The structure, level and rate of growth of government expenditure is frequently a crucial part of a Bank country economic mission's responsibility for making performance evaluations and policy prescriptions. In undertaking this task the economist cannot expect much assistance from the literature on public finance which is to a large extent barren on adequately developed theory of public expenditure, in general, and of studies on "operational" issues of public expenditure, in particular.

The Domestic Finance of Developing Countries Division has recently initiated long term research on the public expenditure problems of interest to the Bank. The focus of these studies will be primarily upon these problems as they arise in the developing countries of Africa.

The present paper highlights the conflicting empirical findings of various cross-section studies of the widely known Wagner's Law of public expenditure and it suggests a possible explanation of this conflict. It also points out the various interpretations given to the Law by different researchers.

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Domestic Finance of Developing Countries Division
Prepared by: Ved P. Gandhi
Wagner's Law of Public Expenditure: Do Recent Cross-Section Studies Confirm it?

I. Introduction

1. In the empirical investigations of the relationship between public expenditures and the level of economic development, generally known as the Wagner's "law of increasing state activities"1/ one comes across as many as five versions of the law:

   (i) According to some researchers what Adolph Wagner argued was "that government expenditure must increase at an even faster rate that output."2/ The symbolic statement of Wagner's Law, according to this version, appears to be that $E = f(GNP)$, where $E$ stands for the level of government expenditure and GNP stands for gross national product, and that the elasticity of public expenditure with respect to gross national product $\frac{\Delta E}{\Delta GNP}$ is greater than unity.

   (ii) According to another writer, briefly stated, Wagner asserted that in growing economies the share of public consumption expenditures in the national income increases.3/ The symbolic statement of Wagner's law, according to this version, seems to be that $C = f(Y)$, where $C$ stands for the level of government consumption expenditure and $Y$ stands for national income, and that the elasticity of government consumption expenditure with respect to national income $\frac{\Delta C}{\Delta Y}$ is greater than unity.

   (iii) Yet another writer writes, "Essentially, Wagner argued that as a nation experiences economic development and growth, an increase must occur in the activities of the public sector and that the ratio of increase, when converted into expenditure terms, would exceed the rate of increase in output per capita."4/ Symbolically, Wagner's law, according to this version, is that $E = f\left(\frac{GNP}{P}\right)$, where $E$ stands for the level of government expenditure and GNP stands for gross national product per capita, and that the elasticity of public expenditures with respect to gross national product $\frac{\Delta E}{\Delta \frac{GNP}{P}}$ is greater than unity.

1/ Following Adolph Wagner of the German Historical School in the late 19th Century.


(iv) According to Musgrave, "Ever since Adolph Wagner expounded his 'law of the expanding scale of state activity', economists have speculated on its validity and the underlying causes... The proposition of expanding scale, obviously, must be interpreted as postulating a rising share of the public sector... or ratio of public expenditure to GNP... in the context of the development of a country from low to high per capita income...". His version of the Wagner's law seems to assume a functional relationship of the form $E = f\left(\frac{GNP}{P}\right)$ and it appears that the validity of the law is established whenever the elasticity of public expenditure as a share of gross national product with respect to gross national product per capita is greater than unity.

(v) Yet another functional relationship attempted in testing Wagner's law has been $E = f\left(\frac{GNP}{P}\right)$. The focus of this particular exercise has been to find out whether or not the elasticity of public expenditures per capita with respect to gross national product per capita is greater than unity.

2. The main reason for so many different versions of Wagner's law, of course, is the author's own imprecision. "Wagner's style is so murky that my interpretation is open to some doubt", admits one researcher. "While there is no explicit statement in Wagner that the law of expanding scale relates to the share than the absolute level of public expenditures, occasional reference to 'quotas' suggests the former", presumes another researcher. It is no surprise, therefore, that researchers have tried to test different versions of the so-called Wagner's law.

3/ I am told that a detailed critique of Wagner's law and the data on which it is based is given in Herbert Timm, "Das Gesetz der wachsenden skaatsausgaben", Finanzarchiv, XXI, (September 1961), pp. 201-247.
6/ Maybe all these versions of Wagner's law would yield the same conclusion, when empirically tested with a given set of data, but then maybe they would not. There is obviously a need for an explicit statement of Wagner's law and the income elasticity which would establish or refute its validity.
3. However, a survey of literature reveals that the functional relationship which has been tested the most with the help of cross-section data is the one which correlates the public expenditure share (E/GNP) with the level of economic development (primarily GNP/P). Following Wagner, attempts have also been made to study the shares of various broad categories of public expenditures (like administration, education, economic services, etc.) in the gross national product individually to see if they are positively related to the gross national product per capita.

II. Objective

4. Till recently, it was generally believed that the share of government expenditure in gross national product (E/GNP) tends to rise with a rise in gross national product per capita (GNP/P). There have been at least four major cross-section studies based on different samples of developing and developed countries which provided the necessary empirical evidence in support of this relationship.

5. Lall's recent study pertaining to 46 developing countries from all over the world, revealed the non-existence of any relationship between E/GNP and GNP/P. He also found no relationship between the shares of various individual functional categories of government expenditures in the gross national product and gross national product per capita.

6. More recently, Musgrave has questioned the validity of positive relationship between (current) government expenditure share and per capita income with his cross-section sample of less-developed countries.

1/ As against this the version of Wagner's law which has been empirically tested the most with time series data is the one which hypothesizes a strong positive relationship between E and GNP, with e E.GNP being greater than unity.

2/ Wagner felt that his law held good as much for the various types of public expenditures as it did for the aggregate of all public expenditures. See Alan T. Peacock and Jack Wiseman, op. cit., p. 18 and Richard A. Musgrave, op. cit., p. 75.


7. The simple correlation matrix of yet another study of government expenditure of 37 developing countries (with per capita gross national product of US$ 800 or less) suggests the non-existence of a significant relationship between the shares of social welfare, education and health, defense, economic services, and total expenditures respectively in the gross national product and the per capita income.1/

8. My own exercises relating to government administration expenditure,2/ civil consumption expenditure,3/ and government expenditure on education4/ for about 25 developing African countries lend support to the findings of the above-mentioned studies.

9. I propose to advance in this note one possible explanation5/ for these conflicting empirical findings and hope that it would help resolve the differences between the various cross-section studies and provide a proper perspective to future research in this area. The core of my argument below is that one is likely to get conflicting results in such a situation when one uses a cross-section sample of less-developed countries as against that of a sample containing both developed and less-developed countries. And this appears to be precisely the major underlying difference between the above-mentioned studies.

III. The Argument and Basic Conditions

10. Let me pose the question in this fashion: Assuming that we have a cross-section sample in which countries have different per capita gross national products and public expenditure shares, under what conditions would we find rising $E$ with a rising $\frac{GNP}{P}$?

1/ Joergen R. Lotz, "Patterns of Government Spending in Developing Countries", (Unpublished Paper). Lotz wrote this paper while he was on the staff of the Fiscal Affairs Department of the IMF.


5/ Other possible factors contributing to the conflicting results of various cross-section studies might be the differences in the reliability of data, errors in measurements, institutional arrangements in various countries, etc. It is difficult, if not impossible, to isolate the role of these factors in the conflict.
11. A rising $\frac{\Delta \text{GNP}}{\text{GNP}}$ implies that

$$\frac{\Delta \text{GNP}}{\text{GNP}} > \frac{\Delta P}{P}$$

12. Now, if $E$ is to rise, $E$ must increase faster than GNP.

Or, in otherwords,

$$\frac{\Delta E}{E} > \frac{\Delta \text{GNP}}{\text{GNP}}$$

13. If, therefore, both $\frac{\text{GNP}}{P}$ and $E$ are to rise together

$$\frac{\Delta E}{E} > \frac{\Delta \text{GNP}}{\text{GNP}} > \frac{\Delta P}{P} \quad \text{(i)}$$

14. Let us assume that $E$ is functionally related to GNP and $P$. (The former factor influences both the demand for and supply of public goods and the latter affects primarily the demand for public goods). Assume further that GNP is functionally related to $P$.

15. Let us denote the (national) income elasticity of government expenditure by $e_1$ where

$$e_1 = \frac{\Delta E/E}{\Delta \text{GNP}/\text{GNP}}$$

or

$$\frac{\Delta E}{E} = e_1 \frac{\Delta \text{GNP}}{\text{GNP}} \quad \text{(ii)}$$

16. Let us then denote the elasticity of government expenditure with respect to population by $e_2$ where

$$e_2 = \frac{\Delta E/E}{\Delta P/P}$$

or

$$\frac{\Delta E}{E} = e_2 \frac{\Delta P}{P} \quad \text{(iii)}$$

Under conditions of constant costs or price stability, $e_2$ should represent an "index" of improvement in the per capita quantity and/or quality of public services.

17. Lastly, let us denote the elasticity of gross national product with respect to population by $e_3$ where

$$e_3 = \frac{\Delta \text{GNP}/\text{GNP}}{\Delta P/P}$$

or

$$\frac{\Delta \text{GNP}}{\text{GNP}} = e_3 \frac{\Delta P}{P} \quad \text{(iv)}$$
Under the assumptions of constant labor participation rate and homogenous production functions, \( e_3 \) would represent an "index" of change in labor productivity.

18. Given (ii) and (iii) above, if inequality (i) is to be satisfied

\[
\frac{\Delta E}{E} > \frac{\Delta GNP}{GNP} > \frac{\Delta P}{P}
\]

or

\[
e_1 \cdot \frac{\Delta GNP}{GNP} > \frac{\Delta GNP}{GNP} > \frac{\Delta GNP}{GNP} \cdot \frac{e_1}{e_2}.
\]

or

\[
e_1 > 1 > \frac{e_1}{e_2}
\]

From (iii) and (iv) one finds that \( e_1 = \frac{1}{e_2} \) so that the same condition can also be written as

\[
e_2 > \frac{e_3}{e_1} > 1
\]

19. To sum up, for \( E \) to rise with a rise in \( GNP \), two basic conditions must be simultaneously satisfied:

(a) The (national) income elasticity of total public expenditure (or any particular category thereof, for Wagner's law is supposed to hold good for them as well) must be greater than unity. 1/

(b) The per capita quantity of public goods must increase and/or quality of public goods must improve significantly, assuming constant cost conditions, as population increases. More precisely, this requires that \( e_2 \) is greater than \( e_1 \). The latter condition can also be stated in terms of the "index" of change of labor productivity or the population elasticity of gross national product (\( e_3 \)). The requirement here is that \( e_3 \) must be greater than unity which implies that "index" of labor productivity change must be rising. More precisely, the condition here is that \( e_3 \) must be greater than unity but less than \( e_1 \).

20. It is perhaps easy to see now why the probability that these conditions would be satisfied is much greater in the case of a sample including both developed and less-developed countries than in the case of a sample which includes less-developed countries alone.

IV. Income Elasticity of Public Expenditures

21. The income elasticity of public expenditures or \( e_1 \) depends upon the income elasticity of tax revenues (\( e_t \)), the level of non-tax government receipts

1/ This is suggested to be a more precise statement of Wagner's law in contemporary terminology. See Irving J. Goffman, op. cit., pp. 359-64. Goffman suggests that an empirical test of Wagner's law must always be carried out in terms of the income elasticity of demand for public goods and services, i.e. \( e_1 \), and not in terms of the direction of the movement of the \( E/GNP \) ratio.
including domestic and foreign debts (N) and the income elasticity of non-tax receipts ($e_n$). The theoretical relationship between these variables, assuming a balanced budget, can be shown as follows:

$$E = T + N$$

where $E$ = government expenditure, $T$ = tax revenues and $N$ = non-tax government receipts.

$$\Delta E = \Delta T + \Delta N$$

$$\frac{\Delta E}{T} = \frac{\Delta T}{T} \cdot T + \frac{\Delta N}{N} \cdot N$$

where $e_t$ = income elasticity of tax revenue, $Y$ = national income, and $e_n$ = income elasticity of non-tax government receipts.

$$\frac{\Delta E}{E} = \frac{\Delta Y}{Y((e_t \cdot T + e_n \cdot N)}$$

or $e_1 = \frac{e_t \cdot T + e_n \cdot N}{E}$

where $e_1$ = income elasticity of public expenditures. Therefore,

$$e_1 = \frac{e_t \cdot T + e_n \cdot N - e_t \cdot N + e_t \cdot N}{E}$$

or $e_1 = \frac{e_t - (e_t - e_n) \cdot N}{E}$

Assuming that

(a) $N > 0$

(b) $\frac{N}{E} < 1$

and (c) $e_t > e_n$

it is obvious that $e_1$ would be less than $e_t$.

22. Now the income elasticity of tax revenues ($e_t$) in less-developed countries is generally constrained by a very large amount of unsatisfied private essential needs on which an increment of income primarily gets spent. This consequently limits the taxable capacity and thereby the (national) income elasticity of tax revenues.1/

1/ Our attempt at a double-log relationship between tax receipts ($T$) and gross national product (GNP) of 25 African countries for 1965 (data source: UN Statistical Yearbook, 1967) has yielded the (national) income elasticity of tax revenues ($e_t$) of 1.09 ($R^2 = 0.89$) which obviously is not very much higher than unity.
23. So far as the ratio $N/E$ is concerned, one could expect it to be relatively high for less-developed countries. The obvious reason for this is that lesser developed a country, the lesser would be the taxable capacity of its population and, in all probability, higher would be the reliance of its government on non-tax receipts for meeting the country's public expenditure needs.\(^1\)

24. The income elasticity of non-tax government receipts ($e_n$) could be assumed to be relatively small, normally smaller than unity, in less-developed as well as more-developed countries.

25. The interaction of these forces would be such as to yield a less than unity income elasticity of public expenditures in less-developed countries and more than unity income elasticity of public expenditures in more advanced countries.\(^2\) This is, however, not to deny that government of a particular country, or even governments of various less-developed countries, can influence this elasticity significantly by undertaking major planned or unplanned public expenditure programs.

26. The limited evidence that exists on this question appears to support our generalization. Our own exercises reveal that the (national) income elasticity of civil consumption expenditure and government administration expenditure derived from a sample of 25 African countries were 0.87 ($R^2 = 0.83$) and 0.92 ($R^2 = 0.82$) respectively for the year 1965.\(^3\) Blot-Debeauvais exercise for education expenditure in developing countries reveal that the (national) income elasticity for such expenditures was less than unity for the sample of 82 countries with per capita income of US$ 575 in 1961.\(^4\) In fact, for 74 developing countries of Africa, Asia and Latin America the income elasticity of education expenditures was found to be only 0.95 for the year 1960.\(^5\)

27. This picture is found to be substantially changed when developed countries are included in the sample, for their income elasticity of public expenditure is generally greater than unity. To quote Blot-Debeauvais again,

\(^1\) While $N$ varies from country to country (it was as low as 0.08 for Togo and as high as 0.63 for Malawi for the year 1966), the average for Africa appears to be 0.35 (Kenya = 0.39, Nigeria = 0.36, Tanzania = 0.36, U.A.R. = 0.34). As against this, $N/E$ for more developed countries was smaller in 1966; Germany = 0.05, France = 0.09, Sweden = 0.11, Switzerland = 0.15, U.K. = 0.12 and USA (Federal Government only) = 0.05.

\(^2\) Just to illustrate, if $e_t = 1.10$ and $N/E = 0.35$, $e_1$ would be less than unity for $e_n = 0.80$. This perhaps is the situation in the case of a sample of less-developed countries. As against this in more developed countries $e_t$ may be around 1.50, $N/E$ around 0.10, and, given $e_n = 0.80$, $e_1$ would be more than unity.


\(^5\) ibid, Table 1, p. 75.
the national income elasticity of public expenditure on education in a sample of 19 industrialized countries was 1.10 for the year 1960. Consequently, when one considers a sample of both developed and less-developed countries the income elasticity of public expenditure is raised above unity.

28. Blot-Debeauvais and Edding-Berstecher, who worked independently on different cross-section samples of developed and less-developed countries, found the (national) income elasticity of education expenditure to be 1.07 for the year 1961.

V. Quantity and Quality of Public Services

29. With reference to the second basic condition derived above, once again, the probability that per capita quantity of public goods would increase and/or their quality improved, as population increased, would be much greater for a sample which included the developed countries than that which excluded them. Our own exercises on civil consumption expenditure suggests a value of only 0.78 ($R^2 = 0.83$) for a cross-section of 24 African countries in 1965.

30. Although I do not have the necessary empirical evidence readily available on this question, I would expect that the dynamics of income and production growth patterns in the developed economies would generate demand for an improvement in the (per capita) quantity and quality of various public services and that relatively larger taxable capacity of their populations would make the fulfillment of such demands feasible.

31. One can also consider the basic condition (b) in terms of $e_3$ or the population elasticity of gross national product. Here, once again, due to an acute shortage of capital or technical know-how, one can expect the index of growth of labor productivity to be relatively lower in less-developed countries than in more developed countries. Or, more specifically, the probability that the rate of growth of gross national product ($\Delta GNP/GNP$) would be larger than the rate of growth of population ($\Delta P/P$), or that $e_3 > 1$, is much higher for a sample of more developed than for a sample of less-developed countries.

VI. Conclusion

32. Perhaps this note has raised more questions than it has answered. It admittedly has presented many hypotheses without providing adequate evidence on

1/ ibid, Table 1, p. 75.
2/ ibid, Table 2, p. 75.
4/ Concentrating on our own exercises on civil consumption expenditure (where $e_1 = 0.87$ and $e_2 = 0.78$) and government administrative expenditure (where $e_1 = 0.92$ and $e_2 = 0.96$) for a sample of 25 or 26 less-developed countries of Africa, we find that condition (v) in the text i.e., $e_1 > e_2$ is obviously not met with.


5/ In a study of US state and local finances, it was found that "the scope (quantity) and quality factor of local public services improved by 24 percent in the period 1955-65". See Lawrence R. Kegan and George P. Roniger, "The Outlook for State and Local Finance" in Fiscal Issues in the Future of Federalism, C.E.D., Supplementary Paper No. 23, (New York: Committee For Ec. Development, 1968), p. 256.
them. However, if these hypotheses are correct, a major cause of conflicting findings of various empirical cross-section studies on government expenditure shares might be the compositions of the samples used in these studies. The structural differences between the two kinds of samples are such as to significantly influence the values of $e_1$, $e_2$, and $e_3$.

33. It is, indeed, interesting that we have somewhat of a consistency in the conflict i.e., the empirical finding of a significantly positive relationship (between government expenditure share and gross national product per capita) in the studies covering samples of both developed and less-developed countries and the lack of any such relationship in the samples of less-developed countries alone.\footnote{Exception here being Richard S. Thorn, who for his sample of 32 less-developed countries, found a significant relationship between $E/GNP$ and $GNP/P$. See Richard S. Thorn, \textit{op. cit.}, Table 3, p. 40. However, he did not find the relationship between the ratio of social expenditure to gross national product and the gross national product per capita to be significant for 28 less-developed countries. See his Table 6, p. 44.} This suggests that perhaps sample composition has something to do with the cross-section findings on the validity of Wagner's law.