School of Economics and Management
TECHNICAL UNIVERSITY OF LISBON

Department of Economics

António Afonso & João Tovar Jalles

The cyclicality of education, health, and social security government spending

WP 30/2012/DE/UECE

WORKING PAPERS

ISSN Nº 0874-4548

The cyclicality of education, health, and social security government spending

António Afonso [$ #] and João Tovar Jalles [+]

2012

Abstract

We use a panel of developed and emerging countries for the period 1970-2008 to assess the cyclicality of education, health, and social security government spending. We mostly find acyclical behaviour, but evidence also points to counter-cyclicality for social security spending, particularly in OECD countries, consistent with the operation of automatic stabilizers.

JEL: C23, E62, H50.
Keywords: business cycle, output gap, functional spending, panel analysis.

1. Introduction

The cyclicality of government expenditure is an important issue, notably from a policy making perspective. Changes in notably in functional expenditure patterns may arise from discretionary actions by policy makers or from the operation of automatic stabilizers (see notably Granado et al., 2010). Using a large panel of advanced, emerging and developing countries we assess the cyclicality of three categories of functional public expenditure. Our analysis is an encompassing one since we consider, besides education and health spending, also government expenditure on social security and welfare, and we use a substantially large sample of countries and a long time span (1970-2008).

Most studies find that fiscal policy is procyclical in developing countries and countercyclical or acyclical in advanced ones (see, inter alia, Tornell and Lane (1999), Alesina and Tabellini (2005) and Ilzetzki and Vegh (2008)). A number of explanations have

[$] ISEG/UTL - Technical University of Lisbon, Department of Economics; UECE – Research Unit on Complexity and Economics. UECE is supported by FCT (Fundação para a Ciência e a Tecnologia, Portugal), email: aafonso@iseg.utl.pt.
[#] European Central Bank, Directorate General Economics, Kaiserstraße 29, D-60311 Frankfurt am Main, Germany. email: antonio.afonso@ecb.europa.eu.
[+] Organisation for Economic Co-operation and Development, Department of Economics, 2 rue André Pascal, 75775 Paris Cedex 16, France. email: joao.jalles@oecd.org

been put forward to justify the different cyclical pattern in different groups of countries (see, Gavin and Perotti (1997) or Tornell and Lane (1999) for review).

In our analysis we find that education and health spending are mostly acyclical, while for total expenditures, and spending on social security and welfare, where evidence points to counter-cyclicality, particularly in OECD countries, highlighting in this context the relevance of this activity in the redistribution activity of the government.

2. Data and Methodology

We collected data for a large set of advanced (OECD), emerging and developing countries (using the World Bank's definition) between 1970 and 2008 from the World Development Indicators and the IMF's International Financial Statistics. We then transform our spending variables (education, health and social security)[1] into log levels, deflated with the CPI at 2000 prices (which matches the same reference year for real GDP). Following the related literature we estimate:

$$EXP_{it} = \alpha_{it} + \beta_0 Y_{it} + \beta_1 BB_{it-1} + \beta_2 TOT_{it} + \eta_t + \nu_i + \varepsilon_{it} \qquad (1)$$

where EXP_{it} is the change in the real value of the log of the expenditure item of interest and Y_{it} is the real GDP growth rate. BB_{it-1} is the government's budget balance (% GDP), which captures the potential effect of borrowing constraints on public spending. Countries with high initial budget deficits are perceived to be at a greater risk of debt default and as a result have less access to capital markets during recessions. They would be expected to exhibit a higher degree of pro-cyclicality. TOT_{it} is an index (its change) of the country's terms of trade. The rate of change in the terms of trade is meant to capture the effects of external shocks on fiscal cyclicality. The impact of external shocks is often more pronounced in developing countries due to the close connection between the budget balance and the foreign sector. The remaining usual assumptions apply, in particular ν_i and η_t are country specific and time effects – the latter to control for global shocks. β_0 is the parameter of interest, measuring the degree of cyclicality: a positive estimate implies a pro-cyclical behaviour; a negative one indicates a countercyclical behaviour of the respective spending items.

[1] These three functional spending categories accounted for 41.6%, 54.7%, and 34.5% of government spending, respectively in the full, OECD and developing country-group over the full time span considered in our sample.

3. Empirical results

The potential endogeneity is taken care by running Arelano-Bover (1995) SYS-GMM with appropriate lags of the regressors used as instruments.[2] We begin by estimating (1) without control variables using annual data for the full, OECD and Emerging and Developing (E+D) samples. Our results, presented in Table 1, show that most GDP growth coefficients are mostly statistically insignificant for our spending categories, apart from evidence of countercyclical total government expenditures attributed to the OECD sub-group (which is in line with the literature) and a countercyclical pattern for expenditures in social security and welfare in the different samples, in line with Hallerberg and Strauch (2002) and Darby and Melitz (2008).

In addition, we need to notice that that level of counter-cyclicality for social spending is much stronger in the OECD countries that in the E+D countries, as can be seen by the much higher absolute value of the estimated coefficient for GDP in the first country group. This result can be understood due to the fact that more developed economies possess bigger social systems and more important welfare state features.

[Table 1]

In Table 2 we report the estimated coefficients once the full set of controls are allowed for. In the case of the OECD the government expenditure coefficient remains statistically significant. Moreover, we keep the countercyclical result for spending on social security and welfare (for both the full and OECD samples).

[Table 2]

Finally, given that functional public expenditure may respond asymmetrically, we test this hypothesis by accounting for so-called good and bad times' periods. Therefore, we define g*ood times* as those in which the output gap is positive and *bad times* when the output gap is negative.[3] Our results in Table 3 suggest that for the OECD, total government expenditure is countercyclical in both good and bad times, with the coefficient in bad times being 50% larger in absolute value (more negative). We keep the acyclicality result for education and health expenditures, and the countercyclical result for spending in social security and welfare is also maintained. In fact, in good times the estimated coefficient for social security spending is larger in magnitude (more negative). For emerging and developing countries our results are in

[2] The Hansen J-statistics confirm the validity of the instruments set used. Within-fixed effects results are available from the authors upon request.

[3] The output gap is computed as the difference between actual and potential, and potential GDP is obtainded by means of HP filter extraction. As a robustness check, filtering instead with either the Baxter-King or Christiano-Fitzgerald alternatives didn't qualitatively alter our main results.

line with Jaimovich and Panizza (2007) who report that after controlling for endogeneity, total government spending is acyclical in both good and bad times.

[Table 3]

4. Conclusion

All in all, the functional spending items under analysis are mostly acyclical, with the exception of spending on social security and welfare (and total expenditures) where evidence points to counter-cyclicality, particularly in OECD countries. Therefore, when the economy is slowing down, social spending needs to pick up, and this is consistent with the fiscal automatic stabilizer narrative, and in the context of the redistribution responsibilities of the government. On the other hand, the acyclical behaviour of health and education spending depicts their more structural nature. Hence, this implies that an important part of government spending is rather rigid and more impervious to the business cycle, while such spending is also less easily reduced, notably in periods when fiscal retrenchment is warranted.

References

1. Arellano, M. and Bover, O. (1995), "Another Look at the Instrumental Variable Estimation of Error Component Models", Journal of Econometrics, 68: 29-51.
2. Alesina, A., Tabellini, G. (2005), “Why is fiscal policy often procyclical?”, NBER WP No. 11600.
3. Darby, J., Melitz, J. (2008). “Social spending and automatic stabilizers in the OECD”, Economic Policy, 23, 715-756.
4. Gavin, Michael, and Roberto Perotti (1997). “Fiscal Policy in Latin America.” NBER Macroeconomics Annual 1997, edited by Ben Bernanke and Julio Rotemberg. MIT Press
5. Granado, J., Gupta, S., Hajdenberg, A. (2010), “Is social spending procyclical?”, IMF WP 10/234.
6. Hallerberg, M., Strauch, R. (2002). “On the cyclicality of public finances in Europe”, Empirica, 29 (3), 183-207.
7. Ilzetzki, E., Vegh, C. (2008), “Procyclical fiscal policy in Developing Countries: truth or fiction?”, NBER WP No. 14191.
8. Jaimovich, D., Panizza, U. (2007), “Procyclicality or reverse causality?”, InterAmerican Development Bank, Research Department, WP 599.
9. Tornell, A., Lane, P. (1999), “The voracity effect”, American Economic Review, 89, 22-46.

Table 1: Cyclicality of public expenditures, annual data (without control variables)

Dependent Variable	**Total spending**			**Education spending**			**Health spending**			**Social Security and Welfare spending**		
Estimation	SYS-GMM											
Sample	All	OECD	E+D	All	OECD	E+D	All	OECD	E+D	All	OECD	E+D
	1	2	3	4	5	6	7	8	9	10	11	12
gdppcgr	-2.16*	-5.77***	-1.72	-0.17	-0.43	-0.14	-0.08	-0.23	-0.06	-0.63***	-3.68***	-0.24**
	(1.198)	(1.114)	(1.361)	(0.147)	(0.286)	(0.161)	(0.049)	(0.238)	(0.048)	(0.166)	(0.874)	(0.111)
Observations	2,167	814	1,353	2,226	582	1,644	1,590	521	1,069	1,498	521	977
Hansen (p-value)	0.19	0.29	0.35	0.38	0.26	0.40	0.21	0.51	0.13	0.41	0.26	0.22
AB AR(1) (p-value)	0.00	0.02	0.00	0.00	0.02	0.00	0.00	0.01	0.01	0.00	0.00	0.00
AB AR(2) (p-value)	0.37	0.14	0.72	0.16	0.42	0.18	0.55	0.17	0.26	0.45	0.95	0.39

Note: The models are estimated by Two-Step robust System GMM (SYS-GMM). Lagged regressors are used as suitable instruments. The dependent variable is either total government expenditures, government expenditures on education, health or social security and welfare (all in % GDP), as identified in the first row. "E+M" denote the emerging and developing countries sub-group. Robust heteroskedastic-consistent standard errors are reported in parenthesis below each coefficient estimate. The Hansen test evaluates the validity of the instrument set, i.e., tests for over-identifying restrictions. AR(1) and AR(2) are the Arellano-Bond autocorrelation tests of first and second order (the null is no autocorrelation), respectively. A constant term has been estimated but it is not reported for reasons of parsimony. *, **, *** denote significance at 10, 5 and 1% levels.

Table 2: Cyclicality of public expenditures, annual data (with control variables)

Dependent Variable	**Total spending**			**Education spending**			**Health spending**			**Social Security and Welfare spending**		
Estimation	SYS-GMM											
Sample	All	OECD	E+D	All	OECD	E+D	All	OECD	E+D	All	OECD	E+D
	1	2	3	4	5	6	7	8	9	10	11	12
gdppcgr	-0.49	-4.56**	0.45	-0.29	-0.51*	-0.08	-0.05	-0.24	-0.08	-0.83**	-3.63***	-0.34
	(0.841)	(2.027)	(0.984)	(0.269)	(0.304)	(0.264)	(0.123)	(0.349)	(0.087)	(0.355)	(1.281)	(0.258)
ToT gr	-0.03	-0.12***	-0.02	-0.00	0.00	-0.00	0.00	0.00	0.00	-0.02**	-0.03	-0.00
	(0.025)	(0.027)	(0.035)	(0.006)	(0.007)	(0.005)	(0.005)	(0.006)	(0.005)	(0.011)	(0.024)	(0.007)
govbal_gdp(-1)	0.04***	0.01	0.06***	0.01**	0.00	0.01**	0.00	0.00	0.00	0.01**	0.01*	0.00
	(0.009)	(0.009)	(0.010)	(0.002)	(0.003)	(0.002)	(0.001)	(0.002)	(0.001)	(0.003)	(0.007)	(0.002)
Observations	772	366	406	673	253	420	521	219	302	492	219	273
Hansen (p-value)	0.13	0.19	0.14	0.20	0.21	0.42	0.31	0.31	0.15	0.12	0.36	0.34
AB AR(1) (p-value)	0.00	0.00	0.00	0.02	0.11	0.03	0.09	0.17	0.17	0.01	0.09	0.05
AB AR(2) (p-value)	0.06	0.50	0.08	0.31	0.67	0.25	0.27	0.53	0.26	1.00	0.39	0.07

Note: as in Table 1.

Table 3: Cyclicality of public expenditures in “Good” and “Bad” times, annual data

Dependent Variable	**Total spending**			**Education spending**			**Health spending**			**Social Security and Welfare spending**		
Estimation	SYS-GMM											
Sample	All	OECD	E+D	All	OECD	E+D	All	OECD	E+D	All	OECD	E+D
	1	2	3	4	5	6	7	8	9	10	11	12
Good times	-0.35	-3.84*	1.11	-0.01	-0.83	0.07	-0.01	-0.12	-0.05	-0.80**	-4.00***	-0.17
	(1.020)	(2.139)	(1.328)	(0.271)	(0.580)	(0.316)	(0.123)	(0.389)	(0.123)	(0.407)	(1.369)	(0.234)
Bad times	-2.09**	-5.60**	-1.33	-0.36	-0.37	-0.36	-0.12	-0.38	-0.18	-0.89**	-2.87**	-0.54
	(1.006)	(2.400)	(1.149)	(0.324)	(0.291)	(0.365)	(0.083)	(0.428)	(0.112)	(0.374)	(1.462)	(0.377)
ToT gr	-0.03	-0.11*	-0.03	-0.00	-0.00	-0.00	-0.00	0.00	0.00	-0.01	-0.04**	-0.00
	(0.026)	(0.063)	(0.030)	(0.006)	(0.008)	(0.006)	(0.005)	(0.004)	(0.005)	(0.009)	(0.019)	(0.007)
govbal_gdp(-1)	0.04***	0.01	0.05***	0.01**	0.00	0.00**	0.00	0.00	0.00	0.00*	0.01**	0.00
	(0.008)	(0.014)	(0.008)	(0.002)	(0.004)	(0.002)	(0.001)	(0.002)	(0.001)	(0.002)	(0.006)	(0.002)
Observations	769	366	403	662	253	409	518	219	299	489	219	270
Hansen (p-value)	0.33	0.51	0.12	0.20	0.14	0.23	0.42	0.33	0.11	0.24	0.17	0.38
AB AR(1) (p-value)	0.00	0.00	0.00	0.02	0.11	0.03	0.09	0.17	0.17	0.01	0.07	0.05
AB AR(2) (p-value)	0.06	0.47	0.08	0.34	0.76	0.28	0.25	0.57	0.26	0.97	0.37	0.05

Note: Note: as in Table 1.