VOL. 3, NO. 3, April 2014 ISSN 2307-2466
International Journal of Economics, Finance and Management

http://www.ejournalofbusiness.org

Fiscal Illusion – Does It Exist? An Econometric Evaluation

[1] Amaresh Das, [2] Adnan Omar
[1,2] Professor, College of Business, Southern University at New Orleans, New Orleans, LA 726*

ABSTRACT

Do revenues have a positive causal relationship to expenditures that is, if tax revenues are increased, does spending rise? Or is it the other way round that is if spending rises does revenue rise? Tax revenues in the latter case will rise because of consumer ignorance about the way the tax system works. The latter case may be due to what is called fiscal illusion where a negative causal relationship is expected. Or, is it that there is no equilibrium relationship between revenues and expenditure. The paper probes into the equilibrium relationships first on the basis of Error Correction Models and then proceeds to empirically verifies the revenue-expenditure nexus using annual data from India covering a period from 1985 to 2010.

Keywords: *Co integration, unit roots, error correction models, vector auto regressive.*

1. INTRODUCTION

The paper empirically investigates the existence of fiscal illusion – the notion that the systematic misperception of taxes may significantly distort fiscal choices by the Indian electorate. Understanding that the revenue-expenditure nexus is essential for a proper understanding of the political economy of India. If causation is in the tax-spend direction then there are at least two consequences: If tax revenues are increased, spending will increase; and, if tax revenues are lowered, spending will be lowered. This view has led various proponents of limited government to encourage tax cuts that are not conditional on offsetting spending cuts. The conventional tax-spend hypothesis is associated with Noble Laureate economist, Milton Friedman.

The absence of a positive causal relationship from spending to revenue may exist due to what is termed as 'fiscal illusion'. This is a concept that governments find it easy to raise revenues because of consumer ignorance about the way the tax system works[1]. The point is: if government revenues or taxes are not fully perceived by taxpayers, then the cost of government is seen to be less expensive than it actually is and in that case, the public appetite for government expenditures will increase providing politicians' incentive to expand the size of the government. Fiscal illusionists encourages tax increases (especially during times of budget deficit) because they force the public to meet excessive spending without making them feel the cost. This study will not incorporate the notion of fiscal illusion to include imperfect information where voters are unsure about how much they must pay for additional services or where they are unsure about the services received in return for higher taxes. The paper does not also incorporate other forms in which fiscal illusion may appear, for example, complexity of tax structure, recent illusion with respect to property taxation[2], income elasticity of the tax structure, debt illusion, and what is known as the' fly paper effect'. For evaluation of the work on each of them, see Payne[12] Romer [14]and Turnbull [15] specifically for flypaper effects[3].

The existing literature uniformly imposes symmetry on revenue effects in expenditure. This constraint may bias results toward the conventional tax-spend hypothesis because it is based on simple adherence to a budget constraint. In contrast, the fiscal illusionist hypothesis – based on the taxpayers' subjective perceptions of the cost of government spending - is more plausibly associated asymmetric responses[4]. The relevant questions to be posed are: First, is there any relationship between revenues and expenditures Second, do variations in revenues cause variations in expenditure (from tax to spend) or is causation the other way round (from spend to tax)? Or, nonexistent? We will try to provide empirical evidence on these two issue on the basis of revenue expenditure data from India spanning a period from1985 to 2010. Because the time series of Indian macro variables involved in the analysis are non stationary, the

*Corresponding author adas2@cox.net

[1]Anthony Downs as far back in 1970 [7] argued convincingly that the representative voter is likely to have highly imperfect information on which to base his decisions on public sector activities. Imperfect information is not however, synonymous with fiscal illusion for its existence. Fiscal illusion refers to a systematic misperceptions of fiscal parameters – a recurring propensity, for example, to underestimate one's tax liability associated with certain public programs. Imperfect information alone might give rise to a random pattern of over-and underestimation of such tax liabilities. As such, it will give rise to recurring and presumably predictable, biases to budgetary decisions.

[2] Buchanan and Wagner [3], suggest that the complicated nature of the U.S. tax system causes fiscal illusion and results in greater public expenditure than would be the case in an idealized system in which everyone is aware in detail of what their share of the costs of government is. See, also, Breden and William [2].

[3]Chetty et al [4] demonstrate that tax salience has economically significant behavioral implications, which indicates that tax visibility matters both for consumer choice and for public policy.

[4]For example, individuals may be more sensitive to tax increase, seeking to assign blame for those shocks, while tax decreases are more passively accommodated. This may be due to irrationality, but not necessarily. Tax decrease (relative to spending) create future tax liabilities that may or may not be paid during the individual' life time. Tax increases, on the other hand, are realized with certainty

dynamic link between revenues and expenditures is explored within a possibly co-integrated system where the joint endo geneity of the variables is allowed

We will use an Error Correction Model (ECM)framework and later allow for asymmetric responses to long run budgetary revenue and expenditures. The ECM has prompted a range of statistical developments, most notably the concept of co integration owing to Ganger and Weisss[9]. In fact, recently Adusel [1], Das [6]and Hisham [11] suggest that 'when estimating structural models it is our experience from practical applications that the error correction formulation provides an excellent framework within which it is possible to apply both the data information and the information obtainable from economic theory. Similar views have been expressed by many others.

Although there are different versions of the ECM we will use the Ganger version. As a particular parameterization of the dynamic linear regression model or vector auto regressions (VARs), error correction models are an effective way of characterizing the dynamic multivariate interactions characteristic of economic data. In this use, they are a theoretical models in the sense of Adusel [1}, and there is no particular problem in substituting one observationally equivalent form of the model for another. One implication of the irrelevance of parameterization is that the only questions that can be asked of the model are those which have the same answer for all observationally equivalent versions of the model.[5]

2. METHODOLOGY

Co-integration of a vector of variables implies that the number of unit roots in the system is less than the number of unit roots in the corresponding univariate series Granger[8],[9].To test whether the revenue and government expenditure are co-integrated, the Johansen procedure is employed. The procedure starts with a definition of an n-dimensional vector of non-stationary X, which potentially form a co-integrating set. The Vector Autoregressive (VAR) representation of the unrestricted system with Gaussian error μ(the intercept term may be omitted for simplicity) is:

$$X_t = AX_{t-1} + AX_{t-2} + \ldots + A_k X_{t-k} \qquad (1)$$

where

$$\mu_t \approx N\ [0, \Sigma\ ] \qquad (2)$$

and

$$\Delta X_t = \Gamma_1 \Delta X_{t-1} + \Gamma_2 \Delta X_{t-2} + \qquad + \Gamma_{k-1}\ \Delta X_{t-k-1}$$

$$+ \Pi_{t-k} + \mu_t \qquad (3)$$

where

$\Gamma = -\ (1 - A_1 - \ldots.\ A_t)$ where t = 1. 2. K- t

And

$\Pi = (\ A_1\ -\ \ldots.\ A_k)$

The rank of matrix Π will determine whether there is any significant co-integrating vector between the variables. Clearly, if the rank of Π is zero, the matrix is null and equation (3) is just a VAR model in the first differences. The other extreme is when Π has full column rank, which is equivalent to the stationarity of the vector process. The intermediate case of reduced column rank implies that there exist linear combinations of the variables, corresponding to the co-integration vectors. To decide on the number of co-integrating vectors, the maximum Eigen value test is used. Critical values obtained from Monte Carlo simulations of the limiting distribution are given in Johansen and Juselius [10], Das [5}.

Theorem 1: Granger Representation Theorem

a. If N x 1 vector x_t is co-integrated with co-integrated rank r, and if this vector can be represented by a finite vector auto regression then A (1) has rank r and A (0) = I_n in A (B) $x_t = \varsigma_t + m$

b. There exists N x r matrices $\alpha\,\gamma$ of rank r such that $\alpha' C$ (1) = 0 C (1) = 0 A (1) = $\gamma\, x^r$

b. There exists an error correction representation with $z_t = \alpha' x$ in r x 1 vector of stationary random variables A^* $(B)($ 1- B $)x_t = \gamma\, z_{t-1} + \varsigma_t + m$ with A^* (0) = I_n

(For proof see Engle and Granger (1991),[6]

[5]Although there are plausible precursors, Phillips [13] introduced the terminology of error correction to economics, in his analysis of feedback control mechanisms for stabilization policy. Consider a state variable x(r) influenced by a control variable *y* (t) and exogenous shocks. There is a desired level for *x* (t), x*(t), and there is an error associated with it, *e (t)= x*(t) - x(t).* What Phillips called 'error correction type stabilization policy' then adjusts the control variable according to proportional, integral and derivative (PID) feedbacks from the errors:

$$Y(t) = y^*(t) + f_p\ e(t)dt + f_e \int e(t)dt + f_e \frac{\delta(t)}{\delta t}$$

Phillips' formulation of the control variable was slightly more complicated since he allowed for lags in the policy implementation. In addition he did not provide for the intercept denoted above by *y**. This is the equilibrium level of the control variable, at which *x = x*,* and is a natural addition to the model

[6] The equation in (a). describes the unrestricted VAR which can be used to estimate and forecast the vector x_t .This

VOL. 3, NO. 3, April 2014 ISSN 2307-2466
International Journal of Economics, Finance and Management

http://www.ejournalofbusiness.org

Table 1: Unit Root Test on Government Expenditures and Revenues

Statistic	Revenue	Expenditure
ADF	7.123 (0.334)	-6.234(0.652)
Phillips-Perron	-11.444(0.689)	-7.451(0.823)
	ΔR	ΔX
ADF	- 31.451 (0.010)	-11. 423 (0.000)
Phillips-Perron	-45.783 (0.000)	-41.878 (0.001)

Notes: Both the ADF and Phillips-Perron test include constants and linear trends. Numbers in Parentheses arep–values

Table 2: Maximum Likelihood Co integrating Set

Panel 1			
Null Critical value	**Alternative**	**Statistic**	**95%**
Maximum Eigen value test			
r= 0	r=1	48.02	23.43
r=1	r =2	7.03	14.64
r=2	r=3	4.51	7.82
Trace test			
r = 0	r ≥ 1	52.43	24.23
r = 1	r ≥ 2	12.12	18.31
r =2	r ≥ 3	8.34	6.81
ECM = REV – 0.86 EXPENDITURE – 4.34 (-3. 23) (4. 53) t -Statistics are in parenthesis			

Both tests do suggest that there is a single co-integrating vector. Our Indian data appear to suggest that there is a long-run relationship between revenue and government expenditure. To be more precise, there is evidence for the presence of a unique statistical equilibrium EQ which works as the 'attracter' for the variables:

EQ = REVENUE–0.072EXPENDITURE – 3.45
(-2.56) (-4.43)

The long run relationship as it stands allows to test for the tax-spend hypothesis. Recall that according to the tax-spend hypotheses, the long run impact of government expenditure should be positive. Additionally, strictly speaking, the long-run impact should be unity. In other words, revenues increase expenditure one-to-one.

$$\frac{\delta\ EXPENDITURE}{\delta\ REVENUE} = 1$$

According to the information in the sample, revenue and government spending is correlated. However, the null that the long run impact is unity (or, equivalently, that the elements of co integration vectors are symmetrical can be rejected at the conventional level of significance.

3. RESULTS OF THE ESTIMATRE

Table 3: ECM Estimate

A. Equation for government Expenditure [a]

Variable	Coefficient	t -stat
Δ(REV) (-1)	0.11	0.40
Δ(REV) (-2)	2.04	0.03
Δ(REV) (-3)	2.13	0.11
Δ(REV) (-4)	3.23	0.51
Δ(EXP) (-1)	0.21	0.00
Δ(EXP) (-2)	0.09	2.21
Δ (EXP) (-3)	0.02	0.21
Δ(EXP) (-4)	-0.06	-1.78
ECM (-1)	-0.02	-1.21
AIC	**-5. 1154**	

R^2 = 0.54 Serial Correlation LM (4)
p- value = 0.01

ARCH LM (4) Test p- value = 0.04

F–Stat	**7.634**	
B. Equation for Revenues		
Variable	**Coefficient**	**t -stat**
Δ(REV) (-1)	0.68	0.42
Δ(REV) (-2)	0.43	0.38
Δ(REV) (-3)	0.56	0.34
Δ(REV) (-4)	-2.3	-0.51
Δ(EXP) (-1)	-0.71	-2.30
Δ(EXP) (-2)	-0.69	-1.81
Δ (EXP) (-3)	-0.62	-0.51
Δ(EXP) (-4)	3.06	2.35
ECM (-1)	2.22	1.71
AIC	**-11.654**	

Table 3 continued . . .
R^2 = 0.78 Serial Correlation LM (4) p- value = 0.00
ARCH LM (4) Test p- value = 0.31

F- Stat 0. 7654

representation, however, has restriction implied by the $N - r$unit roots which would not be imposed by such an unrestricted estimation. On the other hand, (c).shows that a VAR differences is inappropriate as the levels should appear through z in fact ,the vector $(1 - B)x$ does not have a vector ARMA representation with an invertible moving average. Such a series is over differenced.

VOL. 3, NO. 3, April 2014 ISSN 2307-2466
International Journal of Economics, Finance and Management

http://www.ejournalofbusiness.org

[a] Δ stands for the difference operator
[b]Heteroskedasticity –adjusted t statics

Now let us evaluate the conventional tax-spend hypothesis versus fiscal illusion hypothesis by analyzing annual data from India from 1985 t0 2010. The system (1) and (2) is estimated by OLS. Since the focus of the paper is on evaluating the conventional tax-spend hypothesis versus fiscal illusion hypothesis, we restrict reporting to results from expenditures equations, such as in equation (3) below. This constraint may, of course, bias results toward the conventional tax-spend hypothesis because it is based on simple adherence to a budget constraint. In contrast, the fiscal illusion hypothesis – based on public's subjective perceptions of the cost of government spending – is more plausibly associated asymmetric responses. The existing literature uniformly imposes symmetry on revenue effects in expenditure equations.

A standard ECM system will be:

$$\Delta X_t = \gamma_0 + \alpha_1 \Delta X_{t-1} + .. + \alpha_p \Delta X_{t-p} + \beta_1 \Delta R_{t-1} + .. + \beta_p \Delta R_{t-p} + \psi \delta_{t-1} + \mu_t \tag{3}$$

$$\Delta R_t = \begin{array}{l} \bar{\gamma}_0 + \bar{\alpha}_1 \Delta X_{t-1} + ... + \bar{\alpha}_p \Delta X_{t-p} + \bar{\beta}_1 \Delta R_{t-1} + \\ .. + \bar{\beta}_p \Delta R_{t-p} + \bar{\psi} \delta_{t-1} + \bar{\mu}_t \end{array} \tag{4}$$

Consider an alternative ECM where revenue increases and decreases are allowed to effect expenditures asymmetrically

$$\Delta X_t = \gamma_0 + \alpha_1 \Delta X_{t-1} + .. + \alpha_p \Delta X_{t-p} + \beta_1 NEG\ D\ NEG\ \Delta R_{t-1} + ... + \beta_p\ NEG\ D\ NEG \Delta R_{t-p} + \beta_1 POS\ \ D\ \ POS\ \ \Delta r_{t-1} + \beta_p\ \ POS\ \ D\ \ POS\ \Delta r_{t-p} + \rho E_{t-1} + \mu_t \tag{5}$$

where D POS = 1 if $\Delta r > 0$ and 0 otherwise;
D NEG = 1 if $\Delta r < 0$ and 0 otherwise.
We estimate (4) for lag lengths (ρ) of 1 through 8. The Akaike- Information Criterion (AIC) suggests a lag length of 4 (AIC = 11.56).Similar to several previous studies, the hypothesis that the coefficients on revenue

Table 4: Estimation of Expenditure with Asymmetric Results

Coefficient	Symmetric	Coefficient	Asymmetric
β_1	-0.23(-0.34)	β_1 NEG	-3.45(-.08)
β_2	0.56(0.43)	β_2 NEG	1.67(0. 31)
β_3	0. 34(0.31)	β_3 NEG	-2.44(-0.43)
β_4	0.05) (0.03)	β_4 NEG	1.23(0.32)
		β_1 POS	1.65(0.23)
		β_2 POS	2.34(0.02)
		β_3 POS	3.45(0.01)
		β_4 POS	3.73(0.02)
ρ	0.71(0.02)	ρ	1.45(1.02)
R^2	0.673	R^2	0.767
AIC	- 11.34	AIC	-11.56

F- Stat 4.567* F- Stat 3.513

$\beta_1 = \beta_2 = \beta_3 = \beta_4 = 0$

β_1 NEG = β_2 NEG = β_3 NEG = β_4 NEG = 0

F –Stat 6.241*

β_1 POS = β_2 POS = β_3 POS = β_4 POS = 0

F- Stat 3.451 F Stat 1.012

Table 4 Continued …

$\beta_1 + \beta_2 + \beta_3 + \beta_4 = 0$

$\beta_1 POS + \beta_2 POS + \beta_3 POS + \beta_4 POS = 0$

Notes * denotes significance at the 5 percent level
Numbers in parenthesis are standard errors

changes are jointly zero is rejected at the 5 percent significance level. This suggests that revenue changes Granger-cause changes in expenditures. Furthermore Granger causality is based on a positive coefficient on the fourth lag of ΔREV(β_4). With about 3–year lag, increases (decreases) in revenue results in increase (decrease) in government expenditure[7].

The hypothesis testing following the values of F- Stat on Table 4 presents the results of incorporating asymmetric effects. The first statistic to note is R^2 which rises from .456 to .767 when asymmetric effects are allowed. This result is to be expected given the greater number of explanatory variables. However, the AIC, which imposes a penalty for including additional variables falls slightly from -11.34 to -11.56, despite the addition of four additional variables. These estimates suggest that the data are more consistent with the asymmetric model than with the symmetric model. In the case of the asymmetric ECM, the null hypothesis of no granger causality cannot be rejected for negative changes at the 5 percent significance level. However, the null hypothesis cannot be rejected for positive changes at the 5

[7]Chetty *et al*[4]also has recently demonstrated that tax salience has economically significant behavioral implications which indicates that tax visibility matters both for consumer choice and for public policy. A similar tax survey in the United States was found problematic because responses would hinge on the perception of the 'typical' earner, on family status, and on various deductions and exemptions.

percent significance level. This revenue increases Granger-cause expenditure changes is based on significant coefficients on the third and fourth lags of Δr, from 3.45 t0 3.73. Given these estimate a reasonable interpretation is that an increase in revenues leads to a decrease in government expenditure about three quarters later. This is inconsistent with tax- spend hypothesis but consistent with fiscal illusion effects. The relative point estimates imply that the expenditure decreases only partially reverses itself in the following quarters. However, the null hypothesis that $\beta_1 POS + \beta_2 POS + \beta_3 POS + \beta_4 POS = 0$ can't be rejected.

4. CONCLUDING REMARKS

On the basis of Indian data, we demonstrated that allowing revenue increases and decreases to asymmetrically affect expenditures in an otherwise error correction model (ECM) leads to evidence of fiscal illusion. Specifically, although conventional tax-spend correlation may appear to be associated with revenue decreases it is not significant in a Granger-causal sense. Alternatively, revenue increases Granger-cause decreases in government expenditures. Our results do not provide support to the tax-spend type of hypothesis. Perhaps counterintuitively, our findings suggest that tax increases, even temporary may serve to decrease expenditure by forcing the public to reckon with the cost of government spending. A potential source of bias in the paper may be that the tax payers may confuse average and marginal tax rates or may have a mistaken view of the typical worker's income. This effect should not be pronounced in India, however, because Indian tax system is only mildly progressive. Individuals are more likely to perceive the costs of public programs if they pay for them through current taxation than if tax liabilities are deferred through public sector borrowing

For proponents of limited government, understanding which of the relationships, tax-spend or spend-tax, best explain reality is critical from the policy point of view. Believers in fiscal illusion may view tax cuts as counterproductive because they perversely encourage even greater spending by decreasing its perceived price. Fiscal illusionists may instead encourage tax increases (especially during times of budget deficits) because they force the public to confront costs of excessive spending hopefully decreasing their tolerance for it.

REFERENCES

[1] Adusel, Michael 92012) 'Development and Economic Growth' British Journal of Economics, Management and Trade, 2 (3)

[2] Breeden, C and Hunter, W (1985)'Tax Structure and Tax Revenue' Public Finance Quarterly, 13, 4, 216-24

[3] Buchanon J. and Wagner, R. F. (1977) Democracy in Deficit: The Political Legacy of Lord Keynes, New York, Academic Press

[4] Chetty, R., Looney, A and Kroft, K (2009) Salience and Taxation: Theory and Practice, American Economic Review, 99, 4, 1145-77

[5] Das, Amaresh (2010) 'A Test of Ricardian Equivalence and Public Debt Neutrality' International Journal of Economics and Finance Vol 3 (3), 270- 279

[6] Das, Amaresh (2005) 'Do Stock Prices and Interest Rates Possess a Common Trend, Recherches Economiques DE Louvain. Louvain Economic Review, Vol 71 (2), 384-390

[7] Downs, Anthony (1957)An Economic Theory of Democracy, New York, harper and Row,

[8] Granger, C. W. 91981) 'Some Properties of Time Series Data and their Use in Econometric Model Specification' Journal of Econometrics, 16, 3, 21-30

[9]] Granger, C. W and Weiss, A (1983) 'Time Series Analysis of Error Correcting Models' in Studies in Econometrics :Time Series and Multivariate Statistics, New York, Academic Press

[10] Johansen, S and Juselius, K (1990) 'Maximum likelihood Estimation and Inferences on Co integration Aplication to the Demand for Money' Oxford Bulletin of Economics and Statistics, 52(2) 169-210

[11] Hisham Abdelbak (2013) 'The Impact of Arab Spring on Stock Market Performance' British Journal of Economics, Management and Trade,3 (3)

[12] Payne, j E (2003) 'A Survey of the International Empirical Evidence on the Tax-Spend Decline' Public Finance, 31 (3), 302-24

[13] Phillips, P.C. B (1985) Time Series Regressions with Unit Roots' Cowles foundation Discussion Paper, Number 740, Yale University

[14] Romer, C. D and Romer, D. H (2007) 'Do Tax-cuts Starve the Beast?' The Effects of Tax changes Government Spending' University of California, Berkeley, Working Paper (http://elsa.berkeley.edu cromer/draft 1007pdf

[15] Turnbull, Geoffrey (1998) 'The Overspending and the Flypaper Effects of Fiscal Illusion: Theory and Empirical Evidence' Journal of Urban Economics, 44, (1), 1-26