THE IMPACT OF THE CENTRALIZATION OF REVENUES AND EXPENDITURES ON GROWTH, REGIONAL INEQUALITY AND INEQUALITY[1]

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SUMMARY

This paper focuses on determining the effect of the centralization/decentralization of government activity on economic growth, regional inequality and household inequality. While there is a small empirical literature that examines the relationship between decentralization and growth, we are not aware of any empirical studies that explicitly examine the relationship between different degrees of fiscal decentralization and regional or household inequality.

Using data for 13 OECD countries, the empirical analysis generated no pervasive evidence that revenue centralization or expenditure centralization is associated with faster or slower growth. On the other hand, the analysis found that lower levels of regional inequality are associated with both revenue centralization and expenditure decentralization. This result is consistent with the view that revenue decentralization exacerbates regional disparities when fiscal capacity is unevenly distributed across regions. A somewhat surprising result was obtained for the case of household equality where it was found that increased revenue centralization is associated with more inequality.

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to the assignment of administrative authority from higher-level to lower-level governments so that local authorities simply administer centrally developed and financed programs with little or no discretion. Delegation refers to the actual transfer of decision-making power and fiscal resources to local authorities from the central authority. However, under delegation the central authority retains control over the resource allocation process. The most complete form of decentralization is devolution in which local authorities have full control over fiscal and allocative decisions without interference from the central authority. Devolution could occur in a "hard" form in which local authorities possess the ability to set tax rates and raise revenues or in a "soft" form in which local authorities receive revenues via automatic and unconditional transfers from the central authority.

While the Habibi et. al. theoretical construct provides a very precise delineation of the decentralization process, the actual measurement of the degree of centralization or decentralization that is typically used in empirical studies is considerably less precise. Empirical studies have usually focused on either measures of expenditure decentralization or measures of revenue decentralization. For example, Habibi et. al. (2001) in their study of the impact of increased decentralization in Argentina used a revenue decentralization measure defined as the ratio of the value of the resources controlled by lower level governments (provinces) to the total value of available resources for all levels of government. Conversely, Xie, Zou and Davoodi (1999) and Davoodi and Zou (1998) measured the degree of decentralization across countries using an expenditure measure, defined as the ratio of spending by subnational governments to the spending of all levels of government (net of intergovernmental transfers).

The existence of intergovernmental transfers, particularly those flowing from higher-level to lower-level governments, creates difficulty in applying both revenue-based and expenditure-based decentralization measures. Intergovernmental grants blur the distinction between national and subnational government authority. However, without detailed information about the nature of these grants (whether they are automatic or discretionary and whether they are conditional or unconditional), it is not possible to disentangle completely the overlapping authority between national and subnational government. Thus, both revenue-based and expenditure-based measures of the degree of decentralization tend to be somewhat crude.

II.1 Decentralization and Growth

The fundamental economic argument advanced in favour of decentralized government activity has been that decentralization is a means to enhance the efficiency of government activity, to increase social welfare and to promote economic development and growth. The standard basis for this efficiency argument is individual voter and taxpayer mobility so that the creation of "local jurisdictions" provides market-type solutions to the preference revelation problem

discovering such cost-effective innovations and quicken the pace of technological progress.

For the decentralization of government authority to be efficient it is necessary that individual preferences differ and that individuals be mobile across local jurisdictions. If preferences do not differ then the uniform provision of public goods and services is optimal

intergovernmental transfers, less wealthy regions would be relatively disadvantaged by decentralization.

Kneebone (1997) maintains that decentralization may also adversely affect the distribution of income across individuals. If a local jurisdiction in a decentralized system of government wished to redistribute income within its jurisdiction towards lower income individuals there may be an adverse spillover effect. A more generous redistribution policy would be attractive to low income individuals residing in other jurisdictions and, if these individuals were mobile, create an incentive to move to the jurisdiction with the more generous policy and raise the cost of the policy in that jurisdiction.[2] Thus, local jurisdictions may choose to "free ride" on each other with respect to income redistribution policies. This would reduce or eliminate such policies overall and, ultimately, worsen the distribution of income across individuals.

A large theoretical and empirical literature exists regarding issues of income distribution and inequality in general. Much of the literature relating to economic growth and the distribution of income has focused on "territorial" (countries or regions) inequality and the issue of convergence. The question addressed by this analysis has been: as the growth process occurs over time, do countries or regions within a country converge to similar levels of per capita income and output or do they ultimately diverge?

The theoretical basis of the convergence hypothesis is the one-sector neoclassical growth model with exogenous technological change. With decreasing returns to scale and mobility of factors and technology, the model predicts strong or unconditional convergence (all economies converge to the same steady state). However, the

[2] While fiscally-induced migration across jurisdictions is a theoretical possibility, the thesis remains to be confirmed empirically. Within the Canadian context, Mills, Percy and Wilson (1983) and Shaw (1986) report evidence that interprovincial migration patterns are responsive to fiscal variables while Liaw and

III.1 Data

The relationship between the degree of centralization/decentralization and economic growth and equality is examined using data from 13 OECD countries, a listing of which appears in Table 1. Data are available from the early 1960s to the late 1990s, but data availability varies by country from eleven years to 37 years. The choice of countries to include in the data set was based primarily on the availability of comparable data and a desire to include a mixture of countries with both relatively centralized and relatively decentralized systems of government in order to have sufficient variation in the centralization measures. The analysis was limited to OECD countries because OECD data are roughly comparable. Only developed economies were included as the goal was to study countries that were not extremely different in institutions, level of development and economic structure.

The empirical analysis utilizes three measures of the extent of centralization or decentralization within a country: a revenue-based measure and two alternative expenditure-based measures. Revenue centralization (CREV) is measured as the ratio of central government revenue to the sum of central government revenue and the revenues (net of intergovernmental transfers) of lower levels of government. Expenditure centralization is measured in "gross" form as central government current expenditure less transfers to other governments divided by total government current expenditure (CEXP), while in "net" form the expenditure measure excludes interest payments by the central and other levels of government from the ratio calculation (NETCEXP). The gross expenditure measure summarizes the centralization of total government spending net of transfers while the net expenditure measure summarizes the centralization of program spending net of

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associated with the measure of centralized revenues is negative and significant when all the explanatory variables are added to the estimating equation. This provides evidence that greater centralization of revenues is associated with lower regional inequality. This would not be unexpected as centralization of revenue collection is likely to help smooth regional differences in tax raising ability. On the other hand, the estimated coefficients associated with the expenditure centralization measures imply that centralized expenditure is associated with greater regional inequality. These results would seem to imply that regional inequality can be reduced by raising revenues centrally while divesting expenditure responsibility from the center to the regions. Interestingly, however, the importance (as a ratio of GDP) of transfers from the center to other levels of government does not appear to significantly affect regional inequality as the coefficient on the TRANSFER variable is insignificant.

In order to evaluate the relative importance of the explanatory variables as determinants of regional inequality, the impact on the level of the regional Gini coefficient of a 10 percent change in each explanatory variable is calculated. These calculations are presented in Table 9. Changes in the revenue and expenditure centralization measures have much larger impacts on regional inequality than any of the other explanatory variables. Furthermore, while the impact of revenue centralization is at least as large as that of expenditure centralization, the magnitudes of the two effects are relatively similar (although opposite in sign). This would imply that a policy of either decentralizing both revenues and expenditures or centralizing both revenues and expenditures is likely to have a relatively small impact on regional inequality (although decentralizing both would still tend to reduce regional inequality). On the other hand, a policy of decentralizing expenditures, while centralizing revenue collection would be associated with a potentially large reduction in regional inequality.

III.4 Centralization and Inequality Between Individuals

It has often been suggested that the decentralization of revenues and expenditures the reveleenaialsyof deceexta 10 pefistioralizing expthe magp106 T9(o)-5.1(

Figures 8 and 9, there does not appear to be any relationship between the expenditure centralization measures and the household Gini. The absence of a relationship is confirmed in the regression of the log of the average Gini coefficients on the average data for the revenue centralization measure and the two expenditure centralization ratios (reported in Table 11). As in the cases of per capita growth and regional inequality, the estimated coefficients are all statistically insignificant and the proportion of the variation in the average Gini explained by the average centralization measures is extremely small.

To more fully investigate the impact of fiscal decentralization on individual inequality, the individual Gini observations are pooled into one sample and regressed on the annual values of the fiscal centralization measures rather than their averages. Furthermore, in order to determine whether other determinants of inequality have an important impact on the relationship between inequality and the fiscal centralization measures, the estimating equation is estimated while including the same control variables that were used to explain regional inequality. All the estimates were undertaken using ordinary least squares as a Hausman test for endogeneity did not indicate that any of the current period control variables were endogenous.

The estimated coefficients for six different specifications of the household inequality equation are provided in Table 12. The two specifications that include INFLATION, the only additional control variable that is statistically significant, are not rejected by the RESET test. The estimated coefficient associated with the INFLATION variable indicates that higher inflation is associated with lower inequality.

The estimated coefficients associated with the revenue centralization variable in Table 12 are all positive (and significant when the INFLATION variable is included). This implies a positive relationship between more centralized revenue collection and individual inequality. This evidence contradicts the usual theoretical argument that it is regional tax competition thquate(inuemm)ld2.4(av,al)TjT*0ee0.0008 ablr0004 T.0007e0.000(ne)7.6nt

increased revenue centralization is associated

Appendix: Data Sources and Details

Note: All data are annual.

Fiscal Centralization Measures:

Expenditure Centralization (CEXP): Central government current expenditures less transfers to other government subsectors divided by central government current expenditures less transfers to other government subsectors plus state-level current expenditures minus state transfers to other government subsectors plus local government current expenditures. (Note that state (or provincial) data are only distinguished from local-government data for three countries - Austria, Canada and West Germany.) Calculated from the data in Tables 6.1, 6.2 and 6.3, OECD, *National Accounts*, Volume II, CD-ROM.

Net Expenditure Centralization (NETCEXP): Calculated the same as CEXP except expenditures at all levels of government exclude interest payments. These are given by "Property Income Paid" (generally all or almost all made up of interest payments) in Tables 6.1, 6.2 and 6.3, OECD, *National Accounts*, Volume II, CD-ROM.

Revenue Centralization (CREV): Central government revenue divided by central government revenue plus state government revenue minus transfers from other government subsectors plus local government revenue minus transfers from other government subsectors. Calculated from data in Tables 6.1, 6.2 and 6.3, OECD, *National Accounts*, Volume II, CD-ROM.

Growth, Regional Inequality and Inequality Measures:

Gini: Gini coefficients associated with the distribution of household incomes in a country. This is a measure of income inequality. It is bounded by zero and one, with a value closer to one indicating greater inequality. The gini coefficients used are the cross-country "comparable" Gini coefficients provided by the Luxembourg Income Study (LIS). These Gini coefficients are all based on disposable income (after taxes and transfers) and were downloaded on 7 November 2001 from the LIS website: http://lisweb.ceps.lu/keyfigures.htm (where a detailed description of this data can be found).

Real Per Capita GDP Growth Rate (RPCGDPG): Real GDP growth rate minus the population growth rate. The real GDP growth rate is calculated using the data on Real GDP, OECD, *National Accounts*, Volume II, CD-ROM, Table 1 for each country. Data on population are from the International Monetary Fund, *International Financial Statistics*, CD-ROM, except for some data for the former West Germany. For the years 1983-1990, these are from OECD, *Labour Force Statistics*, 1979-99; while for 1991-1992, they are from OECD, *Labour Force Statistics*, 1972-92.

$RPCGDPG_{-1}$: Real per capita GDP growth rate lagged one period.

RegGini: The Gini coefficient for regional per capita income. This is a measure of income inequality across regions. The regional gini for a particular country in a given year is calculated by letting the per capita income of each region in a country take the role of an observation on an individual in the standard gini coefficient calculation. The exact method used to

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Table 1: Data for the Real Per Capita GDP Growth Rate Sample

Part A: Averages of Country Data

Country	Sample Period	Number of Obser-vations	Real Per Capita GDP Growth Rate	Revenue Centralization Ratio (*Rank*)	Expenditure Centralization Gross (*Rank*)	Ratio Net(*Rank*)
Australia	1969-96	28	.018117	.763105 (*7*)	.536647 (*8*)	.545338 (*7*)
Austria	1976-96	21	.021417	.674394 (*9*)	.613283 (*6*)	.587047 (*4*)
Belgium	1961-97	37	.027532	.910472 (*1*)	.805334 (*1*)	.786908 (*1*)
Canada	1961-97	37	.022257	.499905 (*13*)	.425142 (*12*)	.392023 (*12*)
Denmark	1976-95	20	.020873	.707200 (*8*)	.406965 (*13*)	.335140 (*13*)
France	1970-97	28	.020214	.840713 (*5*)	.764662 (*2*)	.771684 (*2*)
Germany (West)	1961-92	32	.026749	.520925 (*12*)	.432626 (*11*)	.426869 (*11*)
Italy	1980-95	16	.018609	.908978 (*2*)	.658075 (*4*)	.561407 (*6*)
Netherlands	1977-96	20	.015840	.887169 (*3*)	.536452 (*9*)	.515282 (*8*)
Spain	1985-95	11	.026059	.819563 (*6*)	.630237 (*5*)	.581479 (*5*)
Sweden	1980-96	17	.011272	.622918 (*10*)	.529631 (*10*)	.480050 (*10*)
United Kingdom	1961-96	36	.020074	.863748 (*4*)	.682341 (*3*)	.680513 (*3*)
United States	1961-97	37	.019965	.594428 (*11*)	.543661 (*7*)	.507912 (*9*)
Average*			.020691	.739501	.581927	.551666

* This is the average of the average values for the 13 countries listed.

Part B: Correlations of Country Average Data

(i) Simple Correlations:

	Expenditure Centralization	Net Expenditure Centralization	Revenue Centralization
Expenditure Centralization	1.0000		
Net Expenditure Centralization	0.9747	1.0000	
Revenue Centralization	0.7430	0.6820	1.0000

(ii) Rank Correlations:

	Expenditure Centralization	Net Expenditure Centralization	Revenue Centralization
Expenditure Centralization	1.0000		
Net Expenditure Centralization	0.9615	1.0000	
Revenue Centralization	0.7143	0.7033	1.0000

Table 2: Regressions of the Average of the Real Per Capita Growth Rate on the Average of Each Centralization Measure

RPCGDPG =	.0213 - .0008 CREV (3.07) (.09)	R^2 = .0007
RPCGDPG =	.0170 + .0063 CEXP (2.71) (.59)	R^2 = .0308
RPCGDPG =	.0171 + .0066 NETCEXP	R^2

Table 3: Per Capita Growth Regression - All Observations

Dependent Variable: Real Per Capita GDP Growth Rate (RPCGDPG)

4. ** Coefficient is significant using a 95 percent confidence level.
   * Coefficient is significant using a 90 percent confidence level.
5. Note that R^2 does not have the usual properties when estimation is undertaken using two-stage least squares.
6. The RESET test is a t-test of whether the square of the predicted value of the dependent variable is significant when added to the regression equation.
7. The AR1 Test is a test for first-order serial correlation. This is a t-test of the significance of the lagged residual in a regression of the residuals on the lagged residuals and the explanatory variables.
8. Sample for each country: Austria, 1977-1993; Australia, 1970-1996; Belgium, 1962-1997; Canada, 1962- 1997; Denmark, 1977-1995; France, 1971-1997; Germany (West), 1962-1992; Italy, 1981-

Table 4: Per Capita Growth Regression - All Observations

3. Each equation also included year dummy variables, country dummy variables and a constant.

4. ** Coefficient is significant using a 95 percent confidence level.
   * Coefficient is significant using a 90 percent confidence level.

5. The RESET test is a t-test of whether the square of the predicted value of the dependent variable is significant when added to the regression equation.

6. The AR1 Test is a test for first-order serial correlation. This is a t-test of the significance of the lagged residual in a regression of the residuals on the lagged residuals and the explanatory variables. See Davidson and Mackinnon (1993, p.358).

7. Sample for each country: Austria, 1977-1993; Australia, 1970-1996; Belgium, 1962-1997; Canada, 1962- 1997; Denmark, 1977-1995; France, 1971-1997; Germany (West), 1962-1992; Italy, 1981-1995; Netherlands, 1978-1996; Spain, 1986-1995; Sweden, 1981-1996; United Kingdom, 1962-1996; United States, 1962-1997.

Table 5: The Magnitude of the Impact of Changes in the Explanatory Variables on Growth

Mean Real Per Capita Growth Rate = .0208

	Change in the Real Per Capita Growth Rate due to a 10 Percent Increase in Each Explanatory Variable			
Explanatory	Short Run		Long Run	
Variables	Change	Percent Change	Change	Percent Change
CREV	-.0092†	-44.3†	-.0109†	-52.4†
CEXP	.0090	43.1	.0107	51.2
NETCEXP	.0044	20.9	.0052	24.9
TRANSFER	.0015	7.1	.0018	8.5
GOVREV/GDP	-.0085	-40.9	-.0101	-48.4
INFLATION	-.0014	-6.9	-.0017	-8.0
OPEN	.0015†	7.4†	.0018†	8.5†

Notes: These changes are calculated using the coefficient estimates of Column I in Table 3 except for those associated with NETCEXP

Table 6: Data Averages for the Regional Gini Sample

Country	Sample Period	Number of Obser-vations	Regional Gini[1]	Revenue Centralization Ratio	Expenditure Centralization Ratio (Net)
Australia	none				
Austria	1988-96	9	.14612 (9)	.69373	.61710(.57567)
Belgium	1980-96	17	.13636 (11)	.90821	.81562(.77977)
Canada [2]	1981-97	17	.11861 (10)	.47284	.41263(.36324)
Denmark	none				
France[3]	1982-96	15	.07732 (22)	.81687	.74882(.75213)
Germany[4] (West)	1980-94	15	.10661 (30)	.51337	.42925(.41414)
Italy	1980-95	16	.14223 (20)	.90898	.65808(.56141)
Netherlands	1987-96	10	.08735 (12)	.88704	.57114(.53657)
Spain[5]	1985-95	11	.11666 (16)	.81956	.63024(.58148)
Sweden	1985-96	12	.05837 (6)	.62418	.53207(.48061)
United Kingdom	1994-96	3	.10735 (37)	.93045	.70672(.68750)
United States[6]	1986-97	12	.10594 (50)	.56492	.51425(.45691)
Average		11	.10936	.74001	.60326(.56267)

[1] The number in brackets following the gini value is

Table 7: Regressions of the Average of the Regional Gini Coefficient on the Average of Each Centralization Measure

Log(RegGini) =	-2.427 + .2446 CREV (6.03) (.46)	R^2 = .023
Log(RegGini) =	-2.463 + .3611 CEXP	R

Notes to Table 8:

1. All regressions also included a constant, country dummy variables, and year dummy variables.

2. All standard errors are corrected for heteroscedasticity of unknown form using the White (1980) correction.

3. The number in brackets beneath each estimated coefficient is the absolute value of the t-statistic.

4. ** Coefficient or test statistic is significant using a 95 percent confidence level.
   * Coefficient or test statistic is significant using a 90 percent confidence level.

5. The RESET test is a t-test of whether the square of the predicted value of the dependent variable is significant when added to the regression equation.

6. The AR1 Test is a test for first-order serial correlation. This is a t-test of the significance of the lagged residual in a regression of the residuals on the lagged residuals and the explanatory variables. See Davidson and Mackinnon (1993, p.358).

7. A Hausman test was used to test all the current period explanatory variables jointly for endogeneity. The F-statistic reported is for this test. This test did not indicate any of the explanatory variables were endogenous. The instruments used in the Hausman test included a constant, the year dummy variables, the country dummy variables, **SYRM**, **SYRF**, and lagged values of **CREV**, **CEXP**, **NETCEXP**, **GD1 0 TD0.0014 Tc/TT43** **,**

Table 9: The Magnitude of the Impact of Changes in the Explanatory Variables on Regional Inequality

Mean Regional Gini Coefficient = .1096

	Change in the Regional Gini Coefficient due to a 10 Percent Increase in Each Explanatory Variable			
Explanatory	Short Run		Long Run	
Variables	Change	Percent Change	Change	Percent Change
CREV	-.0065	-6.0	-.0097	-8.9
CEXP	.0047	4.3	.0072	6.6
NETCEXP	.0037	3.2	.0058	5.3
TRANSFER	-.0002†	-.2†	-.0003†	-.3†
$RPCGDP_{-1}$	.0020	1.9	.0031	2.8
INFLATION	.0003	.3	.0005	.4
OPEN	.0018	1.6	.0027	2.5
GOVC/GDP	.0024	2.2	.0037	3.4

Notes: These changes are calculated using the coefficient estimates of Column I in Table 8 except for those associated with NETCEXP which use the estimated coefficient from Column II of Table 8.

Long run estimates take into account the dynamic effect through the lagged dependent variable.

The percent change is calculated at the mean.

† - These calculations should be treated with caution as they are based on an estimated coefficient that is statistically insignificant.

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Table 12: Gini Coefficient Regressions

Dependent Variable: Log of the Gini Coefficient (Gini)

Estimation Technique: Ordinary Least Squares

Number of Observations: 54

Explanatory Variables	**I**	**II**	**III**	**IV**	**V**	**VI**
CREV	.7969**	.8407**	.5493	.5499	.5281	.4915
	(3.50)	(3.67)	(1.50)	(1.60)	(1.47)	(1.41)
CEXP	.3093		.2385		.2602	
	(.88)		(.47)		(.62)	
NETCEXP		.2487		-.5104		-.4909
		(.89)		(1.50)		(1.49)
TRANSFER	.0681	-.0466	-.1377	-.3817		
	(.08)	(.06)	(.13)	(.43)		
INFLATION	-1.096**	-1.147**				
	(6.83)	(6.60)				
R^2	.881	.881	.823	.826	.822	.826
RESET Test (t-statistic)	1.12	1.00	1.27	1.63	1.39	2.24**
Hausman Test (F-statistic, degrees of freedom in brackets)	.64 (4,34)	.41 (4,34)	.47 (3,36)	.59 (3,36)	.03 (2,38)	.11 (2,38)

Notes to Table 12:

1. All regressions also include a constant and country dummy variables, but not year dummy variables due to the small number of observations.

2. All standard errors are corrected for heteroscedasticity of unknown form using the White (1980) correction.

3. The number in brackets beneath each estimated coefficient is the absolute value of the t-statistic.

4. ** Coefficient is significant using a 95 percent confidence level.
   * Coefficient is significant using a 90 percent confidence level.

5. The RESET test is a t-test of whether the square of the predicted value of the dependent variable is significant when added to the regression equation.

6. A Hausman test was used to test all the current period explanatory variables for endogeneity, both individually and jointly. The F-statistic reported is for the joint test. This test did not indicate any of the explanatory variables were endogenous either individually or jointly. The instruments used in the Hausman test included a constant, the country dummy variables, **SYRM**, **SYRF**, and lagged values of **CREV**, **CEXP**, **NETCEXP**, **TRANSFER**, **INFLATION**, **GOVC/GDP**, **GOVREV/GDP**, **OPEN**, **INV/GDP**, and **RPCGDP**.

8. The sample is the same as that given in Table 10 except the one observation for Spain has been dropped, as with country dummy variables its inclusion would make no difference to the parameter estimates. In addition, the 1994 observation for Germany could not be used as data on some of the other explanatory variables did not exist for this year.

9. Variables that were added to the estimȧting equation, but which were individually and jointly insignificant, were

Table 13: The Magnitude of the Impact of Changes in the Explanatory Variables on Inequality

Mean Gini Coefficient = .27852

	Change in the Gini Coefficient due to a 10 Percent Increase in Each Explanatory Variable