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EXPLAINING GOVERNMENT SPENDING: A COINTEGRATION APPROACH

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ABSTRACT: Based on a comprehensive theoretical model we investigate the determinants of government spending. Besides GDP, commonly associated with either Walra´s law or Keynesian macro stabilization policies, we consider some variables identified with the public choice approach, namely median voters, pressure groups and the ideology of the government in power. These other variables are women, elderly population and population occupied in agriculture. The model is tested empirically using Johansen´s cointegration technique for the cases of Australia and Canada with data on general government expenditure, thus covering all government sectors, including social security. For the most part, we find long-run relationships among the variables and with the expected signs.

Keywords: Public Economics, Public Choice, Government spending, Interest groups

JEL Classification Numbers: H20, H39, H50

1. Introduction

At least since Adolph Wagner (1835-1917) many economists offered valuable theoretical and empirical contributions for the explanation of ever-increasing government expenditures. The well-known Wagner´s law of *increasing state activity* establishes that government expenditures increase more than proportionally to GDP both in absolute and relative terms. The reason why it is not a theory lies in the fact that it does not set a causal relationship from GDP growth to government spending. Rather, it merely recognizes a positive statistical association between those two variables. However, a substantial number of the literature that undertook its empirical testing (Abizadeh and Gray (1985),Bairam (1992), Bird (1971),Bohl (1996), Courakis, Moura-Roque and Tridimas (1993), Gandhi (1971), Goffman and Mahar (1971), Henrekson (1993), Lin (1995), Mann (1980), Murthy (1993), Nagarajan and Spears (1990), Oxley (1994), Payne and Ewing (1996), Ram (1992), Wahab (2004) and others) assumes that government spending is endogenous. If that is so, then Wagner´s law is supported whenever the estimated coefficient on GDP is positive and greater than one. Not surprisingly, the empirical outcomes, based on a considerable variety of functional forms, data specifications, country and selected time periods, data sources and econometric methods of different degrees of technical sophistication, provided contradictory results. Whereas some found evidence supporting it, others did not. In any case, the interpretation of the law itself is controversial with respect, for example, to the countries to which it validly applies and to the expenditures to be included under the notion of government spending. Peacock and Scott (2000) emphasize the idea that it solely applies to emerging industrial societies, not being therefore applicable to modern developed countries; on the other hand, all expenditures ought to be considered no matter the government level, central, federal, or local, that undertakes them. Furthermore, the above stated principle of inclusion fully applies to public enterprises.

Keynesians see the functional relationship between these same two variables under a different perspective. Now, public spending is a policy variable whose level is chosen by government officials as a counter-cyclical instrument designed to stabilize important economic variables in the short-run, such as GDP and employment. In so being, GDP becomes an exogenous variable that negatively determines public spending. In this framework, a line of discussion and research is to assess if government expenditures are

growth enhancing or growth impending. Based on empirical research, Barro (1991) takes the view that public spending is detrimental to economic development due to the large share of transfer payments in its composition.

The various contributions to explaining the secular expansion of public spending are usually structured in two groups of theories. On the one hand, we have the so-called demand based theories and, on the other hand, the supply based theories. Due to their relationship with the political decision-making process, Holsey and Borcherding (1997) prefer to name them, respectively, of political and non-political theories even though it is not clear for us that some of the contributions placed under the non-political group are indeed entirely of a non-political nature. The first category stresses the role of electors that demand more and more services from the state at any level and which politicians agree to provide since they are motivated by their own reelections. Differently, for the second group of theories, the expansion of the state is self-generated by inefficiencies of the public sector in comparison to the rest of the economy (Baumol, 1967), and by the pressure exerted by self-interested politicians and bureaucrats who aim at improving their own welfare at the state´s expense.

Public choice theory has an enormous influence in all this literature. Fiscal illusion (Oates, 1988), the decisive influence of the median voter under majority rule (Black, 1958), pressure groups (Olson, 1965; Becker, 1983; Peltzman, 1976, 1989), the political manipulation of the business cycle (Alesina, 1987,1989,1995,1997; Nordhaus, 1975), the bureaucrats (Niskanen, 1971, 1975, 1994) and, in general, Buchanan´s Leviathan (Buchanan, 1975). Under this general framework, we have abundant specific contributions. One of them is by Meltzer and Richard (1978, 1981, 1983) who stress the idea that income distribution is skewed to the right such that median income is lower than average income and, in so being, the concentration of votes on population with incomes below average stimulates redistribution from high-income voters to low income individuals. This would explain both increasing public spending as well as its tendency towards a rising share of unproductive transfer payments. Some authors go a little further in this respect when they identify particular social groups that, in their view, exert a decisive influence on social choices. For Becker and Mulligan (1998) for example, the increasing electoral influence of elderly population is a main force driving up public spending, whereas for Lott and Kenny (1999) women are indeed the most important influence in that respect. Since the twenty´s of the 20th century women have gained substantial political influence, not only due to the fact

that their right to vote was recognized at that time, but also because their deepening integration in the labor market made them an increasingly independent social and political group. What´s more, according to the views expressed by these authors, they are risk averse and, in average, their wages are lower than men´s. Fearing divorce, and conscious to the fact that they are unable to recover the investment made in the family through court sentences, they unmistakably favor governments with strong redistributive programs. In short, it appears that Rawl´s principle stated in the often-cited expression *veil of ignorance* aptly mirrors women´s preferences.

The role of self-interested pressure groups is present in this type of analysis. According to McCormick and Tollison (1981), there is an incentive to organize pressure groups whenever to receive one-dollar worth of benefits one has to spend less than that. This is precisely the mechanism that explains the exploration of large groups by small ones in a democracy where majority rule prevails. A typical and often mentioned example is the agricultural sector in the E.U. and in other western democracies.

Finally, ideology and the corresponding political orientation of the party in office is another explanatory variable commonly taken into consideration in this respect. It is a subject well explored in the economic literature by authors such as the above-mentioned Nordhaus and Allesina. The prevailing notion is that governments from the left of the political spectrum are more expansionary and less fiscally responsible, easily engaging in policies leading to fiscal deficits, whereas governments supported by right wing parties are more conservative and responsible in managing public finances. If so, we would expect public spending to rise when parties from the left control the government, and the opposite if, instead, parties from the right are in power.

Using a wider measure of government spending than the ones usually employed, our goal is to investigate the actual influence of some of the above-mentioned factors on public spending by means of Johansen´s cointegration approach.

2. The model and the data set

The particular contribution of this paper is to inquiry on the explanatory ability of economic, social and political variables related to a few of the above-mentioned theoretical approaches to increasing government spending. We do so by means of a single and parsimonious *ad-hoc* model where those variables are put together and its long-

run influence estimated by means of Johansen´s cointegration technique. The model is written as:

1) $$G_t = \propto + \beta_1 GDP_t + \beta_2 POP65_t + \beta_3 WOM_t + \beta_4 POPAGR_t + \beta_5 GOVLEFT_t + \mu_t$$

Thus, the model investigates the specific influence of the following factors on the dependent variable G, which stands for public spending: a) GDP; b) elderly population (POP65); c) women (WOM); d) population occupied in agriculture (POPAGR); e) the political ideology of the government (GOVLEFT). μ_t is the white noise term.

An estimated, and statistically significant, coefficient for β_1 greater than 1, is evidence in support of Wagner´s law; instead, if it is negative and statistically significant, G becomes a government instrumental policy variable in the very Keynesian tradition. As far as the other coefficients are concerned we expect β_2, β_3 and β_4 to be positive and statistically significant in order to support demand-based theories. Finally, β_5 is positive if the government is from the left, and negative otherwise.

In the particular case of population employed in agriculture, a negative coefficient is also plausible but then subject to quiet a different interpretation. Farmers would no longer stand as a pressure group imposing their self-interests on the government, but rather as a closely interdependent social community committed to solidarity practices among them. If this last scenario applies, the higher the relative weight of these individuals in the whole population the lower the need for government support in the usual form of transfer payments. But then, as agriculture looses economic and social importance, migration to urban areas imposes new obligations and expenses on the government as those closely knit community social bonds dissolve.

We use time series data sets made up of annual observations. *G* is *Total General Government Expenditure*; it includes spending in consumption, capital formation, interest and transfer payments from all government levels or sectors (central, state, and local governments where applicable, and social security funds). Because it embraces all government expenditures, without exceptions, we believe this measure reflects public spending and government influence more accurately than the alternative of only a few sectors being taken into consideration. *G* and *GDP* are measured in national currency at constant OECD 2002 base year prices. The data set relative to these two variables comes

from *OECD.stat* (stats.oecd.org/WBOS/index.aspx). *POP65* is defined as the total number of individuals aged 65 years old or more as a percentage of total population. The variable women should exclude females still with no voting rights due to their youth, and women aged at least 65 years old. Following Lott and Kenny, we refer to relatively young women who hold real political influence as they attempt to hedge risks that may occur during their active lives and beyond. Consequently, we thought it most appropriate to measure *WOM* as female´s share in total civilian employment, so much so that those are the ones who have the best opportunities to be politically engaged through unions or other politically or socially motivated organizations. *POPAGR* is civilian employment in agriculture as a percentage of total civilian employment. Data for *POP65*, *WOM* and *POPAGR* comes from *Population and Labour Force Statistics* Vol 2008 release 01 (oecd-stats.ingenta.com/OECD/TableViewer/tableView.aspx). Finally, the *Comparative Political Data Set 1960-2005, by Armingeon, K. et al.* provides a quantitative measurement to *GOVLEFT.* The political orientation of the government is given in a continuous numerical scale from 0 to 100, depending on its composition. We use the observations in the sixth column of that data set (gov_left) except for Canada because it is equal to zero all the time and, consequently, we use the observations in the fourth column (gov_right). Finally, all variables are in logarithms except for the government political orientation in view of the fact that it includes zeros. Except for *GOVLEFT* , the estimated coefficients are elasticities of government spending with respect to the independent variables.

Unfortunately, the OECD data sets length varies significantly from country to country which is especially true in the case of the dependent variable *G*. Strangely enough, in view of the economic and political relevance of this variable, there is not a considerable number of observations available. In so being, it is rather limited the number of countries whose data sets contains a reasonable number of observations to make feasible the empirical testing of the proposed model. The countries selected are Australia and Canada. The criterion for country selection was the availability of a reasonable amount of data and their ability to fulfill all the statistical prerequisites imposed by the Johansen methodology. Australia is the country with the largest number of observations since its data set begins in 1960; for Canada, it begins in 1970 and ends in 2006. Accordingly, the conclusions are highly dependent upon the behavior of the variables concerned during this not very long period of time. However, we can point out to the following advantages: 1) we will extract conclusions from information relative to recent experience, and 2) we won´t observe

substantial changes in regime as it would most certainly be the case with very long time series data sets. The tables below summarize some basic statistics of the variables.

Table 1- Government Expenditure (G)

	AUSTRALIA	CANADA
ANNUAL GROWTH RATE IN THE PERIODO	4.62%	3.40%
AVERAGE ANNUAL GROWTH RATE	4.68%	3.44%
STANDARD DEVIATION OF ANNUAL GROWTH RATE	3.43%	3.11%
TIME PERIODO	1960-2006	1970-2006
NUMBER OF OBSERVATIONS	47	37

Table 2- Gross Domestic Product (GDP)

	AUSTRALIA	CANADA
ANNUAL GROWTH RATE IN THE PERIODO	3.63%	3.15%
AVERAGE ANNUAL GROWTH RATE	3.65%	3.17%
STANDARD DEVIATION OF ANNUAL GROWTH RATE	1.91%	2.03%
TIME PERIODO	1960-2006	1970-2006
NUMBER OF OBSERVATIONS	47	37

Table 3- ELDERLY POPULATION (POP65)

	AUSTRALIA	CANADA
ANNUAL GROWTH RATE IN THE PERIODO	0.96%	1.44%
AVERAGE ANNUAL VALUE	10.2 3%	10.65%
STANDARD DEVIATION OF ANNUAL VALUES	1.67%	1.71%
TIME PERIODO	1960-2006	1970-2006
NUMBER OF OBSERVATIONS	47	37

Table 4- WOMEN (WOM)

	AUSTRALIA	CANADA
ANNUAL GROWTH RATE IN THE PERIODO	1.13%	0.95%
AVERAGE ANNUAL VALUE	38.23%	42.16%
STANDARD DEVIATION OF ANNUAL VALUES	5.09%	4.25%
TIME PERIODO	1964-2006	1970-2006
NUMBER OF OBSERVATIONS	42	36

Table 5- POPULATION OCCUPIED IN AGRICULTURE (POPAGR)

	AUSTRALIA	CANADA
ANNUAL GROWTH RATE IN THE PERIODO	-2.47%	-2.90%
AVERAGE ANNUAL VALUE	6.57%	4.67%
STANDARD DEVIATION OF ANNUAL VALUES	2.00%	1.33%
TIME PERIODO	1960-2006	1970-2006
NUMBER OF OBSERVATIONS	47	37

Table 6- IDEOLOGY OF THE GOVERNMENT (GOVLEFT)

	AUSTRALIA	**CANADA***
LOWEST VALUE IN THE PERIODO	0%	0%
HIGHEST VALUE IN THE PERIOD	100%	100%
AVERAGE VALUE IN THE PERIOD	34.57%	27.44%
TIME PERIODO	1960-2006	1970-2006
NUMBER OF OBSERVATIONS	47	37

*- In the case of Canada it is GOVDTA

3. The Empirical Methodology and the Results

The purpose of the empirical research is to investigate the existence and direction of a long-run relationship between dependent and independent variables through cointegration analysis. As a prerequisite, one must begin by studying the stationary properties of the individual time series because cointegration is only admissible if they are all integrated of the same order. To detect the integrating order of the variables of the model, we resort to the augmented Dickey-Fuller (ADF) test procedure. Table 7 shows the ADF results for each one of them, both in levels as in first differences. The ADF tests are performed for the hypothesis of a constant and a trend for all variables except government ideology. *GOVLEFT* assumed no constant and no trend.

Table 7 – ADF Tests of Unit Roots

COUNTRIES	VARIABLES	LEVEL FORM		FIRST DIFFERENCES FORM	
		With Constant and Trend	With No constant and No Trend	With Constant and Trend	With No constant and No Trend
AUSTRALIA	***G***	**-1.60**		**-5.53***	
	GDP	**-2.35**		**-5.58***	
	POP65	**-3.34**		**-1.66**	
	WOM	**-2.26**		**-5.45***	
	POPAGR	**-1.97**		**-8.27***	
	GOVLEFT		**-1.54**		**-5.70***
CANADA	*G*	-1.46		-5.03*	
	GDP	-3.44		-4.13*	
	POP65	0.44		-4.82*	
	WOM	-0.90		-4.15*	
	POPAGR	-1.58		-4.37*	
	GOVDTA		-1.35		-5.24*

* Statistically significant at the 1% level; ** Statistically significant at the 5% level

Based on MacKinnon´s critical values at the 5% level of significance we conclude as follows:

a) for Australia, the reported ADF tests show that, with the sole exception of elderly population, the null hypothesis of a unit root was not rejected for the variables in

levels, but it is so when they are in first differences thus indicating that they are I(1);

b) for Canada all variables are I(1).

The practical implication of the results just reported is that, for Australia, the variable *POP65* should be excluded from the cointegration test.

Recent literature indicates that panel-based unit root tests have higher power than the usual tests on individual time series. Even though these other tests are commonly referred to as panel unit root tests, under a theoretical point of view they are nothing but multiple-series unit root tests. We perform the Levin, Lin and Chu t^* test in order to check for the correctness of the diagnosis just produced and, accordingly, of the soundness of the conclusions coming from the Johansen tests we intend to carry on.

Table 8 – Levin, Lin and Chu tests for Models 1 and 2.

Null Hypothesis: Unit Root (assumes common unit root process)

	SERIES: ***G, GDP, WOM, POPAGR,GOVLEFT***	
		t^*
AUSTRALIA	LEVEL	-1.58
	1ST DIFFERENCE	-13.10*
	SERIES: ***G, GDP, WOM, POP65, POPAGR,GOVDTA***	
		t^*
CANADA	LEVEL	-0.99
	1ST DIFFERENCE	-9.14*

All the results reported in table 8 fail to reject the null-hypothesis for the variables in levels, but do so when they are in first differences, thus confirming the previous diagnosis.

The next step is to decide on the correct lag order for the Johansen cointegration test in order to avoid distorted results due to misspecification. To this end, we apply Akaike´s Information Criterion (AIC) to a VAR model specification of all the variables concerned for each one the countries taken individually. Table 9 below presents those results.

Table 9 – VAR Lag Order Selection for the Model

	LAGS	AIC statistic
AUSTRALIA	1	-11.11
	2	-11.19*
	3	-10.68
CANADA	1	-21.27
	2	-21.66
	3	-22.30*

*indicates the lag order selected by the criterion.

We investigate the null hypothesis of a long-run relationship among the variables by means of Johansen´s (1991) multivariate technique based on maximum-likelihood estimation. This technique is capable of identifying several cointegrating vectors and is

orthogonal to an arbitrary normalization. Furthermore, and very importantly, it also provides normalized cointegrating estimated coefficients for the model proposed.

The results of the cointegrating tests for each one of the countries are displayed in Table 10. The number of cointegrating vectors, R, is set by the trace statistic, in conjunction with the critical values provided by MacKinnon-Michelis (1999).

Table 10 – Johansen´s Cointegration Tests for Long-Run Relationships in the Model

AUSTRALIA			
THE MODEL: $G_t = \alpha + \beta_1 GDP_t + \beta_2 WOM_t + \beta_3 POPAGR_t + \beta_4 GOVLEFT_t + \mu_t$			
Null Hypothesis	**Trace Statistic**	**Eigenvalues**	**5% Critical Values**
R=0 *	83.70	0.57	76.97
R≤1	49.63	0.49	54.08
R≤2	22.66	0.22	35.19
R≤3	12.81	0.18	20.26
R≤4	4.83	0.11	9.16
CANADA			
THE MODEL: $G_t = \alpha + \beta_1 GDP_t + \beta_2 POPGE_t + \beta_3 WOM_t + \beta_4 POPAGR_t + \beta_5 GOVDEA_t + \mu_t$			
Null Hypothesis	**Trace Statistic**	**Eigenvalues**	**5% Critical Values**
R=0*	403.21	0.98	103.85
R≤1*	279.01	0.95	76.97
R≤2*	182.44	0.92	54.08
R≤3*	101.99	0.89	35.19
R≤4*	32.70	0.48	20.26
R≤5*	11.78	0.31	9.16

* denotes rejection of the hypothesis at the 5% level of significance

At the 5% level of significance there is only one cointegrating vector in the case of Australia. However, for Canada there are multiple cointegrating vectors, which confirm the existence of a long-run relationship among the variables. However, since these results imply serious difficulties of interpretation, we re-estimate the model for this country. The re-estimation strategy is to delete from the model each one of the explanatory variables, one at a time, until we arrive at a single cointegrating vector. Having done this, multiple cointegrating vectors disappear if we exclude women. We display all relevant statistics for the shorter explanatory model on Canada in table 11.

Table 11 – Statistics for CANADA for the Shorter Explanatory Model of Government Spending

LAG STRUCTURE	**LAGS**	**AIC statistic**
CANADA	1	-12.59*
	2	-12.22
	3	-12.38
CANADA´S Johansen´s Cointegration Tests for Long-Run Relationships in the Shorter Model of Eq.(1)		
THE MODEL: $G_t = \alpha + \beta_1 GDP_t + \beta_2 POPGE_t + \beta_3 POPAGR_t + \beta_4 GOVDEA_t + \mu_t$		
Null Hypothesis	**Trace Statistic**	**Eigenvalues**	**5% Critical Values**
R=0*	100.98	0.76	76.97
R≤1	52.27	0.46	54.08
R≤2	31.05	0.39	35.19
R≤3	14.09	0.21	20.26
R≤4	6.15	0.17	9.16

* denotes rejection of the hypothesis at the 5% level of significance

4. The Results

Given the need to fulfill all the right properties imposed by the cointegration test, it has become clear in the previous section that we cannot test the model in its whole dimension, as initially proposed. In any case, the role played by each of the variables considered is estimated, if not for both countries, at least for one of them, putting into evidence that, indeed, there exists a long-run relationship among the variables. Table 12 displays the normalized cointegrated coefficients estimated for the variables, which are the long-run equilibrium coefficients for the detected relationships, as well as their t-statistics.

Table 12 – Normalized Cointegrating Coefficients Using Johansen Cointegrating Procedure

	Model		GDP	WOM	POP65	POPAGR	GOV(LEFT or DTA)
AUSTRALIA Log likelihood =268.81	G	-6.30 (-1.34)	1.46 (2.22)*	-7.14 (-4.00)*	-	0.75 (1.38)	0.004 (4.43)*
CANADA Log likelihood =236.70	G	-46.83 (-4.20)*	3.67 (3.92)*	-	-7.34 (-7.12)*	1.63 (3.10)*	0.001 (2.80)*

* Significant at the 1% level; ** significant at the 5% level;

Since in the case of Canada *WOM* was withdrawn from the estimation of the cointegrating coefficients, we now apply the Johansen technique to an even shorter model where we explore the influence of this single independent variable on Canadian G. The next table reports the required statistics.

Table 13 – Statistics for CANADA: Model $G_t = \lambda + \beta_3 FEM_t + \theta_t$

	LAGS	AIC statistic
	1	-13.14*
	2	-13.12
	3	-13.00

Johansen´s Cointegration Tests for Long-Run Relationships

Null Hypothesis	Trace Statistic	Eigenvalues	5% Critical Values
R=0*	20.55	0.36	20.26
R≤1	4.73	0.13	9.16

* denotes rejection of the hypothesis at the 5% level of significance

Table 14 – Normalized Cointegrating Coefficients Using Johansen Cointegrating Procedure

	Model	Const.	WOM	GOVDTA
CANADA Log likelihood =231.85	G	-1.70* (-3.43)	-2.96* (-22.92)	

* Significant at the 1% level; ** significant at the 5% level;

The set of results just reported on the long-run coefficients are very interesting with respect to their signs and statistical significance. With respect to GDP, we detect a

negative relationship with government expenditures, lending support to the Keynesian perspective. Indeed, following the generalized interpretation of Walra´s law, it would be improbable to detect a positive relationship because that law applies only to developing economies, which is not the case for any of the countries here. Furthermore, they are highly significant and greater than 1 in absolute value.

The influence of women goes in the direction pointed out by Lott and Kenny. In every case, it is positive and, interesting enough, highly significant. The same is true with population aged at least 65 years old.

For Australia and Canada, population occupied in agriculture exerts a negative influence on government spending, but it is statistically significant only for Canada. In short, we do not find evidence supporting the idea that farmers organize themselves as an effective pressure group.

Finally, with respect to ideology, the reported results prove that both in Australia and in Canada the relationship between the variables is negative and significant in spite of the fact that governments exhibit opposite ideological orientations. Indeed, it is as if in the period and in these two countries governments were constrained to act to control spending, no matter their political ideologies.

5. THE SHORT-RUN DYNAMICS OF THE PROCESS

It is convenient to explore the short-run dynamics of the process towards its long-run equilibrium in the presence of shocks in the dependent variables. There are various econometric methods to accomplish this goal, such as error correction models, variance decomposition and impulse responses. Succinctly we will look at the vector of information provided by these three methods.

Given that the linear combination among the variables is stationary, we construct an Error Correction Model (ECM) based on the appropriate lag specifications and cointegrating coefficients estimated previously. The following equation shows the ECM model for the general case.

2)

$$\Delta G_t = \gamma_0 \Delta G_{t-1} + \gamma_1 \Delta G_{t-1} + \gamma_1 \Delta GDP_{t-1} + \gamma_2 \Delta GDP_{t-1} + \gamma_4 \Delta FOP65_{t-1} + \gamma_5 \Delta FOP65_{t-1} + \gamma_6 \Delta FEM_{t-1} + \gamma_7 \Delta FEM_{t-1} + \gamma_8 \Delta FOPAGR_{t-1} + \gamma_9 \Delta FOPAGR_{t-1} + \gamma_{10} \Delta GOVLEFT_{t-1} + \gamma_{11} \Delta GOVLEFT_{t-1} + \gamma_{12} ECT_{t-1} + \mu_t$$

The number of time lags, 1 or 2, actually depends upon the AIC statistics shown in tables 9 and 11; Δ is the first difference operator, ECT is the estimated error correction term obtained from the long-run cointegration relationships via de Johansen maximum likelihood procedure, and μ are serially uncorrelated random error terms with zero mean. The estimated values for the speed of adjustment γ_{12} are reported in table 15 as well as other statistics.

Table 15 – Estimated Error Correction Model

	AUSTRALIA	CANADA
γ_{12}	-0.081 (-1.840)***	-0.007 (-0.217)
Adjusted R-squared	0.22	0.21
SSR	0.021	0.02
F-statistic	2.12	2.78
Log likelihood	94.03	78.44

The estimated ECM model reveals very low speeds of adjustment, most especially in the case of Canada. One possible explanation for this result is the presence of a relatively large number of structural variables in the model which, by definition, change only slowly through time. These results are confirmed by the variance decomposition approach and by impulse responses reported below at the end of a ten-year period.

Table 16 – Variance Decomposition for G - Australia

Period	G	GDP	WOM	POPAGR	GOVLEFT
10	73.90	12.75	8.09	0.06	5.20

Table 17 – Accumulated Response of G to Each of the Variables - Australia

Period	G	GDP	WOM	POPAGR	GOVLEFT
10	0.4735	0.1554	0.1503	-0.004	-0.049

Table 18 – Variance Decomposition for G - Canada

Period	G	GDP	POP65	POPAGR	GOVDTA
10	63.63	26.35	2.53	7.39	0.097

Table 19 – Accumulated Response of G to Each of the Variables - Canada

Period	G	GDP	POP65	POPAGR	GOVDTA
10	0.3338	0.1875	0.0612	0.0978	0.0046

The variance decompositions uncover the fraction of the movements in the dependent variable due to their own shocks, versus shocks to the other variables; they are

shown in tables 16 and 18 at the end of a ten-year period. One can see that even though government spending is comparatively the more exogenous of the variables under consideration, it is nonetheless influenced, to a lesser or greater extent, by movements in the remaining variables of the model. GDP explains 12.75% or 26.35%, depending on the specific country, of the variance over a 10-year forecast horizon, whereas women explain 8.09%, POP65 explain 2.53% and so on. A similar pattern emerges from the impulse response functions, which show the effect of a unit shock, applied separately to the error of each equation. These especially reveal the very low speeds of adjustment; actually, after a 10-year period the response of the systems were below 50%; that is, the shocks work throughout the system rather slowly.

6. Conclusions

We use an all-inclusive measure of government spending and test for a long-run relationship with a few variables pertaining to various theoretical approaches to the explanation of those expenditures. Based on the results obtained for the countries in the sample, Australia and Canada, with recourse to Johansen ´s methodology we obtain estimates for GDP, women and elderly population with the correct signs and statistically significant. On the other hand; the influence played by farmers is significant only in one instance and its sign is negative thus not lending support to the thesis that they organize as a pressure group. In what concerns government ideology, its political orientation seems to be irrelevant on how the manage public finances, which is probably due to either the specific characteristics of these countries or to the time period we studied.

Besides, the adjustment process in the short-run is very slow no matter the econometric technique used for such an evaluation. The result cannot be said to be surprising given the fact that we deal with variables that, in many cases, are structural in nature.

It would be highly interesting to enlarge this research to a larger number of countries belonging to different geographic regions and, therefore, with quite different historic and cultural backgrounds.

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