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**EXPLAINING THE REAL SIZE OF GOVERNMENT  
IN AUSTRALIA: AN APPLICATION OF THE  
FERRIS AND WEST MODEL**

by

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# **EXPLAINING THE REAL SIZE OF GOVERNMENT IN AUSTRALIA: AN APPLICATION OF THE FERRIS AND WEST MODEL**

Sukvinder Singh and Brian Dollery\*\*

## **Abstract**

Existing empirical evidence on theories purporting to explain the size and growth of government is mixed. However, a new empirical approach developed by Ferris and West (1996) using real rather than nominal data seems to be promising in the light of their U.S. results. In order to determine the generality of their model, we apply it to Australian data for the period 1960 to 1995. Our results indicate that the Ferris and West approach does not explain the real growth of government in Australia.

Key Words: growth of government, public expenditure

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# **EXPLAINING THE REAL SIZE OF GOVERNMENT IN AUSTRALIA: AN APPLICATION OF THE FERRIS AND WEST MODEL**

## **1. INTRODUCTION**

The determination of the size and scope of government activity in a modern advanced market economy is neither obvious nor straightforward. Numerous conceptual, statistical and other problems need to be addressed in order to clarify the meaning of public sector activity and the measurement of the size of government. Saunders (1987; 1993) has suggested that the growth of government cannot be captured by any single technique, but requires instead the adoption of several measurement methodologies. To date, there exists a voluminous literature on the subject aimed at explaining the growth of government which has endured in many developed countries for the better half of this century.

In a recent paper, Ferris and West (1996), henceforth referred to as FW, tested several theories that purport to explain the growth of government size in the U.S. context. This paper attempts to apply the same arguments to the Australian case.

The paper itself is divided into six main parts. Section 2 examines the real versus nominal growth debate. We argue, in tandem with much recent research, that while either measure of growth significantly affects research findings, the question of growth should be looked at from the real perspective. Section 3 presents an overview of theories which seek to offer an explanation for the rapid growth of government and associated attempts at empirical measurement applied by FW. The theory is discussed in section 4 and the resultant empirical model is outlined in section 5. The results of the empirical tests are discussed in section 6. The paper ends with some brief concluding comments in section 7.

## **2. REAL GROWTH VERSUS NOMINAL GROWTH**

An important dimension of measuring the growth of government involves the issue of real as opposed to nominal growth. To date, existing literature mostly measures growth in nominal value terms. A striking difference in empirical findings is apparent when real values are utilised. Insofar as governments have certainly grown in the nominal sense over the post-war period, the overall trend nevertheless points towards a decline when calculated in real terms. This has led FW (1996, pp.537-8) to observe that “this distinction becomes immediately more

striking when it is pointed out that , while most authors hitherto have attempted to explain the phenomenon of positive growth in the ratio of nominals over the past half century, the ratio of reals has actually fallen for most of our time period, when that real share is exclusive of transfer payments”.

Beck (1979) tackled the question of real growth *vis-a-vis* nominal growth in a study of 13 OECD countries from 1950 to 1977. His findings showed a nominal median growth rate of government consumption expenditure of 12%, whereas real growth was a mere 3.8%, with Switzerland and the U.K. even displaying zero real growth of government consumption expenditure. A primary cause of these differences can be ascribed to the dearth of official deflators. Lowery and Berry (1993, pp.734-5) point out that “any assessment of change in the size of the public sector must reflect a recognition of the differential rates of change in the prices of goods and services between the public and private sectors ...” so that, “when the numerator and denominator in the ratio of U.S. governmental expenditure to total national output are adjusted with price deflators ... the apparent rate of government growth in the post war era falls substantially”.

This observation can be illustrated mathematically as follows. Assuming a two-sector economy, we have the total output, (Q), comprised of public sector output, (G), and private sector output, (H). Let the price of each sector’s output be  $P_g$  and  $P_h$  respectively and  $P$  (a weighted average) represent priced total output. Government expenditure and GDP can then be expressed as follows:

$$E = P_g G \tag{1}$$

and,

$$GDP = PQ = P_g G + P_h H \tag{2}$$

Changes in government expenditure and GDP can now be expressed in total differential terms as:

$$dE = P_g dG + G dP_g \tag{3}$$

and,

$$dGDP = P dQ + Q dP \tag{4}$$

Changes in the real ratio of government expenditure to GDP, where all prices are held constant will give,

$$\frac{dE}{dGDP} = \frac{P_g dG}{P dQ} \quad (\text{where } P = dP = 0) \tag{5}$$

Alternatively, if relative prices are allowed to change, such that  $dP_g > 0$  (i.e.  $dP_h < 0$ ), while keeping prices constant on average ( $dP = 0$ ), we have the nominal values of government expenditure as:

$$\frac{dE}{dGDP} = \frac{Pg dG}{PdQ} + \frac{GdPg}{PdQ} \quad (6)$$

A comparison of equations (5) and (6) reveals that it is possible for a nominal ratio of government expenditure to GDP to change by a greater amount than its real counterpart. This occurs despite a situation of zero inflation ( $dP = 0$ ). We can hence conclude that investigations into real changes in government expenditure should use equation (5).

### **3. OVERVIEW OF THE THEORY AND EMPIRICAL ANALYSIS OF GOVERNMENT GROWTH**

Numerous taxonomies of theories purporting to explain the growth of government in advanced representative democracies have been developed. For instance, Lybeck (1988, pp. 29-35) distinguishes twelve different theories of government growth. These are: “Wagner’s Law Version 1 : Restructuring Society”; “Wagner’s Law Version 2 : Income-Elasticity Demand”; “Peacock and Wiseman’s Displacement Effect”; “Price-Inelastic Demand and Baumol’s Disease”; “Income Redistribution”; “Interest Groups”; “Fiscal Illusion and the Ease of Tax Collection”; “Politico-Economic Cycles and Political Decision-Making”; “Bureaucracy”; “Public Employees as Voters”; “Impact of Parties” and “Centralisation of Power”. By way of contrast, Gemmell (1993, p.10) identifies five theories that attempt to explain the growth in government size. These are: “Peacock and Wiseman’s Displacement Hypothesis”; “Public expenditure and the Political Process”; “the Economics of Bureaucracy”; “Wagner’s Law and Musgrave’s Hypothesis” and finally, “Modelling Public Expenditure Growth : an Integrated Approach”. Similarly, both Mueller (1989) and West (1991) have independently distinguished five theories that offer some explanation for the growth of government. These categories of theories are based on the two different classifications of political processes. Each type of political process, with its unique characteristics, provides a different dimension to government growth. The first invokes the classical theory of the democratic state (Mueller, 1989). Under this structure, governments exist mainly to satisfy the needs of the citizenry. This occurs largely through government programs like income redistribution, education, health care services and so on. The second type of government constitutes the “state-over-citizen” perspective, alternatively referred to as

the Leviathan type of government (Mueller, 1989). Here a public choice perspective is adopted which sees government as malevolent rather than benevolent.

Under the rubric of the classical theory of democracy, West (1991, p.363) identifies “three propositions often associated with the democracy explanations of government growth”. He lists these as: governments solely responsible for the provision of public goods and alleviating externalities; governments redistribute income and wealth; and governments interact with interest groups. In terms of the opposite concept of the state, West (1991 p.364) notes that “with regard to the state-over-citizen (Leviathan) classification of explanations, two main hypotheses are involved”. The first surrounds the extent of bureaucratic influence over governments and the second focuses on fiscal illusion. Mueller (1989, pp. 320-347) reaches similar conclusions.

Buchanan (1977) and Borcharding (1977) both identify distinctive, albeit not entirely different, taxonomies of theories of the growth of government. Buchanan (1977, pp. 5-18) begins by attempting a somewhat polemical distinction between “government by the people” and “government against the people”. In terms of this dichotomy, the theories that explain an expansion of the public sector are divided into responsive and excessive government categories respectively. Under the responsive government arrangement, Buchanan (1977) lists the following: inflation, population and public spending; the services economy and income elasticity of demand; the public productivity paradox; and urbanization and congestion, In the excessive government case, he includes “tax consciousness and fiscal illusion”; “politics for profits”; “conflict of interest”; “education for the people or education for the educators” and “private provision of public goods and services”. The core difference in the current context is that the theories pertinent to the growth of responsive government are considered as demand inducing explanations, whilst those surrounding excessive government are seen as supply-side models.

Borcharding (1977, pp. 45-64) seeks to “explain as much of this increase as possible, based upon our current understanding of the determinants of public expenditures”. He accordingly ascribes this growth of public expenditure in the U.S. over this century as arising from: price and the demand for public services; income changes; population increases; interdependencies and the political side of public spending.

The massive literature centred on trying to provide satisfactory theoretical explanations for the growth of government in advanced representative democracies in the twentieth century has engendered a vast empirical effort aimed at testing the explanatory power of the various theories. The results of this enormous empirical exercise have been disappointing (see, for

example, Dollery and Singh (1998), Gemmell (1993), and Lybeck (1986), for detailed surveys of this empirical literature). At best the results have been mixed, and no single theory can be said to command significant empirical support.

#### **4. THE FERRIS AND WEST APPROACH**

The following theories were empirically assessed by FW using U.S. data: Wagner's law with respect to modernisation and demographic change; Wagner's income elastic demand for government output; Baumol's cost disease; interest groups and fiscal illusion. These theories are further segregated into demand and supply side explanations. The organisation of these theories into a demand and supply framework permits the equilibrium real share of government output to be linked with competing factors that influence government size. Aside from traditional variables affecting product demand, Wagner's postulate of high income elasticity of demand for government services in the initial growth stages is included in the model. In addition, the Leviathan public choice literature focussing on special interest groups is considered by Ferris and West (1996) as strongly influencing the real size of government. Brennan and Buchanan's (1980) bureau voting hypothesis receives particular attention under this theory. Collectively, these two theories are viewed as affecting the demand for real government output.

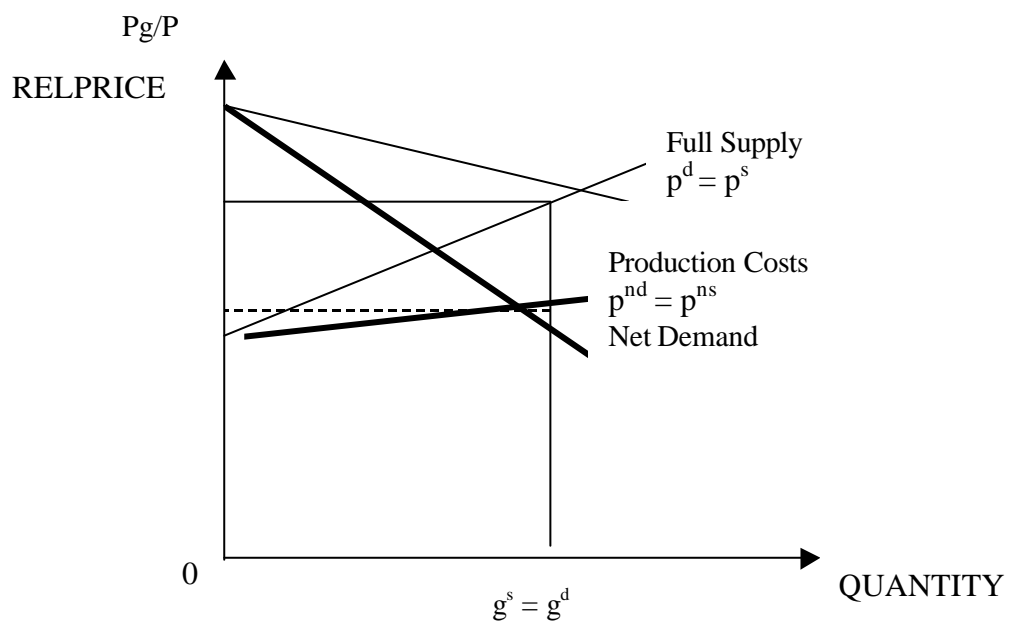
The remaining theories are seen as determinants of the supply of government output. Baumol's (1967) hypothesis of rising costs of providing government services over time, giving rise to the need for larger budgets, is tested. A strand of the fiscal illusion theory, known as the Kau and Rubin (1981) hypothesis, is incorporated into the supply side effects. This argument posits that intertemporal tax collection costs will fall as individuals shift to occupations with more visible rewards.

In Figure 1 below, the intersection of the full demand and supply curves yield the full demand price  $p^d$ , and the full supply price  $p^s$ . Using FW terminology, this full demand price signifies the marginal willingness of society to pay for additional government output, whereas the full supply price reflects the marginal costs incurred. These marginal costs are further delineated into production costs and deadweight costs of collecting extra revenue through taxation. The central argument of the FW study evolves around these deadweight costs which are deemed as positively correlated with real government size.

To derive a meaningful empirical examination of the ideas underpinning government growth, FW used only observable price and quantity values. This required net demand and

supply terms to be used. Hence the equilibrium real size of government is attained at the point where the net demand for real government services (less observed tax collection and deadweight costs from the full marginal willingness to pay) is equal to the net supply (production costs of government output). Put differently, net demand now computes society's willingness to pay after realising that marginal deadweight costs will consequently rise from addition tax collection. Net supply refers to production costs, obtained from the national accounting data. At equilibrium, we thus have the marginal production costs of producing government output, denoted as RELPRICE and measured as the ratio of government services deflator in GDP ( $P_g$ ), to GDP deflator, ( $P$ ). The corresponding quantity is the real share of the National Accounts measure of government ( $G$ ), in GDP denoted as RSHARE and measured as  $(G/P_g) / (GDP/P)$ .

**FIGURE 1**  
**EQUILIBRIUM AND REAL SHARE OF GOVERNMENT**



Source: Ferris and West (1996, p.540).

In the empirical exercise, government size is inclusive of federal, state and local government spending. Furthermore, FW also distinguished between two separate measures of the real size of government. The first incorporates government spending less transfer payments. The second includes government transfer payments. Conformity with the United Nations System of National Accounts (SNA) definitions is thus ensured.

## 5. EMPIRICAL MODEL



Since the primary objective of this paper involves a comparative study of the FW approach using Australian data, the FW model is used in the empirical exercise. We begin with a brief explanation of each variable in the model, followed by a discussion of the coefficient estimates of the three-stage least squares system. Table 1 provides a summary of the variables employed by FW and their expected signs.

**TABLE 1**  
**VARIABLES AND EXPECTED SIGNS**

Variable Name	Description	Sign
RSHARE	Ratio of real government output to GDP, (G/GDP) / (GDP/P), (ie) ratio of government output to deflator P <sub>g</sub> , divided by GDP price deflator, P.	(+, for GOVEMP)
RELPRICE	Ratio of government output price deflator to GDP	(+, for demand) (-, for supply)
YPC	Per capita income	(+)
POVRATE	Poverty rate	(+)
GOVEMP	Ratio of total government employees to population 20+	(+)
FARMPOP	Ratio of farmers to population 20+	(+)
UNION	Ratio of total union membership to population 20+	(+, for GOVEMP)
AGEDROP	Ratio of total population 65+ to population 20+	
SE	Ratio of self-employed to population 20+	(-)
FPART	Female participation rate	(+)
URBAN	Ratio of urban vehicle miles to total	(-)
BERATO	Quantity of business equipment produced relative to consumer goods	(+, for demand) (-, for supply)
BPRATIO	Ratio of foreign transactions (Current Account balance) to national income	(-)
POP	Population ('000s)	
POPSQ	Population squared	
RWAGEG	Real public sector employees' earnings	(-)
RWAGEPS	Real private sector employees' earnings	(+)
PAYRATIO	Ratio of public to private sector earnings, (RWAGEG / RWAGEPS)	(-)
YEAR	Time	(-)
MPROD	Manufacturing output per hour	(-)
TBR	Three month treasury bill rate	(+)

(RSHARE) relates to the quantity of government output demanded as a percentage of GDP, both inclusive and exclusive of government transfer payments, treated separately.

Based on the law of demand, the net demand price (RELPRICE) of government output is expected to be negative.

Under Wagner's law version two : income elastic demand, a positive sign is expected and income elasticity of demand for government output (YPC) is viewed as greater than 1. This implies that in the early stages of development, demand for government output rises more than proportionately as income increases. With rising income there is an increased demand for schools, infrastructure and hospitals, etc. FW also incorporate the poverty rate (POVRATE) variable in their model without explicitly testing the income redistribution theory. Their justification resides in measuring the impact of this target group which receives substantial amounts of government services and transfers. The empirical performance of this variable can then be traced to evaluate (RSHARE) inclusive of transfers. It is noted that in accordance with the median voter theorem, a rise in (POVRATE) will fuel higher government expenditure levels, since the welfare state will have to fund greater social security payments. Hence the expected sign associated with (POVRATE) is positive.

The test of interest group strength involves the usage of the following special interest groups: bureaucrats (GOVEMP), farmers (FARMPOP), union power (UNION), and the elderly (AGEDPOP). Public choice theory holds that if bureaucrats and farmers comprise an increasing proportion of the voting population, the share of government in GDP will rise since they are large net recipients of government revenue. Traditionally, these groups have been regarded as major lobby groups and this applies in the case of Australia as well. Hence positive signs for their coefficients are expected. More recently, the expanding over 65 population (AGEDPOP) has been regarded as requiring larger budget proportions allocated to their welfare in terms of health care and pensions. FW argue that it is also this group that displays the highest level of disposable income and lowest poverty and owns around a third of all household assets and forty percent of all financial assets in the U.S. It is this reasoning that leaves the variable without any a priori expected sign. The (UNION) variable also portrays a similar characteristic. On one hand, workers view governments as an alternative to unions. This may explain growing "union-like" functions undertaken by some governments, like unemployment benefits, health and safety laws, and workers' compensation, which may have resulted in declining union membership. By the same token, traditionalists argue that unions typically favour larger governments. Consequently no *a priori* restriction on the sign of (UNION) is anticipated.

In the supply side framework, Kau and Rubin (1981) postulate that when individuals switch to jobs with greater visible earnings, governments are better placed to tax these

individuals than if they remained in occupations with more invisible earnings. By contrast, as the number of self employed persons (SE) in the economy rises, greater tax avoidance results since there are opportunities to understate income earned. Tax revenues will fall as the real costs of funding government activity rise. In the FW estimation model, an increase in (SE) is deemed to decrease the demand for government output. This outcome rests entirely on the assumption of consequent falling tax revenues. The underlying weakness of this strong assumption is discussed in the next section. The authors also include an urbanisation (URBAN) variable into their model which approximates the likelihood of closely spatially located individuals to avoid formal markets. For these reasons, both (SE) and (URBAN) are expected to show negative signs.

The next two variables are expected to show positive signs. The logic surrounding the female participation rate (FPART) is that as more women enter the workforce (generating greater income visibility), moving away from traditional occupations in the home (with less income visibility), tax collection costs will fall and higher tax revenue levels are made available to governments. In the spirit of Kau and Rubin (1981), widespread computerisation lowers the costs of tracing taxable income. The ratio of business equipment to consumer goods (BERATIO) is used to measure this effect. Finally, the balance of payments ratio (BPRATIO) is taken to reflect the interconnectedness of the economy with the rest of the world. Growing internationalisation is seen as reducing governmental ability to tax and accordingly constrains its size.

Finally, the variables used to test Baumol's production cost theory pertain to the usual conventional cost considerations: that is, the supply price of government output (RELPRICE) is positively correlated with real government size (RSHARE). In a similar vein, a rise in relative labour costs would raise the cost of government output and reduce the quantity supplied. This can be represented through the shift of the supply curve inwards. The ratio of government employees' income to private sector income (PAYRATIO) is used to measure this effect. Alternatively, the Samuelsonian theory of public goods provision argues that the relative cost of providing a stipulated level of public goods will fall when the population grows. A test of this approach is conducted by applying the population (POP) and population squared (POPSQ) variables. (POPSQ) allows for a nonlinear relationship. No a priori signs are expected for (POP) and (POPSQ).

To the extent that government output is labour intensive, public sector productivity may lag behind that in the relatively more capital intensive private sector. Over time government output becomes more expensive, hence reducing its relative size. The (BERATIO) variable is

also used for these purposes and it is maintained that as the value of this ratio rises, government output falls. The expectation is for a negative sign in the coefficient. FW also employ the (MPROD) and (YEAR) variables which provide information on annual manufacturing output per hour. These variables are meant to represent the manufacturing rate of productivity change measures. A negative sign is predicted in both cases.

Due to the potential endogeneity of the (GOVEMP) variable, the risk of spurious results is reduced by establishing a separate equation for this variable and then testing these relationships as a system of equations using the three stage least squares estimation technique. The crux of the argument lies in the fact that larger government output can only be provided if more employees are hired. But these employees also form an effective lobby group. It thus becomes imperative that this two way relationship between (GOVEMP) and (RSHARE) is separated, lest the strength of a particular correlation be ascribed to the wrong theoretical reason. This third equation comprises the price and quantity (RELPRICE, RSHARE) variables together with (UNION), (RWAGEG), (RWAGEPS) and (TBR). In the FW model, both (RELPRICE) and (RSHARE) coefficients are predicted to be positive due to derived factor demand. FW also argue that unions play a dominant role in the government employment share and as such the coefficient will be positive. (RWAGEG) and (RWAGEPS) relate to public and private sector wages respectively. Given the desire to economise on relative labour costs, (RWAGEG) is predicted to be negative, whilst the impact of private sector wage (RWAGEPS) rises on government employment is viewed as positive. This expectation surrounds the idea of staff losses to the higher income paying private sector. The three month treasury bill rate (TBR) variable expresses the substitutability of capital for labour within the public sector and its effect is deemed as positive.

These categories of variables serve as the framework for our basic estimation model. For the demand side analysis, we can narrow down the list of variables and classify them into three categories as:

$$g^d(TDV, PCV, DCC) \tag{7}$$

where TDV represents a set of traditional demand side expenditure determinants comprising price (P) and income per capita (YPC); PCV signifies the set of public choice (Leviathan) variables (ie. GOVEMP, FARMOOP, AGEDPOP, and UNION) and DCC relates to the tax collection costs variables (ie. SE, FPART, URBAN and BPRATIO). These can also be expressed as:

$$g^d(P, YPC, PCV, DCC) \tag{8}$$

For the empirical tests, we adopt a linear form of the equations. The estimating equation based on the demand side considerations may be written as:

$$\begin{aligned}
 RSHARE = & \mathbf{a1} + \mathbf{a2} RELPRICE + \mathbf{a3} YPC + \mathbf{a4} GOVEMP + \mathbf{a5} FARMPOP \\
 & \mathbf{a6} AGEDPOP + \mathbf{a7} UNION + \mathbf{a8} SE + \mathbf{a9} FPART + \\
 & \mathbf{a10} URBAN + \mathbf{a11} BPRATIO + \mathbf{e1}
 \end{aligned} \tag{9}$$

To summarise the predictions of the analysis, we expect negative signs for  $\alpha_2$ ,  $\alpha_8$ ,  $\alpha_9$  and  $\alpha_{11}$ ;  $\alpha_3$  is largely a test of Wagner's law and a positive sign would mean support for the hypothesis; and  $\alpha_4$ ,  $\alpha_5$  and  $\alpha_{10}$  are all expected to be positive. Finally,  $\alpha_6$  and  $\alpha_7$  have no expected signs.

The supply side variables explaining the relationship are generally categorised as:

$$g^s(\text{P, Relative Factor Costs, Population, Relative Productivity Changes}) \tag{10}$$

where P, relative factor costs and population relate to the traditional cost considerations (comprising of RELPRICE, PAYRATIO and POP) whilst relative productivity changes depicts the variable measuring Baumol's cost disease hypothesis (namely, MPROD). Our estimating equation highlighting these factors is :

$$\begin{aligned}
 RSHARE = & \mathbf{b1} + \mathbf{b2} RELPRICE + \mathbf{b3} PAYRATIO + \mathbf{b4} POP + \mathbf{b5} MPROD + \mathbf{e2}
 \end{aligned} \tag{11}$$

To recapitulate, the predictions are that  $\beta_2$  will bear a positive relationship with supply of government output, whereas  $\beta_3$  and  $\beta_5$  will be negative. The sign of  $\beta_4$  will identify the situation of economies or diseconomies of scale in the relative provision of real government services.

The final equation in our estimation model relates to the role played by public sector employees (GOVEMP) within our analysis. The need for this separate equation arises from two sources. Firstly, the demand and supply equations (equations 9 and 10) must be estimated simultaneously because of the mutual interdependence of the price and quantity variables inherent in these equations. Accordingly, a three stage estimation technique is employed. Secondly, for the results generated to be regarded as tests of the proposed theories, it is crucial that the remaining variables on the right hand side are essentially exogenous. This condition gives rise to the problem posed by the GOVEMP variable in the demand equation (equation 9). On one hand, it has been argued that government employees form a potent interest group

and hence support larger government size. However, more staff are also needed in order to provide more government output. This two way relationship between GOVEMP and RSHARE necessitates a separation of the central aspects of their mutual interdependence. Otherwise, the strength of a particular coefficient may be attributed to a wrong theoretical reasoning. This third equation is made up of the variables used by FW as,

$$GOVEMP = \beta_1 + \beta_2 RSHARE + \beta_3 RELPRICE + \beta_4 RWAGEG + \beta_5 RWAGEPS + \beta_6 UNION + e^3 \quad (12)$$

Based on the theory of derived factor demand,  $\beta_2$  and  $\beta_3$  are predicted as positive. By striving to economise on relative labour costs,  $\beta_4$  is expected to be negative and  $\beta_5$  positive. Finally,  $\beta_6$  is also predicted to be positive.

The testing period spans from 1960 to 1995, with 1960 as the base year. This helps establish a firm basis for comparison of results with the U.S. experience as part of this period, from 1960 until 1989, overlaps that of FW.

## 6. EMPIRICAL RESULTS

### Demand side variables

We begin by testing the hypothesis connected with the traditional choice variables, price and income, followed by the remaining rows in Table 1. The results for the demand equation are listed in columns 1 and 2. Columns marked (a) and (b) distinguish between the transfer inclusive and exclusive measures of government size respectively.

Beginning with the own-price coefficients (RELPRICE), we note a rather mixed set of results. In the supply equation, both supply price coefficients under each measure of government size conform to the expectation that price increases will generate upward movements along an upward sloping supply curve. These positive coefficients are significantly different from zero as well. By contrast, the estimates of the own-price effects on demand equations contradict the expected signs in each case, and only the transfer exclusive coefficient is found to be significantly different from zero.

Turning to the empirical validity of income per capita (YPC), used here to test Wagner's law, an income elasticity of real government expenditure as greater than one will hold only if the regression coefficients are significantly positive. The underlying reasoning dictates that for real government expenditure to portray an elasticity greater than one, an increase in the share of government in income should be observed. An inspection of the

coefficients confirms that none of the regression estimates are significantly different from zero when the confidence interval is set at five per cent. However, increasing this confidence interval to seven per cent indicated that government expenditure with transfers declined as income rose. This might infer that as income increases, demand for government output increases by a lesser proportion.

The demand side variables used to meter the intensity of interest group strength as a cause of government growth include bureaucrats (GOVEMP), the rural voice (FARMPOP), the elderly population (AGEDPOP) and union power (UNION). For the two public choice variables for which specific signs are predicted, the regression estimates suggest that only bureaucrats (GOVEMP) exhibit a powerful role in explaining (RSHARE) variations. These coefficients are also significantly positive.

However, the sign of the (FARMPOP) estimates indicates an inverse relationship with government size, implying that this variable does not explain government growth. Furthermore, the coefficients are not significant either. Hence we can infer that in the Australian context, the hypothesis that the stronger these two interest groups get, the larger governments become, holds only in the case of the former variable. It is this “bureaucratic strength” that necessitates the separation of this variable to be tested as a third equation in order to remove any endogeneity of government employment.

The coefficients on the second set of public choice variables (UNION and AGEDPOP) assist, to some extent, to resolve the opposing arguments prevailing within these two interest groups. Whereas the coefficients suggest that a growth in the population over 65 years of age translates into an increase in real government size, the values are not significantly different from zero. Notwithstanding the results hinting at conflicting incentives facing this group, it appears the elderly are not an effective lobby group in Australia. The role of trade unions suffers a similar fate. Despite suggesting that larger unions actually decrease government size, these findings cannot be substantiated since the coefficients are not statistically significantly negative.

The remaining variables are associated with the Kau and Rubin (1981) tax collection cost hypothesis, which maintains that changes in the economic organisation structure will render greater ease for governments to monitor and collect taxes from economic activity (Ferris and West, 1996, p.549). Put differently, larger governments can be expected as a consequence of lower tax collection costs. Of the four variables used to determine the empirical validity of this hypothesis, only the self employed (SE) coefficients show the expected sign and are significantly different from zero. This suggests that with more self

employment in the economy, the propensity to pay less taxes by not fully declaring income earned rises as well. As a result, more resources are consumed to monitor and track such behaviour, so that growth in government size will be constrained.

The results generated for the female participation rate (FPART) and internationalisation of the economy (BPRATIO) variables both contain signs contrary to expectations. Moreover, only (FPART) is significantly different from zero. The coefficient indicates that as more women join the workforce, the relative size of government shrinks. The result is theoretically suspect since the Kau and Rubin (1981) analysis prescribes that because a potentially higher level of tax revenue exists when the labour force grows, the government should be able to spend more. By contrast, any allowance received by wives without jobs from their husbands is regarded as untaxable. In light of this ambiguity, we draw the conclusion that the Kau and Rubin (1981) postulate pertaining to female participation in the economy does not hold in Australia's case.



**TABLE 2**

**THREE STAGE LEAST SQUARES ESTIMATES OF REAL GOVERNMENT SIZE,  
AUSTRALIA, 1960-1995**

Demand Equation	1 (a)	2 (b)	Supply Equation	3 (a)	4 (b)	Govemp Equation	5 (a)	6 (b)
Dep.var. : RSHARE			Dep.var.: RSHARE			Dep.var.: GOVEMP		
Constant	2.046* (2.318)	1.7451* (2.763)	Constant	0.489 (1.508)	-0.025 (0.092)	Constant	-0.003 (0.873)	0.005 (0.884)
RELPRICE	0.194 (0.39)	1.007* (2.859)	RELPRICE	1.200* (4.122)	1.253* (5.138)	RSHARE	0.006 (2.382)	0.010* (1.221)
YPC	69889 (0.183)	0.192E+06 (0.706)	PAYRATIO	-0.011 (0.811)	-0.005 (0.403)	RELPRICE	0.021* (3.365)	0.011 (1.221)
GOVEMP	68.321* (3.059)	36.343 (2.244)	POP	-0.159 E05* (8.925)	-0.795E-06* (5.308)	RWAGEG	-0.022 (1.602)	-0.256* (2.941)
FARMPOP	-2.337 (0.411)	-7.197 (1.757)	MPROD	0.273 E-06* (7.487)	0.164 E-06* (5.367)	RWAGEPS	-0.0004 (0.289)	-0.001 (0.875)
AGEDPOP	0.819 E-07 (1.52)	0.909 E-08 (0.164)				UNION	0.002 (0.411)	0.002 (0.369)
UNION	-0.091 (0.558)	-0.097 (0.854)						
SE	-1.435* (4.997)	-0.925* (4.516)						
FPART	-0.077* (3.199)	-0.049* (2.792)						
URBAN	-0.374 E-08 (0.292)	-0.102 E-07 (1.105)						
BPRATIO	0.029 (1.064)	0.015 (0.798)						
R <sup>2</sup>	0.842	0.944		0.930	0.952		0.844	0.832
S.E.	0.009	0.003		0.004	0.003		0.21 E-05	0.23 E-05

Column (a) 3 equation estimate with transfer exclusive measure of government size and GOVEMP endogenous.

Column (b) : 3 equation estimate with transfer inclusive measure of government size.

T- statistics in parentheses ; \* significantly different from zero at 5%.

Insofar as greater internationalisation of market activity (BPRATIO) is concerned, the Kau and Rubin (1981) hypothesis maintains that by going global, firms can be readily taxed by governments, since that aspect of their business activity will become visible to the government. However, our estimates lend support to the theory that with a greater amount of business conducted internationally, firms are able to avoid domestic taxes. This argument appears plausible since tax breaks offered to foreign firms comprise a critical criterion in their international operational decisions, together with production costs, etc.

The final variable relates to the rate of urbanisation (URBAN). It is argued that if more opportunities are available to closely located taxpayers to engage in methods of arranging economic activities, such that tax payments may be lowered or even avoided, then the income missed by tax collectors implies that the government would be unable to expand. It exhibits the expected sign but is insignificant.

Overall, our empirical exercise involving variables contained in the demand side theories provided contradictory findings. Whilst support for some variables exists, conclusive evidence of the explanatory strength of any theory listed on the demand side is absent.

### **Supply side variables**

In Table 1, columns 3 and 4 present the estimates derived for the supply equation. The price coefficient (RELPRICE) confirms the theoretical prediction that increases in the supply of government output are cost driven. Furthermore, growing real input cost of government employees relative to private sector employees, measured by (PAYRATIO), somewhat reduces the real size of government. Put differently, the data does not support the publicness theory of government output provision. The population variable (POP) reveals an inverse relationship with government size, implying diseconomies of scale instead of economies of scale in providing government output. The final supply variable also attracts no support in our estimates. Whilst (MPROD) was expected to be negative, since the labour intensive government sector would generally trail the more innovative capital intensive private sector (such as the manufacturing sector in overall productivity), we find that no evidence of this relationship existing in this instance. Thus Baumol's cost disease hypothesis of lagging public sector productivity with respect to the private sector does not appear to hold in these circumstances.

### **Government employment equation**

Of the five variables in this equation which endogenise government employment and account for the supply side interaction of employment and output, three variables (RSHARE, RELPRICE and UNION) perform well as predicted by the cost minimisation theory. However, these are not all significantly different from zero at five per cent level. The real government size coefficients (RSHARE) conform to the prediction that greater output levels will translate into the use of more labour. However, this is only true in the transfer inclusive measure of government size case. By contrast, the relative price of government output coefficients (RELPRICE) shows that a rise in the price of government services will entail a stronger stream of labour inflow into the public sector, thus increasing government size. However, this only holds in the case of the transfer exclusive measure of government. One plausible conclusion that can be drawn is that price changes do not affect government output (and employment) levels in the transfer measure since the framework for a social security program is already firmly in place. Perhaps only a reallocation of resources ensues. Similarly for (RSHARE), more employees will be needed in response to higher output levels when transfers are included. This may be ascribed to the fact that gradually a growing proportion of the budget is set aside for social security. At this stage, these explanations may at best be only speculative.

The coefficients of real public sector wages (RWAGEG) signifies that as labour input costs rise, employment levels in the public sector will fall. In common with the case discussed above, only partial support was recorded for the (RWAGEG) variable. The estimates are significant only in the transfer inclusive measure although both estimates display the expected signs. The results generated for the private sector wage (RWAGEPS) impact on government size are not significantly different from zero. Finally, the effect of unions (UNION) on government employment is positive but also not significant.

The consolidated findings from our empirical analysis are contrary to those reported by FW. Using the same variables they employed, none of the theories seem to explain the growth of the Australian public sector. We have seen that, at best, only qualified support exists for some variables.

### **Results using different variables**

Since utilising the FW model yielded rather unsatisfactory results, we explored the empirical validity of Wagner's law and interest group theories in the Australian context using several additional variables. The interest group hypothesis now includes the number of farmers

(FARMPOP), proportion of population over 65 (AGEDPOP) and the number of students (STUNOS). Traditionally, the agricultural sector forms a significant proportion of the economy, whilst the over 65 population has become a steadily growing group as well. The large student population in Australia may play an important role in affecting government size since their concerns typically relate to Austudy, government spending on education, the job market and so on. Altogether, we expect these three major interest groups in Australia to bear a positive correlation with real government size.

Amongst the various versions of Wagner's law, the model involving structural changes in the economy that contribute to government size is tested in this instance. During the period under review, the structure of the Australian economy has gradually shifted in focus from the agricultural sector to the manufacturing sector in terms of proportion of GDP. Annual agricultural output as a proportion of total output (AG) is one variable that is tested. Furthermore, total employment in the manufacturing sector as a proportion of total employment in the economy (MEMP) is also included. These variables are used to measure the extent of restructuring in the economy. It can be argued that a larger agricultural sector facilitates a larger presence of government in the form of tax incentives to farmers and drought relief etc. The infrastructure necessary to support the manufacturing sector is measured by the (URBAN) variable which considers the number of motor vehicles registered. The analysis is simplified by assuming that a rail network is crucial for the agriculture sector whilst an efficient road network system is essential for the manufacturing sector. In all, positive signs are predicted for both the (AG) and (URBAN) variables and a negative sign is expected for the (MEMP) variable.

An ordinary least squares regression analysis is conducted. As before, both transfer inclusive and exclusive measures of government expenditure are incorporated. Our findings are detailed in Table 2. Under both measures of government size, the (URBAN) variable testing Wagner's law conforms with our hypothesis that a better organised road network sustains the manufacturing sector. The remaining variables (AG and MEMP) portray conflicting signs under both classifications of government expenditure and are also not significantly different from zero.

In terms of the interest group theory, none of the variables display the predicted sign. However, it appears from the (AGEDPOP) coefficients that government size actually contracts as this group grows. One conclusion that may be drawn here is this group probably begins to use their pensions and savings and relies less on government assistance.

**TABLE 3**  
**ORDINARY LEAST SQUARES ESTIMATES OF REAL GOVERNMENT SIZE,**  
**AUSTRALIA, 1960-1995**

Dep. Var. : RSHARE	1 (a)	2 (b) Dep. Var. RSHARE
CONSTANT	1.242* (2.654)	0.999* (2.347)
URBAN	0.325 E-06* (5.373)	0.256 E-06* (4.425)
AG	-0.2311 (0.155)	0.548 (0.438)
MEMP	0.245 (0.345)	-0.285 (0.048)
FARMPOP	-0.213 (1.310)	-0.156 (1.173)
AGEDPOP	-0.183 E-05* (5.854)	-0.115 E-05* (3.654)
STUNOS	0.261 E-06 (1.414)	-0.148 E-06 (0.827)
R <sup>2</sup>	0.924	0.947
S.E.	0.005	0.004

Column (a) : OLS estimate with transfer exclusive measure of government size.

Column (b) : OLS estimate with transfer inclusive measure of government size.

T- statistics in parentheses ; \* significantly different from zero at 5% .

## 7. CONCLUSION

We set out to derive empirical measures of four theories purporting to explain the growth of the Australian real government size using the methodology developed by FW. We hoped to determine whether the same four theories would also generate as much empirical support when applied in the Australian context. Although intended to yield comparable estimates with the U.S. experience, the main operational concern of this empirical research relates to incompatible data for some variables in several occasions. A broad example of this drawback

involves earlier national accounts editions with a narrower scope than more recent ones, in terms of data categories.

The main finding of our empirical exercise is that when applied to the Australian case, the theories and their underlying empirical variables do not explain the real growth of the Australian government size. Whether the analysis is conducted for government size with or without transfers appears to have no bearing on the results. This is in stark contrast to the overwhelming support churned out for these theories in the U.S. case.

A plausible explanation lies in the choice of variables used to test the explanatory strength of each theory for at least two reasons. Firstly, the same set of variables were subject to different estimation techniques namely, log-based and lag-based tests. However, the results derived failed to muster any support for each theory's explanatory power as a cause of government growth. The exception being in the case of the transfer inclusive measure where support was found for Wagner's law and partial support for the Kau and Rubin (1981) ease of tax collection hypothesis.

Secondly, under the existing empirical literature, other possible variables may be identified under each of these four theories. This leads to the general argument that when tested using a set of different variables, support for these theories could perhaps be generated. Thus, even though the same phenomenon was experienced in both countries, opposing factors may have been influential.

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