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Introduction

The United States has a well –established program of tax compliance research that has yielded numerous studies of the compliance behavior of agents and in particular individuals. This is not the case for most other countries, including Canada. This paper examines how one can use information from these studies to learn something about tax compliance and in particular the tax gap for other studies. We do this for the individual income tax gap for Canada as a whole over the 1951-2001 period and for Canadian provinces in 2001. This is done using a combination of observable characteristics of taxpayers and information as to the US tax gap determinants. This is of interest since it is plausible that the situation in Canada in terms of incomplete information is similar to what is observed in other countries.

We begin by discussing what makes it hard to tax some individuals. We then summarize the results of existing US studies on tax evasion, putting the emphasis on the impact of observable and predictable characteristics on the importance of hard to tax individuals (HTTI).We then turn to an examination of the trends in the number and importance (income) of the relevant types of taxpayers in Canada. We do this using a methodology inspired by predictive work done for compliance costs (Blais and Vaillancourt, 1995).These results could be of interest to tax administrators trying to allocate resources across varying regions in a given year or trying to set the proper level of resources to be used for tax compliance work for a given year

1. HTTI Why do they exist

There is an important literature (Andreoni et al 1998 for a summary) on why some individuals choose to hide from the tax system completely or at least to hide some of their income form the tax authorities. One important factor is the tax system (rates, penalties, audit probability...); another one is the opportunity offered by the type of income received by individuals and a third is the set of socio-demographic characteristics of the population and associated attitudes. Examining the various papers, one notes that the authors concentrate on the tax factors in their analysis, using the socio-demographic information

as control variables and the type of income either as control variables or to create groups of returns subject to analysis(TCMP audit classes). We will focus on these two factors with the intent of examining how the risk of tax evasion varies across time and regions.

Before turning to this however, we would like to note that the literature appears to assume that governments want to tax individuals with differing socio-demographic characteristics in a similar fashion if they have similar income. For political reasons, a government may decide to advantage fiscally a specific socio-demographic group For example, OECD (2001) work shows that older (65+) face a lower tax burden in countries such as Canada or the United States .To some extent then, HTTI can be considered a result of government's choices and electoral constraints. .

Let us now examine the impact of type of income and socio-demographic factors on the likelihood of being an HTTI.

Type of Income

The literature uses various ways of measuring the type of income:
  - ➢ studies using TCMP zip-code aggregated data use the % of employment as a proxy for wage income or the % self-employed. They find that compliance increases with the % employed in manufacturing and decreases with the % self-employed;
  - ➢ other studies using individual data use the presence of self-employment income of various types to explain compliance. They find that the greater the importance of what is referred to in some studies as fungible income, the greater the tax avoidance. For example, Das-Gupta (1994) writes that «hard-to-tax groups encompass proprietorships and partnerships of businessmen-such as retailers and professionals such as plumbers or doctors in private practice».

Table 1 present the results from two TCMP studies on the importance of tax evasion by income type. The information for each year is not strictly comparable but shows in both cases that wage income is highly compliant, investment income less compliant and farm

income the least compliant with respect to the individual income tax in the US. We will use the % of 1992 in calculations further on

Table1

Tax evasion by income type, USA, 1979 and 1992

	1979% returns with unreported income of 500$+	1992 Income gap, Individual income tax % reported correctly
Wages and salaries	2,3	99,1
Interest	2,1	97,7
Pensions and annuities	na	96,0
Taxable Social Security	na	95,8
Taxable Unemployment	na	93,1
Capital gains	12,9	92,8
Partnership Small Business Income	27,2	92,5
Dividends	4,8	92,2
Rents and Royalties	22,6	82,8
Farm Income	45,7	67,8
Other Sole Proprietors	42,3	67,7

Sources

1979: Roth et al, 1989, table 8, p108

1992: General Accounting Office Letter dated 06/13/1997

Socio-demographic factors

The four socio-demographic factors examined in the literature are sex, age, education and marital status. The impacts of these factors are reported in Table 2 for 9 US studies. They can be summarized as follows:

- women tend to evade taxes less than men;
- older(65+) individuals tend to evade taxes less than others;
- the impacts of education and marital status on tax avoidance are uncertain

Table 2 Synthesis of the impact of demo-socio characteristics on HTT behavior,
United States studies

Author(s)/ Year	Area/Year of data	Data type/N	Dependent variable/method of analysis	Sex	Age(%yes)	Education	Marital status
Spicer and Lunstedt 1975	United States	Survey of Individuals	Indexes of tax resistance and of tax evasion	N/A	Resistance goes down with age	Not Significant	N/A
Ekstrand, laurie,1980	United states-two cities(South Bend and San Jose) 1979	Survey of adults 18+ legally required to file income tax return N=528	Answer to questions on overstating deductions/understating income tabulation	N/A	Compliance increases with age	Compliance decreases with education	
Clotfelter, 1982	United states,1969	TCMP IRS file ,1969 stratified sample of returns N=47000	Underreporting of Income (log) Tobit analysis for 3 types of returns Non business Non farm business Farm	N/A	Compliance increases with age for all three groups	N/A	Married non business returns are less compliant
Slemrod, 1985	United States, 1977	IRS random sample Uses 1/4 N=23111	Index of evasion calculated as position within 50$ brackets		Compliance higher for those 65+		Compliance lower for married individuals

Witte and Woodbury 1985	United States ,1969	TCMP IRS file ,1969 stratified sample of returns aggregated by Zip codes N= 567	IRS compliance index Regression analysis for 3 audit classes: small proprietors Wages and salary(middle group) Self-employed(upper income)	N/A	Compliance increases with age for small proprietors Elasticity is .174 Not significant otherwise		
Dublin and Wilde ,1988	United States,1969	TCMP IRS file ,1979 stratified sample of returns aggregated by Zip codes N=5580	IRS compliance index Regression analysis for all 7 audit classes: IV results reported	N/A	Impact varies by audit class	Compliance generally increases with education	N/A
Feinstein 1991	United States 1992 4 districts	TCMP IRS file ,1982 and 1985 100% of returns from each districts N=2267(82) N=3050(85)	Net taxable income Underreported Log-likelihood methods	N/A	N/A	N/A	Married individual have less underreported income
Beron, Tauchen	United States,1969	TCMP IRS file ,1979	Tax liability measure	Female report a	Compliance increases	High school	

and Witte, 1992		stratified sample of returns aggregated by Zip codes N=4191	Reduced form model Regression analysis for 5 audit classes (high incomes omitted)	greater tax liability	with age	graduates comply less	
Smith,1992	United States,1987	Survey of tax filers N=1573	Self reported likelihood of underreporting Regression analysis	Female underreport less	Underreporting decreases with age	N/A	N/A

2.0 Canadian trends, 1951-2001

To carry out the exercise of linking socio-demographic trends to the size of tax evasion, we need information on both trends and tax evasion

Trends

There are two data sources of use to us:

- Income tax statistics are a yearly publication of tables prepared using either a stratified sample(final publication) or all (interim publication) of taxpayers by Canada Customs and Revenue Agency (formerly Revenue Canada) since 1946.They are know as *Taxation Statistics* or more recently *Income Statistics*
- Statistics Canada data on population and income as found in various publication. These go back to various dates depending on the type of data

Information on the age ,self employment status and income types(2) is reported in Table 3 for the 1951-2001 period Examining it we note that:

- The population of Canada is aging ,making it easier to tax,
- Wages have diminished as a share of income, making it more difficult to tax
- Self-employment income is first going down as a share of income ,due tot he reduction of the farming sector then going up later on but to a lower level

Turning to table 4 , we note that one cannot use either age or self-employment income individually to predict provinces more at risk of greater tax evasion since their impacts are in opposite directions.
 We thus need to carry out more precise calculation to examine the extent to which it may be hard to collect personal income tax in Canada. We do this by creating an index of taxed income obtained by multiplying income shares in a given year by the 1992 TCMP collection %(Table1). This index is reported in table 5(1), with details of calculation in tables A-1 and A-2

Table 5 shows a decline of about 4% points from 1951 to 2001 in the index of taxed income, with most of the decline occurring from 1961 to 1991 in a fairly smooth fashion and mainly explained by a decrease in the importance of wages in total income. These calculations presume that:

> the collection ratios available for the US apply to Canada, a reasonable assumption given the similarity between the two societies;

> the collection ratios remain unchanged over time. This is probably not true but we do not know which technology evolves faster; that of the tax collector or of the tax evader;

We do not as such take into account the aging of the society or the increasing female labor force participation rate. In the first case, if we assume that this is done with an increase in the share of pension income in total income, then this leads to more tax evasion since the % for that income is lower than the % for wages In the second case, the very high % of taxed wages means that the sex of wage earners is irrelevant. The entry of women in liberal professions may mater however.

Note also that if we had used the % of wages in total income as measured in taxation statistics as an indicator of ease of collection, we would conclude that the situation had deteriorated more than it appears to have. But if we use the % of wages in personal income in the National Accounts, then one gets a similar change from 1961 to 2001(2001/1961 is 94% for personal income and 96% for the income correctly collected indicator)Thus, one should be careful in tax compliance work to use more than one indicator of type of income.

Table 3 Some trends, personal income tax, Canada, 1951-2001

Years	% population aged 65+ (1)	% tax fillers aged 65+ (2)	% wages and salaries in personal income (3)	% wages and salaries in taxable income (4)	% self employment in personal income (5)	% self-employment in taxable income (6)	% self-employed in labor force
1951	7,7	n.a.		81,0		12,5	
1961	7,8	n.a.	69,3	83,7	14,3	8,9	
1971	8,0	10,6	71,7	87,5	10,1	4,1	
1981	9,6	9,4	67,6	72,2	6,0	4,4	14,6
1991	11,4	12,4	62,6	67,3	6,4	4,3	17,2
2000/2001	12,6	17,6	65,2	66,1	8,0	4,8	19,4

Sources:

(1)1951: 1951 Census Dominion Bureau of Statistics Volume 1 Population General characteristics, table 23

1961: 1961 Census Dominion Bureau of Statistics 92-525 Specific age groups and Sex, Introductory table;

1971-1997 Revised Intercensal Population and Family Estimates Statistics Canada 91-537 table 1.2

2001 Annual Demographic Statistics 2001 Statistics Canada 91-213

(2), (4): Taxation Statistics Revenue Canada table2 various years

(3), (5):1961-1997: Canadian Economic Observer Historical Statistical Supplement 2000/2001 Table 2 Statistics Canada 11-210

2001: Canadian Economic Observer April 2003 Statistical summary Table 2 Statistics Canada 11-010

Table 4 Differences between provinces in age structure and self-employment, Canada, 2000

Province	% 65+ (1)	% Income from self - employment(2)
Newfoundland	11,8	6,0
Prince Edward Island	13,2	6,5
Nova Scotia	13,4	4,9
New Brunswick	13,0	4,0
Québec	13,0	5,1
Ontario	12,6	6,0
Manitoba	13,5	6,1
Saskatchewan	14,6	6,8
Alberta	10,2	4,6
British Columbia	13,2	4,8

Sources:

(1):

(2)Income Statistics 2002-2000 year Canada Customs and Revenue Agency

Table 5 % income subject to income tax with complete collection, Canada, 1951-2001

Year	Income correctly collected, detailed calculations(1)	Underground economy % of GDP(2)
1951	94,9	2,5
1961	96,2	2,0
1971	95,2	2,5
1981	93,8	3,0
1991	92,9	3,5
2001	92,4	4,0

Sources ;(1) table A-2

     (2) see text

Tax Evasion

The following extract from the April 1999 report of the Auditor «general of Canada is the most recent official statement on the size of the underground economy and related tax evasion in Canada:

> Estimates of the size of the Canadian underground economy contained in many studies over the last 17 years have ranged from 3 percent to over 20 percent of gross domestic product (GDP). Our review of these studies indicates that differences in their objectives, definitions of the underground economy and measurement methodologies explain the wide variation in these estimates. Taking into account the differences, our review concluded that a reasonable range of estimates of the underground economy - defined in terms of the value of transactions in goods and services that are hidden and result in the evasion of taxes - was between 4.2 and 4.5 percent of GDP in 1993. This range is in line with

Statistics Canada's estimate of 4.2 percent of GDP for that year. At 4.5 percent of GDP in 1997, the size of the underground economy would have amounted to $38 billion. This figure translates into a loss of income and commodity tax revenues of $12 billion for that year alone - $7 billion at the federal level and $5 billion at the provincial level.

If we link the underground economy to the tax evasion index, and assume that it is a linear relationship with 100%coverage=0% underground economy, we obtain the results in column 2 of Table 5.

We can use the same approach to examine which province has the most income at risk of evasion. We did this for 2001 and found little difference in the income correctly corrected % from one province to another (less than 1% difference from lowest to highest).

Conclusion

This paper has examined how one can combine Us information on tax gaps and information on income types to obtain some information on the importance of the tax gap in Canada from 1951 to 2001.It would be useful to refine the methodology by applying the TCMP % to non-tax income information and by using all the TCMP information available.

Table A-1 Type of Income, Canada 1951-2001

	1951	1961	1971	1981	1991	2001
Wages and Salaries	**80.96%**	**83.74%**	**82.17%**	**72.20%**	**67.26%**	**66.11%**
Business Income	7.73%	4.52%	2.83%	1.39%	1.24%	2.24%
Professionall Income*	2.25%	2.75%	2.72%	2.03%	2.68%	2.19%
Commission Income**	1.58%	1.62%	1.92%	1.83%	1.63%	1.46%
Farm Income*	**2.53%**	**1.62%**	**0.99%**	**1.02%**	**0.38%**	**0.34%**
Pensions	**0.00%**	**1.48%**	**3.24%**	**4.71%**	**9.57%**	**12.17%**
Dividends	1.95%	1.67%	1.22%	3.16%	1.88%	2.39%
Bond+Bank Interest	0.68%	1.45%	3.07%	7.51%	6.29%	2.95%
Mortgage Interest	0.93%	0.59%	0.60%	0.31%	0.53%	0.00%
Foreign Investment income	0.00%	0.00%	0.11%	0.12%	0.10%	0.00%
RRSP income	**0.00%**	**0.00%**	**0.00%**	**0.00%**	**0.83%**	**1.10%**
Net rental income	0.93%	0.72%	0.15%	0.19%	-0.06%	0.39%
Unemployment insurance benefits	0.00%	0.00%	0.00%	1.90%	3.43%	1.51%
Capital gains	0	0	0	1.01%	1.74%	1.26%
Total	99.53%	100.17%	99.03%	97.37%	97.50%	94.10%

Source: calculations by the authors, Taxation Statistics, Revenue Canada

Table A-2 Shares of incomes weighted by % of compliance, Canada, 1951-001

Wages and Salaries	80.23%	82.98%	81.43%	71.55%	66.65%	65.51%
Business Income	7.15%	4.18%	2.62%	1.29%	1.15%	2.07%
Professional Income*	1.52%	1.86%	1.84%	1.37%	1.82%	1.48%
Commission Income**	1.07%	1.10%	1.30%	1.24%	1.10%	0.99%
Farm Income*	1.72%	1.10%	0.67%	0.69%	0.26%	0.23%
Pensions	0.00%	1.42%	3.11%	4.52%	9.19%	11.68%
Dividends	1.79%	1.54%	1.12%	2.92%	1.73%	2.20%
Bond+Bank Interest	0.66%	1.41%	3.00%	7.33%	6.15%	2.89%
Mortgage Interest	0.01%	0.00%	0.00%	0.00%	0.00%	0.00%
Foreign Investment income	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
RRSP income	0.00%	0.00%	0.00%	0.00%	0.08%	0.11%
Net rental income	0.77%	0.60%	0.13%	0.16%	-0.05%	0.33%
Unemployment insurance benefits	0.00%	0.00%	0.00%	1.77%	3.19%	1.40%
Capital gains	0.00%	0.00%	0.00%	0.94%	1.61%	1.17%
Other Income	0.00%	0.00%	0.01%	0.02%	0.02%	0.04%
Total	94.93%	96.20%	95.24%	93.79%	92.90%	90.10%

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Table A-2 Weighted Incomes, Canada, 1951-2001

2011	14,0						
2021	17,5						
2031	21,0						
2041	21,7						