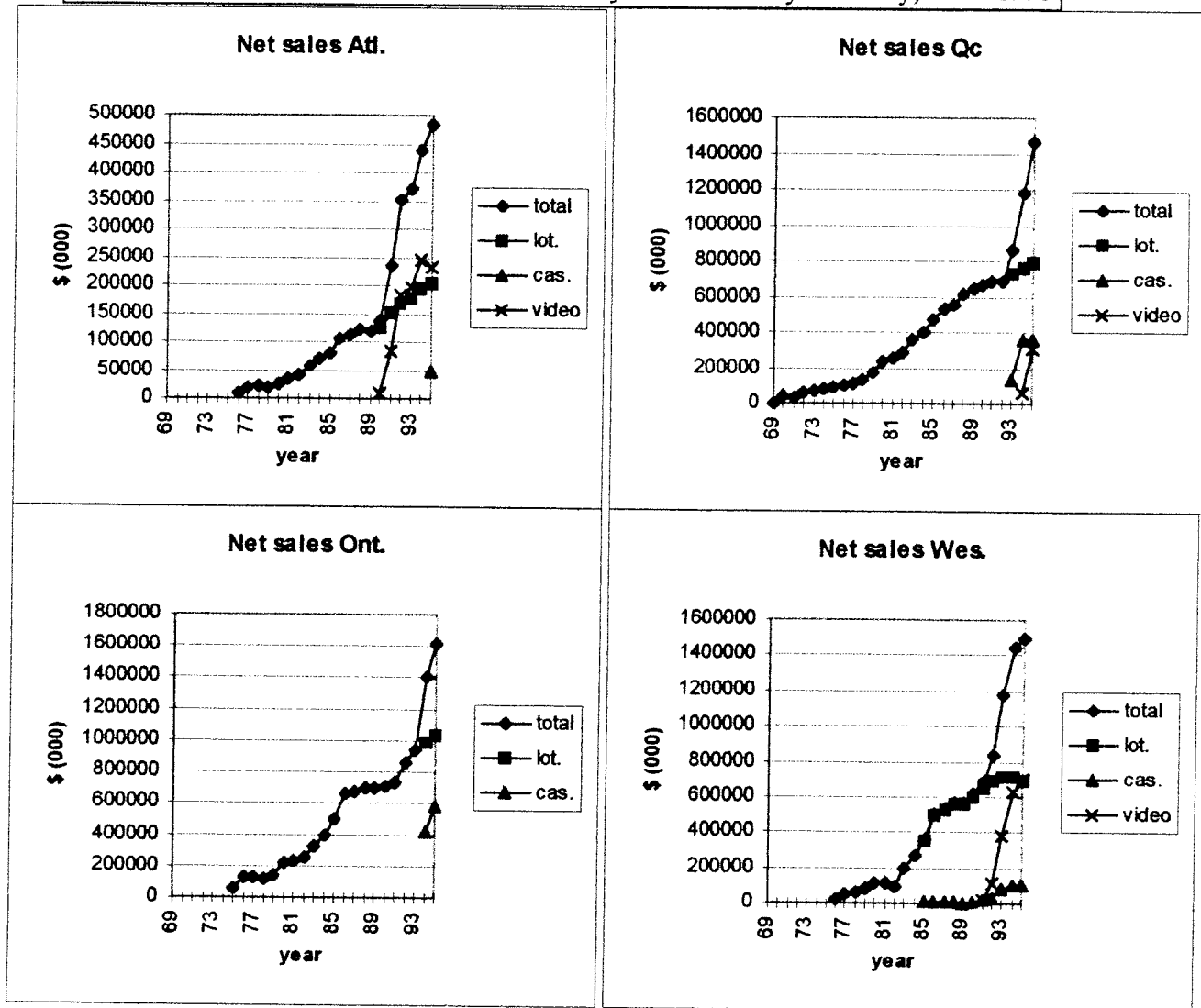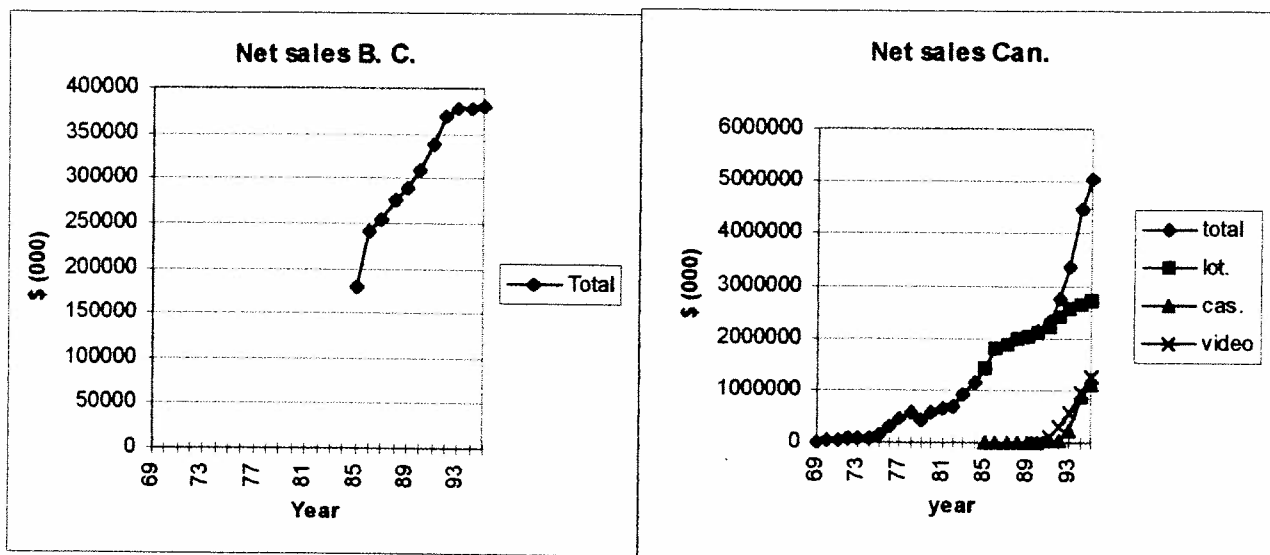
Source : Table A-2

FIGURE 6

Payments to prov. gov. by lotteries, casinos and video lottery in each lottery authority, 1969-1995

Payments to prov.gov by all games

Payments tp prov. gov. by all games

Payments to prov.gov. by all games
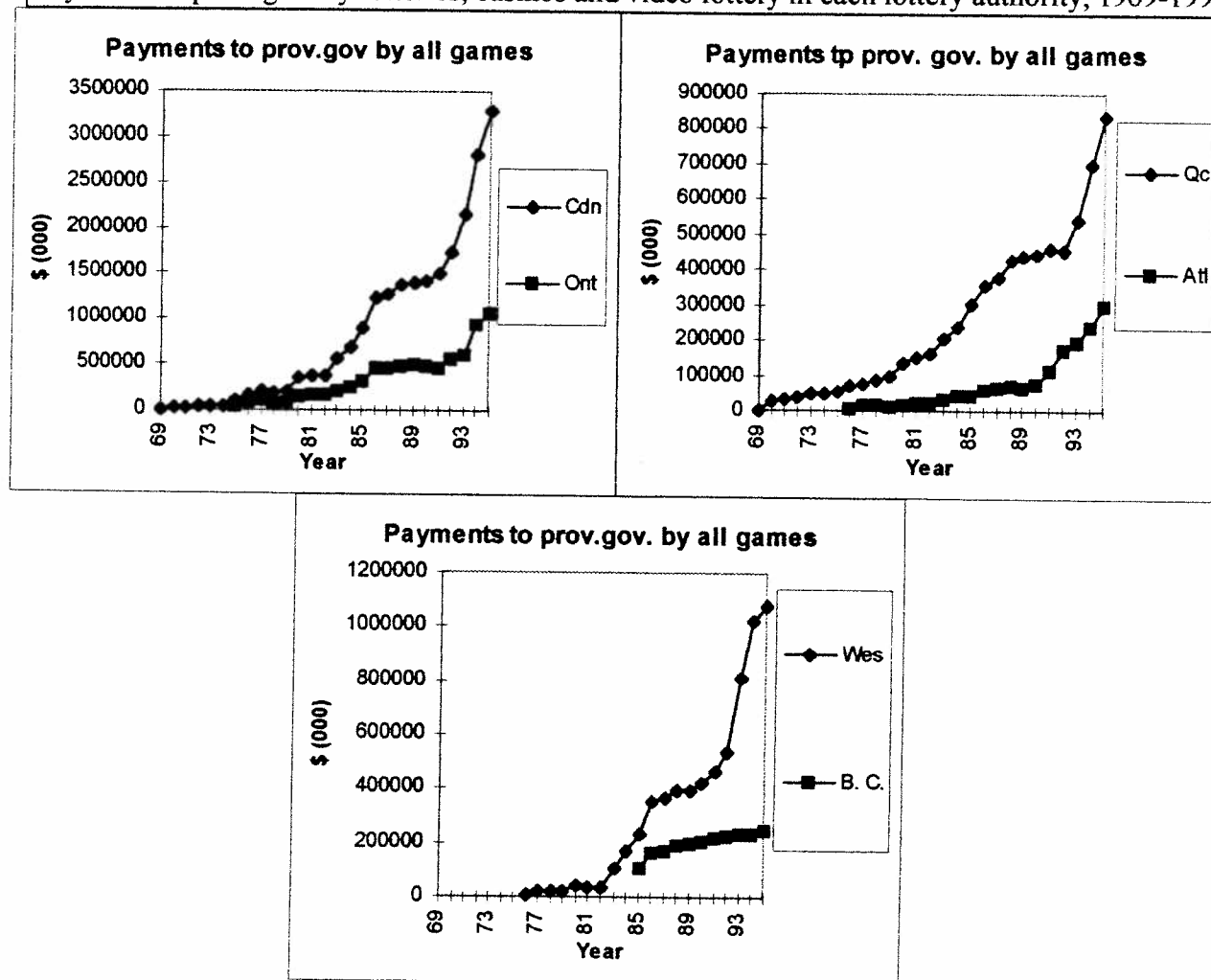
Source : table A-2

1.2 Lotteries and games in the economy

First we examine lottery sales in relation to gross domestic product. Figure 7 demonstrate a slow

upwards evolution until 1969. The ratio stagnating since 1986 and even been regressing for the

last four years of the eighties. This is due primarily to the fact that the growth of lotteries

revenues was slower than that of the GDP.

FGURE 7
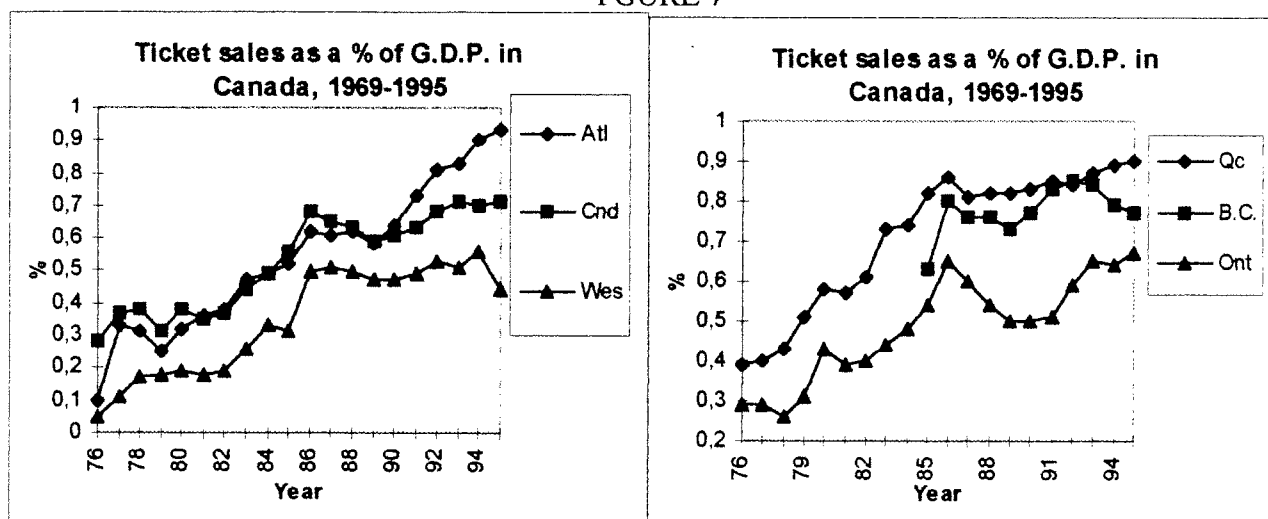
Source : Table A-3

Second the most interesting ratio for governments is the payments by lotteries to provincial

governments as a percentage of total gross general revenues as figure 8 indicates. This ratio peak

in 1985, than regress for few years and finally stabilize since 1993..

FIGURE 8
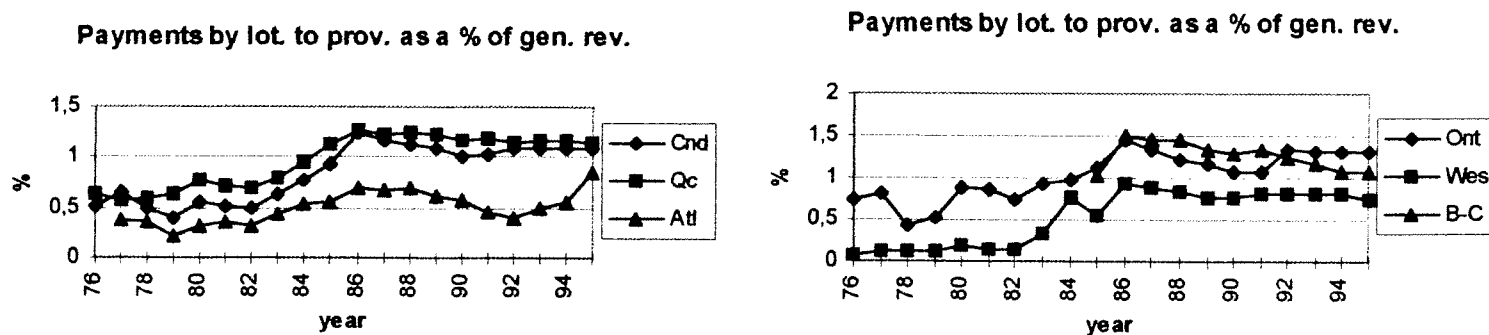
Source : Table A-3

Payments to provincial governments by lotteries represented almost 1% government revenues since 1990 in Canada. But when all government gambling revenues are considered, provincial governments received between 2% and 3% of its gross general revenues from gambling as figure 9 indicates. For example, provincial government shared by the Western Canada Lottery Corporation received up to 2.8% of its gross general revenues from games. This is interesting since Western Canada has the lowest ratio for lotteries, but has the highest one for all forms of games. Figure 8 and 9 shows that the ratio of British Columbia has exactly the opposite evolution of that for Western Canada. For the whole of Canada this percentage is growing rapidly since 1990 with the advent of video lottery. To close this section, it's remarkable to find that although video lottery and casinos have existed only for five years and contribute more than 50% of provincial government gambling revenues.

FIGURE 9
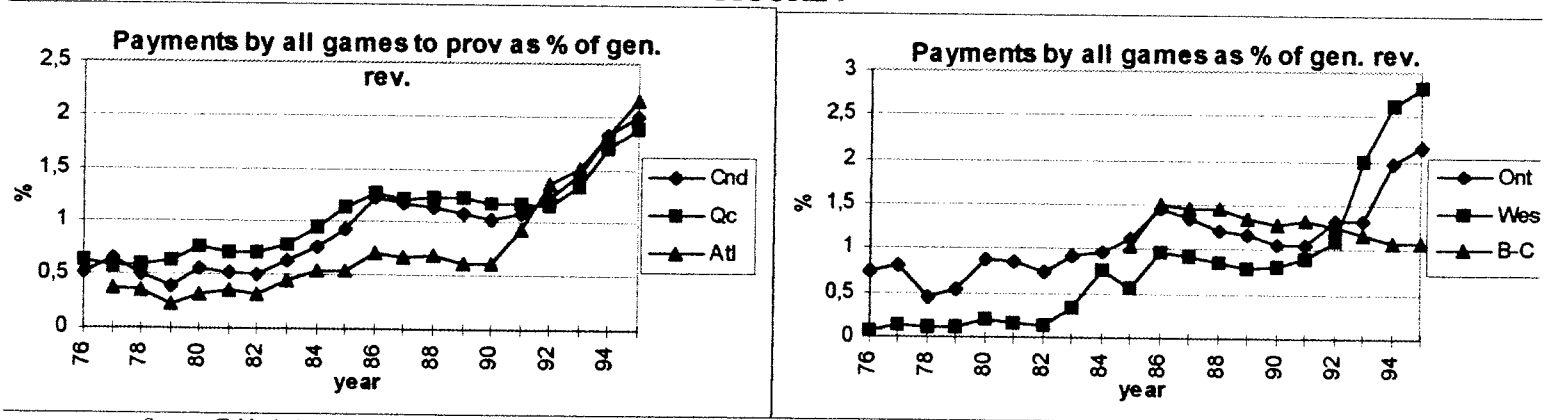
Source : Table A-4

But is this an unusual performance for gambling ? To answer this question let us first compare Canada to the United States in both ticket sales and payments to provincial / state government. Between 1976 to 1995, the growth was faster in United States then in Canada as figure 10A indicates it. Over that period, lottery ticket sales increased by 2726% in the United States.

20

FIGURE 10A   FIGURE 10B

Ticket sales and payments by lottery as a % of gen. rev. in Canada in the United States, 1969-1995
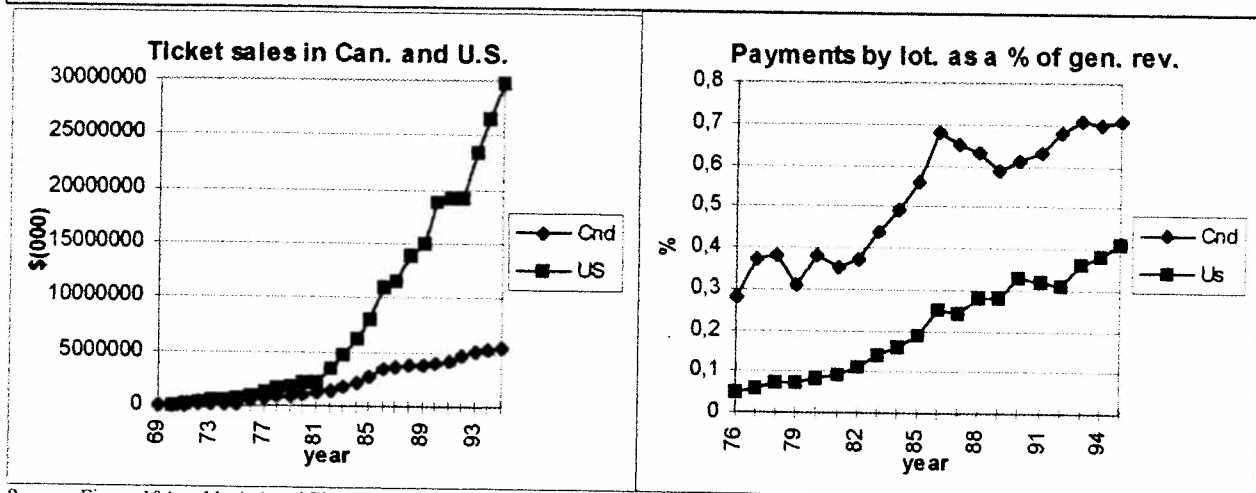
Source : Figure 10A, table A-1 and Figure 10b, table A-3

However our neighbor had only 13 states with lotteries in 1976 while 38 states (District of Columbia included) had lotteries in 1995. In Canada lotteries covered the whole territory during that time which explain the difference in the rise of ticket sales. Table A-3 (see appendix) shows that the United States payments to provincial government ratio is always behind the Canadian payments to provincial government ratio because the lotteries didn't cover all of American territory. In the United States, the ratio is growing faster than in Canada as shows the figure 10B and is catching up slowly with the Canadian ratio because the lotteries are beginning to cover all the American territory.

Let us now compare Canada with other countries, we using data from « The '98 World Lottery Almanac ». [4]. Table 7 indicates the ticket sales for lotteries and video lotteries per capita in the G7 countries (in US $).

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[4] I use that data because they are available for many countries. I made a correction on the data for Western Canada because the Almanac doesn't include video lottery in this region

TABLE 7

Lottery sales per capita in the G7, US$, 1997	
Country	Sales per capita in US$, 1997
United States	123,34
Canada	175,85
United Kingdom	169,48
France	98,09
Italy	172,7
Germany	102,31
Japan	47,06

Source : The '98 World Lottery Almanac, LaFleur

Canada had the highest level per capita sales in the G7 and Japan by far the lowest in the group. The biggest lottery agency in the world in 1997 was the United Kingdom National Lottery with 9$(US) billions in sales and the highest sales per capita were in South Dakota Lottery with 741$ which can be explained by the fact that Wyoming and North Dakota, two neighboring states, don't have state lottery in 1997 (Almanac 1998).

1.3 Literature and regression

There are two kinds of literature on lottery. One analyses lottery ticket sales from the point of view of the government and the second one analyses lottery ticket purchases from the point of view of consumers. The first group of researches tries to explain which variables influenced the government revenues from lotteries and the existence of lottery. The second group of 13 studies examine the consumers' choice to spend on lotteries and presented in the second chapter.

At first we will discuss two studies explaining the government revenues from lottery, also two studies on the advent of lottery and finally another one on both of subjects. Clotfelter (1990), Davis (1991) and Stover (1987) based their research on lottery revenues. Their main difference results from the different types of revenue used. Clotfelter (1990) and Davis (1991) used net

revenues and Stover (1987) used gross revenues. In this study, gross lottery revenues will be used. It represents more accurately the real demand because the consumer spending includes net revenues, prizes and expenses.

TABLE 8

Summarize of literature review

Authors (Year)	Country	Year	Characteristics of sample	Dependent variable	Independent variables	Statistical technical used	R2	Non significant coefficients	Revenue elasticity
Clotfelter,C.T Cook,P.J. (1990)	USA	1989	Base on 32 American State Lotteries	Net revenue	Payout Prize (%) Operation cost	———	Net revenue operation (percent) 40%	———	Regressive
Stover.M.E (1987)	USA	1983-1984	Base on N=36 American state lotteries	Gross revenues for each games Instant Numbers Lottos	Income Poverty Population Living in metropolitan areas	OLS	Instant 0,99 Numbers 0,99 Lottos 0,99 Share 0,98	Poverty Income	———
Davis, J.R. Filer, J.E. Moak, D.L. (1992)	USA	1991	U.S. states + District of Columbia N=29 18 do not have lotteries and 4 are too recent for data to be available	Net revenue per capita generated per year by state lottery, Two other regressions on the existence of lottery and on the age of the lottery	Income Number of hotel/motel room per thousand of state population Percentage of state's border contiguous to a lottery State spendable revenue per capita from gambling	GLS	0,51	State spendable revenue per capita	N.C. < 1

Compilation by the author

The second kind of studies were on the existence of lotteries. Berry (1990), Davis (1991) and Alm (1993) wrote on this subject. Berry (1990) used almost all the states of United States in his regression but Alm (1993) and Davis (1991) just used the states that had a lottery in their regression. They used almost the same independent variables except that Berry put more emphasis on the election variable. Finally, their results were approximately the same. In this study, there are no regressions on the existence of lottery because lotteries in Canada have been in place for a long time. This isn't the case in the United States.

TABLE 9

Summarize of literature review

Authors (Year)	Country	Year	Characteristics of sample	Dependent variable	Independent variables	Statistical technical used	R2	Non significant coefficients	Revenue elasticity
Alm, J. Mckee, M. Skidmore, M. (1993)	USA	1964-1988	Base on 28 states	Existence of lotteries	State income Tax revenues Transfer Debt Population density Age Religion Election	Maximum likelihood	0,95	Debt Election Age	——
Berry,F.S. Berry,W.D. (1990)	USA	1964-1986	Base on 48 states N=857 with party N=901 without party	Existence of lotteries	Fiscal health Party Proximity of election Income Neighbors Religious	Maximum likelihood	With party 0,48 Without party 0,44	Fiscal health	The historic event and neighbors explain the lottery's existence

In this study we use a simple model on lottery revenues (dependent variable) with regard to GDP (independent variable) or personal expenditures. For both GDP and personal expenditures, five OLS were estimated for the four regions (Atlantic, Quebec, Ontario and Western) and one for Canada. In addition one pooling regression which regroups the four Canadian regions was estimated. All these regressions were estimated with both linear and logarithmic functions using constant dollars. British Columbia was included in the Western region, because the British Columbia Lottery Corporation existed for just ten years. The first year (two years for Western lottery authority) of the opening of a lottery corporation was excluded from the analysis because the jumps of lottery sales between the first and the second year were too large. The five OLS regressions and the pooling regression are described with regard to GDP and personal expenditures in table 10 and 11.

TABLE 10

The beta, t-ratio and R^2 for each region, a linear and a logarithmic function, 1969-1995							
	Linear				Logarithm		
Regression	Pers. Exp.	R^2	G.D.P.	R^2	Pers. Exp.	R^2	G.D.P.	R^2
Atlantic	0,0292 (12,02)	0,8947	0,0169 10,85	0,8738	3,9985 (15,79)	0,9362	3,1548 (13,08)	0,9096
Quebec	0,026 (22,27)	0,9539	0,0172 19,91	0,9429	2,7815 (19,94)	0,9431	3,0783 (21,10)	0,9489
Ontario	0,0176 (10,99)	0,8703	0,0106 (10,44)	0,8582	2,2425 (10,65)	0,863	2,3875 (10,77)	0,8657
Western + B. C.	0,0254 (11,37)	0,8837	0,0187 (5,33)	0,6256	4,1811 (10,77)	0,8721	5,7152 (6,13)	0,6882
Canada	0,0118 (11,27)	0,8411	0,0068 (9,57)	0,7924	1,3102 (16,21)	0,9163	1,2976 (14,63)	0,8992
Pooling	0,0098 (10,53)	0,6385	0,0049 (9,61)	0,5945	1,0751 (10,67)	0,6118	0,913 (13,64)	0,7185

Source : Calculation by the author with the Shazam software
Note : Lottery ticket sales is the dependent variable

For Canada, a income elasticity of 1.34 was found for lotteries with a linear function while the elasticities of Canadian regions were more higher. The Western region had the highest elasticity in both G.D.P. and personal expenditures.

TABLE 11

The elasticity for each region in linear and logarithm function				
	Linear		Logarithm	
Regression	G.D.P	Pers. Exp.	G.D.P.	Pers. Exp.
Atlantic	2,90	3,61	3,15	4
Quebec	2,62	2,37	3,08	2,78
Ontario	2,14	2,01	2,39	2,24
Western + B.C.	4,58	3,26	5,63	3,91
Canada	1,32	1,34	1,30	1,31
Pooling	0,90	1,06	0,91	1,08

Source : Calculation by the author with the Shazam software
Note : For the linear part, the author used the mean of the independent variable and the mean of the independent variable

The pooling regression is constructed with the four regions and each region has 19 data. Then we obtain a regression with 76 data. A dichotomous variable was included to indicate the advent of casinos or video lottery for each region but it wasn't significant. We indicate 0 for the dichotomous variable when the region has just lotteries over its territory and we indicate 1 when the region has lotteries and another game (casino or video lottery) over its territory. For the

pooling regression the results were similar as we have in the « Canada regression ». The revenue elasticity range from 0,90 to 1,08 and it indicates that the elasticity is around 1,00.

To conclude this chapter, lottery revenues are growing quickly since 1969 but over the last five years more slowly. This can be explained by a saturation of the market and the advent of casinos and video lottery. As the regressions show there is a positive connection between lottery and GDP, and also personal expenditures.

CHAPTER 2 : An analysis from consumer point of view

This chapter is divided into three sections and each answering one question : Who plays lotteries and how much do they spend?, Which variables influenced the decision to play and the amounts played? and finally, Are lotteries a progressive or regressive tax?. It focuses only on lotteries which represent 88%[5] of net gambling in Canada in 1992 since our data source, the 1992 Family Expenditure Survey collected information only on lotteries and not on gambling. This survey was conducted by Statistic Canada in the spring of 1993 and interviewed 9492 families in Canada. The data from the survey can be weighted to represent the situation of the 9 804 337 Canadians families. The problem with this type of survey can be the under or overestimation by the respondents of certain expenditures. For example, generally people underestimate their alcohol consumption and overestimate their purchases of books. In our case, the respondents underestimated their lottery ticket purchases by a factor of three as shown in table 12.

TABLE 12

Comparison of sales by lottery authorities and purchases by consumer in that area operation, Canada, 1992			
Region	Sales 1992	Purchase 1992	P / S
Atlantic	346995000	86797446	0,25
Quebec	1327830000	456055090	0,34
Ontario	1665344000	535106711	0,32
Western	628857000	241970175	0,38
British Columbia	738485000	179609325	0,24
Canada *	4707511000	1530360384	0,33

Source : 1) Sales : Table A-1. 2) Purchases : Calculation by the author using the 1992 family data. 3) P / S : 1 / 2
* Includes data from masked region in purchase 1992

In Canada the population estimated their consumption at around 1.5$ billions instead of 4.7$ billions of sales as the annual reports of lottery authority indicated.

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[5] Source : Table A-1, table 4 and table 5 ; Calculation by the author.

2.1 Who Plays lotteries and how much do they spend : a descriptive analysis ?

Who plays lotteries ?

In this section we examine the purchases of lottery ticket by ten factors, resumed in five tables : province/region and size of area, income after tax, the number of adults over 15 years old and marital status, sex, education and age, mother tongue and country of birth. As shows in table 13A in 1992, 70% of Canadian household purchased lottery tickets at least once. It was in the Quebec region where this percentage was highest at 78% while the lowest was for the Atlantic provinces at 60% of households. Newfoundland had the lowest level in Canada at 53%. Those lower percentages perhaps reflect the fact that the Atlantic Lottery Corporation introduced video lottery in 1990, which may have caused a transfer of gamblers from lottery to video lottery while the Western Lottery Corp. introduced video lottery only in late 1991. The area of the residence (urban or rural) also influenced the decision to buy lotteries. The difference between urban and rural was about 5%, 71% for urban families against 66% for rural families. This difference may be explained by the greater availability of points of sales in urban regions.

As table 13B indicates the percentage of participation of lottery ticket purchases increase with the rise of income after tax. For example, for an income under 10 000$, the percentage of household buying lottery tickets was 49% but for the second upper group of income (69999$ to 90000$), it was 80%.

The next two factors, numbers of adults over 15 years old in a family and marital status of the head examined in table 13C, are clearly related. For example, 58% of families with just one adult member played lotteries while the percentage for single / other household is 62% / 61%. When they are two adult member or more in a family, the percentages range from 72% to 79% while for a married household, it is 75%.

Table 13D examines the impact of three individual characteristics of the household's respondent(head of the household) : sex, age and education. Female headed households were less likely to buy lottery tickets than male headed households perhaps because they earned less income and / or because its have a smaller number of adults. The age of the head of the household influenced first positively then negatively the percentage of participation to lotteries. This is probably related to the income of the head. The education of household head influenced purchases of lottery tickets in the same way as age, positively then negatively, perhaps because an university graduate knows better the probability to win at the lottery than those with other levels of education.

Table 13E presents information on the mother tongue and country of birth in. The results by mother tongue indicated the same thing than by province. French Canadians played more than English Canadians as Quebecers participated more than other Canadians. Canadians and Asians have the same participation but other nationalities have a lower participation.

TABLE 13A

REGIONS OR PROVINCES OF RESIDENCE

	% of purchasing households	$ spent by purchasing households	$ spent by all households
Atlantic Canada	59%	190 $	113 $
Newfoundland	53%	232 $	123 $
P.E.I.	58%	155 $	89 $
Nova Scotia	62%	186 $	116 $
New Brunswick	60%	177 $	106 $
Quebec	78%	226 $	177 $
Ontario	67%	224 $	151 $
Western Canada	69%	223 $	154 $
Manitoba	61%	220 $	135 $
Saskatchewan	69%	186 $	130 $
Alberta	72%	238 $	171 $
British Columbia	68%	223 $	150 $
Canada	69%	225 $	156 $

AREA OF THE RESIDENCE

	% of purchasing households	$ spent by purchasing households	$ spent by all households
Urban	71%	222 $	156 $
Rural	66%	239 $	157 $

TABLE 13B

AFTER TAX INCOME OF THE HOUSEHOLD

	% of purchasing households	$ spent by purchasing households	$ spent by all households
r<10000	49%	131 $	64 $
9999<r<15000	54%	137 $	74 $
14999<r<20000	58%	167 $	97 $
19999<r<25000	65%	245 $	159 $
24999<r<30000	73%	234 $	171 $
29999<r<35000	76%	208 $	157 $
34999<r<40000	76%	251 $	190 $
39999<r<50000	77%	232 $	178 $
49999<r<60000	80%	258 $	208 $
59999<r<70000	79%	246 $	194 $
69999<r<90000	80%	288 $	230 $
r>89999	68%	221 $	150 $

TABLE 13C

NUMBER OF ADULT OVER 15YEARS IN THE HOUSEHOLD		
% of purchasing households	$ spent by purchasing households	$ spent by all households
1 58%	158 $	92 $
2 72%	221 $	160 $
3 78%	272 $	213 $
4 78%	294 $	229 $
5 79%	379 $	297 $
6 79%	359 $	282 $

MARITAL STATUS OF HEAD		
% of purchasing households	$ spent by purchasing households	$ spent by all households
Maried 75%	243 $	181 $
Single 62%	176 $	109 $
Other (divorced) 61%	187 $	113 $

TABLE 13D

SEX OF HEAD		
% of purchasing households	$ spent by purchasing households	$ spent by all households
Male 74%	247 $	182 $
Female 65%	187 $	121 $

AGE OF HEAD		
% of purchasing households	$ spent by purchasing households	$ spent by all households
age<25 59%	134 $	79 $
24<age<35 71%	160 $	113 $
34<age<45 73%	197 $	145 $
44<age<55 76%	265 $	201 $
54<age<65 75%	294 $	221 $
64<age<76 62%	278 $	175 $
age>75 46%	200 $	92 $

EDUCATION OF HEAD		
% of purchasing households	$ spent by purchasing households	$ spent by all households
No secondary 65%	288 $	189 $
Secondary 73%	243 $	178 $
Post-secondary 72%	196 $	141 $
University 60%	133 $	80 $

TABLE 13E

MOTHER TONGUE OF HEAD		
% of purchasing households	$ spent by purchasing households	$ spent by all households
English 66%	215 $	142 $
French 80%	231 $	184 $
Other 66%	241 $	159 $

COUNTRY OF BIRTH OF HEAD		
% of purchasing households	$ spent by purchasing households	$ spent by all households
Canada 71%	226 $	161 $
Europe 62%	209 $	131 $
Asia 69%	252 $	175 $
Other 63%	167 $	106 $

Source : Result from analysis of family expenditure survey 1992 by the SAS software

What is spent in lotteries by gamblers ?

Now lotteries will be examined from the point of view of gamblers. This section tries to understand which variable modified the behavior of gamblers. First, gamblers' expenditures will be analysed by province of residence. It is interesting that the participation by Newfoundlanders in lottery purchases was the lowest as table 13A indicates, but that Newfoundlanders gamblers spent the second highest amount per year at 232$ just below Alberta at 238$. Quebec and Ontario spent approximately the same amount at 226$ and 224$ while Prince Edward Island had the lowest amount at 155$. The area of residence also influenced the behavior of the player. Rural gamblers bought more lottery tickets than urban gamblers. This is possibly linked to the relative scarcity of entertainment in rural areas.

As the percentage of participation at lottery purchases, the income after tax influenced positively the amount spent by gambler households at lottery (table 13B). Number of adult and marital status of head are linked in the same way as they were when the percentage of participation was examined. Single person spent 176$, almost the same amount of a households with only one adult member who spent 158$. Like before, a married head of household spent 243$ a little higher than a household with two adult members with 221$ spending in lotteries in table 13C.

Table 13D presents that a household with younger head spent less money then household with older head probably because the former have a lower income than the latter. Once more, a head men spent more money in lottery than a head woman as much as participation in gambling, probably because they generally earned more money, for the reason mentioned as earlier. For the education variable, the relation between education and ticket purchases was almost the same for

gamblers as for the overall population. This link was in inverse ratio to education. A household with a head who had an university degree spent 133$. It was less than half of a household with a head who didn't have a secondary level.

Finally, the household's mother tongue didn't affect ticket purchases, unlike the participation in lottery as table 13E presents. Again Asian headed households spent more in lotteries than other groups.

What is spent in lotteries by all households ?

First, the household spent on average 156$ on lottery in Canada in 1992 as table 13A shows. Ontario, Western Canada and British-Columbia households spent on lotteries approximately the same amount. Quebec had the highest expenditure level, just above Alberta. As indicated before, Newfoundland had the lowest participation to lotteries but it has the highest level of expenditures in the Atlantic region. It's interesting to examine the impact of the urbanization. There is any difference in the average expenditures on lotteries between an urban family and a rural family in Canada. The opposite variation in participation and in spending by gamblers neutralize their both impact.

In table 13B the income after tax always had the same influenced on lottery ticket purchases as the other section, exactly the same conclusion could be applied for the number of adult and the marital status of the household of head. Again a married household purchased more lotteries than a single person because the family revenues were often higher in that case. The same reasoning is applied for the number of adults variable

Table 13D show that education, age and sex greatly influenced the level of lottery expenditures. The education level had a major influence on expenditures. A headed household who didn't complete his secondary level bought 189$ worth of tickets per year. But a headed household who had an university spent only 80$ in 1992. This demonstrates that the education has a inverse impact on ticket purchases. The age also affected the amount of lotteries bought perhaps because a household with a older head earned more money than younger one. Furthermore, it was directly for that reason that household with a head between 45 and 65 of age purchased more lotteries than others.

Though Canadian households participated as much as Asian households and more than other nationality households, it was Asian households who bought the most lotteries with an average of 175$, far before Canadian families and especially European households and other nationality households with only 131$ and 106$ of expenditures per year.

2.2 Who Plays lotteries and how much do they spend : a multivariate analysis ?

At first, we will examine the literature on the subject. In the literature section, 13 studies will be examined and separated in two main groups. One group for Canadian studies and a the other group for American and English studies.

There are 4 Canadians studies on Canadian lotteries. Vaillancourt (1988) and Kitchen (1990) used household data from Statistics Canada and the two others, Livernois (1987) and Brenner (1990), used their own surveys as table 15 shows. Kitchen (1990) reproduced almost the procedure of Vaillancourt (1988), but he used the family expenditure survey of 1986 instead of

1982. Their results are very similar and both of them found a Suits index (measures the degree

of progressivity or regressivity of a tax) equal to -0.18 for Canadian lotteries. This indicates that

Canadian lotteries were regressive as we will explain in the next paragraph. Livernois (1987)

found similar results with his own survey. He found a lower Suits index -0.10. Brenner (1990)

used a different dependent variable, the percentage of lottery expenditures. He found that

lotteries were regressive as did the other Canadian authors but he didn't calculate a Suits index.

TABLE 14

Summarize of literature review									
Authors (Year)	Country or region	Year	Characteristics of sample	Dependent variable	Independent variables	Statistical technical used	R2	Non significant coefficients	Revenue elasticity
Livernois, J.R. (1987)	Alberta	1983	Annual survey of Edmonton residents N=387 for household, N=397 for individual, Regrouped in 9 categories in the regression N=9	Average monthly spending on lotteries	Average monthly income	N.M.	Household R=0,36	Average monthly income	0,72 < 1 regressive Suits index -0.10
Vaillancourt,F Grignon, J. (1988)	Canada	1982	Households data from Family Expenditure Survey of Statistics Canada N=10938	Household expenditures	Income	OLS	Canada lin 0,0168 log 0,0489	———	Canada lin 0,39 < 1 log 0,69 < 1 Suits index -0.18
Kitchen, H. Powell, S. (1991)	Canada + 6 regions Atlantic Quebec Ontario Man/Sask Alberta British Columbia	1986	N=10350 Household data from Family Expenditure Survey of Statistics Canada	Household lottery expenditures	Income(after tax) Household wealth Sex Age Education Occupation Mother tongue Urban or rural	Tobit	Atl R=0,51 Que R=0,65 Ont R=0,58 M/S R=0,53 Alb R=0,56 B-C R=0,56	———	Regressive/ Suits Atl 0,8/ -0.21 Que 0,7/ -0.13 Ont 0,78/ -0.19 M/S 0,73/ -0.19 Alb 0,92/ -0.16 B-C 0,71/ -0.18 Cdn -0.18
Brenner, R. Brenner,A.G. (1990)	Quebec and Canada	1982	N=851 for Quebec N=7083 for Canada	Annual total spending on lottery tickets of respondent as percentage of total family income	Education Age Wealth Number of children Income Family income	OLS	Quebec 0,38 Canada 0,24	———	Elasticities -0,3870

There were 9 studies on the United States lottery market and one on the English lottery market. Most of them used a telephone survey to gather their data. Borg (1990) explains the expenditures on gambling instead of the expenditures on lotteries which like the other American study do, but he found approximately the same results. The English research by Farrell (1997) is interesting because its results seem to the Canadian and American results as table 15 indicates. Generally, similar independent variables were used in the regressions by all the authors. The final results were often similar from one authors to another.. In fact, most of the authors found that lotteries is regressive like Suits (1977) Borg (1988), Clotfelter (1987), Borg (1990), Hansen (1995), Farrel (1997) and Stranahan (1998) (table 17). But Scott (1994) indicated that income had no effect, like a proportional tax, and finally Mikesell (1989) showed that lotteries were a proportional or progressive tax. Note that Suits introduced a new index to measure the incidence. The Suits index measures the degree of progressivity of a tax. The range of the index is from -1 (very regressive) to 1 (very progressive). The index indicates 0 when the tax is proportional : « the index involves comparison of the accumulated percentage of total income »(Suits p.24). Finally, Suits found that all kinds of gambling activities are regressive and State lotteries have an index of -0.31.

TABLE 15

Summarize of literature review

Authors (Year)	Country or Region	Year	Characteristics of sample	Dependent variable	Independent variables	Statistical technical used	R2	Non significant coefficients	Revenue elasticity
Suits, D.B. (1977)	USA	1974	Survey Research Center of the University of Michigan N=2032	——	——	Index suit 1 progressivity 0 proportional -1 regressivity	——	——	Regressive lottery -0,31

Source : Compilation by the author

In this search, household lottery expenditure is the dependent variable as in most of American and Canadian studies. In our regressions, we used the independent variables that came back very

often in American and Canadian studies, except for mother language because it's only a

Canadian reality.

TABLE 16

Summarize of literature review

Authors (Year)	Country or region	Year	Characteristics of sample	Dependent variable	Independent variables	Statistical technical used	R2	Non significant coefficients	Revenue elasticity
Clotfelter,C.T Cook,P.J. (1987)	Maryland	1984	N= 1051 Base on Gallup telephone survey. The sample exclude anyone who was unaware of the lottery(1%), or who was morally opposed to gambling (8%)	Average weekly expenditures on lottery product	Education Age Race Income Sex Percent urban in county	Tobit	F(z)=0,44	Income Percent urban in county	Regressive
Borg, M.O. Mason,P.M. Shapiro,S.L. (1990)	Las Vegas Atlantic City	Las Vegas 1984-1985 Atlantic City 1987 Separate	Las Vegas N1=123, N2= 2510, N1+N2=N=2633 N1 random sample from 1987 Clark county telephone book Atlantic City N=353 face to face interview along the boardwalk	Household weekly budget for gambling	Income Sex Age Race Profession Marital Status Education Unemployment Mode of transportation	OLS	Las Vegas 0,039 Atlantic City 0,0272	------	Regressive Las Vegas 0,30<1 Atlantic City 0,88<1
Hansen, A. (1995)	Colorado	1989-1990	N=114 in 62 counties 6 equations for the two subjects	Instant game sales Percentage of income spent on instant game tickets	Income Sequence of lotteries Race Density Education Age Number of outlets Border location	Weighted least square	IGS 0,53 PIS 0,54	Race Density	Regressive Negative significant coefficient for income Suits -0.095
Mikesell, J.L. (1989)	Illinois	1985-1987 fiscal years	N= 58 Border counties and counties with a ratio of persons working in the county to resident workers above 1.1 are excluded	County per capita lottery sales	% of urban pop. % of black pop. % of pop. with education > 16 years Per capita income	OLS	1985 0,50 1986 0,51 1987 0,48	------	Proport. / progress. 1985 1,02 1986 1,27 1987 1,49
Stranahan,H. Borg,M.O (1998)	Florida Colorado Virginia	Sept-Oct 1991	3 telephone surveys Samples were chosen from telephone books Total N= 757 Flo. N=260 Col. N=239 Vir. N=258	Lottery expenditures	Sex Race Marital status Education Age Income (8 groups) Urban/Rural Occupation	Probit Tobit (N=503)	N.A.	------	Income is important on the probability of playing the lottery or on the amount spent

Author (year)	Location	Period	Survey	Dependent variable	Independent variables	Method			Conclusion
Borg, M.O. Mason,P.M. (1988)	Illinois	09/1984–03/1986	Telephone survey N=487 winners of $600 or more	Average weekly lottery expenditures per household	Age Marital status Race Education Household income Education	OLS	0,055	—	Regressive 0,004
Scott,F. Garen,J. (1994)	Kentucky	First six months of the Kentucky lottery 1989	Telephone survey of random of Kentucky household N=582	Lottery expenditures	Urban size Gambler Marital status Sex Race Unemployment Public assistance Religion Income Age Education	Tobit Heckman selection	Tobit 0,64 Heckman 0,7	—	Income has no impact on participation in lottery The amount spend isn't affected by an increase or a decrease of income
Farrell,L. Walker,I. (1997)	United Kingdom	5 surveys 07/95 09/95 01/96 03/96 05/96 pooled	N=9077 with 5915 individuals result positive expenditures	Lottery ticket purchases	Sex Marital status Age Income Education Price	OLS Tobit Heckman selection	OLS 0,083	Probit because it differ so much from the convential wisdom.	Elasticities -0,12 to -0,24

Source : Compilation by the author

In this study we examine the participation in lottery and the amount spent in lottery. A logistic function is used to explain the percentage of households purchasing lottery tickets and OLS function is used to explain the amounts spent in lottery tickets by gamblers. The relation between income after tax and both lottery participation and lottery purchases is expected to be positive because a higher income increase the available resources to buy lotteries as table 18 shows. The same effects are expected for the number of adults over 15 years old since a higher number of adults increase the opportunity to buy lotteries. Age should have a negative impact because younger people are more attractive by the gambling than older people (Ladouceur 1994 and Ladouceur 1996). For the region of residence, Atlantic Canada should have a negative impact on both lottery participation and lottery purchases since they have video lottery in this region; residing in Quebec should have a positive effect on lottery participation since lotteries were introduced before in Quebec then anywhere in Canada. Residing in Western Canada and British Columbia should have a similar impact to that of residing in Ontario. Residing in rural areas should have a negative effect on the decision to gamble because rural areas have lower

access to points of sale than urban area but gamblers from the two populations should gamble the same way.

TABLE 17

EXPECTATIONS			
Variables	Logistic	OLS	OLS with Mills
Atlantic (omitted Ontario)	-	-	-
Quebec (idem)	+	n.s.	n.s.
Western (idem)	n.s.	n.s.	n.s.
British Columbia (idem)	n.s.	n.s.	n.s.
Income after tax	+	+	+
Number of adults	+	+	+
Sex (omitted men)	-	-	-
Age	-	-	-
Secondary (omitted no secondary)	-	-	-
Post-Secondary (idem)	-	-	-
University (idem)	-	-	-
French People (omitted English)	+	n.s.	n.s.
Other Language (idem)	?	?	?
Rural (omitted urban)	-	n.s.	n.s.
Never Married (omitted married)	+	+	+
Other Marital Status (idem)	?	?	?
European (omitted Canadians)	n.s.	n.s.	n.s.
Asian (idem)	?	?	?
Other Country (idem)	?	?	?
Mills	------	------	?

Note : + : positive impact, - : negative impact, N.S. : no significant and ? : any idea

Never married people should both have a positive effect because most of compulsive gamblers are single people according to Ladouceur (1996) and Gambling in Canada (1996) said. Women should participated and spent less than men because most of studies on pathological gamblers indicate that men have more gambling problems than women (Ladouceur 1994 ; Blaszczynski 1994). For the education variable, the secondary, the post-secondary and university variables should have negative coefficients perhaps because they better understand their chance to win at

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the lottery than those who didn't finish their secondary. For the language variable, the French variable is expected to have a positive impact with regard to English since lottery appeared before in Quebec but they should gamble the same amount. Finally, the last variable is on the origin of immigrants. European immigrants should participate like Canadians because almost all Canadians were originate from Europe and the Europeans have too lotteries in their origin country.

To test the model, the software SAS was used to examine the question « Why people play? »., When a household didn't participate in lotteries, the lottery variable was represented by 0 and it was given a value of 1, when a household participated in lottery. Because those data were weighted, the probit function can't be used since it doesn't normalize the standard error. But the logistic function did the same regression as the probit fuction but it normalized the standard error.

The equation includes 19 variables. The results on the dichotomous region variable indicates that the population of Atlantic Canada participated less in lottery than the population in Ontario in 1992 like expected but residents of other region residing played lottery like Ontarians. The other results almost represented the expectation except for age, secondary level, Europeans and Asians as table 18 indicates.

TABLE 18

Results from logistic regression, dependent variable : Participation in lotteries	
Variables	Logistic
Intercep	0,3211**
Atlantic (omitted Ontario)	-0,1573*
Quebec (idem)	0,0704
Western (idem)	0,1025
British Columbia (idem)	0,0659
Income after tax	8,566E-6**
Number of adults	0,0691**
Sex (omitted men)	-0,1457**
Age	-0,0044**
Secondary (omitted no secondary)	0,1453**
Post-Secondary (idem)	0,0066
University (idem)	-0,4632**
French People (omitted English)	0,4060**
Other Language (idem)	0,0554
Rural (omitted urban)	-0,1852**
Never Married (omitted married)	-0,1519*
Other Marital Status (idem)	-0,1231*
European (omitted Canadians)	-0,1607*
Asian (idem)	-0,0225
Other Country (idem)	-0,1179
Mills	------
R² or Concordant	67,4

* significant at 95 %, ** significant at 99 %
Note : N = 9492

Most of the results are have a similar impact as was expected. Income after tax, age, sex, rural, number of adults and language exactly presents the impact as we expected. We have two other results where my expectations are correct at 75%. We anticipated the impact for Atlantic, Western and British Columbia but Quebec hasn't significant. For the education variable, we have overestimated the impact of secondary and post-secondary because they don't effect the participation at lottery like the university variable. Finally a unexpected fact was the opposite sign of the never married and country of birth variables. It indicates that Asians participated no more than Canadians on lottery and a household with a head never married participate less than a

household with a head married. For the validity of the model, the association of predicted probabilities and observed responses are concordant at 67,4%.

This section will determine which variable have influenced the quantity of ticket purchases. First, the regressions from the survey of family expenditures in 1992 will be analysed. All the variables mentioned before will be used in this regression. To analyse those coefficients, the software SAS was used with a simple OLS.

The model was estimated with and without the inverse of Mill's ratio. The inverse of Mill's corrects

> « the bias that results from using nonrandomly selected samples to estimate behavioral relationships as an ordinary specification error or « omitted variables » bias. The estimated values of the omitted variables (inverse of Mill's ratio) can be used as regressors so that it is possible to estimate the behavioral functions of interest by simple method » Heckman (1979)

and the selected bias is corrected. In our case the inverse of Mill's ratio is used to prevent the sample selection bias[6] become from the use of only the households with positive spending on lotteries in the OLS analysis. If the inverse of Mill's ratio is omitted, the regression results reflect the impact of both decision to purchase lottery tickets and of the decision on amount played. But with the inverse of Mill's ratio the selection bias is eliminated.

In those models the variables used were the same as in the logistic model, except for the regression with the inverse of Mill's ratio that didn't include country of origin variables. Those variables were removed from the regression because including the same variables in the OLS and

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[6] Heckman p. 154

in the logistic regression generating the inverse of Mill's ratio creates a problem of collinearity in the OLS regression.

TABLE 19

Results from OLS regression with and without Mill's ratio, dependent variable : Amount spent in lottery		
Variables	Regression	Regression with Mills
Intercep	47,3317	288,8578**
Atlantic (omitted Ontario)	-36,1996	3,6289
Quebec (idem)	-11,5789	-26,4648
Western (idem)	6,4557	-12,4034
British Columbia (idem)	-1,5492	-13,8316
Income after tax	0,0013**	-0,0002
Number of adults	32,5691**	18,3938*
Sex (omitted men)	-41,2797**	-11,3261
Age	2,6291**	3,5777**
Secondary (omitted no secondary)	-20,6856	-49,8105*
Post-Secondary (idem)	-63,8032**	-66,9698**
University (idem)	-154,6789**	-60,0911
French People (omitted English)	11,124	-62,1772
Other Language (idem)	29,1843	8,578
Rural (omitted urban)	0,6958	39,6617
Never Married (omitted married)	25,048	60,1716*
Other Marital Status (idem)	-15,3164	13,4102
European (omitted Canadians)	-54,0479*	------
Asian (idem)	-6,1768	------
Other Country (idem)	-59,3604*	------
Mills	------	-420,5267**
R^2 or Concordant	0,0531	0,0528

* significant at 95%, ** significant at 99%
Note : N = 6627

The regression without the inverse of Mill's ratio shows that income, the number of adults and the age of head were positively linked to the amount spent at 99% as table 19 presents. Generally, the expectations we explain before were correct like for the income after tax, number of adults, sex, rural, language, province of residence and also education but we don't expect the negative impact of age and the negative impact of European households. For age, it's probably because a household with a younger head don't buy a lot of lottery compared to a household with a head between 45 to 65 years old. The result also indicated that the European immigrants bought less

lotteries than Canadians. Finally the R^2 was 0.053, which is low but normal because the size of the sample.

The regression with the inverse of Mill's ratio presents similar results as the previous regression. The income hadn't effect over ticket purchases. The number of adults and also the age modify positively the amount spent in lottery by a gambler. The rural variable stayed not significant like the previous regression. The sex variable stayed with a negative effect and indicated that men bought more lotteries than women. After that, the function showed that the level of education lowered the consumption of lotteries. But university graduated bought as much lottery as people who didn't finish high school, certainly because they had higher revenues. The language dummies didn't affect the ticket purchases like before. Again a divorced person almost bought the same quantity of lotteries as a married person but as our assumptions, a single person acquired more lotteries than a married person. Like the other regression the R^2 is stayed stable.

2.3 Were lotteries a progressive or regressive tax ?

In this section, two methods will be used to calculate the incidence of lottery. Table 20 shows lottery expenditures as a percentage of average income for each income group. Lower income groups spent more on lotteries as a proportion of their income than higher income groups, although from the second to the sixth income group (10000 - 34999), the share of income spent on lotteries stayed about constant.

TABLE 20

Household Expenditures on lotteries in 1992			
Income group $	lottery expenditure $	average income $	lot./inc. %
<10000	71	6354	1,11740636
10000-14999	68	12392	0,54874112
15000-19999	93	17535	0,53036784
20000-24999	137	22456	0,61008194
25000-29999	154	27450	0,56102004
30000-34999	179	32304	0,55411095
35000-39999	158	37348	0,42304809
40000-49999	169	44748	0,37767051
50000-59999	173	54548	0,31715187
60000-69999	205	64605	0,3173129
70000-89999	216	78748	0,27429268
90000+	196	119563	0,16393031

Source : 1992 family expenditures survey, Calculation by the author

Another way to measure the incidence of income before tax on lotteries is to use the Suits index. As mentioned in the literature review, the Suits index measures the degree of progressivity of a tax. In the case of lottery purchases, it's a comparison of the accumulated percentage of lottery purchases to the accumulated percentage of family income. To calculate the index, the surface under the curve L is divided by « the area of the triangle composed of the diagonal line of proportionality together with the bottom and right side of the figure » K (Suits p.25).

FIGURE 11

The Suits index in Canada, 1992
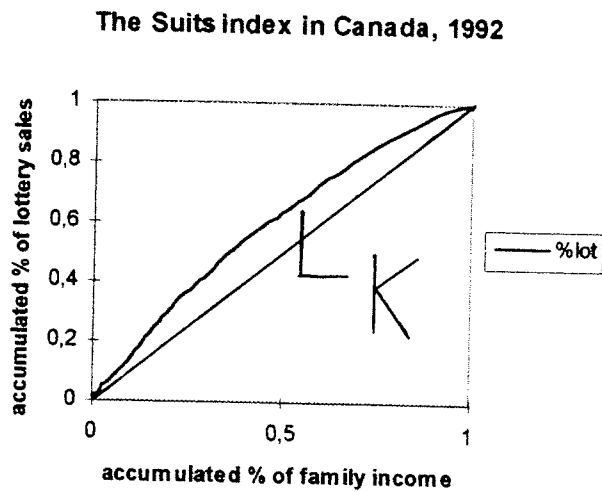
$$S = 1 - (L / K)$$

The Suits index for lotteries in 1992 was -

0.07. This result means that

Canadian lotteries were close to be

proportional but were still regressive. This result is surprising since in 1984, lottery have become

less regressive in 1992 than in 1984. Vaillancourt had found a Suits index of -0.17 for Canadian

lotteries in 1984. This decline may be explained by the advent of video lottery in Atlantic

Canada, Alberta and Manitoba ; on what spending isn't included in our data.

CONCLUSION

As this study indicates, government gambling revenues increased quickly in the last few years and this rise is related to the introduction of casinos and video lotteries. In 1995, government gambling revenues represent almost 2% of the general gross revenues of Canada. It may be this rise that explain the fright by Canadian population about video lottery. From the 1992 family expenditures survey, we learn that income after tax, number of adults and age of the head had a positive effect on the amount spent in lotteries, and that female and education had a negative effect. But something is very interesting and counterbalanced the fast rise, it's the fact that lotteries were less regressive than before in the 1984 and 1986 survey. To conclude, all these factors help us to understand why we have a continued rapid growth of lottery revenues in Canada over the last 20 years.

APPENDIX

<div align="center">TABLE A-1</div>

Government lottery revenues, amounts and uses, by lottery authority, 1969-1995, 000$ (current)										
Lottery Authority	Year	1969	1970	1971	1972	1973	1974	1975	1976
	Items								
Atlantic Lottery Corp.	Ticket sales	--	--	--	--	--	--	--	11574
	Prizes	--	--	--	--	--	--	--	3298
	Net revenues	--	--	--	--	--	--	--	8276
	Expenses	--	--	--	--	--	--	--	3249
	Payments to can. gov.	--	--	--	--	--	--	--	--
	Payments to prov. gov	--	--	--	--	--	--	--	5027
Loto-Québec	Ticket sales	3319	51436	60495	97164	125510	132185	147892	183343
	Prizes	615	15370	24701	37286	49795	50264	58642	75981
	Net revenues	2704	36066	35794	59878	75715	81921	89250	107362
	Expenses	837	9680	4921	22517	27840	30798	35879	37314
	Payments to can. gov.	--	--	--	--	--	--	--	--
	Payments to prov. gov	1867	26386	30873	37361	47875	51123	53371	70048
Ontario Lottery Corp.	Ticket sales	--	--	--	--	--	--	97137	218792
	Prizes	--	--	--	--	--	--	36095	94943
	Net revenues	--	--	--	--	--	--	61042	123849
	Expenses	--	--	--	--	--	--	19042	37849
	Payments to can. gov.	--	--	--	--	--	--	--	--
	Payments to prov. gov	--	--	--	--	--	--	42000	86000
Western Canadian Lot.	Ticket sales	--	--	--	--	--	--	--	30104
	Prizes	--	--	--	--	--	--	--	6439
	Net revenues	--	--	--	--	--	--	--	23665
	Expenses	--	--	--	--	--	--	--	14558
	Payments to can. gov.	--	--	--	--	--	--	--	--
	Payments to prov. gov	--	--	--	--	--	--	--	9107
British Columbia lot.	Ticket sales	--	--	--	--	--	--	--	--
	Prizes	--	--	--	--	--	--	--	--
	Net revenues	--	--	--	--	--	--	--	--
	Expenses	--	--	--	--	--	--	--	--
	Payments to can. gov.	--	--	--	--	--	--	--	--
	Payments to prov. gov	--	--	--	--	--	--	--	--
Loto-Canada	Ticket sales	--	--	--	--	--	--	--	107182
	Prizes	--	--	--	--	--	--	--	55995
	Net revenues	--	--	--	--	--	--	--	51187
	Expenses	--	--	--	--	--	--	--	22910
	Payments to can. gov.	--	--	--	--	--	--	--	28277
Canada	Ticket sales	3319	51436	60495	97164	125510	132185	245029	550995
	Prizes	615	15370	24701	37286	49795	50264	94737	235956
	Net revenues	2704	36066	35794	59878	75715	81921	150292	315039
	Expenses	837	9680	4921	22517	27840	30798	54921	116580
	Payments to can. gov.	--	--	--	--	--	--	--	28277
	Payments to prov. gov	1867	26386	30873	37361	47875	51123	95371	170182
U.S	ticket sales in us$	------	49200	147500	295100	556100	634900	776000	975500

Source : Annual report from each lottery authority on the period 1969-1995

Government lottery revenues, amounts and uses, by lottery authority, 1969-1995, 000$ (current)							
Lottery Authority	Year	1977	1978	1979	1980	1981	1982
	Items						
Atlantic Lottery Corp. .	Ticket sales	40602	43617	41096	52557	66750	78635
	Prizes	19764	20950	22408	25217	30847	35784
	Net revenues	20838	22667	18688	27340	35903	42851
	Expenses	6706	6922	8074	9140	12546	19960
	Payments to can. gov.	—	—	—	1697	1832	2267
	Payments to prov. gov	14132	15745	10614	16503	21525	20624
Loto-Québec	Ticket sales	202899	244122	318686	410554	453297	515878
	Prizes	89328	110376	144018	178390	198636	227059
	Net revenues	113571	133746	174668	232164	254661	288819
	Expenses	40232	48516	70439	90418	97004	117854
	Payments to can. gov.	—	—	4229	6746	7657	8965
	Payments to prov. gov	73339	85230	100000	135000	150000	162000
Ontario Lottery Corp.	Ticket sales	240431	235106	323787	490333	506896	550096
	Prizes	108292	123886	182733	270324	271893	293663
	Net revenues	132139	111220	141054	220009	235003	256433
	Expenses	32139	49220	54932	58637	59217	85756
	Payments to can. gov.	—	—	2122	9372	8786	8677
	Payments to prov. gov	100000	62000	84000	152000	167000	162000
Western Canadian Lot.	Ticket sales	71273	129826	156305	200225	210567	237425
	Prizes	18019	65487	74148	88805	93739	139560
	Net revenues	53254	64339	82157	111420	116828	97865
	Expenses	34704	43956	57728	59511	68913	47733
	Payments to can. gov.	—	—	1813	8700	11317	12548
	Payments to prov. gov	18550	20383	22616	43209	36598	37584
British Columbia lot.	Ticket sales	—	—	—	—	—	—
	Prizes	—	—	—	—	—	—
	Net revenues	—	—	—	—	—	—
	Expenses	—	—	—	—	—	—
	Payments to can. gov.	—	—	—	—	—	—
	Payments to prov. gov	—	—	—	—	—	—
Loto-Canada	Ticket sales	225214	258000	—	—	—	—
	Prizes	106538	N.A	—	—	—	—
	Net revenues	118676	N.A	—	—	—	—
	Expenses	44361	N.A	—	—	—	—
	Payments to can. gov.	74315	62000	—	—	—	—
Canada	Ticket sales	780419	910671	839874	1153669	1237510	1382034
	Prizes	339576	320699	423307	562736	595115	696066
	Net revenues	440843	589972	416567	590933	642395	685968
	Expenses	160507	344614	191173	217706	237680	271303
	Payments to can. gov.	74315	62000	8164	26515	29592	32457
	Payments to prov. gov	206021	183358	217230	346712	375123	382208
U.S	ticket sales in us$	1191600	1614600	1804500	2188100	2113100	3548000

Source : Annual report from each lottery authority on the period 1969-1995

Government lottery revenues, amounts and uses, by lottery authority, 1969-1995, 000$ (current)							
Lottery Authority	Year	1983	1984	1985	1986	1987	1988
	Items						
Atlantic Lottery Corp.	Ticket sales	109163	134987	152734	197117	211984	230895
	Prizes	51083	65023	70694	90687	98066	107228
	Net revenues	58080	69964	82040	106430	113918	123667
	Expenses	23418	26219	31264	40700	44116	48742
	Payments to can. gov.	2288	2343	4965	5065	5123	2923
	Payments to prov. gov	32374	41402	45811	60665	64679	72002
Loto-Québec	Ticket sales	662177	741102	883121	998040	1036491	1158170
	Prizes	304682	342086	409753	460311	477784	542695
	Net revenues	357495	399016	473368	537729	558707	615475
	Expenses	143278	149548	149900	158324	161588	175915
	Payments to can. gov.	9217	9468	20797	19030	17069	10889
	Payments to prov. gov	205000	240000	302671	360375	380050	428671
Ontario Lottery Corp.	Ticket sales	661818	811974	1007830	1336823	1355589	1377905
	Prizes	341019	415538	510965	673773	679618	685589
	Net revenues	320799	396436	496865	663050	675971	692316
	Expenses	91393	130518	150502	178020	180802	192736
	Payments to can. gov.	12406	15918	25666	26294	24034	15450
	Payments to prov. gov	217000	250000	320697	458736	471135	484130
Western Canadian Lot.	Ticket sales	350477	483476	317858	476680	501890	527744
	Prizes	156623	219747	144733	218787	230600	246295
	Net revenues	193854	263729	173125	257893	271290	281449
	Expenses	81014	86554	37412	55956	63746	74407
	Payments to can. gov.	10213	10630	12755	13043	13285	7504
	Payments to prov. gov	102627	166545	122958	188894	194259	199538
British Columbia lot.	Ticket sales	--	--	330061	444935	469639	524230
	Prizes	--	--	150767	203991	216267	247650
	Net revenues	--	--	179294	240944	253372	276580
	Expenses	--	--	66088	73108	79235	82045
	Payments to can. gov.	--	--	9138	8321	7551	4890
	Payments to prov. gov	--	--	104068	159515	166586	189645
Loto-Canada	Ticket sales	--	--	--	--	--	--
	Prizes	--	--	--	--	--	--
	Net revenues	--	--	--	--	--	--
	Expenses	--	--	--	--	--	--
	Payments to can. gov.	--	--	--	--	--	--
Canada	Ticket sales	1783635	2171539	2691604	3453595	3575593	3818944
	Prizes	853407	1042394	1286912	1647549	1702335	1829457
	Net revenues	930228	1129145	1404692	1806046	1873258	1989487
	Expenses	339103	392839	435166	506108	529487	573845
	Payments to can. gov.	34124	38359	73321	71753	67062	41656
	Payments to prov. gov	557001	697947	896205	1228185	1276709	1373986
U.S	ticket sales in us$	4764000	6237000	8121500	11054500	11469000	13919600

Source : Annual report from each lottery authority on the period 1969-1995

TABLE A-1 CONTINUED

Government lottery revenues, amounts and uses, by lottery authority, 1969-1995, 000$ (current)

Lottery Authority	Year / Items	1989	1990	1991	1992	1993	1994	1995
Atlantic Lottery Corp.	Ticket sales	227925	258476	309312	346995	370037	409406	436780
	Prizes	109362	131376	158808	180665	193295	216014	233035
	Net revenues	118563	127100	150504	166330	176742	193392	203745
	Expenses	48780	56925	91382	113277	109286	117712	82981
	Payments to can. gov.	3112	3249	3354	3444	3584	3525	3565
	Payments to prov. gov	66671	66926	55768	49609	63872	72155	117199
Loto-Québec	Ticket sales	1214543	1273922	1315949	1327830	1409416	1494131	1574159
	Prizes	570125	612082	629460	635931	684521	735161	786589
	Net revenues	644418	661840	686489	691899	724895	758970	786589
	Expenses	191890	206240	213401	221906	241159	265807	269715
	Payments to can. gov.	11397	11911	12376	12516	12570	12515	12719
	Payments to prov. gov	441131	443689	460712	457477	471166	480648	505136
Ontario Lottery Corp.	Ticket sales	1383456	1379209	1406294	1665344	1886080	1941755	2118428
	Prizes	685982	668333	674155	808789	941453	958060	1087190
	Net revenues	697474	710876	732139	856555	944627	983695	1031238
	Expenses	173074	220376	253887	268565	323573	338329	363827
	Payments to can. gov.	16311	17126	17916	18241	18599	18793	19243
	Payments to prov. gov	508089	473374	460336	569749	602455	626573	648168
Western Canadian Lot.	Ticket sales	516674	551991	580533	628857	641982	612071	616347
	Prizes	244829	257518	264160	301094	310126	276907	303092
	Net revenues	271845	294473	316373	327763	331856	335164	313255
	Expenses	69310	73524	83987	86364	84104	85456	82483
	Payments to can. gov.	7836	8166	8487	8562	8544	8492	8669
	Payments to prov. gov	194699	212783	223899	232837	239208	241216	216754
British Columbia lot.	Ticket sales	548147	603297	676411	738485	769088	780788	797033
	Prizes	259351	293967	337791	370068	390586	403250	416739
	Net revenues	288796	309330	338620	368417	378502	377538	380294
	Expenses	87785	96289	105262	123148	128425	126473	119665
	Payments to can. gov.	5213	5520	5811	5973	6126	6279	6524
	Payments to prov. gov	195798	205308	219032	227025	233766	234523	244058
Loto-Canada	Ticket sales	--	--	--	--	--	--	--
	Prizes	--	--	--	--	--	--	--
	Net revenues	--	--	--	--	--	--	--
	Expenses	--	--	--	--	--	--	--
	Payments to can. gov.	--	--	--	--	--	--	--
Canada	Ticket sales	3890745	4066895	4288499	4707511	5076603	5238151	5542747
	Prizes	1869649	1963276	2064374	2296547	2519981	2589392	2826645
	Net revenues	2021096	2103619	2224125	2410964	2556622	2648759	2716102
	Expenses	570839	655567	756434	825531	896732	944040	934067
	Payments to can. gov.	43869	45972	47944	48736	49423	49604	50720
	Payments to prov. gov	1406388	1402080	1419747	1536697	1610467	1655115	1731315
U.S	ticket sales in us$	15027800	18818600	19167000	19217000	23453000	26588000	29799000

Source : Annual report from each lottery authority on the period 1969-1995

TABLE A-2

Government gambling revenues, amounts and uses, by lottery authority, 1985-1995, 000$ (current)

Lottery authority	Items	Year 1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995
Atlantic Lottery Corp.	Net sales	82040	106430	113918	123667	118563	137236	234984	350227	372235	439899	485055
	Expenses	31264	40700	44116	48742	48780	60169	118416	172124	171844	196594	183746
	Payments to can. gov.	4965	5065	5123	2923	3112	3249	3354	3444	3584	3525	3565
	Payments to prov. treas.	45811	60665	64679	72002	66671	73818	113214	174659	196807	239780	297744
Loto-Québec	Net sales	473368	537729	558707	615475	644418	661840	686489	691899	861982	1181800	1461600
	Expenses	149900	158324	161588	175915	191890	206240	213401	221906	308213	472187	615317
	Payments to can. gov.	20797	19030	17069	10889	11397	11911	12376	12516	12570	12515	12719
	Payments to prov. treas.	302671	360375	380050	428671	441131	443689	460712	457477	541199	697098	833564
Ontario Lottery Corp.	Net sales	496865	663050	675971	692316	697474	710876	732139	856555	944627	1402645	1608523
	Expenses	150502	178020	180802	192736	173074	220376	253887	268565	323573	441371	518893
	Payments to can. gov.	25666	26294	24034	15450	16311	17126	17916	18241	18599	18793	19243
	Payments to prov. treas.	320697	458736	471135	484130	508089	473374	460336	569749	602455	942481	1070387
Western Canadian Lot.	Net sales	180534	265314	280057	288401	276836	309614	355030	467955	830236	1201075	1278956
	Expenses	40233	59286	67564	77831	72772	80134	100945	146459	220524	305265	308559
	Payments to can. gov.	12755	13043	13285	7504	7836	8166	8487	8562	8544	8492	8669
	Payments to prov. treas.	127546	192985	199208	203066	196228	221314	245598	311653	601168	887318	961728
British Columbia Lot.	Net sales	179294	240944	253372	276580	288796	309330	338620	368417	378502	377538	380294
	Expenses	66088	73108	79235	82045	87785	98502	113777	135419	138610	136736	129712
	Payments to can. gov.	9138	8321	7551	4890	5213	5520	5811	5973	6126	6279	6524
	Payments to prov. treas.	104068	159515	166586	189645	195798	205308	219032	227025	233766	234523	244058
Canada	Net sales	1412101	1813467	1882025	1996439	2026087	2128896	2347262	2735053	3387582	4602957	5214428
	Expenses	437987	509438	533305	577269	574301	665421	800426	944473	1162764	1635943	1756227
	Payments to can. gov.	73321	71753	67062	41656	43869	45972	47944	48736	49423	49604	50720
	Payments to prov. treas.	900793	1232276	1281658	1377514	1407917	1417503	1498892	1740563	2175395	2917410	3407481

TABLE A-3

The importance of lotteries in the Canadian and US Economies (% GDP, % Pers. exp, % Gov. rev), 1976-1995

Year	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995

Ticket sales as a percentage of gross domestic product

	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995
Atlantic	0,10	0,33	0,31	0,25	0,32	0,36	0,38	0,47	0,49	0,52	0,62	0,58	0,64	0,73	0,81	0,83	0,90	0,93		
Quebec	0,39	0,40	0,43	0,51	0,58	0,57	0,61	0,74	0,82	0,86	0,81	0,82	0,83	0,85	0,87	0,89	0,90			
Ontario	0,29	0,29	0,26	0,31	0,43	0,40	0,44	0,48	0,54	0,65	0,60	0,54	0,50	0,51	0,59	0,65	0,64	0,67		
Western	0,05	0,11	0,17	0,18	0,19	0,26	0,33	0,31	0,50	0,51	0,47	0,49	0,53	0,51	0,56	0,44				
B. C.	----	----	----	----	----	----	----	----	----	0,63	0,80	0,76	0,73	0,77	0,83	0,84	0,79	0,77		
Canada	0,28	0,37	0,38	0,31	0,38	0,35	0,37	0,44	0,49	0,56	0,68	0,65	0,63	0,59	0,61	0,63	0,68	0,71	0,70	0,77
US	0,05	0,06	0,07	0,07	0,08	0,09	0,09	0,11	0,14	0,16	0,19	0,24	0,25	0,28	0,28	0,33	0,32	0,31	0,36	0,38

Ticket sales as a percentage of personal expenditures

	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995
Atlantic	0,14	0,43	0,42	0,35	0,41	0,47	0,50	0,63	0,69	0,72	0,87	0,87	0,89	0,82	1,03	1,13	1,18	1,27	1,34	
Quebec	0,67	0,67	0,74	0,86	1,01	1,00	1,06	1,24	1,34	1,39	1,33	1,39	1,36	1,37	1,36	1,34	1,39	1,43	1,48	
Ontario	0,51	0,51	0,46	0,57	0,77	0,71	0,71	0,85	0,96	1,16	1,07	0,99	0,91	0,87	0,86	1,00	1,09	1,09	1,16	
Western	0,09	0,20	0,33	0,35	0,38	0,36	0,50	0,63	0,64	0,91	0,90	0,89	0,81	0,82	0,84	0,89	0,88	0,81	0,79	
B. C.	----	----	----	----	----	----	----	----	----	1,00	1,26	1,22	1,25	1,19	1,20	1,27	1,32	1,30	1,24	1,22
Canada	0,50	0,64	0,67	0,56	0,68	0,64	0,66	0,78	0,86	0,98	1,16	1,11	1,09	1,03	1,02	1,04	1,11	1,16	1,15	1,19
US	0,09	0,09	0,12	0,12	0,13	0,14	0,17	0,21	0,25	0,30	0,38	0,37	0,42	0,42	0,49	0,48	0,46	0,53	0,57	0,61

Payments by lotteries to provincial (state) governments as a percentage of gross general government revenues

	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995
Atlantic	----	0,38	0,36	0,22	0,31	0,36	0,32	0,44	0,54	0,55	0,70	0,68	0,69	0,61	0,58	0,46	0,39	0,49	0,55	0,84
Quebec	0,63	0,57	0,60	0,63	0,76	0,70	0,78	0,95	1,13	1,26	1,22	1,24	1,23	1,17	1,18	1,36	1,34	1,39	1,17	1,14
Ontario	0,73	0,80	0,44	0,53	0,88	0,75	0,92	0,97	1,13	1,45	1,34	1,22	1,17	1,06	1,06	1,33	1,32	1,32	1,30	
Western	0,07	0,13	0,12	0,12	0,20	0,15	0,14	0,34	0,76	0,94	0,89	0,83	0,77	0,77	0,81	0,82	0,82	0,80	0,73	
B. C.	----	----	----	----	----	----	----	----	----	1,03	1,51	1,45	1,46	1,34	1,28	1,33	1,25	1,17	1,08	1,07
Canada	0,52	0,65	0,50	0,39	0,56	0,5	0,64	0,77	0,93	1,24	1,45	1,17	1,13	1,08	1,01	1,02	1,08	1,09	1,08	1,08
US	0,15	0,16	0,21	0,23	0,25	0,31	0,38	0,53	0,63	0,78	0,75	0,84	N.D.	0,84	0,83	0,76	0,90	0,87	N.D.	

Source : Table A-1 and Table A-5. Calculation by the author

TABLE A-4

The importance of gambling in the Canadian Economies (% GDP, % Pers. exp, % Gov. rev), 1976-1995

Year	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995
Atlantic	----	0,38	0,36	0,22	0,31	0,36	0,32	0,44	0,54	0,55	0,70	0,68	0,69	0,61	0,61	0,94	1,37	1,52	1,82	2,14
Quebec	0,63	0,57	0,60	0,63	0,76	0,71	0,70	0,78	0,95	1,13	1,26	1,22	1,24	1,23	1,17	1,18	1,15	1,34	1,70	1,88
Ontario	0,73	0,80	0,44	0,53	0,88	0,85	0,75	0,92	0,97	1,13	1,45	1,34	1,22	1,17	1,06	1,06	1,33	1,32	1,98	2,15
Western	0,07	0,13	0,12	0,12	0,20	0,15	0,14	0,34	0,76	0,57	0,96	0,91	0,85	0,78	0,80	0,89	1,10	2,00	2,61	2,81
B. C.	----	----	----	----	----	----	----	----	----	1,03	1,51	1,45	1,46	1,34	1,28	1,33	1,25	1,17	1,08	1,07
Canada	0,52	0,65	0,5	0,39	0,56	0,52	0,5	0,64	0,77	0,94	1,24	1,17	1,13	1,08	1,03	1,08	1,23	1,46	1,83	2,00

Source : Table A-1 and A-5. Calculation by author

TABLE A-5

Region	Items	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985
Atlantic	G.D.P.	11574	12304	14070	16438	16424	18541	20693	23226	27682	29258
Quebec	G.D.P.	47011	50725	56773	62487	70785	79525	84570	90709	100196	1072244
Ontario	G.D.P.	75446	82907	90425	104447	114030	129973	137524	150413	170516	1856625
Western	G.D.P.	60208	64794	76368	86836	105381	116981	124960	134798	144866	1022231
B.C.	G.D.P.	----	----	----	----	----	----	----	----	----	52781
Canada	G.D.P.	196783	210924	239650	270927	303597	353574	373522	405371	444735	477988
U.S	G.D.P.	1951000	1986000	2306571	2577857	2735125	2347888	3225454	3402857	3902400	4180700
Atlantic	Pers. Exp.	8267	9442	10385	11741	12818	14202	15727	17327	19499	21083
Quebec	Pers. Exp.	27364	30283	32989	37056	40648	45329	48667	53401	60320	65988
Ontario	Pers. Exp.	42900	47143	51110	56804	63679	71393	77478	85950	95150	104650
Western	Pers. Exp.	33448	35636	39341	44658	52690	60162	65951	70095	76306	49352
B.C.	Pers. Exp.	----	----	----	----	----	----	----	----	----	33027
Canada	Pers. Exp.	110199	121940	135921	149977	169657	193360	209399	228671	251645	274503
U.S	Pers. Exp.	1083888	1324000	1345500	1503750	1683153	1509357	2087058	2268571	2492300	2704800
Atlantic	Gross gov. rev.	----	3718	4373	4824	5323	5979	6445	7357	7611	8332
Quebec	Gross gov. rev.	11118	12866	14205	15873	17763	21126	23142	26283	25181	26829
Ontario	Gross gov. rev.	11780	12500	14090	15849	17272	19647	21600	23586	25786	28399
Western	Gross gov. rev.	13010	14269	16985	18846	21604	24398	26845	30184	22027	22531
B.C.	Gross gov. rev.	----	----	----	----	----	----	----	----	----	10104
Canada	Gross gov. rev.	32727	31695	36671	55700	61912	72139	76441	87031	90237	96195
U.S	Gross gov. rev.	650333	744750	768857	859285	951347	845240	11445516	12253684	555062	613904

Source : Statistics Canada: Provincial economic accounts, annual estimates, 1981-1994, catalogue 13-213

TABLE A-5 CONTINUED

Region	Items	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995
Atlantic	G.D.P.	31916	34702	37275	39455	40679	42196	43094	44402	45544	47142
Quebec	G.D.P.	116622	128379	140584	148144	153164	155575	157373	161720	167493	174422
Ontario	G.D.P.	205643	226798	253143	276073	277508	278463	282803	288569	303151	315069
Western	G.D.P.	94612	98464	104791	110600	118472	117873	119282	126177	134316	139295
B.C.	G.D.P.	55527	62073	68571	74808	78790	81453	86698	91228	98910	103433
Canada	G.D.P.	505666	551597	605906	650748	669467	676477	690122	712855	750053	780027
U.S	G.D.P.	4422200	4692300	5049600	5438700	5743800	5916700	6244400	6550200	6931400	7245800
Atlantic	Pers. Exp.	22653	24247	25933	27640	29100	30135	30633	31395	32282	32561
Quebec	Pers. Exp.	71879	77798	83458	89357	93283	96593	98848	101557	104524	106214
Ontario	Pers. Exp.	114951	126184	138956	151833	158584	162632	166642	172247	178458	182759
Western	Pers. Exp.	52242	55632	59270	63539	67421	69218	70411	72602	75653	78529
B.C.	Pers. Exp.	35248	38392	41798	46059	50378	53088	55910	59005	62964	65485
Canada	Pers. Exp.	297478	322769	349937	378933	399319	412246	423055	437289	454302	465970
U.S	Pers. Exp.	2892700	3094500	3349700	3594800	3839300	3975100	4219800	4454100	4698700	4924300
Atlantic	Gross gov. rev.	8726	9560	10498	11005	12014	12060	12729	12906	13148	13884
Quebec	Gross gov. rev.	28498	31172	34680	35924	37955	39033	39629	40432	40907	44248
Ontario	Gross gov. rev.	31425	35235	39776	43330	44635	43559	42909	45569	47586	49810
Western	Gross gov. rev.	20022	21925	23951	25314	27511	27602	28331	29024	30064	29825
B.C.	Gross gov. rev.	10598	11508	12998	14597	16038	16439	18227	20038	21814	22768
Canada	Gross gov. rev.	99269	109400	121903	130170	138153	138693	141825	147969	153519	160535
U.S	Gross gov. rev.	670145	729445	766914	N.A	895313	926200	1006007	1069134	1115998	N.A.

Source : Statistics Canada: Provincial economic accounts, annual estimates, 1981-1994, catalogue 13-213

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