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Income Inequality and Public Expenditures in Canadian Provinces: Is Director's Law Still Relevant?*

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ABSTRACT

In this article, I empirically test George Stigler's (1970) theoretical argument, which is based on Aaron Director's observation that income redistribution runs from the poor and the rich to the middle classes. Using a panel dataset for ten Canadian provinces from 1981 to 2008, I analyze the impact of various measures of inequality on provincial government size. The estimation results do not support the predictions of theories explaining the growth of government size on the basis of the median voter theorem.

KEY WORDS Income Redistribution; Gini Coefficient; Director's Law

In one of his seminal works, Stigler defines Director's Law as follows: "Public expenditures are made for the primary benefit of the middle classes, and financed with taxes which are borne in considerable part by the poor and the rich" (1970:1). The theoretical justification that Stigler offers is based on the median voter theorem. According to this theorem, when the policy agenda is unidimensional and voters have single-peaked preferences, the legislative outcome will favor the median voter preferences. The assumption of single-peaked preferences is in most cases unrealistic, because it requires only one preferred choice among all alternatives. For example, when the viewers of a popular television show *American Idol* face the decision as to who should move to the next level of competition, they may have two or more equally preferred contestants in mind. When it comes to the choice of tax-financed expenditure alternatives, however, individuals will have a unique optimum as long as preferences are well behaved and exhibit diminishing marginal rate of substitution. In other words, there is only one tangency point between an individual's indifference curve and her budget constraint. The key substantive assumption in Stigler's argument is that there is a strong correspondence between the distribution of voters along the income scale and the distribution of income in the population. Given that these assumptions are met, a greater

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income inequality therefore implies greater income redistribution in favor of the middle (income) classes.

In this paper, I empirically test Director's Law using the year-to-year change in government size as a dependent variable and various measures of income inequality as an independent variable. I employ a dataset that spans 1981 to 2008 and covers ten Canadian provinces. The results indicate that the sign on the coefficients for various measures of income inequality are positive, but the estimates are statistically not discernable from zero. Although the estimates clearly reject the implications of Director's Law in its simplest form, once we account for Canadian voter profiles, the results become qualitatively more in line with the underlying logic of this law.

The next section in this paper presents a brief review of economic literature that addresses the relationship between growth of government and inequality. The third section presents the theoretical basis for econometric models in this paper. The fourth section presents a summary of the dataset used in the empirical analysis. The fifth section explains the choice of empirical strategies used in the analysis. The sixth section presents the results of empirical analysis. Finally, the seventh section concludes with a discussion of the difference between simple interpretation of Director's Law and its underlying logic as explained by Stigler.

LITERATURE REVIEW

Since 1962, an extensive economic and political science literature has presented ample empirical evidence supporting theories based on individual rational choice in collective decision-making processes. One of the fruitful areas of public-choice research programs has been explaining variation of size and growth of government across countries and over time. Holcombe (2005) describes the public-choice explanation of government growth with three general theories: budget maximization, rational choice of collective decision making, and path dependency. The budget-maximization model (Friedman 1977; Niskanen 1971) offers an explanation as to why government size is large by assuming that the objective of bureaucrats is to maximize their budget size or revenue. The rational-choice models suggest that the size of government increases in response to the median voter preferences and demands of special-interest groups (Becker 1983; Mueller 2002; Peltzman 1980; Shughart and Tollison 1986; Tollison 1991; Tullock 1983). The path dependency, or "ratchet hypothesis," explains government growth as an outcome of a series of external shocks that push government expenditures upward and subsequently keep expenditures above its level before the shock (Holcombe 1993). Another explanation that generated a large number of empirical studies is Wagner's Law. According to this hypothesis, the demand for government services has income elasticity of demand greater than unity (Bird 1971).

A growing literature in empirical analysis of government growth attempts to explain short-term variations in public expenditures. A commonly accepted explanation in this field underscores the effect of the *partisan cycle*, which suggests that succession of

power from one party to another leads to differential spending patterns, and the *electoral cycle*, according to which public expenditures rise before an election and fall afterward. Frey and Schneider (1978) argue that these cycles may be interrelated if the incumbent party's future is uncertain. Recently, Tellier (2006) tested Frey and Schneider's hypothesis that electoral cycles can interact with partisan cycles. Tellier's analysis provides evidence to support Frey and Schneider's hypothesis using a panel dataset for six provinces of Canada from 1983 to 1995. Petry et al. (1999) analyze a panel dataset for 10 provinces that covers the period from 1974 to 1995 and report that the political party variable is statistically significant during nonelection years. Abizadeh and Gray (1992) report that the political party in power has no effect on levels or growth rates of public expenditures in provinces. They analyze a panel dataset covering 10 provinces in Canada from 1960 to 1986. The main result from their investigation is that tax base and unemployment were the primary factors in determining the growth of public expenditures. The author's attempt to find similar patterns of association with more recent data were not successful, which may indicate that the observed statistical significance in Abizadeh and Gray's work may have been a result specific to their sample.

Overall, recent contributions to this literature, particularly those using Canadian provincial data, focus on opportunistic behavior of politicians in power. This paper argues that studies of short-term variations in public expenditures also should account for the portion of population that exerts most influence upon the government.

THE THEORETICAL MODEL

Stigler's formal exposition of Director's Law relies on two assumptions: (1) proportional taxation and (2) uniform subsidies per household. These assumptions are not necessary to arrive to the same conclusion, but they simplify mathematical exposition of the problem. In this simple framework, the subsidy to families belonging to income deciles with less than one-tenth of the national income would exceed its tax burden. If families in these deciles constituted the majority of voters, they would vote for redistribution. According to Stigler, "fiscal machinery of government" is flexible, and where the opportunity arises for the majority coalition of voters to gain at the expense of others, redistribution is likely to take place, be it the coalition of the middle classes with the rich or with the poor.

Empirical analysis of Director's Law is complicated by the absence of data on distribution of full tax burden and total benefits received by income classes. Furthermore, a researcher will face a colossal challenge of defining and defending what constitutes the middle classes. There is, however, one easily testable implication. If one assumes that income is the main "strategic basis for the formation of voting coalitions," then more positively skewed income distribution is likely to increase income redistribution.

Meltzer and Richard (1981) provide a theoretical model that overcomes part of the challenges seen in Stigler's formalization of Director's Law. The authors assume that the median income voter is the key decision maker. As the distribution of income gets

skewed more to the right, the distance between the median voter's income and the average income increases, which induces the median voter to choose greater redistribution. Meltzer and Richard (1983) use a specific functional form to obtain a closed-form solution to their theoretical model, which results in the following linear model:

$$\ln[t(1-F)] = \alpha + \beta \ln(m-1) + \gamma (1/y_d) + u \quad (1)$$

The dependent variable consists of two parts: t is the measure of redistribution, and F is the dependency rate. The dependency ratio, F , is the proportion of the population eligible to receive subsidies for old age, disability, and dependent children. The product of $(1-F)$, the proportion of population not eligible for direct subsidies, and t , the measure of redistribution, shows the degree of redistribution net of direct subsidies. The independent variables consist of natural log of $m-1$ and inverse of y_d , where m is the ratio of the mean to the median income and y_d is the median income. The theoretical model predicts that the higher the ratio of the mean to the median income greater is the net redistribution. Also, consistent with Wagner's Law, a higher median income leads to greater net redistribution. One should therefore expect $\beta > 0$ and $\gamma < 0$.

Even if the estimated parameter β in (1) turns out to have the wrong sign, we will not be able to definitively refute Director's Law. If the median voter has above-average income, the majority voting coalition will be made up of the middle classes and the rich, and, subsequently, a simple redistribution from the rich to the middle classes may not be feasible. To make the hypothesis refutable, I modify (1) by adding voter turnout in provincial elections as an interaction term:

$$\ln[t(1-F)] = \alpha^1 + \beta^1 \text{VoterTurnout} \ln(m-1) + \gamma^1 (1/y_d) + u \quad (2)$$

A measure of voter turnout puts greater weight on the inequality measure in a province-year combination that had more active political participation. This may not adequately address the problem of locating the median voter in the income distribution, but it may increase the statistical precision of the estimated effect of m on measures of redistribution.

DATA

The primary data source for this analysis is Statistics Canada's key socioeconomic database, CANSIM. The data consist of repeated cross-sections of 10 provinces in Canada for the years 1981 through 2009. The 10 provinces are Newfoundland and Labrador, Prince Edward Island, Nova Scotia, New Brunswick, Quebec, Ontario, Manitoba, Saskatchewan, Alberta, and British Columbia. The data contain information on provincial public expenditures as a share of the provincial final domestic demand. This variable is constructed using the methodology proposed by

Imbeau et al. (2001). The primary dataset also contains province-specific Gini coefficients, ratios of the top quintile to the middle quintile (Q5/Q1) of the provincial income distribution, ratio of the middle quintile to the bottom quintile (Q3/Q1), ratios of the mean to the median income minus one, the dependency ratio measured as a share of the old (aged 65 or older) and the young (aged 15 or younger) in the population, per capita real federal transfers, and voter turnout in provincial elections. Table 1 reports the means, standard deviations, and minimum and maximum values of the variables used in the analysis.

Table 1. Summary Statistics

Variable	N	Mean	Std. Dev.	Min	Max
Government Size	280	0.33	0.05	0.19	0.42
Dependency Ratio	280	0.34	0.02	0.30	0.39
(Mean/Median)–1	280	0.35	0.06	0.20	0.53
Median Income	280	21581.07	3727.81	12800.00	34800.00
Gini Coefficient	280	0.40	0.02	0.35	0.44
Q5/Q3	280	2.38	0.16	2.05	2.78
Q3/Q1	280	3.21	0.29	2.67	4.85
Per Capita Real Federal Transfers	280	1925.30	990.46	486.82	7323.09
Voter Turnout	280	70.29	9.85	40.60	87.00

The average government size across the sample is 33 percent, with a standard deviation of 5 percent. There is a considerable variation in the government size, as evidenced by the standard deviation. Similarly, there is a substantial variation in most of the independent variables, which helps to reduce the standard errors for the estimated coefficients.

The choice of the measure of income inequality has to account for the specifics of the investigation (Allison 1978). I use four measures of income inequality. Three measures are based on simple ratios of the top, middle, and bottom quintiles of the income distribution, and the Gini coefficient for before-tax income. The distribution of income in Canada changed substantially over time and across regions (Breau 2007). For the purposes of this study, it is important to capture how these changes affect the bottom, middle, and top income classes relative to each other. The fourth measure of income

inequality is the ratio of the mean to the median income in real 2009 dollars minus one. In this sample, the average value of this variable across all provinces is 0.35, with a standard deviation of 0.06. Clearly, this measure of inequality exhibits much lower variation than income quintile-based measures.

EMPIRICAL STRATEGY

To determine the most appropriate empirical strategy, I carry out panel data-based tests for cross-section dependence, unit root, heteroscedasticity, and autocorrelation. The formal test for cross-section dependence is based on Pesaran's CD test. The results of CD test suggest that cross-section correlation is substantial and statistically significant for all variables. Commonly used tests for presence of panel unit root assume cross-section independence. More recently developed tests, however, allow for cross-section dependence. I employ the CADF test developed by Pesaran. This test indicates that most of the variables in my sample are integrated of order one. Further tests reject the null hypotheses that the panel dataset has no heteroscedasticity and has no autocorrelation of order one.

One faces the risk of running a spurious regression by estimating equations (1) and (2) in levels, as the variables are nonstationary. The usual remedy is to estimate these equations using the first-differenced values. Although first-differencing reduces the total variation of the dependent variable, this approach produces additional benefits. For example, measures of income inequality vary across provinces and over time. These changes may be correlated with province-specific and time-invariant unobserved factors. First-differencing eliminates unobserved province-specific factors, which could potentially lead to biased estimates of all explanatory variables in empirical models. In other words, I sacrifice much of the variation in both the dependent and independent variables and in return obtain unbiased and more precise estimates of how income inequality affects provincial spending patterns. The diagnostic tests on the first-differenced data indicate that series are stationary, but the cross-section dependence is still there. The cross-section dependence in the error term does not affect the estimates, but it makes the standard errors of estimates unreliable. I make several adjustments to the model specification to improve the reliability of standard errors.

Based on the results of diagnostic tests, I estimate regression equations of the following common form:

$$\Delta \text{Gov.Size}(1\text{--Dependency Ratio})_t = \alpha + \beta_1 \Delta \text{Inequality}_t + \beta_2 \Delta \text{Per Capita Real Income}_t + \varepsilon_t \quad (3)$$

$$\begin{aligned} \Delta \text{Gov.Size}(1\text{--Dependency Ratio})_t = & \alpha + \beta_1 \Delta \text{Inequality Voter Turnout}_{t-1} \\ & + \beta_2 \Delta \text{Per Capita Real Income}_t + \beta_3 \Delta \text{Additional Controls}_t + \tau_t + \varepsilon_t \end{aligned} \quad (4)$$

where t indexes years, τ_t is fixed effects for year, and ε_t is a disturbance term that is assumed to be heteroscedastic and autocorrelated. The panel data-specific test results

suggest that the data in this study exhibit both AR(1) serial correlation and heteroscedasticity. I follow the estimation strategy proposed by Beck and Katz (1995). In addition to addressing the contemporaneous correlation and autocorrelation of the panel error terms, I also control for year fixed effects to reduce the risk of omitting time-variant common effects that are potentially correlated with the right-hand-side variables. Of course, even after controlling for year fixed effects, it may be the case that the effects change over time and are correlated to each province uniquely.

RESULTS

Table 2 presents the results from estimating equations in the previous section. The results of the regression analysis on the first-differenced values show a negative association between changes in the mean to the median income ratio and the adjusted government size. It implies that as the distance between the mean and median incomes increases over time, the change in government size decreases, which is completely the opposite of what Stigler's and Meltzer and Richard's models predict. This result is consistent with the findings of Gouveia and Masia (1998). The authors test empirically the predictions of Meltzer and Richard's model using the panel data of the US states and report a negative association between government size and the mean-to-median ratio. In contrast to Gouveia and Masia, I consider other measures of income inequality. Namely, I substitute the mean-to-median ratio with the ratio of the fifth to the third quintiles, the third to the first quintiles, and Gini coefficient. If the median voter is not the median income-earning voter, then the model proposed by Meltzer and Richard will be severely misspecified and theoretical predictions cannot be tested using the mean to the median ratio.

Stigler's interpretation of Director's Law suggests that it is not the distance between the mean and the median income but rather the distance between the middle classes from the rich and the poor that determines the degree of redistribution, as the middle classes are a key component for a successful coalition formation. Alternatively, we can rely on Stigler's reasoning and assess the effect of relative income inequality on government size. To address the effect of voter turnout, I weigh income inequality measures by voter turnout shares in each province-year combination. The last three columns of Table 2 indicate that the relationship between income inequality and government size is positive for all three measures, after controlling for per capita real income and fixed time effects. The estimates, however, are not statistically significant. The outcome is not surprising, as the year-to-year variation in the ratios of income quintiles and Gini coefficient is not large in this particular sample.

Contrary to the findings of Meltzer and Richard but consistent with those of Gouveia and Masia, I find no evidence in support of Wagner's Law in this sample. The estimates of the coefficient on the inverse of per capita real median income are positive and statistically significant. The evidence from this sample points to a negative association between short-term variations in income and government size, after controlling for fixed time effects.

Table 2. Regression Estimates. Dependent Variable: Government Size Multiplied by (1–Dependency Ratio)

Variables	Eq3: Mean/Median		Eq4: Mean/Median		Eq4: Q5Q3		Eq4: Q3Q1		Eq4: Gini	
	Coeff	p-value	Coeff	p-value	Coeff	p-value	Coeff	p-value	Coeff	p-value
d(ln(m-1))	-.017	0.606								
d(Inverse of Per Capita Real Median Income)	4542.28	0.018	3291.45	0.001	3441.96	0	3490.41	0	3474.97	0
d(ln(m-1)*VoterTurnout)			-.017	0.444						
d(Q5Q3*VoterTurnout)					0.015	0.517				
d(Q3Q1*VoterTurnout)							0.013	0.242		
d(Gini*VoterTurnout)									0.132	0.426
d(Per Capita Real Federal Transfers)			0	0.372	0	0.359	0	0.37	0	0.358
Time Fixed Effects	No		Yes		Yes		Yes		Yes	
R2	0.05		0.39		0.39		0.39		0.39	
N	270		260		260		260		260	

CONCLUSION

Recent contributions to the economic literature that explains short-term variations in public spending focus primarily on the opportunistic behavior of politicians. In this article, I consider the other side of political decision making—the opportunistic behavior of voters to exploit the government. Stigler put it eloquently when he wrote, “If the coalition of voters is to make effective use of the political machinery of the state to redistribute income, it must find a state activity (expenditure) whose benefits flow to the coalition in greater proportion than the taxes which will finance the activity” (1970:4).

According to Director’s Law, when there is correspondence between the distribution of voters along the income scale and the distribution of income in the population, the middle classes should reap the benefits of public expenditures disproportionately more than their contributions for public-goods financing. One implication of this law is that a greater income inequality should lead to greater redistribution of income measured in terms of the size of public expenditures. Using up-to-date panel datasets for Canadian provinces for the period 1981 to 2008, I tested Stigler’s hypothesis indirectly by estimating the model proposed by Meltzer and Richard. My analysis finds no support for Meltzer and Richard’s model, in terms of either substance or statistical significance; however, when I use alternative measures of income inequality, the effect of income inequality on spending has the predicted sign but statistically is not discernible from zero, which indirectly indicates that the opportunistic behavior of voters may be less important than other forces such as the opportunistic behavior of politicians.

An effective coalition, of which Stigler writes, may not necessarily lead to exploitation of the rich by the middle classes in broad agreement with the poor. The underlying argument for a positive relationship between measures of income inequality and the growth of public expenditures relies on the assumption that extending the franchise to the poor translates into active participation of the poor in the political process (Meltzer and Richard 1981). McCormick and Tollison (1981) suggest that it is neither necessary nor sufficient for influential coalitions to have the poor. Tullock (1981, 1983) argues that the redistribution may be within the middle- or high-income classes and may have no impact on overall distribution of income.

Recent data on Canadian and other advanced democracies clearly indicate a continuous decline in voter turnout (Gray and Caul 2000). Furthermore, this decline, or non-voting pattern, has been more pronounced for particular population subgroups of population. For example, Blais et al. (2004) report that in the Canadian context, income and education have been the most important socioeconomic determinants of voting, with substantially higher voter turnout among the rich and significantly higher nonvoting among the poor, uneducated, and voting-age youth. Also, these scholars find that the effect of income on voting is weaker in eastern provinces of Canada. Given these patterns, it is likely that the median voter, especially in provincial elections, is not necessarily the median-income voter. If the median voter is also an upper-middle income-class voter, then her or his demand for public goods and services may be different from

the preferences of the poor. In that case, the effective coalition may consist solely of the middle-income voters and those on the lower end of the high-income classes. Income inequality between the middle classes and the poor may be an indicator of similarity in taste for public goods and services between the middle classes and the poor.

One key element in this analysis is that the short-term variation of the public expenditures may not reflect the preferences of the upper-middle classes and the rich at the extensive margin, i.e. decisions to opt out from public goods markets to purchase similar services in private markets. It may have to do more with the actual relative demand for public goods and services.

According to the provincial accounts from Statistics Canada, more than half of provincial expenditures are directed to health care and education. Dunlop, Coyte, and McIsaac (2000) report that Canadians with higher income use surgical day care, diagnostics, and other specialist services disproportionately more than those with lower income but that lower-income Canadians use acute inpatient care services more than those with higher income. The efforts to contain costs have been primarily successful in acute care services, but the costs associated with secondary ambulatory services, including expensive diagnostic procedures and dialysis, which higher-income Canadians use at a disproportionately higher rate, have been steadily increasing in rate and as a share of total hospital costs.

Similarly, attendance at universities is affected by parental income. According to the Canadian Survey of Labour and Income Dynamics, about 41 percent of all university students are from high-income families, 28 percent are from middle-income families, and only 20 percent are from low-income families (Drolet 2005). Finnie and Mueller (2008), using nationally representative sample data, report that a parental income in excess of 100,000 Canadian dollars increases the likelihood of attending university by 19.1 percent relative to the baseline income group of 50,000 to 75,000 Canadian dollars. They also find that having a parent with a bachelor's degree increases the likelihood of attending by 31 percent for male students.

Returning to Stigler's original argument, it may be the case that Canadian provincial politics is dominated by two distinct coalitions (two distinct profiles of the median voter) that use the state's machinery to their advantage. The eastern provinces with smaller income inequality between the middle classes and the poor demand greater income redistribution, but the upper-middle-income and high-income Canadians in the western provinces exert sufficient political influence to keep public expenditures lower. Tullock (1981:906) suggests that all transfers are based on deception because plain truth would not get necessary political support. Perhaps in provinces where the rich have a considerable influence, the political cost of deception is substantially higher.

The findings in this article must be interpreted with caution. Shugart and Tollison (1986) warn us that not all government growth is reflected in public expenditures. Without accounting for off-budget governmental activities, explanations of changes in government size measured with public expenditures will be, at best, incomplete.

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APPENDIX: VARIABLES AND DATA SOURCES

%ΔExpenditures: Annual growth rate of total provincial public expenditures in percentage term. Total expenditures were measured in constant terms (2002 is the base year) before transformation. Source: CANSIM series v689291, v689314, v689337, v689360, v689383, v689406, v689429, v689452, v689475, v689498.

%ΔPersonal Income: Annual growth rate of provincial personal income in percentage and in constant 2002 dollars. Following Tellier (2006), this variable was squared and multiplied by –1 when growth was negative. Terms were squared to give greater weight to higher values. Source: CANSIM series v691824, v691847, v691870, v691893, v691916, v691939, v691962, v691985, v692008, v692031.

Budgetary Balance: Ratio of provincial public deficit as a percentage of total provincial expenditures. Similar to personal income variable, this variable was squared and multiplied by –1 during deficit and unaltered during surplus years. Source: CANSIM series v689282, v689305, v689328, v689351, v689374, v689397, v689420, v689443, v689466, v689489, v689291, v689314, v689337, v689360, v689383, v689406, v689429, v689452, v689475, v689498.

%ΔUnemployment Rate: Annual growth rate of provincial unemployment rate in percentage term. Source: Statistics Canada Table 282-0002.

%ΔFederal Transfers: Annual growth rate of total federal transfers to provincial governments in real terms (2002 constant dollars). Source: CANSIM series v691289, v691312, v691335, v691358, v691381, v691404, v691427, v691450, v691473, v691496.

Left, Right, and Election Years: Dummy variables indicating current government ideology. Left includes Parti Quebecois and NDP. Right includes Progressive Conservative, Social Credit, and SP. Election year is a dummy variable for provincial elections. Source: *Canadian Parliamentary Guide*.

Age variables: Proportion of population aged 65 or older and 15 or younger is compiled using CANSIM series v466989, v467304, v467619, v467934, v468249, v468564, v468879, v469194, v469509, v469824, v467274, v467589, v467904, v468219, v468534, v468849, v469164, v469479, v469794, v470109.

Quintile Variables: Five income quintiles were compiled using Statistics Canada Table 202-0701.

Gini coefficient: Gini coefficient of total income by province is compiled using Statistics Canada Table 202-0705.

Income>100K: Proportion of provincial population with income in excess of 100,000 Canadian dollars is compiled using Statistics Canada Table 202-0402.

% University Degree: Proportion of provincial population with university degree is compiled using CANSIM series v2584827, v2587257, v2589687, v2592117, v2594547, v2596977, v2599407, v2601837, v2604267, v2606697.

GDP Deflator: CANSIM TABLE 3840036