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## THE EMPIRICAL ANALYSIS OF FISCAL ILLUSION

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**Abstract.** This paper examines the empirical analysis of the five main hypotheses subsumed under the generic term fiscal illusion. After placing these hypotheses within a common theoretical framework, the paper attempts to evaluate empirical research into the revenue-complexity hypothesis, the revenue-elasticity hypothesis, the flypaper effect, renter illusion, and debt illusion.

**Keywords.** Revenue-complexity; revenue-elasticity; flypaper effect; renter illusion; debt illusion; fiscal illusion.

### 1. Introduction

The 1990s have been characterised by an international trend towards greater accountability in government. All levels of government in a number of countries are now obliged to display transparency in policy formulation and implementation, which includes the full and frank disclosure of financial transactions. This focus on accountability means that governments must present a clear and readily accessible account of all revenue-raising and expenditure decisions. In many countries, and especially those with a federal system of government, this has also led to a reexamination of the financial relationships between the federal, state and local jurisdictions. The hypothesised ability of governments to obscure the real costs of public sector activity through fiscal illusion has once again emerged as a key question in the analysis of government spending and taxing.

The concept of fiscal illusion revolves around the proposition that the true costs and benefits of government may be consistently misconstrued by the citizenry of a given fiscal jurisdiction. The origins of this argument can be traced back at least as far as J.R. McCulloch and J.S. Mill. For instance, in his *A Treatise on the Practical Influence of Taxation and the Funding System* McCulloch developed several of the principles underlying the modern analysis of fiscal illusion. Thus he contended that direct taxation involved less fiscal illusion than indirect taxation since direct taxation imposes a more obvious burden on taxpayers. Similarly, McCulloch argued that taxpayers misperceived not only the costs of government activity but also its benefits. J. S. Mill followed a

similar line in his *Principles of Political Economy*, although he placed much more emphasis on the resultant bias in government expenditure. But perhaps the dominant influence in the development of the theory of fiscal illusion was Puviani (1967). Although his approach has been criticised for being too general it did serve as the basis for the subsequent works of both Buchanan (1967) and Wagner (1976). In its present form the theory of fiscal illusion owes much to Downs (1957) work on the economic theory of politics. Downs (1957, p. 148) argued that:

[I]t is rational for every individual to minimise his investment in political information, in spite of the fact that most citizens might benefit substantially if the whole electorate were well informed. As a result, democratic political systems are bound to operate at less than maximum efficiency.

The empirical analysis of fiscal illusion has been directed almost exclusively at the revenue side of the fiscal equation with a corresponding neglect of the benefits of public sector activity. This asymmetry does not necessarily reflect the increased importance of government expenditure relative to government output. As Goetz (1977, p. 177) has argued the reasons for this are somewhat more mundane:

It is not that the issue of over or undervaluation of the benefits of public goods is not a trenchant one. Quite the contrary. In the last analysis, however, assessments of the relative values of goods are intrinsically subjective and highly personal... there is little hope for establishing the truth or falsity of J. K. Galbraith's contention that the preference of Americans for automobiles over public goods is symptomatic of illusion.

In any event, the empirical analysis of fiscal illusion has either taken the form of what Oates (1988, p.68) describes as *ad hoc* expenditure studies, like Wagner (1976), Breeden and Hunter (1985), Feenburg and Rosen (1987), Misiolek and Elder (1988), or work employing demand functions for public goods such as Bergstrom and Goodnam (1973), Wildasin (1989), Hayes (1989) and Crane (1990). In both the expenditure and demand approaches a measure of budgetary size or budgetary growth is regressed against various socio-economic variables aimed at capturing those determinants present in the absence of fiscal illusion. An indicator or proxy for the relevant illusionary variable is then added, so that a significant directional coefficient indicates the presence of fiscal illusion. The model itself typically takes the form  $E = \alpha X + \beta F + u$ , where E is a measure of budgetary size, X is a vector of explanatory variables in the absence of fiscal illusion, F is a vector of variables intended to measure fiscal illusion, and u is the error term (Oates, 1988, p.68).

Within this general approach, the empirical study of fiscal illusion has proceeded in five distinctive directions, each of which seeks to account for the putative existence of fiscal illusion. The present paper attempts to review the literature in question within a common theoretical framework.

The paper itself has been sub-divided into seven main areas. Section 2 seeks to locate the five major empirical approaches within the analytical context provided by Wagner (1976). Sections 3, 4, 5, 6 and 7 examine in detail the empirical work on the revenue-complexity, revenue-elasticity,

the flypaper effect, the renter illusion, and fiscal illusion hypotheses respectively. The paper ends with some brief concluding remarks in section 8.

## 2. A Common Theoretical Framework

The five specific hypotheses underlying the empirical analysis of fiscal illusion can be illustrated in terms of a simple diagram developed by Wagner (1976, p.54) which is shown in Figure 1 below. Each of these hypotheses has attempted to model a process in which fiscal illusion causes citizens to underestimate the tax-price of a public good and so result in an oversupply of that good. In Figure 1,  $X_2$  and  $P_2$  represent the tax-price and desired output of the public good in the absence of fiscal illusion, and the area  $OP_2aX_2$  the public budget (expenditure or revenue). This is consistent with the socio-economic vector  $aX$ . With the introduction of fiscal illusion the perceived tax-price falls to  $P_1$ , desired output expands to  $X_1$  and the perceived budget is  $OP_1cX_1$ . However, the actual budget is  $OP_2dX_1$  since the actual tax-price is still  $P_2$ . Empirical tests of fiscal illusion aim to evaluate the significance of the area  $X_2adX_1$ , the excess budget/revenue/expenditure attributable to the illusion vector  $\beta F$ .

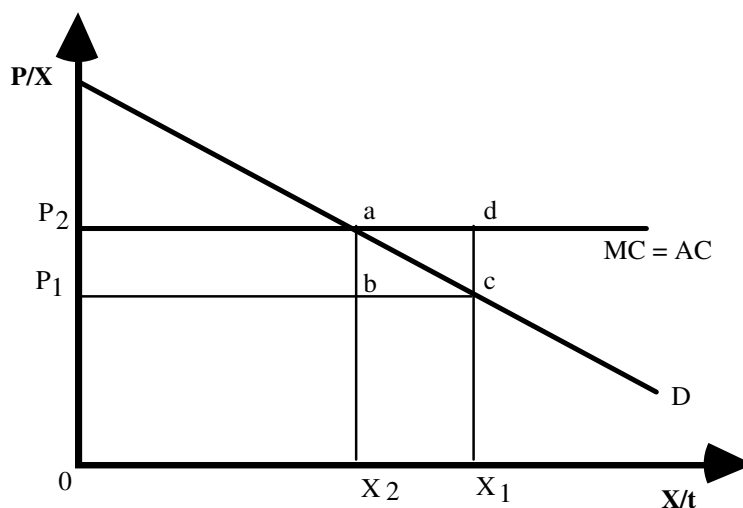


FIGURE 1. *Modelling Fiscal Illusion*

The first hypothesis is revenue-complexity where the misperception of the tax-price results from fragmentation of the revenue system. Studies by Wagner (1976), Pommerehne and Schneider (1978), Baker (1983) and Breeden and Hunter (1985) have sought to measure this effect. In terms of Figure 1, the increasing complexity of the revenue system, or a fall in its level of simplicity, should cause a move in the perceived price of the public good down the vertical axis. An extremely simple revenue structure on the other hand would be associated with the actual price  $P_2$ . Movement down the vertical axis is linked with higher levels of illusion and, as a result, more public goods. The second genre of work focuses on revenue-elasticity where growth in the level of public activity is associated with income elastic forms of taxation. Oates (1975), Craig and Heins (1980), Hunter and Scott (1987) and Misiolek and Elder (1988) have examined revenue-elasticity empirically. Figure 1 would show the y-axis as being associated with the level of income elasticity of the revenue structure. The higher the level of dependence on income-elastic revenue devices, or the lesser the proportion of revenue from inelastic sources, the higher the level of illusion, and the

higher the level of expenditure. The third type of approach is the flypaper effect, where lump-sum grants and public utility profits exert a stimulatory effect on expenditures. Contributions by DiLorenzo (1982b), Winer (1983), Logan (1986) and Grossman (1990) fall into this category. Figure 1 would show the vertical axis as being associated with the level of dependence on grants or public utility profits. All other things being equal, the higher the level of dependence on grants and public utility profits, or the lower the proportion of revenue from other sources, the higher the level of illusion, and therefore expenditure. The fourth area centres on renter illusion, where fiscal illusion is related to the level of property ownership in a fiscal jurisdiction. Bergstrom and Goodman (1973) and Martinez-Vazquez (1983) provide examples of this kind of work. The vertical axis in Figure 1 would then illustrate the proportion of owner-occupiers in a given jurisdiction. The lower the proportion of owners, or the higher the level of renters, the higher the degree of fiscal illusion, and the higher the level of public good provision. Finally, the situation where debt provides illusionary effects has been investigated. Oates (1972), Epple and Schipper (1981) and Dalamagas (1993) have undertaken empirical work in this area. Figure 1 would show that as a jurisdiction increasingly relied on debt, or as the proportion of revenue from taxes falls, the level of fiscal illusion would increase, and as a result the level of public good expenditure would also increase. Empirical work on each of these five hypotheses will now be examined in more detail.

### **3. Revenue-Complexity Hypothesis**

The first source of fiscal illusion to be examined derives from revenue structure complexity. Initially defined by Buchanan in 1967, the roots of the revenue-complexity hypothesis apparently date to the work of Puviani in 1903. Buchanan (1967, p. 135) has argued that "...to the extent that the total tax load on an individual can be fragmented so that he confronts numerous small levies rather than a few significant ones, illusionary effects may be created". Thus it is increasingly difficult for the tax-payer to identify the tax-price of public sector activities and more likely that total tax liability of public output is underestimated. Moreover, even if the tax-payer can identify the various tax sources, the marginal costs of procuring full information may quickly outweigh any marginal benefits. Consequently, the revenue complexity hypothesis predicts the more complex the revenue system, the larger will be the level of public expenditure *ceteris paribus*.

The seminal study of the revenue-complexity hypothesis was undertaken by Wagner in 1976. Wagner argued that a fiscal system was characterised by the composition and predilection of fiscal extraction devices (FEDs). Wagner proposed that as a revenue-raising system became more complex, the FEDs diversified, spatially, temporally, and in terms of obtrusiveness (Wagner, 1976, p. 51). The rationale for such behaviour was to mask the extent of revenues transferred from taxpayers to the fiscus. As a result of diversification, Wagner (1976) posited that the formation of perceptual hypotheses and the securement of data become so demanding that it raises the marginal

cost of inquiry significantly. Moreover, since the marginal benefit of forming an accurate hypothesis on a fiscal variable is less in collective choice than market choice, Wagner asserted that an increase in revenue-complexity would *ceteris paribus* increase the level of public expenditure. Wagner (1976) approached the empirical analysis of fiscal illusion by regressing total current expenditure against various socio-economic demand variables and a measure of revenue structure simplicity - the Herfindahl index of concentration. The Herfindahl index CRS (complexity of revenue system) is  $CRS = \frac{1}{n} \sum_{i=1}^n (REV_{ij})^2$ , so that  $REV_{ij}$  represents the *i*-th tax instrument's revenue share of the total revenue amount of the *j*-th jurisdiction. Moreover ( $0 < CRS \leq 1$ ). A complex revenue system would be associated with a relatively low CRS whilst a simple revenue system would have an index approaching 1. At the extremes a revenue system characterised by four equal FEDs would have an index of 0.25 whilst one with a singular FED would have an index of 1. The selection of the Herfindahl index as a measure of revenue simplicity was to become one of Wagner's most enduring contributions, since virtually all subsequent studies of the revenue-complexity model have employed this index as a measure of the illusion variable (Oates, 1988, p. 69). Wagner's analysis of local government expenditure was likewise instrumental in focusing later studies on local public goods. In Wagner's analysis the expected sign of the revenue-complexity variable was negative and significant. Indeed, Wagner (1976, p. 57) used the results to propose that an adjustment of the revenue system to an extreme level of simplicity would entail a fall in expenditures of 33.06%!

Despite the apparent success of Wagner's analysis in identifying fiscal illusion as a result of revenue-complexity, subsequent studies and Wagner himself acknowledged some serious deficiencies (Wagner, 1976; Oates, 1988; Munley and Greene, 1978; Misiolek and Elder, 1988). Firstly, the selected measure of revenue-complexity, the Herfindahl index, failed to take into account the perceived visibility of revenue classes. Oates (1988, p. 70), for example, noted that charges and fees for government services emphasised the cost of these goods and services more than equivalent excise taxes. The possibility that Wagner's regression equation may have well been misspecified (and hence biased) prompted subsequent studies to include "visibility" weightings (see, for example, Clotfelter, 1976; Pommerehne and Schneider, 1978; Breeden and Hunter, 1985; Henrekson, 1988; Misiolek and Elder, 1988). Secondly, whilst Wagner incorporated qualitative measures of population (for example, percentages below the poverty line and proportion urbanised) the lack of population quantity as an independent variable, or the use of per capita expenditures, opened the model to significant bias via equation misspecification. Munley and Greene (1978) (see Table 1) using identical data to Wagner, found that the misspecified equation incorporated substantial heteroskedasticity, and that the use of the generalised least squares (GLS) procedure resulted in revenue structure being no longer significant. They also found that Wagner's use of published data had unnecessarily restricted the measure of revenue-complexity (Wagner's four revenue categories as against Munley and Greene's nine). After modifying the equation for either population or per capita measures, revenue structure, whilst still negative, was insignificant, which

may indicate that Wagner's results were somewhat fragile. Subsequent analysis by Misiolek and Elder (1988) yielded similar results.

Despite the damning evidence provided by Clotfelter (1976), Munley and Greene (1978), and Misiolek and Elder (1988), four post-Wagnerian studies provided support for the revenue-complexity hypothesis. Pommerehne and Schneider (1978) analysed Swiss municipalities and found that weighting of the revenue-complexity index by visibility significantly improved the explanatory power of Wagner's basic model. The study also indicated that the fiscal distortion indicated in the revenue-complexity hypothesis was more likely to be pronounced in indirect as against direct democracies. Baker (1983) used US state data on a per capita basis, and found that revenue-complexity was significant and negative in terms of fiscal change. After an analysis of data drawn from thirty-seven U.S. cities, Breeden and Hunter (1985) concluded that relatively narrowly-based taxation systems yield less revenue than relatively diffuse and broadly-based taxation systems. Finally, a British study by Cullis and Jones (1987, p. 226) provided evidence for widespread ignorance regarding revenues without establishing the existence of fiscal illusion *per se*.

Whilst the empirical studies on average tend to offer considerable support for the revenue-complexity hypothesis, critics have argued that the basic assumptions of the model are seriously flawed. Put differently, there are accusations that either the assumed causal linkage between revenue-complexity and revenue levels is incorrect, or that alternative hypotheses exist (other than fiscal illusion) for revenue-complexity and the growth of government (Wagner, 1976; Breeden and Hunter, 1985; Borcharding, 1985; Anderson, Wallace and Warner, 1986; Oates, 1988; Misiolek and Elder, 1988). Political agents may well be subject to considerations of *both* budget maximisation and burden minimisation, determining fiscal structure in light of their own self-interest and that of their constituents (Wagner, 1976, p. 58). This may throw doubt on the traditional motivations for revenue-diversification. Oates (1988, p. 71) approached the question slightly differently by arguing that two competing hypotheses existed; revenue-complexity and what he termed revenue-diversification. He postulated that in order to prevent producer and consumer mobility across jurisdictional borders on the basis of tax inducements, officials will introduce new sources of revenue rather than increase existing tax rates. Accordingly, jurisdictions with relatively high levels of spending are associated with more diversified revenue systems, rather than the causal relationship of diversified revenue systems and expenditure offered by the fiscal illusion literature. Oates suggests that past studies are therefore compromised on the basis of simultaneous equation bias (estimates will be biased and inconsistent, tests of hypothesis on parameters will be invalid). Misiolek and Elder (1988, p. 233) approached the question of causality by arguing that a conflict existed between fiscal illusion (tax diversification resulting from inaccurate or incomplete information) and fiscal stress (tax diversification as a result of the need for revenue stabilisation). They regarded the revenue simplicity measure utilised in past studies of fiscal illusion as a measure of risk-reducing revenue diversification (Misiolek and Elder, 1988, p. 233). In their empirical analysis of forty-eight US states, Misiolek and Elder found little evidence in favour of fiscal illusion

but some support for the fiscal stress argument that revenue variability may affect the size of government.

**TABLE 1.**  
*Summary of major studies of the revenue-complexity hypothesis*

Author(s)	Data (a)	Estimation technique (b)	Dependent Variable (c)	Measure of Fiscal Illusion Employed (d)	Other Independent Variables (d)	Major Findings
Wagner (1976)	50 US cities Cross-sectional 1970	OLS	Total current expenditure	(Herfindahl) revenue-complexity.	Total personal income, intergovernmental revenue, percentage of population below poverty line, av. salary of city employees, local expenditure as a percentage of total, population density.	Simplicity of revenue structure significantly negative.
Clotfelter (1976)	50 US states Cross-sectional 1970	TOLS	Per capita expenditure and per capita revenue.	Ratio of direct to indirect taxes.	Wage rate, income, population, public tertiary education enrolment ratio, various measures of education revenue simplicity.	Simplicity of revenue structure negative though insignificant.
Pommerehne and Schneider (1978)	110 Swiss cities Cross-sectional 1970	OLS	Per capita expenditures	(Herfindahl) revenue-complexity with different visibility weightings.	Income, tax-price, population.	Simplicity of revenue structure significantly negative depending on weighting of visibility.
Munley and Greene (1978)	50 US cities Cross-sectional 1970	OLS/GLS	Total current expenditure	(Herfindahl) revenue-complexity,	Total personal income, intergovernmental revenue, percentage of population below poverty line, average salary of city employees, local expenditure as a percentage of total, city population as a percentage of total area, population density.	Model (Wagner) prone to bias on the basis of equation specification.
			Per capita expenditures.	(Herfindahl) revenue-complexity,	Total personal income per capita, intergovernmental revenue per capita, percentage of population below poverty line, average salary of city employees, local expenditure as a percentage of total, city population as a percentage of total area, population density, population.	Revenue structure simplicity negative though insignificant.
Baker (1983)	50 US states Cross-sectional 1975	OLS	Voter tax cost	(Herfindahl) revenue-complexity,	Per capita: income, mineral shipments, motel receipts, manufacturing value added, debt lagged one year, percentage of males with education < 12 years, tax structure elasticity measure (mean for average income return).	Simplicity of revenue structure negative and significant.



Author(s)	Data (a)	Estimation technique (b)	Dependent Variable (c)	Measure of Fiscal Illusion Employed (d)	Other Independent Variables (d)	Major Findings
Breeden and Hunter (1985)	37 US cities Cross-sectional 1975	OLS	Per capita total city revenue	<i>Measure of breadth of revenue system (number of different instruments).</i>	<i>Per capita income, per capita federal revenue, per capita state revenue, dummies for dependence on general states taxes, select sales taxes, license fees, charges, property taxes, city area.</i>	Simplicity measure negative and significant, breadth of revenue system positive and significant.
Cullis and Jones (1987)	UK survey 1981	Descriptive statistics	Visibility of central government revenue sources.	Not applicable	Various UK revenue classifications.	Significant illusion in terms of identifying revenue sources.
Henrekson (1988)	Sweden Time-series 1950-1984	OLS	Government consumption, investment and transfer expenditures.	(Herfindahl) revenue-complexity, ratio of direct to indirect taxes.	Urban population, <i>GDP</i> , <i>non-labour force population as a proportion of total</i> , ratio of median to mean income, ratio of net exports to <i>GDP</i> , <i>proportion of unionised to non-unionised labour</i> , inflation.	Simplicity of revenue structure insignificantly positive.
Misiolek and Elder (1988)	50 US states Cross-sectional 1984	OLS (log-linear)	Real tax revenues per capita, real state-local expenditures per capita.	(Herfindahl) revenue-complexity, (Oates) income elasticity, visible tax concentration ratio.	Per capita personal income, <i>population, average monthly salary of state-local employees</i> , dummy for <i>state expenditure limit, tax export measure, variability of taxes over period</i> , variance of income over period, state share of state-local expenditures.	Measures of revenue structure simplicity and visibility insignificant.
Martinez-Vazquez, Harwood, Larkins (1992)	US survey data 1991	Descriptive statistics	Various questions on withholding vs. lump-sum taxation	Not applicable	Effect of withholding on tax compliance.	No evidence of fiscal illusion in terms of income tax complexity.
Heyndels and Smolders (1994)	302 Flemish municipalities Cross-sectional 1990	OLS (log-linear)	Total expenditure.	(Herfindahl) <i>revenue-complexity</i> , (Oates) <i>income elasticity</i> , percentage non-owner occupied, <i>grant income divided by total income.</i>	<i>Population, median voter tax share, median voter total disposable income.</i>	Complexity of revenue system has a positive and significant impact on expenditures.

Author(s)	Data (a)	Estimation technique (b)	Dependent Variable (c)	Measure of Fiscal Illusion Employed (d)	Other Independent Variables (d)	Major Findings
Worthington (1994)	46 Australian LGAs Cross-sectional 1991	OLS TSLS (linear and log-linear)	Total and per capita expenditure.	<i>Proportion owner-occupied, (Herfindahl) revenue-complexity, dummies for grant and utility reliance, indirectness of revenue system.</i>	<i>Rateable area, rateable roads, median voter tax price, median voter income, population, proportion of population over 65 years.</i>	Complexity of revenue system positive and significant impact on expenditures. Revenue system determined exogenously to level of expenditure.
Dollery and Worthington (1995a)	7 Australian states. Pooled time-series, cross-sectional (1982-1992)	OLS and GLS (linear and log-linear)	Total expenditure and total expenditure net of grants and transfers.	<i>(Herfindahl) revenue-complexity, (Oates) income elasticity, ratio of direct to indirect taxes, dummy variables for reliance on grant income.</i>	<i>Population, median voter income, proportion of population under 19 years, proportion of population over 65 years, population density, dummies for large and small states.</i>	Complexity of revenue system positive and significant impact on expenditures.

(a) Singular dates represent cross-sectional studies, intervals time series. Where two dates are given, different years for some cross-sectional variables have been used. (b) OLS/GLS/TSLS - Ordinary Least Squares, Generalised Least Squares and Two-Stage Least Squares respectively. (c) More than one dependent variable indicates alternative equations have been evaluated. (d) Italicised independent variables indicate significant t-values at 90% or more.

#### 4. Revenue-Elasticity Hypothesis

The second form of fiscal illusion derives from the income elasticity of the revenue system. In this approach, revenue systems characterised by a high degree of income elasticity will attract larger increments in general income, and this increase will be "automatically" funnelled into increased expenditure. In other words, a clear deterministic relationship exists between the "automatic" increases in revenue found under an income elastic revenue structure and increased expenditure *ceteris paribus*. But as Oates (1975, p. 141) has caustically observed:

But why should people care about the income elasticity of the tax structure? What the proposition under study seems to imply is that people will not object to increases in public expenditure if they can be funded with no increase in tax rates (that is, from increments to revenues resulting solely from growth in income), but they will not support an expanded public budget if it requires a rise in tax rates. This suggests what people care about is not their tax *bill*, but rather their tax *rate*. Viewed this way, the hypothesis simply is not consistent with our conventional description of rational behaviour; it implies that consumer-taxpayers are subject to a kind of 'fiscal illusion' (original emphasis).

The first major study of the revenue-elasticity hypothesis was undertaken by Oates in 1975. The study began by regressing US state expenditures against various socio-economic variables, along with a measure of the income elasticity of the revenue structure (see Table 2). The hypothesis held that in addition to the determinants of growth in expenditure indicated by the various socio-economic variables, the income elasticity of the tax structure would exert a positive influence (Oates, 1975, p. 146). The process was repeated in an almost identical form for a selection of thirty-three US cities, and in a slightly modified model for a selection of fifty-seven countries. The results prompted Oates (1975, p. 156) to conclude that tax elasticity seems to be positively related to the growth of the public expenditure.

Despite the apparent "success" of these empirical studies, Oates himself was loathe to unambiguously accept the findings. In fact he suggested that the analysis had been compromised in several ways. Firstly, in common with many studies of fiscal illusion, some of the socio-economic variables were presumed to be endogenous, notably grant-matching state and federal funds. This problem was rectified in the Oates analysis by the use of a two-stage least squares regression and the addition of variables associated with the level of intergovernmental grants. The procedure caused the the income-elasticity variable to lose a substantial amount of explanatory power (Oates, 1975, p. 156). Secondly, Oates (1975) had analysed state and city data over a period associated with rapid budgetary growth, which he believed may have exaggerated the significance of the revenue-elasticity hypothesis. He posited that in the long-run the income elasticity of the tax system will probably not have a significant impact on the growth of the public sector. Thirdly, Oates observed that the proxies he had used for the income elasticity of the revenue systems were far from satisfactory. In particular, governmental estimates were suitable for single years only, and measures using the proportion of income tax revenue to total revenues provided only a reasonable approximation. Despite this Oates' (1975) approximation was employed by DiLorenzo (1982a), Baker (1983), Misiolek and Elder (1988), Heyndels and Smolders (1994) and Dollery and Worthington (1995a), whilst the ACIR (Advisory Commission on Intergovernmental Relations) elasticity estimates were used by Craig and Heins (1980). Finally, Oates (1975, p. 143) admitted that he was uncomfortable with the notion of revenue-elasticity being "a hypothesis founded solely on irrational behaviour". Put differently, the fiscal illusion hypothesis held that tax rates not tax bills would dominate taxpayer perceptions, even in the presence of full information. Oates reasoned more compelling and acceptable evidence must exist. He argued *inter alia* fiscal illusion may depend in some way on the political mechanism and could thus still be consistent with rational individual behaviour (Oates, 1975, p. 143). Such a conclusion he felt could be supported by either the transaction cost theory of Wagner (1976) or the rational taxpayer ignorance theory proposed by Downs (1957). Wagner (1976) proposed that the habitual behaviour of legislators in selecting an income elastic revenue system was more efficient than the frequent and costly adjustments associated with continual reexaminations. But in the sense that it does not rely on imperfect information or misperceptions it cannot be regarded as mutually exclusive of the theory of fiscal

illusion (Oates, 1988, p. 75). Downs (1957, p. 147) argued that ignorance (not irrationality) of the public budget was a highly rational response to the facts of political life in a large democracy.

Subsequent studies have provided mixed support for the revenue-elasticity hypothesis (see Table 2). Craig and Heins (1980) found a positive and significant relationship, but accepted that their empirical observations were supported by US state moves to install legislative limits on expenditure as a proportion of income. DiLorenzo (1982a) in an analysis of sixty-six county jurisdictions found that revenue elasticity was negative and insignificant as a determinant to expenditure, a result in his estimation influenced by the presence of Tiebout mobility. Tiebout mobility infers that at the local level, expenditure and tax differentials will affect the choice of residential location *ceteris paribus*. The migration of taxpayers away from more income elastic local areas (with their higher tax bills) would reduce the demand for expenditure growth, thereby underestimating the expansionary effect of income elastic revenue structures (Craig and Heins, 1980; DiLorenzo, 1982a). Baker (1983) found little support for the revenue-elasticity hypothesis when examined in conjunction with the revenue-complexity hypothesis, and Feenburg and Rosen (1987, p. 200) concluded that there is no evidence that income elastic tax structures generate higher rates of growth in the public sector. In an alternative approach to the question of tax structures Hunter and Scott (1987), and later Greene and Hawley (1991) found that the probability of a tax rate cut increased when US states had more income elastic revenue systems. This questioned the revenue-elasticity hypothesis that elastic structures were exploited by political agents to gain higher levels of expenditure. It should be noted that Feenburg and Rosen (1987), Hunter and Scott (1987) and Greene and Hawley (1991) share a proxy for revenue-elasticity different to that employed by Oates (1975). Using a sample of 25 000 Federal Income Tax returns, Feenburg and Rosen (1987), and later Greene and Hawley (1991), estimated state personal income and sales tax liabilities for each unit, and then calculated the elasticities of the income and sales tax systems assuming an increase in income of one percent. Hunter and Scott (1986; 1987), on the other hand used a Gini coefficient assuming equal distribution of income across income levels to construct their measure of system progressivity. Finally, Misiolek and Elder (1988, p. 242) found that tax elasticity was significant only when the dependent variable was tax revenue.

The main problem surrounding past empirical studies of the revenue-elasticity hypothesis appears to be that researchers, whilst reluctant to dismiss the intuitive appeal of the model, are frustrated by the lack of a suitable measure of income elasticity. It is also apparent that whilst alternative explanations for revenue elasticity are not mutually exclusive, in the case of transactions costs and illusion it may not be possible to conclude that on the basis of the revenue elasticity hypothesis alone that this represents a distinct form of fiscal illusion (Oates, 1988, p. 76).

**TABLE 2.**

*Summary of major studies of the revenue-elasticity hypothesis*

Author(s)	Data (a)	Estimation technique (b)	Dependent Variable (c)	Measure(s) of Fiscal Illusion Employed (d)	Other Independent Variables (d)	Major Findings
Oates (1975)	48 US states Cross-sectional Changes between 1960 and 1970 33 US cities Cross-sectional Changes between 1960 and 1970	OLS and TSLS     OLS	Per capita general expenditure    Government revenues as a percentage of national income	ACIR revenue-elasticity, <i>individual income tax es,</i> corporation income taxes, <i>total income tax receipts as a percentage of total tax receipts.</i>	<i>Median family income, percentage of families below poverty line, population, federal grants per capita and state-local share of total expenditure (under TSLS), GDP per capita, total exports as a percentage of GDP, measure of income elasticity of tax structure (income tax as a percentage of total revenues).</i>	Measure of tax elasticity positive and significant in effect on state expenditures.    Tax elasticity measure positive and significant.
Craig and Heins (1980)	50 US states Pooled time-series, cross-sectional 1970 and 1975	OLS and TSLS	Per capita state expenditure, expenditure as a percentage of income.	ACIR <i>estimates of elasticity income of state taxes.</i>	<i>Per capita personal income, per capita federal aid, population density, percentage of population urban, percentage of population &gt; 18, percentage of state and local expenditures sourced locally.</i>	Positive and significant relationship between tax elasticity and expenditure.
DiLorenzo (1982a)	66 US counties Cross-sectional changes between 1967 and 1977	OLS	Change in per capita expenditures	<i>Income elasticity (Oates).</i>	Change in population, change in population density, <i>change in per capita real income, change in intergovernmental revenue.</i>	Tax elasticity significant though negative.
Baker (1983)	50 US states Cross-sectional 1975	OLS (Log-linear)	Per capita state tax liability	<i>(Herfindahl) revenue-complexity,</i> (Oates) income elasticity.	<i>Per capita income, percentage of males with education &lt; 12 years, per capita mineral shipments, per capita hotel receipts, per capita manufacturing value added, per capita lagged debt.</i>	Income elasticity measure positive though insignificant.
Feenburg and Rosen (1987)	49 US states Pooled time-series, cross-sectional 1978-1983	OLS and TSLS (log-linear)	Change in state government expenditure per capita.	Income elasticity (Feenburg and Rosen).	<i>Change in per capita grants, change in state-local expenditure, change in per capita personal income, population, change in population.</i>	No significant effect of income elasticity on expenditure growth.

Author(s)	Data (a)	Estimation technique (b)	Dependent Variable (c)	Measure(s) of Fiscal Illusion Employed (d)	Other Independent Variables (d)	Major Findings
Hunter and Scott (1987)	40 US states Pooled time-series, cross-sectional 1976-1983	Logit	Dummy variable if the state decreased income taxes during the year.	<i>Measure of progressivity of state income tax.</i>	Proportional change; <i>in GNP deflator</i> , state income, state revenues, population.	States with a higher degree of income elasticity have a higher probability of cutting tax rates.
Misiolek and Elder (1988)	50 US states Cross-sectional Changes between 1967 and 1984.	OLS (log-linear)	Real tax revenues per capita, real state-local expenditures per capita.	<i>Income elasticity (Oates), (Herfindahl) revenue-complexity, visible tax concentration ratio.</i>	<i>Per capita personal income, population, average monthly salary of state-local employees, dummy for state expenditure limit, tax export measure, variability of taxes over period, variance of income over period, State share of state-local expenditures.</i>	Tax elasticity positive and significant in tax revenues only.
Greene and Hawley (1991)	40 US states Pooled time-series, cross-sectional Unlagged 1977-83 lagged 1978-84	Logit	Discrete variable for tax code change	<i>Income elasticity (Feenburg and Rosen).</i>	<i>Change in GNP deflator, rate of change in nominal income, change in revenue, revenue at beginning of year, rate of population change.</i>	Highly income elastic tax structures will cut rates to prevent over-expansion (as for Hunter and Scott).
Heyndels and Smolders (1994)	302 Flemish municipalities Cross-sectional 1990	OLS (log-linear)	Total expenditure.	<i>(Herfindahl) revenue-complexity, (Oates) income elasticity, percentage of non-owner occupied residences, grant income equivalent divided by total income.</i>	<i>Population, median voter tax share, median voter total disposable income.</i>	No empirical support for revenue-elasticity hypothesis.
Dollery and Worthington (1995a)	7 Australian states. Pooled time-series, cross-sectional (1982-1992)	OLS and GLS (linear and log-linear)	Total expenditure and total expenditure net of grants and transfers.	<i>(Herfindahl) revenue-complexity, (Oates) income elasticity, ratio of direct to indirect taxes, dummy variables for reliance on grant income.</i>	<i>Population, median voter income, proportion of population under 19 years, proportion of population over 65 years, population density, dummies for large and small states.</i>	No empirical support for revenue-elasticity hypothesis.

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(a) Singular dates represent cross-sectional studies, intervals time series. Where two dates are given, different years for some cross-sectional variables have been used. (b) OLS/GLS/TSLs - Ordinary Least Squares, Generalised Least Squares and Two-Stage Least Squares respectively. (c) More than one dependent variable indicates alternative equations have been evaluated. (d) Italicised independent variables indicate significant t-values at 90% or more.

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## 5. The "Flypaper Effect" of Grants and Utility Profits

### 5.1 *The Flypaper Effect*

A further form of fiscal illusion is the flypaper effect, which holds that a tendency exists for categorical lump-sum grants to increase public expenditure by more than an equivalent increase in income from other sources (Dougan and Kenyon, 1988, p. 159). The term "flypaper effect" itself is attributed by Courant, Gramlich and Rubinfeld (1979) and Marshall (1989) to Arthur Okun's observation that "money sticks where it hits". First modelled by Courant, Gramlich and Rubinfeld (1979) and Oates (1979), the theory holds that budget-maximising political agents (politicians and bureaucrats) conceal the lump-sum nature of grant revenues. Instead of the income being returned to tax-payers, either directly via a rebate or indirectly via a reduction in tax contributions, the grant is used to expand the public budget. This is accomplished by political agents fostering an illusion that in addition to actual average tax rates falling, there has been a reduction in the marginal tax-price of the public good. As a result the electorate is willing to support a higher level of spending at the recipient level than they would have if the fiscal parameters were correctly perceived.

Three distinct groups of researchers have investigated the issue of the flypaper effect empirically. Firstly, some have incorporated grant distortions into studies directed at other forms of fiscal illusion, such as the revenue-complexity or elasticity hypotheses. These include Oates (1975), Wagner (1976), Goetz (1977), Munley and Greene (1978), Craig and Heines (1980), DiLorenzo (1982b) and Breeden and Hunter (1985). In general, the results have indicated that intergovernmental grants are an important determinant of the level of public good expenditure. The second and third groups are those that have directed their studies to the question of the flypaper effect directly. The first of these are writers in the vein of Courant, Gramlich and Rubinfeld (1979) and Oates (1979) who argued that grants reduce the average price of recipient public goods, and that voters base their allocative decisions on this price, rather than the actual marginal tax-price. The second group includes Winer (1983) and Logan (1986) who have observed that grants cause voters to view their tax-burden as being transferred to other jurisdictions. Regardless of this distinction, both groups view grants as reducing the perceived marginal cost of the public good, and thereby biasing public expenditure upwards. These approaches are discussed below.

Winer (1983, p. 127) began his study by observing that "...there is an obvious temptation for politicians to foster the belief that the cost of public services will fall disproportionately on someone else". In so doing he provided the rationale for the analysis of a federal system in which spending and taxation decisions are separated, and accordingly may have a systematic and biased effect on the level of expenditures. A federal structure is prone to fiscal illusion of this form,

regardless of whether the voter is aware or unaware of aid, or of the status of the local government (donor or recipient). If the voter is unaware of aid s/he may perceive a reduction in costs because of a higher portion of government spending in financing expenditures. If the voter is aware of aid, illusion may still prevail since the voter may well be unaware of their own provincial status (grantor tax share > local tax share) or that all communities in some sense finance a portion of aid to other provinces (intergovernmental-complexity) (Logan, 1986, p. 1310). Utilising Canadian provincial data, Winer (1983, p. 127) reasoned that since federal taxation is levied nationally, federal grants-in-aid may induce a belief among a recipient provinces voters that public services are being financed by non-residents. As a result grants, and especially unconditional grants, reduce the tax-price of provincial public goods and may well bias expenditures upward. This may be the case even if it were not possible to shift the taxation burden externally. As shown in Table 3, Winer's analysis regressed net provincial expenditures against provincial income, federal grants and interprovincial grants. He also included dummies for the different categories of recipient and donor provinces. Winer found that the results indicated that the grant system did increase expenditure and that the elasticity of grants with respect to expenditure for "poor" jurisdictions (recipient) is roughly twice as large as for "rich" jurisdictions (donor).

Logan (1986), and later Hammes and Wills (1987), modified Winer's (1983) "partial equilibrium" approach by incorporating the effect of fiscal illusion on the grantor governments tax-price as well as that of the recipient. Logan based his analysis on the fact that although voters were subject to incomplete information they were still rational, and that they were faced with the perception that federal taxes were rising but services were not, and that state taxes were falling but services were not (Logan, 1986, p. 1306). From this he surmised that the contrasting effects of misperceived tax-prices would mean an upward bias of recipient expenditures, and a downward bias of donor expenditures exclusive of grants. As shown in Table 3, Logan (1986) regressed per capita federal non-aid expenditure against per capita measures of income, federal aid, state expenditure and unemployment for a US national time-series. The results indicated that a negative relationship did indeed exist between the level of federal expenditures on aid, and the level of federal non-aid expenditures; proof that modification of tax-prices occurred at the donor level (Logan, 1986, p. 1317). Such results imply that tax-prices were modified in the opposite direction for recipient expenditures, supporting the fiscal illusion hypothesis (O'Brien and Shieh, 1990, p. 201). Hammes and Wills (1987) used an identical analysis for Canadian data, and arrived at a similar conclusion.

In terms of the approach of Courant, Gramlich and Rubinfeld (1979) and Oates (1979), Grossman (1990) and Marshall (1991) are more recent examples. Grossman approached the question of flypaper illusion by arguing that the degree of illusion encompassed in grants was a function of the level of indirectness. A federal grant, for example, would be more indirect or remote than a state grant in terms of local government finance, and as a result induce a higher level of local expenditures (Grossman, 1990, p. 314). Grossman (1990) regressed expenditures for local government areas against various socio-economic variables and categories of grants, both federal



and state, conditional and unconditional. The results bolstered earlier studies (Courant, Gramlich and Rubinfeld, 1979; Oates, 1979) in supporting the stimulatory effects of grants. Employing a somewhat different methodology, Marshall (1989; 1991) used an exogenous illusion variable, namely tax-windfalls, to analyse the flypaper illusionary hypothesis. Using a set of socio-economic indicators (including the windfall) and a level of state expenditures, Marshall (1991, p. 1343) found no systematic effect of the tax windfalls on the level of state expenditure.

Despite strong empirical support for the flypaper effect, several alternative hypotheses have been developed. Romer and Rosenthal (1979) show that where the public budgetary agenda is dominated by political agents, the outcome may be determined by threat tactics. In this manner an upward bias in expenditures need not imply any systematic illusion such as the flypaper effect. Dougan and Kenyon (1988) offer an explanation of the flypaper effect being the result of lobbying by local pressure groups. As a result the stimulative effect of grants need not be the outcome of a widespread tax-price illusion but rather the alteration of the relative wealth positions of various pressure groups (Dougan and Kenyon, 1988, p. 169). Oates (1988) has utilised both the works of Romer and Rosenthal (1979) and Dougan and Kenyon (1988) to argue that normal political budgetary processes may fulfil the theoretical role of fiscal illusion in biasing expenditures upwards, and that the stimulatory effect of grants is incorrectly identified as being the result of flypaper illusion.

## 5.2 *Utility Profits*

An illusion closely related to that of the intergovernmental grants based flypaper effect is the public utility profit illusion. First described by Puviani (1903), this approach recognises that utility or public domain profits are used in internal subsidisation to reduce the perceived tax-price of public good expenditure (Buchanan, 1967, p. 131). The result is similar to the flypaper effect in that income, whether from grants or profits, that reduces the average tax-price is misperceived to decrease the more economically relevant marginal tax-price, thereby expanding the level of expenditure. The only difference is that grants are exogenous rather than endogenous to local government ownership, in comparison with to utility profits.

The only study directed at the disjunction between costs and benefits caused by utility profits has been undertaken by DiLorenzo (1982b). Using reduced form expenditure equations similar to Wagner (1976) and Munley and Greene (1978), DiLorenzo (see Table 3) regressed per capita expenditures, inclusive and exclusive of utility profits, against various socio-economic variables and a dummy variable for internal subsidisation. The results for the sample of New York state municipalities indicated that public utility profits did indeed bias expenditures upwards by reducing the perceived marginal tax-price, thereby supporting the fiscal illusion hypothesis (DiLorenzo, 1982b, p. 249). This result held for both expenditures in total and for that regression where only "own" revenues (exclusive of utility profits) were tested. However, despite the support offered by

DiLorenzo's (1982b) analysis, the model may be questioned in a similar manner to that of the flypaper effect.

**TABLE 3.**

*Summary of major studies of the "flypaper" effect*

Author(s)	Data (a)	Estimation technique (b)	Dependent Variable (c)	Measure(s) of Fiscal Illusion Employed (d)	Other Independent Variables (d)	Major Findings
DiLorenzo (1982b)	116 New York municipalities Cross-sectional 1976	OLS	Per capita total expenditure and expenditures exclusive of utility profits	(Herfindahl) revenue-complexity, dummy variable for municipalities practising internal subsidisation (utility profits).	Population, per capita income, percentage non-white income, intergovernmental income, average monthly wage.	Positive and significant value for utility profits. Internal subsidisation (utility profits) increases the level of expenditure.
Winer (1983)	10 Canadian provinces, pooled time-series, cross-sectional. 1952/53-1969/70	TOLS	Net provincial expenditure	Not applicable	Per capita income (+ lagged income), federal grants (+lagged grants), grants to other provinces (+lagged other grants), dummies for population and provincial groups (donor and recipient).	Expenditure separation reduces perceived tax-prices and increases expenditures. Grant elasticity higher in recipient provinces.
Logan (1986)	US national Time-series 1947-1983	OLS (linear and non-linear)	Per capita federal direct non-aid expenditure	Not applicable	Per capita income, per capita total federal aid to state and local expenditure, per capita total state and local expenditure, unemployment rate, dummy for war.	Grants process modifies perceived tax-prices of recipient and donor expenditure.
Hammes and Wills (1987)	Canada national Time-series 1962-1984	OLS (log-linear and nonlinear)	Real per capita federal non-aid expenditures, real per capita recipient government expenditures.	Not applicable	Perceived price of grantor (federal) expenditures, per capita income, perceived price of recipient (provincial and local) expenditures.	Results similar to that of Logan (1986). Alternative support for hypothesis of "fly-paper effect"
Marshall (1989; 1991)	50 US states Cross-sectional 1986	TOLS	Expenditure per capita  Change in per capita expenditures.	Estimated per capita tax windfall.	Per capita income, per capita intergovernmental revenue, price of public goods (employee salaries), population, state share of final expenditure on public goods, percentage urban population, population density. Per capita tax windfall.	Windfall revenue exerts a positive though insignificant effect on expenditure.

Author(s)	Data (a)	Estimation technique (b)	Dependent Variable (c)	Measure(s) of Fiscal Illusion Employed (d)	Other Independent Variables (d)	Major Findings
Grossman (1990)	136 Virginian localities Cross-sectional 1982 and 1983	TOLS	Three expenditure categories; education, public safety and general government admin.	<i>Federal and state unconditional grants, state unconditional grants, federal + state categorical grants.</i>	<i>Median household income, tax price (local) share, percentage urban population, percentage black.</i>	Unconditional grants are positive and significant in increasing the level of expenditure.
Stewart (1993)	Australia National time-series 1949-1992.	OLS	Total state and local government outlays.	Not applicable	<i>National income, total net aid to all state and local governments, unemployment rate.</i>	Increase in grants associated with fall in own-purpose expenditures.
Heyndels and Smolders (1994)	302 Flemish municipalities Cross-sectional 1990	OLS (log-linear)	Total expenditure.	<i>(Herfindahl) revenue-complexity, (Oates) income elasticity, percentage non-owner occupied, grant income divided by total income.</i>	<i>Population, median voter tax share, median voter total disposable income.</i>	Positive and significant impact of grants on expenditure.
Dollery and Worthington (1995a)	7 Australian states. Pooled time-series, cross-sectional (1982-1992)	OLS and GLS (linear and log-linear)	Total expenditure and total expenditure net of grants and transfers.	<i>(Herfindahl) revenue-complexity, (Oates) income elasticity, ratio of direct to indirect taxes, dummy variables for reliance on grant income.</i>	<i>Population, median voter income, proportion of population under 19 years, proportion of population over 65 years, population density, dummies for large and small states.</i>	Strong empirical support for the "flypaper" effect.
Dollery and Worthington (1995b)	Australia National time-series 1981-1992	OLS (linear and log-linear)	Per capita federal non-grant expenditures.	Not applicable	<i>Perceived price of grantor expenditures, per capita national income, perceived price of recipient expenditures, per capita state and local expenditures, unemployment rate.</i>	Support for "flypaper" effect at grantor level.

(a) Singular dates represent cross-sectional studies, intervals time series. Where two dates are given, different years for some cross-sectional variables have been used. (b) OLS/GLS/TOLS - Ordinary Least Squares, Generalised Least Squares and Two-Stage Least Squares respectively. (c) More than one dependent variable indicates alternative equations have been evaluated. (d) Italicised independent variables indicate significant t-values at 90% or more.

## 6. Renter Illusion

A fourth type of fiscal illusion that has received attention in the empirical literature is renter illusion. In this approach, an increase in a jurisdiction's proportion of renters will *ceteris paribus* increase the level of expenditures. The presumption is that since the primary revenue of local governments is the property tax, only those voters directly levied (owners) will correctly perceive the tax-price of the local public good. Whilst we could expect that higher property taxes will be passed onto renters via higher rents, the illusionary hypothesis argues that a disjunction exists between a rental voter's perception of the level of public good services and the level of rents paid. Even if the illusionary influence is not perfect, so long as the actual tax-price is underestimated, rental voters will support higher levels of public expenditure and would therefore bias expenditures upwards. The ability of this group to increase the level of expenditure would then depend on the number of voters involved.

The first empirical study of renter illusion was undertaken by Bergstrom and Goodman in 1973. In Bergstrom and Goodman's (1973) analysis of eight hundred and twenty-six US municipalities (see Table 4) the proportion of owner occupied households was one of several socio-economic variables against which general, police, and parks/recreation expenditures were regressed. The resulting negative coefficient indicated that the level of local government expenditure was indeed a function of the proportion of renters in the community, assuming identical income levels. The hypothesis that renters were subject to a lower perceived tax-price than owners was therefore not falsified.

Subsequent to the seminal argument of Bergstrom and Goodman (1973), several studies verified the persistence of renter illusion in the tax price-rent nexus. Peterson (1975) found that renters do not think that they bear the full cost of property taxes. However, Lovell (1978) argued that renters believed landlords shifted a relatively large portion of the property tax onto them, whilst Gronberg (1980, p. 451) observed that "...the effects of property tax differentials on rental prices may be an implicit or hidden cost to the rental household", without the benefit of empirical support. Later studies (Heyndels and Smolders, 1994; Worthington, 1994) verified these findings, although Moomau and Morton (1992, p. 179) found evidence of variability in the illusionary influence.

Despite the strong support of the renter illusion hypothesis since Bergstrom and Goodman (1973), most studies have given either implicit or explicit consideration of the alternate hypothesis of "renter rationality". In this approach, the apparent link between a jurisdiction's proportion of renters and the systematic increase in expenditures is the result of rational, informed decisions on the behalf of voters, rather than any misperceptions of relevant fiscal parameters. Studies of this hypothesis may be divided into: early approaches that supported rational type-behaviour (Barr and Davis, 1966; Hanushek, 1975; Beck, 1984; Brazer and McCarty, 1987); those that qualified findings on renter illusion (Peterson, 1975; Oates, 1988; Heyndels and Smolders, 1994); and those that directly attack the theoretical foundations of renter illusion (Martinez-Vazquez, 1983; 1988). More generally, they may be discussed in terms of the incidence and distribution of property taxes amongst voters.

First, Barr and Davis (1966) argued that the market for rental properties would be unaffected by modifications in property tax. Given that the supply of such properties was fixed in the short run, and the demand for rental property did not depend on the tax rate, they proposed *inter alia* that the property tax change would not be passed on to renters. Barr and Davis (1966, p. 152) added that "...in addition, the long run is indeed long in terms of tax shifting since sufficient time must be allowed for the tax to prevent what would have otherwise been a non-negligible addition to the stock of rental properties". The absence of effective shifting of property taxes onto renters, in both the short and long run, will ensure a lower tax price for renters, and voter outcomes consistent with rational decisions.

Following Barr and Davis (1966), the issue of property tax-rent shifting has received some attention in the literature. Oates (1988) proposed certain circumstances where the burden of tax-expenditure increases would be shifted onto tenants as against owners; more specifically, "if the higher revenues are associated with improved local services, then the tax-expenditure increase should translate into a higher demand for rental housing...that will drive up rents" (Oates, 1988, p. 72). However, Oates noted where tax differentials do not reflect service differentials and where long leases existed there is a reduction in the present discounted value of any tax increase; the burden of tax may thus remain on the lessor. Peterson (1975) and Hanushek (1975) have also addressed the issue of tax-shifting, and more particularly in the case of the former, the role of time lags in rental contracts. Whilst much empirical work remains to be done, there does appear to be some evidence that renters may have significantly lower tax-prices than owner occupants.

Second, a somewhat related renter rationality argument has been proposed by Martinez-Vazquez (1983). Quite apart from the plausible arguments that renters differ from owner-occupiers in terms of both income (for instance, since renters have lower incomes they benefit from the progressive incidence of fiscal budgets) and general preference for public goods (for example, renters tend to have more school-age children) Martinez-Vazquez (1983, p. 244) proposed that the voting behaviour of renters will vary because they have a lower level of housing consumption expenditure, holding income constant. Since property taxes are often levied in proportion to the consumption of housing, any increase in expenditure on publicly-provided goods will entail larger net benefits to renters than homeowners of the same income level. If we assume that renters vote rationally, increases in expenditure will be the result of such considerations, not renter illusion. In fact, such an outcome will be enhanced where renters have stronger preferences for the public good or where full tax shifting has not occurred. Accordingly, the lower the level of housing consumption expenditure or income for renters compared to owner-occupiers, and the higher the level of benefits of the former, the more likely voter outcomes are consistent with rational behaviour. Martinez-Vazquez (1983) tested the alternative hypothesis using data from a 1974 St Louis expenditure referendum. As shown in Table 4, the initial model regressed the number of "yes" votes favouring a higher level of expenditure against the percentage of renters and median income. The coefficient for the proportion of renters was positive and significant, *prima facie* evidence of renter illusion

(Martinez-Vazquez, 1983, p. 241). However, when the net benefits of the higher levels of expenditure were regressed against the percentage of renters and the median income, the results indicated that renters had voted rationally. Accordingly, whilst "the possibility of a certain degree of fiscal illusion in renter's behaviour cannot be excluded...[the present argument] provides sufficient bases to question the predominance, if not the validity, of the fiscal illusion hypothesis in explaining renters' behaviour" (Martinez-Vazquez, 1983, p. 244).

**TABLE 4.**  
*Summary of major studies of renter illusion*

<b>Author(s)</b>	<b>Data</b> (a)	<b>Estimation technique</b> (b)	<b>Dependent Variable</b> (c)	<b>Measure(s) of Fiscal Illusion Employed</b> (d)	<b>Other Independent Variables</b> (d)	<b>Major Findings</b>
Barr and Davis (1966)	64 Pennsylvanian municipal areas Cross-sectional 1959	OLS	Per capita general, highway, judicial and other expenditures.	<i>Percentage of electorate owning property.</i>	<i>Per capita assessed property value.</i>	Property holding an important determinant of expenditure decisions.
Bergstrom and Goodman (1973)	826 US municipal areas Cross-sectional 1962	OLS (log-linear)	Total expenditures on police, parks and total excluding education and welfare.	<i>Percentage of municipal housing owner occupied.</i>	<i>Number of households, tax share of median voter, median income, measure of the crowding of the public good, percentage population change, percentage non-white, of population &gt; 65, population density.</i>	Negative and significant coefficient between percentage owner occupied and the level of general expenditures.
Hanushek (1975)	140 Cleveland precincts Cross-sectional 1960	OLS	Probability of voter turnout, probability of voting in favour of expenditure increase.	<i>Percent homes owner-occupied.</i>	<i>Median income, value of owner-occupied dwelling, gross rent, ethnic breakdown, educational level, age level.</i>	Homeowners tend to vote more readily against increases in public expenditure.
Peterson (1975)	School districts in California Michigan N. Jersey N. York Kansas Cross-sectional 1968-71	OLS (log-log)	Desired school spending per pupil.	<i>Percentage of adult renters in school district.</i> <i>Dummy variable for renter status.</i>	<i>Household income, property tax base value divided by property value per pupil, state aid per pupil, number of school children in household.</i>	The rental population of an area is associated with the demand for higher public service levels.
Lovell (1978)	136 Connecticut towns Cross-sectional 1970	OLS, GLS (linear and log-linear)	Educational expenditure per pupil.	<i>Proportion of homes owner-occupied in town.</i>	<i>Percentage of population in poverty, median family income, skewness of income distribution, property per pupil, median school years, enrolments, percentage of Democrat voters.</i>	Expenditures negatively related to the level of owner occupied housing.

Gronberg (1980)	83 Chicago localities Cross- sectional 1970	OLS, TSLS	Total municipal expenditures.	<i>Percentage owner occupied in local area.</i>	Labour force participation rate, percentage of non- whites, <i>per capita assessed value of property, median voter income</i> , median voter tax share.	Proportion of owner occupied negatively related to level of expenditures.
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Author(s)	Data (a)	Estimation technique (b)	Dependent Variable (c)	Measure of Fiscal Illusion Employed (d)	Other Independent Variables (d)	Major Findings
Martinez-Vazquez (1983)	Sundry St Louis precincts Cross-sectional 1974	OLS	"Yes" votes on increased expenditures in police, fire, parks, highway, library. Net benefits of increased expenditures.	<i>Percentage of renters in precinct.</i>	<i>Median income.</i>	Higher proportion of "yes" votes attributable to high rates of renter occupation. Results also suggest that "yes" votes on the behalf of renters are rational rather than illusionary.
Beck (1984)	219 California municipal areas Cross-sectional 1971-74	NLLS	Per capita total expenditure.	<i>Percent of owner-occupied housing.</i>	<i>Per capita grant aid, tax base per household, per capita sales tax revenue, median family income, percentage non-white, percentage over 65 years, population, Gini coefficient.</i>	Demand for municipal services is a nonmonotonic function of income, with minimum varying across communities.
Brazer and McCarty (1987)	600 Connecticut New Jersey Virginia districts Cross-sectional 1981-82	OLS (log-linear)	School expenditure per pupil. Municipal expenditure per capita.	<i>Proportion of owner-occupiers.</i>	<i>Tax price, state and federal aid, proportion aged, education, poverty ratio, enrolment rates, population growth and density, nonresident and resident pupils, urbanisation.</i>	Coefficient on owner-occupier negative and significant.
Schokkaert (1987)	2404 persons in Purrs, Belgium 1986	Logit	Probability of favouring increase in expenditure.	Dummy variable for homeownership.	Dummy variables for <i>age, unemployment, urban status, job description, sports activity; measures of age, education, sex, income, tax.</i>	Homeowners appear more favourable to increases in expenditure.
Schwab and Zampelli (1987)	73 Maryland cities and counties Cross-sectional 1978	NLLS	Per capita police expenditure.	Proportion of owner-occupiers.	<i>Per capita income, price, grants, percentage non-white, unemployed, high school graduates.</i>	No relationship between percentage of homeowners and police expenditure.
Moomau and Morton (1992)	428 New Orleans precincts Cross-sectional 1982	Logit	Probability of voting in favour of change in property tax.	<i>Percentage of renter and homeowner households.</i>	Income, rental contract value, percentage white, <i>percentage black, homestead exemption value.</i>	The higher the value of rent the more likely renters will perceive the tax burden.

Author(s)	Data (a)	Estimation technique (b)	Dependent Variable (c)	Measure of Fiscal Illusion Employed (d)	Other Independent Variables (d)	Major Findings
Heyndels and Smolders (1994)	302 Flemish municipal areas Cross-sectional 1990	OLS (log-linear)	Total expenditure.	<i>(Herfindahl) revenue-complexity, (Oates) income elasticity, percentage non-owner occupied, grant income divided by total income.</i>	<i>Population, median voter tax share, median voter total disposable income, measure of revenue-complexity, income elasticity measure, grant income equivalent divided by total income.</i>	No relationship between occupancy status and expenditure outcomes.
Carroll and Yinger (1994)	147 Boston towns Cross-sectional 1980	OLS, 2SLS, Box-Cox.	Median rents, index of public service quality, tax rate.	<i>Fraction of rental housing units.</i>	<i>Rental characteristics, population density, distance to CBD/highway, population growth rate.</i>	Property tax increases are exactly offset by increases in rents. Provides support for renter rationality.
Worthington (1994)	46 Australian LGAs Cross-sectional 1991	OLS TSLS (linear and log-linear)	Total and per capita expenditure.	<i>Proportion owner-occupied, (Herfindahl) revenue-complexity, dummies for grant and utility reliance, indirectness of revenue system.</i>	<i>Rateable area and roads, median voter tax price, income, population, proportion of population over 65 years, measure of revenue-complexity, dummies for grant and utility reliance, indirectness of revenue system.</i>	Proportion owner-occupied and expenditure negatively related.

a) Singular dates represent cross-sectional studies - where two dates are given, different years for some cross-sectional variables have been used. b) OLS/GLS/TSLS/NLLS - Ordinary Least Squares, Generalised Least Squares, Two-Stage Least Squares and Non-Linear Least Squares respectively. c) More than one dependent variable indicates alternative equations have been evaluated. d) Italicised independent variables indicate significant t-values at 90% or more.

## 7. Debt Illusion

The final form of fiscal illusion is debt illusion. Here voters are more aware of the costs of public sector programs if they are paid for through current taxation rather than public-sector borrowing. Generally, this results from imperfect information available to individuals on the time path of the future benefits or costs of governmental activity. Accordingly, "the excess of the present value of perceived future net benefits over the present value of actual net future benefits represents an illusionary addition to wealth which can affect real consumption and investment decisions" (Floyd and Hynes, 1978, p. 381). The general presumption is that since a price differential exists between the perceived tax-price of debt based expenditure and that of taxation, reliance on debt will *ceteris*

*paribus* imply a larger expenditure on the public good. Buchanan (1967; 1982) proposed two types of debt-illusion. The first a "Vickrey-type" decision illusion where an individual's subjective assessment of debt on future tax liabilities was undervalued; and the "Puviani-type" behavioural distinction where the subjective assessment of the diminution of the value of assets are not treated in the same manner as a lump-sum taxation payment. Buchanan (1967, p. 161) maintains that for both of these approaches subjective criteria dominate at the time of the selection of debt, with the objective costs only recognised in subsequent time-periods.

One of the first approaches to the question of debt in governmental finance was undertaken by Puviani (1967). Puviani (1967) accepted the basic Ricardian proposition that the payment of an annual tax in perpetuity and a lump-sum extraordinary capital payment were in some sense equivalent (Buchanan, 1967; 1982; Buchanan and Roback, 1987)). However, Puviani (1967) argued that individual taxpayers do not make allocative decisions on this premise. In fact, individuals will not be indifferent to the selection of debt or taxation in violation of Ricardian equivalence, so that future tax liabilities are undervalued because of the issue of "control" (Buchanan, 1967, p. 132). Thus "...the individual retains control over a capital value which, even though fully offset by the liability stemming from the capitalised value of future taxes, remains desirable" (Buchanan, 1967, p. 132). An alternative to Puviani's (1967) and Buchanan's (1967; 1982) approach is that proposed by Floyd and Hynes (1978). Here an individual's decisions on future tax and debt liabilities are based on two sources of information: firstly, information derived from the current political process, like policy platforms; and secondly, analysis of past trends in government expenditure and taxation (Floyd and Hynes). Floyd and Hynes argue that unless marked (and predictable) changes occur in the current political profile, decisions are likely to be (rationally) based upon past behaviour, and therefore debt illusion is inclined to arise when the past trends do not accurately predict future outcomes. In both approaches an illusory effect is created when rational individuals prefer debt to current taxation due to imperfect information.

Given that a fiscal illusion exists when taxpayers underestimate the present discounted value of future tax liabilities under debt finance, it becomes necessary to identify the feedback of debt related choices. In general, since assets and not individuals are taxed at the local level (though not necessarily at that of the state), the empirical question becomes one of the efficacy of community debts capitalisation into individual asset values (Yinger, 1982). The presumption is that the preference for debt exists under illusion because of perceived tax-price advantage; that is, undercapitalisation, even though under "Ricardian equivalence" no differential exists. Since debt based programs have a lower perceived tax-price, higher levels of expenditure will be demanded, and the debt illusion will have succeeded in biasing expenditures upwards.

The issue of debt capitalisation suggested a possible test for the existence of debt illusion to writers such as Daly (1969) and Oates (1969). As Oates (1988, pp. 76-77) has observed:

Consider two otherwise identical communities that undertake identical capital projects. One community, call it A, finances the project out of current revenues, while community B chooses to employ bond finance so as to spread out the payments for the project over future years. At the end of the current year, the sole differences between a "typical resident" of A and B will be that the latter will have a future tax liability whose present discounted value equals the recent differential tax payment by the resident of A. In a world of mobile consumers, this future tax liability associated with residing in community B will become capitalised into lower property values in B ...other things being equal, we should find, that if there is a debt illusion, that the future tax liabilities associated with the debt are not fully capitalised into local property values.

Earlier Oates (1969) undertook a somewhat more holistic approach to local government finance than that required for the issue of debt illusion, which nevertheless does throw light on the issue of empirical analysis (see Table 5). Using a sample of municipalities, Oates (1969, p. 958) attempted to observe the impact of local expenditure programs and property taxes on property values. Regressing housing values against various socio-economic determinates and municipal tax rates and expenditures, Oates (1969, p. 965) found that housing values are negatively related to tax rates and positively related to expenditures. Oates (1969) essentially undertook this analysis as an empirical test of Tiebout mobility. He used the results to argue that consumers will select a community (at least in terms of housing value) by maximising net benefit, taking into account the positive effect of higher expenditure levels and the detrimental effect of higher tax-prices. Such outcomes have persistently been verified in the numerous housing capitalisation studies that followed. (See Chaudry-Shah (1985) for a survey of these cross and intra-jurisdictional fiscal impacts). However, these studies do not provide an adequate test of the debt illusion hypothesis. In general, this is because they are concerned with the capitalisation of expenditure financed solely by current taxation, not with the differentials that may exist between identical communities that finance expenditure with either debt or current taxation.

A study more closely related to debt illusion was undertaken by Epple and Schipper (1981). In this approach (see Table 5) a cross-sectional study regressed median home values against a standard set of socio-economic variables and a proxy for estimated unfunded pension liabilities. The hypothesised value for the unfunded service requirement was unitary and negative indicating that municipal residents expected pension obligations to be funded from local taxes. If full capitalisation of the liability was found, then the presumption would be that debt illusion did not exist and that the tax-price of debt funded expenditure was accurately perceived. The results failed to support the hypothesis of no capitalisation. However, Epple and Schipper (1981, p. 170) noted that further work was required, whilst Inman (1981) observed that the expected differential between estimated (underestimated) and actual unfunded pension liabilities was crucial to any examination. Subsequently, Inman (1982, pp. 69-70) reexamined the issue of pension funding, finding that the continued controversy on the correct estimation of capitalisation models, and the lack of consistent and independent measures of unfunded liabilities, was a significant reason why only Epple and Schipper (1981) had addressed this issue.

Finally, in an international analysis Dalamagas (1993) investigated the conflicting views of the traditional Keynesian approaches to the stimulatory effect of debt financed tax-cuts compared with that of Ricardian equivalence where tax and debt finance are equivalent, and therefore tax-cuts are inconsequential. Regressing the level of private sector consumption against tax revenue, government debt/deficit and inflation, Dalamagas found that the substitution of debt for taxes is misinterpreted as a net addition to wealth and private per capita consumption expenditures rise. However, the relevance of the Dalamagas (1992; 1993) analysis to the present study is limited. This is because unlike the majority of fiscal illusion studies, Dalamagas (1992; 1993) is concerned with the impact of debt illusion on private consumption and not on public expenditure.

**TABLE 5.**  
*Summary of major studies of debt illusion*

<b>Author(s)</b>	<b>Data</b> (a)	<b>Estimation technique</b> (b)	<b>Dependent Variable(s)</b> (c)	<b>Measure(s) of Fiscal Illusion Employed</b> (d)	<b>Other Independent Variables</b> (d)	<b>Major Findings</b>
Oates (1969)	53 New Jersey municipalities Cross-sectional 1961 and 1963.	OLS (log-linear) and TOLS	Median residential home value	<i>Degree of capitalisation.</i>	<i>Effective tax-rate (average 1956-60), distance to urban centre (Manhattan), median number of rooms, percentage of houses built since 1950, median family income, percentage of families with lower level income.</i>	Taxes and expenditures are capitalised into housing values.
Epple and Schipper (1981)	130 Pennsylvanian municipal-ities and 57 Pittsburgh municipal-ities. Cross-sectional 1976	OLS (log-linear)	Median value of residential property.	<i>Degree of capitalisation</i>	<i>School expenditures per capita, effective tax rate, unfunded service cost/ market value of property, median income, travel time to CBD, proportion of homes lacking some or all plumbing facilities.</i>	Unfunded service costs (proxy for debt) either insignificantly positive or excessively negative (greater than 1) indicating over capitalisation
Dalamagas (1992)	52 countries Pooled time-series, cross-sectional 1978/79-1987/88	OLS	Real per capita private consumption.	<i>Consumption expenditures relative to debt levels.</i>	<i>GDP and lagged GDP, Government expenditure and lagged government expenditure, budget deficit and lagged deficit.</i>	The substitution of debt for taxes causes a revision in private consumption decisions. Debt illusion absent in high debt-GDP ratio countries, present in low debt-GDP ratio countries.
Dalamagas (1993)	51 countries Cross-sectional based on 10 year averages 1980-1989	OLS	Real per capita private consumption.	<i>Consumption expenditures relative to debt levels.</i>	<i>Ratio of taxes, deficit to GDP, inflation, dummies (debt/GDP) for debted (&gt;46%), intermediate (35% - 45%) and solvent countries (&lt;35%).</i>	Debt illusion absent in high debt-GDP ratio countries, present in low debt-GDP ratio countries.

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a) Singular dates represent cross-sectional studies - where two dates are given, different years for some cross-sectional variables have been used. b) OLS/GLS/TSLN/NLS - Ordinary Least Squares, Generalised Least Squares, Two-Stage Least Squares and Non-Linear Least Squares respectively. c) More than one dependent variable indicates alternative equations have been evaluated.d) Italicised independent variables indicate significant t-values at 90% or more.

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## 7. Concluding Remarks

In summarising past empirical studies of fiscal illusion several dominant themes emerge. The first is that, in general, results have been mixed. Whilst many studies have found unqualified support for a particular hypothesis, others have found the implications for fiscal illusion inconclusive. This is in part attributable to the diversity of data and models employed. In addition, the heterogeneity of results also applies across the different manifestations of fiscal illusion. Moreover, significant attention has been directed to the issues of revenue-complexity, revenue-elasticity and renter illusion, whereas few resources have been deployed to other forms of fiscal illusion, particularly debt illusion. Even more noticeable is the failure of most empirical studies to incorporate more than one illusionary hypothesis and few studies have analysed more than two (Wagner, 1976; DiLorenzo, 1982a, 1982b; Martinez-Vazquez, 1988; Grossman, 1990; Worthington, 1994; Dollery and Worthington, 1995a; 1995b). Secondly, the ability to find empirical support for the fiscal illusion hypothesis is persistently qualified by alternative hypotheses and the endogeneity of some variables. Whilst some of these issues may be addressed by careful econometric analysis, it may not be possible to resolve fully the psychological black box in which decisions under incomplete and partial information are undertaken. Finally, the body of theory concerning fiscal illusion is incomplete. Issues such as the derivation of suitable proxies for illusionary variables and the usefulness of these variables remain contentious. It may well be that the assumptions used in past approaches to fiscal illusion lack the theoretical rigour required for empirical analysis.

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