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PRIVATE AND GOVERNMENT CONSUMPTION IN TRANSITIONAL ECONOMIES: A PANEL DATA ANALYSIS

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This paper investigates the presence of the relationship between private and government consumption through panel data techniques. Using a panel from different transitional countries, from 1990 to 2003, it applies the panel cointegration and causality methodologies. The study finds statistical evidence for a long run relationship between the variables under study. The empirical findings do not support the Ricardian Equivalence, since government consumption affects private consumption negatively in both methodological approaches.

Keywords: Private & Government Consumption, Ricardian Equivalence, Transitional Economies, Panel Data
JEL classification: E21, H62, P20, C33

1. INTRODUCTION

Most economies in the last decades are plagued by large amounts of government debt and budget deficits. This concern has attracted the interest of the public and the politicians in many countries, since if the budget deficit gets tamed and is reduced, the economy of the underlying country will improve. There are two approaches regarding the relationship between fiscal policy and private consumption. According to the Keynesian approach, private consumption is a function of current disposable income and fiscal policy can affect the national output. Specifically, an increase in the budget deficit due to tax cuts leads to an increase in the real domestic product while an increase in the disposable income stimulates aggregate demand, resulting in increases in private consumption.

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Barro (1974) demonstrated that budget deficits (caused by a reduction in taxes today in exchange for future tax increases of equal present value) are expected to cause no changes in private consumption. Barro's arguments are based on the theory of Ricardian Equivalence, that the effect of government spending is independent of how it is financed. In other words, private agents recognize that the reduction in taxes today are expected to increase future tax liabilities and thus they will save the entire tax cut, leaving private consumption unchanged. The most important assumption for the Ricardian Equivalence to be satisfied is that consumers are not liquidity (or credit) constrained. However, for the hypothesis to hold certain assumptions must also be absent, i.e., the presence of borrowing constraints, the presence of distortionary taxes, and households should not be very altruistic.

Certain empirical measures of the validity of the Ricardian Equivalence hypothesis have concluded that private consumption does not respond to fiscal policy changes (Kormendi (1983), Seater and Mariano (1985), Kormendi and Meguire (1995)). By contrast, studies by Feldstein (1982), Modigliani and Sterling (1990), Graham (1995), Evans (1993), Cardia (1997), Ooms (1997), Elmendorf and Liebman (2000) and by Gale and Potter (2002) have found evidence against the hypothesis. Cardia (1997) argues that the conflicting empirical evidence on the hypothesis is probably due to the presence of certain weaknesses in the statistical methodology followed. Ghatak (2004) through cointegration and error correction modeling, examined the long-run relationship among public deficits, interest rates, the current account deficit, exchange rates, consumption, and public debt for Germany and the UK over the period 1950-2002. The empirical findings indicated that for Germany private consumption and public deficits had a cointegrating (positive) relation, thus, rejecting the Ricardian Hypothesis. By contrast, this was not the case for the UK. Haque (1988) and Gupta (1992) have found empirical support for the Ricardian Equivalence behavior for the case of developing countries.

The purpose of this study is to test empirically the validity of the Ricardian Equivalence Hypothesis for the transitional economies using a panel cointegration approach to examine any relationship between private and government consumption. The results of these tests will be a significant guide for the governments in the transitional economies to help them determine their optimal policy for the growth of their countries.

The major contribution of this study to the relevant literature is that for the first time the presence and most importantly the direction of a relationship between private and government consumption in transitional economies is investigated by applying the novel methodology of panel cointegration and panel causality. There are strong reasons to believe that there is significant heterogeneity in cross-country private-government consumption relationship and that time series estimations will lead to misleading inferences. All of the so far empirical attempts have remained with the time series approach, which does not take into consideration the presence of heterogeneity among the economies included in the sample under investigation. By contrast, applying developed panel cointegration techniques allow us to take into account the presence of

heterogeneity in the estimated parameters and dynamics across countries. In other words, applying panel cointegration techniques will allow us to take into consideration the presence of heterogeneity in the estimated parameters and dynamics across countries. This will enable us to generate more credible results since panel data estimation enables a researcher to capture certain interesting time-series relations that only cross-sectional analysis cannot do it. This approach uses multi-country panel data in order to exploit both time-series and cross-sectional information. Panel unit root and cointegration tests allow for both parameter and dynamic heterogeneity across groups, which have been shown to generate more powerful results (Harris and Tzavalis (1999)).

In order to achieve our objective, the paper is structured as follows: The next presents a brief section review of literature regarding tests of Ricardian equivalence. The third section contains a description of the data, the model and the methodology. The fourth section presents and analyses the results. The final section contains a summary of the paper and concluding remarks.

2. RICARDIAN EQUIVALENCE AND EMPIRICAL FINDINGS

Since our study examines a sample of the transitional economies we focus our literature review on the effects of fiscal policy on private consumption for a certain number of transitional economies. We have mentioned briefly in the introduction some major studies regarding the validity or not of the Ricardian equivalence for developed economies. Full Ricardian equivalence entails that an increase in budget deficits should have no impact on output and private consumption (Wheeler (1999)).

The absence of perfect capital markets in developing countries is the most quoted reason for the Ricardian equivalence not to hold (Haque and Montiel (1989)). However, imperfections in the capital markets are not restricted to developing countries only. Furthermore, since the basic assumption of Ricardian equivalence is that consumers are not liquidity or credit constrained, this might not hold for developing and transitional economies. Hence, it could be expected for the Ricardian equivalence to be invalid in these countries.

Theoretically, Kimball and Mankiw (1989) analyzed the effects of government debt and income taxes on consumption and saving behavior of individuals for an infinite time horizon instead of the usual two-period example. The results indicated that the timing of labor income taxes affects the consumption negatively or positively. Becker (1995) showed that as budget deficits change, private consumption also changed depending on how risk averse the individuals were. His results supported the Ricardian equivalence for some specific utility functions, while he supported the Keynesian proposition for some other utility functions. By contrast, Blanchard (1985) and Feldstein (1988), among others, showed how Ricardian equivalence could not hold. Barro (1974, 1989) and Judd (1987) argue that negative as well as positive wealth effects may occur which could cancel each other or be altogether negligible. Haug (1990) tested the Ricardian

Equivalence in a multivariable framework and found that the relevant hypothesis is rejected under certain conditions, i.e., sample period, definition of wealth, the assumption of a constant interest rate, and stationarity of included variables.

Regarding small open economies, Rock, Craigwell and Sealy (1989) examined empirically the validity of the Ricardian equivalence proposition as a description of consumer behavior for two similar small open economies, the case of Trinidad and Tobago and of Barbados. The results indicated that for the case of Trinidad and Tobago the data did not support the Ricardian equivalence null hypothesis, while for the case of Barbados, the data supported the joint null hypothesis of Ricardian equivalence and rational expectations. The authors concluded that the validity determination of the Ricardian equivalence is an empirical issue and that the irrelevance of the government's debt-tax choice should be reconsidered and not ignored. Meridor (1985) and Leiderman and Razin (1988) examined the effects of the fiscal deficit on private consumption for the case of Israel. They found support for the Ricardian Equivalence. In contrast, Elkayam, Tal and Yariv (1988) determined private consumption differently and found no support for the hypothesis. Recently, Frish (2003) included the assumption that the capital market is the main channel through which Ricardian Equivalence operates. He also found evidence in favor of the hypothesis. In addition, he argued that whenever the capital market channel is ignored, there is a bias towards rejecting Ricardian Equivalence.

Regarding another small open economy, Greece, Drakos (2001) explored the long-run relationship between government borrowing and private savings. His results indicated that as the budget deficit increased, households perceived the government bonds as net wealth, hence, they increased their consumption, without considering the uncertainty of the future tax level. Vamvoukas (2001) and (2002) also tested the Ricardian equivalence and the Keynesian proposition for Greece using cointegration analysis and then SURE analysis. In both cases he found support for the latter.

For the case of developing economies, Haque (1988) and Gupta (1992) have found empirical support for the Ricardian Equivalence behavior for the case of developing countries. Ghatak and Ghatak (1996) examined the validity of the Ricardian equivalence for India and found no support for this proposition. On the other hand, Khalid (1996) found support for the Ricardian equivalence for 12 out of the 17 developing countries in his sample. Dalamagas (1992a) and (1992b) found no support for this proposition for a sample of both developed and developing economies. However, when he split his sample into two groups according to the size of their government debt, his results for the group with the high indebtness gave support to the validity of the Ricardian Equivalence. This group was consisted of the developing countries in his sample. However, we cannot generalize based on these results.

In contrast, we should mention here that for Japan, a well-developed economy, during the past decade 1990-2000, there was observed the highest budget deficit of any industrial country. Walker (2000) found that with respect to taxes, there was strong support for the Ricardian proposition since the changes in taxes had zero or a negligible

effect on output. On the other hand, increases in government spending and budget deficits affect positively both output and private consumption. The implications for Japan are that a tax cut would provide a low stimulus or none on output. On the spending side, an increase in government debt will cause a positive impact on output and consumption, but at a diminishing rate.

Ostry (1997) applied a consumption-smoothing model to five countries from Asia and Middle East. His results indicated that the widening of external imbalances was not influenced by excessive private consumption for most of the selected countries, with the exception of Indonesia and Malaysia, to a small degree. The variables influencing large external deficits were found to be the level and composition of external liabilities, the flexibility of macroeconomic policies and the health of the country's banking system. Issler and Lima (2000) examined the effects of public debt on consumption behavior in Brazil. Their results indicated that the behavior of a "rational" consumer in Brazil is consistent with Ricardian equivalence. The budget deficits are financed and balanced entirely through changes in taxes. On the other hand, Domenech, Taguas and Varela (2000) tested the Ricardian equivalence for a panel of OECD countries and their results invalidated it, since private savings compensated only a small portion of the budget deficit.

More recently, Giorgioni and Holden (2003) assessed whether the Ricardian equivalence held for ten developing economies (Burundi, El Salvador, Ethiopia, Honduras, India, Morocco, Nigeria, Pakistan, Sri Lanka and Zimbabwe). Their results indicated that for these countries the Ricardian equivalence was valid, since there was observed a negative relationship between consumption and budget deficits, although not always significant.

The empirical evidence is ambiguous for both developed and developing economies, making the results of this study very significant by enriching the relevant literature, as well as by presenting insights for the policy makers of the examined economies.

3. THE DATA

The time period under examination is from 1990 to 2003 for the following countries: Albania, Armenia, Azerbaijan, Belarus, Bosnia, Bulgaria, Croatia, Czech Republic, Estonia, Georgia, Hungary, Kazakhstan, Kyrgyz Republic, Latvia, Lithuania, FYROM, Moldova, Mongolia, Poland, Romania, Russia, Slovak Republic, Slovenia, Turkmenistan, Ukraine, and Uzbekistan. Annual data on the following variables were obtained: private consumption per capita (C) is proxied by consumer expenses on nondurables plus services divided by total population, government consumption (G) measured as a percentage of GDP, disposable income (Y) is proxied by the value of per capita GDP (GDP divided by total population) after taxes, money (M) measured by the monetary base, prices (P) measured by the consumer price index (CPI), foreign prices (P*) proxied by the European Union composite price index, and finally the nominal

exchange rate (E) measured as the bilateral rate of the domestic currency against the ECU. The definition of consumption does not include any services from durables because it is difficult to construct (especially for transitional economies) the service flow from durables. Evans (1988) argues the sufficient conditions for deleting durables. For the empirical purposes of this study the panel expected inflation was also employed measured through an ARMA (2, 2) model. All data are on a constant 1995 prices base, and the units are expressed in millions of ECU. All data, except those on disposable income, come from the World Bank. The latter come from the United Nations National Accounts Statistics database. Throughout the paper, small letters indicate variables in logs. All the estimates were carried out with the assistance of the RATS software (6.35 version).

4. EMPIRICAL ANALYSIS

Panel Unit Root Analysis

The null hypothesis of non-stationarity versus the alternative that the variable is stationary is tested using the group mean panel unit root test (or 't-bar' test) of Im, *et al.* (1995, 1997). This test is based on the Augmented Dickey-Fuller (ADF) statistic for each country (Dickey and Fuller (1981)) and allows each member of the cross section to have a different autoregressive root and different autocorrelation structures under the alternative hypothesis. The results are reported without and with a trend and are presented in Table 1. The hypothesis that variables c, y, and g (in levels) contain a unit root cannot be rejected at the 1% significant level. When first differences are used, unit root nonstationarity is rejected at the 1% significant level, suggesting that the variables under study are I (1) variables. These results open the possibility of cointegration among certain variables.

Table 1. Panel Unit Root Tests

Variables	Without Trend	With Trend
All Countries		
c	-1.39 (3)	-1.48 (3)
Δc	-4.57 (2)*	-5.13 (2)*
y	-1.24 (3)	-1.36 (2)
Δy	-4.24 (1)*	-4.48 (1)*
g	-1.33 (2)	-1.60 (3)
Δg	-4.75 (1)*	-5.32 (1)*
rm	-1.68 (3)	-1.77 (3)
Δrm	-4.69 (1)*	-4.74 (2)*

p^e	-1.73 (2)	-1.88 (3)
Δp^e	-4.48 (1)*	-4.34 (1)*
re	-1.61 (3)	-1.91 (3)
Δre	-4.42 (1)*	-4.74 (2)*
Countries with Similar Institutional Characteristics		
c	-1.15 (3)	-1.45(2)
Δc	-4.25 (1)*	-4.33 (1)*
y	-1.26 (2)	-1.78 (2)
Δy	-4.42 (1)*	-4.39 (1)*
g	-1.27 (2)	-1.48 (3)
Δg	-4.56 (1)*	-4.87 (1)*
Countries with Not Similar Institutional Characteristics		
c	-1.13 (3)	-1.23 (2)
Δc	-4.42 (1)*	-4.58 (1)*
y	-1.19 (3)	-1.45 (2)
Δy	-4.30 (2)*	-4.77 (1)*
g	-1.13 (2)	-1.29 (3)
Δg	-4.08 (1)*	-4.53 (1)*

Notes: Figures in brackets denote the number of lags in the augmented term that ensures white-noise residuals. The optimal lag length was determined through the Akaike information Criterion (AIC) and the Schwarz-Bayes Information Criterion (SBIC). * Significant at 1%.

Dynamic Heterogeneity

An issue that it is of major concern is the heterogeneity of the countries included in this data set. In particular, through time and across countries, the effects on the private consumption-disposable income-government consumption relationship of the different macroeconomic policies implemented, as well as the effects of the institutional frameworks established in each country should be expected to be diverse. Although there has been a paucity of relevant studies for the transitional economies, certain explanations could be offered justifying the presence of private consumption heterogeneity in transitional economies.

Heterogeneity could also be generated by the fact that countries, especially transitional countries, are characterized by heterogeneous sensitivity of private consumption to government consumption. This latter differentiation of sensitivity is probably attributed to the fact that government debt levels should be either low or high (Dalamagas (1993)). Table 2 presents data (available from International Financial Statistics of IMF) on the percentage (with respect to GDP) of borrowing from capital markets. These data show the above-mentioned type of heterogeneity among the

transitional economies under study. This type of heterogeneity is due to the differentiation of debt leverage levels. The presence of different levels of government debt tends to contribute to the departures from the predictions of the Ricardian equivalence hypothesis, albeit on a differentiated manner. In other words, private consumption is expected to be responding differently in a country that borrows heavily from capital markets compared to a country that borrows less from capital markets. Because of this, the coefficients in the estimated relationship will be biased due to a heterogeneity bias.

Table 2. Borrowing Percentages from the Capital Markets

Country	1993	1995	1996	1997	1998	1999	2000	2001	2002	2003
Albania	0	0	0	0	0.20	0.15	0.17	0.26	0.31	0.35
Bulgaria	0	0	0	0	23.50	22.40	24.70	24.88	26.77	30.91
Croatia	0	0	0	0	1.50	1.80	1.76	2.32	4.53	6.44
Estonia	0	0	0.08	0.60	0.60	0.40	0.63	0.61	3.49	6.52
Hungary	0	0	0	0.12	0.12	0.11	0.15	0.19	2.25	4.33
Czech Rep	0.01	0.15	0.12	0.11	0.10	0.10	0.12	0.13	1.85	3.09
Latvia	0	0.68	1.40	0.12	0.03	5.40	6.55	7.93	11.23	14.37
Poland	0	2.83	2.03	1.80	1.57	1.57	1.94	2.47	4.84	7.29
Romania	0	0.001	0.001	0.001	0.001	0.002	0.002	0.002	0.86	2.33
Russia	0.20	0.001	0.002	0.03	0.02	0.01	0.02	0.04	0.32	0.74
Slovenia	0	0.002	0.04	0.04	0.04	0.04	0.06	0.07	0.28	0.37
Ukraine	0	0	0	0	0.36	0.29	0.37	0.92	1.86	3.29

Notes: A zero value indicates that data (either on borrowing levels or on GDP) are not available. Borrowing levels are in millions of US dollars, while GDP values have been converted in billions of dollars with the 1995 exchange rate.

Source: IFS

Another potential explanation could be the different degree of imperfections in the transitional economies' capital markets (Bacchetta and Gerlach (1997), Hahm (1998)). In other words, cross-country differences could reflect the degree of liquidity constraints, e.g., indicating differentiation of the degree of availability of consumer credit, sector credit, interest rates charged on consumer groups and so on. In addition, following the change in the political regime in the countries under study from early 90s, it is highly likely that the effects of liquidity constraints might have changed over time. Finally, a potential explanation for the heterogeneous nature of consumption is the differentiated degree of liquidity-constrained consumers vis-à-vis the rule-of-thumb consumers. The former save when their current income is high even though they are constrained from borrowing when current income is low, while the latter consume just their current income without borrowing or saving to smooth consumption (Seater (1997)).

In the statistical framework of this study, these issues can be resolved by first testing for heterogeneity and then by controlling for it through appropriate techniques. The dynamic heterogeneity, i.e., variation of the intercept over countries and time, across a cross-section of the relevant variables can be investigated as follows. In the first step, an ADF(n) equation for each relationship in the panel is estimated; then, the hypothesis of whether regression parameters are equal across these equations is tested. Next, a similar test of parameter equality is performed by estimating a *n*-order autoregressive model for each of the relationships under investigation. Standard Chow-type F tests under the null of parameter equality across all relationships are also performed. Heterogeneity in cross-sectional parameters is indicated if the results reject the null hypothesis. Finally, homogeneity error variance across groups is also examined as another measure of dynamic heterogeneity. White's tests for group-wise heteroscedasticity are employed to serve this objective.

The results of this procedure are reported in Table 3 for the relationship between private consumption, disposable income and government consumption. The empirical findings indicate that the relationship under investigation is characterized by heterogeneity of dynamics and error variance across groups, supporting the employment of panel analysis.

Table 3. Tests of Dynamic Heterogeneity Across Groups

	ADF(3)	AR(3)	WHITE'S TEST
Private Consumption-Disposable Income-Government Consumption	11.18*	20.95*	48.27*

Notes: The ADF(3) column reports the parameter equality test (F test) across all relationships in the panel. The AR(3) column reports the F test of parameter equality conducted in a fourth-order autoregressive model of the relationships under study. Finally, the White's test reports White's test of equality of variances across the investigated relationships in the panel. The White's test was computed by regressing the squared residual of the ADF(3) regression on the original regressor(s) and its(their) square(s). The test statistic is $(NT)\times R^2$, which is X^2 distributed with the number of regressors in the second regression as the degrees of freedom. * Significant at 1%.

Panel Cointegration Analysis

Once the order of stationarity has been established, one can move to a panel cointegration approach, developed by Pedroni (1997, 1999). The panel cointegration technique makes use of a residual-based ADF test. The specific cointegrating relationship estimated is:

$$c_{it} = \beta_{0i} + \beta_{1i} y_{it} + \beta_{2i} g_{it} + \varepsilon_{it}\,, \tag{1}$$

where $i = 1, \ldots, N$ countries and $t = 1, \ldots, T$ year observations, c is the log of private consumption, y is the log of disposable income and g is the log of government consumption. The term ε_{it} is the deviations from the modelled long-run relationship. If the series are cointegrated, this term will be a stationary variable. Thus, stationarity can be achieved by establishing whether ρ_i in:

$$\varepsilon_{it} = \rho_i \varepsilon_{i(t-1)} + \xi_{it}\,, \tag{2}$$

is unity. The null hypothesis, associated with Pedroni's test procedure is that $\rho_i = 1$. This implies that the null hypothesis associated with Pedroni's test procedure is equivalent to testing the null of nonstationarity (no cointegration) for all *i*. Pedroni (1997, 1999) developed four panel cointegration statistics and three group mean panel cointegration statistics.

The Pedroni cointegration results are reported in Table 4. The results reject the null hypothesis of no cointegration, confirming that the panel is stationary. Thus, the results indicate that the variables share a long-run cointegrating relationship. Conclusively, these findings provide support to a strong long-run relationship between private consumption, government consumption and disposable income. A similar result was found by Ho (2001) using also cointegration analysis on panel data for 24 OECD countries. An increase in government spending caused a decrease in private consumption and disposable income.

Table 4. Panel Cointegration Tests among Private Consumption, Disposable Income and Government Consumption

	All Countries	Countries with Similar Institutional Characteristics	Countries with Not Similar Institutional Characteristics
Panel v-stat	-4.37884*	-3.93270*	-3.64587*
Panel rho-stat	-3.78561*	-3.35691*	-3.27661*
Panel pp-stat	-2.83293*	-2.40985*	-2.34580*
Panel adf-stat	-2.68941*	-2.26733*	-2.17698*
Group rho-stat	-3.50992*	-3.17893*	-3.25682*
Group pp-stat	-3.78569*	-3.49862*	-3.41236*
Group adf-stat	-2.94510*	-2.98340*	-2.37097*

Note: * Rejection of the null hypothesis of no cointegration at 1%.

Given cointegration, we estimate the long-run relationship through the Dynamic OLS (DOLS) approach provided by Stock and Watson (1993). This approach regresses a I (1) variable on other I (1) variables plus lags and leads of the first-differences of the I (1) variables. The inclusion of the first-differenced variables eliminates any possible bias

resulting from correlation between the error term and the I (1) variables. We also calculate corresponding robust standard errors through an adjustment suggested by Newey and West (1987), with Bartlett weights and a truncation lag of 3. The DOLS regression is employed, by adding one lag and one lead of the first difference of the right-hand side variable to the equation:

$$c_{it} = 0.061 + 0.369 y_{it} - 0.456 g_{it}$$
$$(3.48)^* \quad (4.27)^* \quad (-4.11)^*$$
$$R^2 = 0.693$$
$$F = 81.24[0.00],$$

where the *F*-test indicates that the coefficients are jointly significant across countries. Figures in parentheses denote *t*-statistics while those in brackets indicate *p*-values. Finally, an asterisk denotes significance at 1%. The empirical findings show that both the disposable income and the government consumption coefficient are statistically significant at the 1% level. Moreover, the government consumption coefficient is negative, indicating that private consumption responds negatively to government consumption, which in itself is not supportive to the Ricardian Equivalence hypothesis. In other words, the empirical findings provide support for the expected positive correlation between private consumption and disposable income as well as for the negative correlation between private consumption and government consumption for the entire sample. The fact that the coefficient of government consumption is negative implies that the impact of debt-ridden countries prevails. In other words, the consumers in those countries fully realize the unfavorable prospects of their future standards of living and they set downward their consuming behavior in order to avoid drastic cuts in their future spending.

Testing the Robustness of the Results: Dividing the Sample into Countries with Similar Institutional Characteristics

According to Wallich (1994), transitional economies should be differentiated into relatively homogeneous groups due to institutional differences regarding the manner fiscal policies are implemented. Such institutional issues involve the democratic traditions have taken root, institutional formation of the sector of public administration, public attitude to equality issues, political conditions, variations in the speed of the economic transition, fiscal reforms regarding the rationalization of tax and non-tax measures, and public sector enterprises and privatization reforms (Shrivastava (2002)). The differentiation of those institutional issues seems to exert a substantial impact on building-up the sector of public administration as well as the reforms needed to pursue efficient fiscal policies (Shah (1994)), i.e., territorial fragmentation (Czech Republic and Hungary), the effective minimal size of local governments, the degree of self-governing

on the regional level (Latvia, Hungary, Slovakia, and Poland), instability of the tax sharing system (Lithuania, Ukraine, Hungary, and other Central Asian states), the need for fiscal equalization because of the inequality in spatial location of revenue base, and the need of criteria that secure the objectivity, stability, comprehensiveness, and transparency of the public administration system (progress under way in Estonia, Poland, Latvia, Lithuania, and Ukraine). It is also true that transitional countries of Central and Eastern Europe, e.g., Poland, Baltic states, Bulgaria, and FYROM, experienced a more accelerated process of reform while transitional states in the former Soviet Union, e.g., Ukraine, Kazakhstan, lagged behind (Martinez-Vasquez and Boex (2000)). Such reforms include the adoption of a standard fiscal classification and reporting system, the incorporation of extra-budgetary funds into the budget, the integration of capital budgets into the budget process in a more flexible manner, and integrating other off-budget phenomena into the budget, i.e., government loan guarantees and other contingent liabilities. Using the information as above we did include in one of the sub-samples the following countries with successful fiscal reforms: Czech Republic, Slovakia, Hungary, Slovenia, Croatia, Bulgaria, Estonia, Lithuania, Latvia, and Poland. The remaining countries were placed on the side of those with no successful fiscal reforms. Once again, unit roots tests denote that all variables are characterized as I (1) processes (Table 1).

Panel Cointegration Analysis

The Pedroni cointegration results are also reported in Table 4. The results reject the null hypothesis of no cointegration, confirming that the panel is stationary in both cases. Thus, the results indicate that the variables share a long-run cointegrating relationship in both sub-samples.

Countries with similar institutional characteristics:

$$c_{it} = 0.042 + 0.396 y_{it} - 0.445 g_{it}$$
$$(3.68)^* \quad (4.37)^* \quad (-4.26)^*$$
$$R^2 = 0.715$$
$$F = 89.66[0.00],$$

where the *F*-test indicates that the coefficients are jointly significant across countries. Figures in parentheses denote *t*-statistics while those in brackets indicate *p*-values. Finally, an asterisk denotes significance at 1%. The empirical findings show that both the disposable income and the government consumption coefficient are again statistically significant at the 1% level. Moreover, the government consumption coefficient is still negative, indicating that private consumption responds negatively to government consumption, which in itself is not supportive of a Ricardian Equivalence behavior.

Countries with not similar institutional characteristics:

$$c_{it} = 0.026 + 0.412 y_{it} - 0.087 g_{it}$$
$$(4.48)^* \quad (3.26)^* \quad (-1.18)^*$$
$$R^2 = 0.423$$
$$F = 71.64[0.00],$$

where the *F*-test indicates that the coefficients are jointly significant across countries. Figures in parentheses denote *t*-statistics while those in brackets indicate *p*-values. Finally, an asterisk denotes significance at 1%. The empirical findings show that this time only the disposable income coefficient is statistically significant at the 1% level. The government consumption coefficient is negative again, but this time turns out to be statistically insignificant, indicating that private consumption does not respond to fiscal policy, which in itself is supportive of the Ricardian Equivalence hypothesis.

Testing the Robustness of the Results: A Higher Multivariable Framework

Following Haug' (1990), Eisner' (1994) and Cebula's *et al.* (1996) approach a multivariable framework is employed and the empirical analysis is repeated. To this end, real money balances, expected inflation, and a real exchange rate index have been included in the analysis with 1983=100 as additional explanatory variables. An increase in the real exchange rate indicates a real appreciation. Although the relevant literature considers demographic variables as extra determinants of the relationship between private consumption and fiscal policy, those variables are not included in the analysis due to the lack of those data.

Panel Cointegration Analysis

$$c_{it} = \beta_{0i} + \beta_{1i} y_{it} + \beta_{2i} g_{it} + \beta_{3i} rm_{it} + \beta_{4i} p^e_{it} + \beta_{5i} re_{it} + \varepsilon_{1it}, \quad (8)$$

where *rm* denotes the log of real money balances, p^e denotes the log of expected inflation, and *re* denotes the log of the real exchange rate. The term ε_{i1it} shows the deviations from the modelled long-run relationship. The cointegration results are reported in Table 5. The results again reject the null hypothesis of no cointegration, confirming that the panel is stationary. Conclusively, these findings provide support to a strong long-run relationship between private consumption, government consumption, disposable income, real money balances, expected inflation and the real exchange rate.

Table 5. Panel Multivariable Cointegration Tests among Private Consumption, Disposable Income, Government Consumption, Real Money Balances, Expected Inflation and the Real Exchange Rate (All Countries)

Panel v-stat	-4.33645*
Panel rho-stat	-3.85413*
Panel pp-stat	-3.14094*
Panel adf-stat	-2.79309*
Group rho-stat	-3.46731*
Group pp-stat	-3.58094*
Group adf-stat	-3.11375*

Note: Similar to Table 4.

Given cointegration, the long-run relationship was estimated through the Dynamic OLS (DOLS) approach. After confirming the stationarity of the new variables included in the analysis (Table 1), the panel cointegration equation yielded:

$$c_{it} = 0.056 + 0.372 y_{it} - 0.437 g_{it} + 0.283 rm_{it} - 0.194 p_{it}^{e} - 0.095 re_{it}$$
$$(4.12)^{*} \quad (4.54)^{*} \quad (-4.47)^{*} \quad (4.06)^{*} \quad (-4.38)^{*} \quad (-4.39)^{*}$$
$$R^2 = 0.653$$
$$F = 69.68[0.00],$$

where the *F*-test indicates that the coefficients are jointly significant across countries. Figures in parentheses denote *t*-statistics while those in brackets indicate *p*-values. Finally, an asterisk denotes significance at 1%. The empirical findings show that all coefficients are statistically significant at the 1% level. Moreover, the government consumption coefficient is still negative, indicating that private consumption responds negatively to government consumption, which in itself is not supportive of a Ricardian Equivalence behavior.

Moreover, the coefficient of real money balances is positive, indicating that an expansionary (restrictive) monetary policy leads to higher (lower) private consumption. This reflects three facts: first, a monetary expansion (contraction) depreciates (appreciates) the domestic currency causing higher (lower) net exports and, thus, higher (lower) income, which in turn stimulates (contracts) private consumption; second, a monetary expansion (contraction) lowers (increases) the interest rate which in turn leads to higher (lower) private consumption; finally, a monetary expansion (contraction) leads to higher (lower) stock prices. As long as stock prices are part of an individual's wealth, higher (lower) stock prices lead to higher (lower) private consumption. In terms of expected inflation, the coefficient turned out to be negative, indicating that higher (lower) expected prices tend to lower (increase) the real value of assets and, therefore, to discourage (stimulate) private consumption. Finally, in terms of the real exchange rate

the coefficient turned out to be negative, indicating that a real appreciation (depreciation) of the currency lowers (stimulates) net exports, which leads to lower (higher) income, and, thus, to lower (higher) private consumption.

5. CONCLUSIONS AND POLICY IMPLICATIONS

This paper investigated the existence of a relationship between private and government consumption, since it is a topic with major political and economic implications. Using a panel from different transitional countries, from 1990 to 2003, it applies panel cointegration and causality methodologies. The study finds statistical evidence for a long-run relationship between private and government consumption deficits. Based on the analysis of a linear relationship, the results indicated absence of any support for the Ricardian Equivalence, since the relationship was negative. It also finds such a long-run relationship in a sub-sample that contains countries that share similar institutional characteristics as well as in a sub-sample with the remaining countries.

The empirical findings recommend the invalidation of the Ricardian Equivalence hypothesis. They indicate that in transitional countries there always is a certain number of individuals whose current tax changes will not match future tax changes. In other words, a low number of consumers in those transitional economies seem to internalize the government budget when predicting future taxes. In addition, credit markets in transitional economies are imperfect, which also seems plausible for the invalidation of the Ricardian Equivalence approach. Another implication of the empirical analysis is that individuals in transitional economies have to cope with strong liquidity constraints as well as differential borrowing rates. Finally, the results diminish the effectiveness of fiscal policy for stabilization purposes, rendering it weak enough to encourage aggregate demand. In other words, these new transitional economies should learn from the experience of the developed countries and should attempt to enlarge their arsenal of affecting the course of the real sector and not just giving fiscal policy too much credit to do the job.

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