The Composition of Public Expenditure and Economic Growth: Can Anything be Learned from Swiss Data?

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1. INTRODUCTION

Although the relationship between government spending and economic growth has been one of the most studied issues in economics, up to recently it was not possible to draw a formal link between these variables. In neo-classical growth models, fiscal policies can affect the rate of growth during its transition to steady-state, but this steady-state itself is determined by the rate of technological progress and population growth, assumed exogenously given.

The development of endogenous growth models has provided the possibility for a more formal presentation of the interaction between government spending and economic growth. Unlike in early neo-classical growth theory, permanent changes in variables that are affected by government expenditure may, in these models, lead to a permanent shift in the steady-state growth rate. Through its influence on savings, fiscal policy can thus have an influence on the long-run growth rate of an economy.

In addition, such models also allow an analysis of the growth effects of different categories of public expenditure. Policy makers are thus provided with a potential tool to assess not only the long-run effects of government expenditure in general, but also those of its different components. This latter aspect could reveal itself to be particularly attractive and useful in helping the government set priorities, if it needs to reorient its spending, or in identifying possible areas for cuts in case of fiscal adjustment.

Empirically, however, the existence and the importance of a link between different fiscal expenditure categories and output growth have been difficult to assess. Although a number of empirical studies, mostly based on cross-country regressions, have been undertaken, their results proved to be quite ambiguous. One reason for this could be that the limited number of selected explanatory variables were not able to capture the high heterogeneity among the countries studied. As LEVINE and RENELT (1992) point out, slight alterations in the right-hand side variables and small changes in the sample of countries may significantly affect the empirical connection between policy indicators

and growth.

In this context, time series analyses could prove to be a useful complement. By testing whether permanent shifts in fiscal variables have yielded permanent movements in the growth rate of a given economy, the heterogeneity encountered in cross-country studies can be avoided and more robust results may be obtained. JONES (1995) has adopted such an approach to investigate the link between growth and total investment in OECD countries. This framework has, however, never been applied to fiscal spending.

This paper intends to fill this gap by applying JONES' approach to analyze the effects of fiscal expenditure on growth in the context of Switzerland. It examines whether any meaningful relationship can be observed within the limits imposed by data availability. The paper will proceed as follows. Section 2 will present a simple endogenous growth model, illustrating the existence of a long-run relationship between the steady-state growth rate and government expenditure. The results of previous cross-country empirical studies are then reviewed in Section 3. Section 4 describes our data set and presents the empirical analysis as well as the results for Switzerland. Some concluding remarks are given in Section 5.

2. THE MODEL

2.1 The environment

The economy is described by a simple overlapping generations model. Each generation lives two periods and is composed of risk-averse individuals. The number of individuals born at any time is constant and is normalized to one. An individual h born at time t consumes $c_t^h(t)$ in period t and $c_t^h(t+1)$ in period $t+1$ and has a utility function of the form:

$$U(c_t^h) = \sum_{i=1}^{2} \beta^{i-1} \ln c_t^h(i)$$

(1)

where b is the constant subjective rate of time preference.

Individuals work only when young, supplying inelastically one unit of labor and earning a real wage of $w_t^h(t)$. When they are old, they become entrepreneurs. They therefore consume only part of their first-period income and save the rest to finance their second-period business and consumption. There is only one good in this economy that can be either consumed or invested. It is produced by the older generation by combining the capital stock they have saved with labor supplied by the young.

In addition to this private sector, a public sector exists, which provides goods and services, G(t). Unlike in BARRO (1990), BARRO and SALA-I-MARTIN (1992) and CASHIN (1995), these goods and services are seen here not as additional factors of production

entering directly into the private production function but rather as variables having a spill-over effect on the productivity of private factors of production.

Following BARRO and SALA-I-MARTIN (1992) and CASHIN (1995), these goods and services are assumed to be subject to congestion. Every private agent can profit from such goods. However for a given amount of public spending G(t), the benefit she derives will decline as the size of the economy grows. G(t) could be, for example, expenditure on highways whose benefits would decrease as highway traffic increases. Agents will therefore consider in their individual production function the spill-over from the total level of public expenditure as measured in percent of total output, $G(t)/Y(t)$. This production process can be expressed by the following production function:

$$y(t) = \left[\frac{G(t)}{Y(t)} \underline{k}_{t-1}\right]^{\delta} k_{t-1}{}^{\alpha} L_t{}^{1-\alpha} \qquad \text{with } \delta + \alpha = 1 \tag{2}$$

k_{t-1} is the capital stock per firm, saved by generation t-1, and L_t is the labor force employed by an entrepreneur. As in BENCIVENGA and SMITH (1991), endogenous growth is achieved by the introduction of $\underline{k}_{t-1}$, the average capital stock, human and non-human, per firm at date t, representing a technological spill-over in the spirit of ROMER (1986). For simplicity, it is assumed that the capital stock, private and public, depreciates completely in one period.

Following BARRO (1990), public expenditure is assumed to be financed by levying a constant flat-rate income tax, τ. The budget constraint of the government can thus be written as:

$$G(t) = \tau Y(t) \tag{3}$$

2.2 Factor markets

Both factor markets are competitive. Labor and capital will thus be priced at their marginal productivity. The after tax clearing prices for the two factors of production will therefore be:

$$w_t{}^h(t) = (1-\tau)(1-\alpha)\left[\frac{G(t)}{Y(t)}\right]^{\delta} \underline{k}_{t-1} L_t{}^{-\alpha} \tag{4}$$

$$r_t(t+1) = (1-\tau)\alpha \underline{k}_t{}^{\delta}\left[\frac{G(t+1)}{Y(t+1)}\right]^{\delta} k_t{}^{\alpha-1} L_{t+1}{}^{1-\alpha} \tag{5}$$

2.3 Goods market

The goods market equilibrium requires that the demand for goods in each period be equal to the supply, or equivalently that investment be equal to savings:

$$S_t(t) = K_t(t+1) \qquad . \tag{6}$$

where $S_t(t)$ denotes savings and $K_t(t+1)$ the investment made by generation t, yielding a return in period $t+1$. Taking the average yields:

$$s_t^h(t) = \underline{k}_t(t+1) \tag{7}$$

2.4 Steady states

An agent h in period t will maximize an expected utility function of the following form:

$$MaxU(c_t^h) = \ln c_t^h(t) + \beta \ln c_t^h(t+1) \tag{8}$$

under his intertemporal budget constraint:

$$c_t^h(t) + \frac{c_t^h(t+1)}{r_t(t+1)} = w_t^h(t) \tag{9}$$

Solving this problem yields the following time paths for consumption and savings:

$$c_t^h(t) = \frac{w_t^h(t)}{1+\beta} \tag{10}$$

$$s_t^h(t) = w_t^h(t)\left(\frac{\beta}{1+\beta}\right) \tag{11}$$

Calculating the long-term growth rate of this economy yields:

$$\frac{Y(t+1)}{Y(t)} = \left(\frac{\underline{k}_t(t+1)}{\underline{k}_{t-1}(t)}\right) \tag{12}$$

The evolution of the technological spill-over factor, $\underline{k}_t$, is obtained using (4), (7) and (11):

$$\frac{\underline{k}_t(t+1)}{\underline{k}_{t-1}(t)} = \frac{\beta}{1+\beta}(1-\alpha)(1-\tau)\left[\frac{G(t)}{Y(t)}\right]^{\delta} L_t^{-\alpha}$$

(13)

Introducing equation (13) into (12) and linearizing by taking the logarithms allows us to describe the long-run evolution of output in this economy in the following way:

$$\Delta \ln Y(t+1) = \Delta \ln y(t+1) = a_1 + a_2 \ln\left[\frac{G(t)}{Y(t)}\right]$$

(14)

The long-run growth rate of output ($\Delta \ln Y$), which in our model is identical to the evolution of output per capita ($\Delta \ln y$), is a linear function of fiscal expenditure measured in percent of output. An increase in fiscal expenditure should be matched by an increase in the steady-state growth rate. This relationship will be tested in the remaining part of the paper for six functional categories of general government expenditure, namely education, health care, social welfare, transport, justice and national defense.

3. RECENT CROSS-COUNTRY EVIDENCE

A number of empirical studies analyzing the impact of fiscal spending on long-term growth have been undertaken, primarily focusing on public expenditure patterns in low and middle-income developing countries. This research is generally based on pooled time-series and cross-section data with notable differences in data coverage. It is therefore not surprising that no clear-cut results have been found. The conclusions drawn seem to be highly dependent on the number and types of countries included in the sample.

With respect to expenditure on human capital, for instance, OTANI and VILLANUEVA (1990) observe that spending on education and health has a significant positive effect on the rate of output growth. DIAMOND (1989) confirms these results. In contrast, DEVARAJAN, SWAROOP and ZOU (1996), EASTERLY and REBELO (1993), LANDAU (1986) and LEVINE and RENELT (1992) find that the ratio of government education expenditure to GDP is not robustly correlated with growth rates and is insignificant at best. These authors reach identical conclusions regarding public health care spending.

Theoretically, the effect of government spending on education and health is ambiguous. On one hand, government spending that promotes basic skills and helps improve public health is likely to enhance the productivity of the labor force and thus positively influence the growth rate of an economy. The potential productivity-enhancing effects from such expenditure could be expected, though, to diminish somewhat in case of a large-scale emigration of workers, a particular concern for developing countries. On the other hand, it can be argued that public spending on education and health care reduces the incentive for private households to save to cover their future spending on these items.

By lowering overall savings, such expenditure could therefore have a negative effect on the long-run growth rate.

Considering public expenditure on physical capital, CASHIN (1995) and HADJIMICHAEL et al. (1995) conclude that a higher share of government investment in GDP has a significant positive effect on output growth. In contrast, KNIGHT et al. (1993), LANDAU (1986) and LEVINE and RENELT (1992) find that there is no significant link between the ratio of government capital formation and growth rates. Evidence of a positive long-run relationship between growth and public investment in transport infrastructure, measured as a percentage share of GDP, is provided by EASTERLY and REBELO (1993). The result of their analysis which includes developing and developed countries seems, however, to unravel when the two groups of countries are distinguished. The conclusions of DEVARAJAN, SWAROOP and ZOU (1996) point to a significant negative influence of public expenditure on transport on the growth rate of developing countries. For developed countries, the significance of this expenditure variable becomes subject to the specification of the equation.

Governments may also enhance growth by improving the legal and institutional framework of their country, making sure private economic activity is not hampered and certain rules in society are being followed. Through expenditure aimed at fostering social and political stability (social transfer payments and spending on the legal system, public administration and national defense) the government can positively influence this environment. Adverse effects of these types of expenditure can, however, not be excluded. Once stability is reached, increases in public expenditure in these areas may become excessive and resource diverting, thus stifling private economic activity. As a potential military threat fades away, defense budgets may waste scarce resources and hurt a country's growth prospects. Likewise, social transfers can be argued to reduce the incentives for private households to save since their future consumption in case of unemployment or during retirement will be secured by public social benefits.

The theoretical ambiguities related to these kinds of expenditure are reflected in the empirical literature. While CASHIN (1995) and SALA-I-MARTIN (1996) find a significant positive effect of government transfers (defined as a share of social security and welfare expenditure in GDP) on output growth, LANDAU (1986) concludes that transfer spending has no significant impact on increases in GDP. Concerning military expenditure, DEGER (1986) finds evidence for a positive effect on output growth. Most of the studies such as BISWAS and RAM (1986), DEVARAJAN, SWAROOP and ZOU (1996), LANDAU (1986), LEVINE and RENELT (1992) and ASCHAUER (1989) report, however, no significant effect of defense expenditure on the growth rate. FAINI et al. (1984) even find that higher military spending (as a percentage of GDP) clearly reduces annual growth rates.

4. EMPIRICAL EVIDENCE FOR SWITZERLAND

4.1 Data description

Annual data on general government expenditure on education, health care, social welfare, transport as well as justice and national defense have been considered (Table 1). These spending categories were selected because they could be expected to generate positive externalities and thus have growth-enhancing effects on human capital, physical capital and political and social stability. The relevant annual figures were provided by the Swiss Federal Finance Administration. They cover the period from 1950 to 1994.

The choice of the sample period was imposed by data availability. In 1968, the classification of the items entering into these different categories was substantially modified. In that year, Switzerland changed its reporting system to adopt a UN-inspired classification, making the subsequent figures inconsistent with prior data. Fortunately, calculations according to the new system have been made for the years 1950, 1955, 1960 and 1965, thus allowing the reconstruction of the time series by interpolation starting in 1950.[1]

Table 1: Variables included in the analysis

Output variable (1):	
GROWTH	annual change in real GDP per capita (year-on-year)
Expenditure variables (2):	
EDUC	education/research (primary, secondary and professional schools; universities)
HEALTH	public health (hospitals, nursing homes, outpatient services)
SOCIAL	social welfare (old age and disability pensions, unemployment insurance, health insurance, welfare support, public housing)
TRANS	transport (road and railway infrastructure)
JUST	legal system/police (courts, prisons, police, public legal support)
DEF	national defense (military, civil defense)

(1) the 1975 growth rate is treated as an outlier and therefore excluded from the sample;
(2) expenditure in % of GDP; data on public spending after 1990 is reported according to the new classification.
Data sources: IMF (International Financial Statistics) and Swiss Federal Finance Administration («Die öffentlichen Finanzen der Schweiz»), various years.

1. The results of these estimations were compared with the evolution of some available sub-components of the expenditure categories and were found to broadly correspond.

The data cover general government spending, which means that they reflect the sum of federal government, cantonal and communal expenditure. Considering the nature of the Swiss political system in which different levels of government fulfill public functions, this comprehensive approach is especially important. Possible double-counting has been eliminated from the data. The different spending categories are expressed as percentage shares of GDP. Their time paths are shown in Figures 1a and 1b.

The evolution of spending on these different items reflect the changing nature of the role of the state and of the environment in which it operates. The GDP share of military expenditure has continuously declined over the considered period, reflecting the evolving situation in international security. For Switzerland, a country not directly exposed to any military threat, it has triggered a steady adjustment of outlays from a rather high level. In contrast, expenditure associated with the «welfare state» in a broad sense (education, health care and social welfare) has significantly expanded, especially between 1960 and 1980, as in other OECD countries. The social insurance system was, for instance, progressively broadened, leading to an extension of individual pension and disability entitlements as well as an increase in total spending on means-tested welfare support.

The growing importance of the car and the development of roads and highways explain the marked jump in expenditure allocated to transport infrastructure at the beginning of the 1960's. In the Swiss case, the introduction of a special tax on petrol designed to finance the construction and maintenance of the highway infrastructure was a major factor in boosting expenditure for these purposes.

Figure 1a: Development of real public expenditure: EDUC, HEALTH, SOCIAL
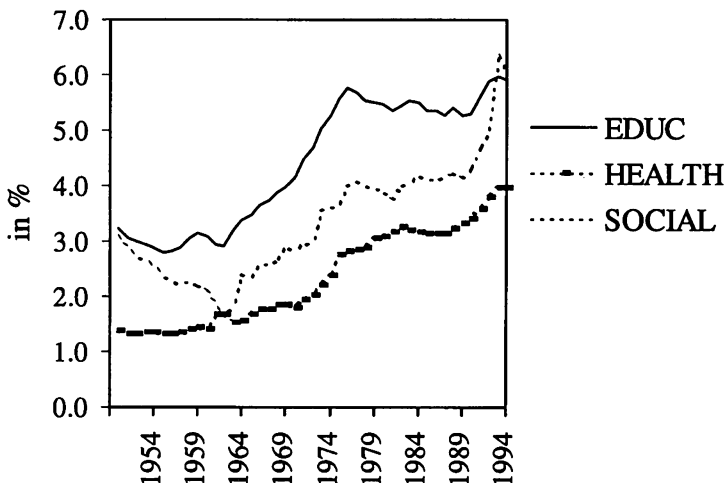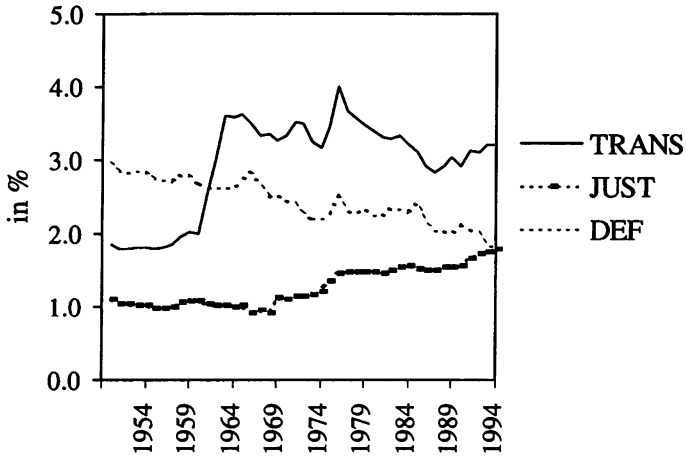
Figure 1b: Development of real public expenditure: TRANS, JUST, DEF

If the condition expressed in equation (14) held, these permanent changes in fiscal expenditure should have translated into permanent shifts in the growth rate of GDP. As shown in Figure 2, however, the growth rate of Swiss output per capita does not appear to have displayed any large permanent movement over the period considered. Rather, it seems to have experienced temporary fluctuations around a stable mean within a well-defined range.

Figure 2: Development of real GDP growth per capita
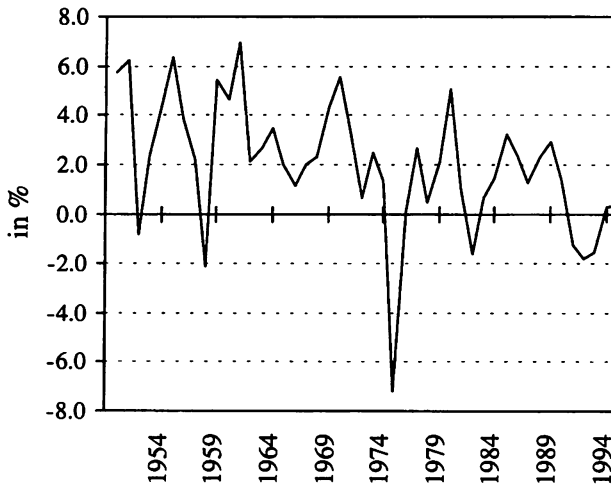
4.2 OLS estimations and dynamic responses

The series on fiscal expenditure and growth were tested for unit roots. Augmented Dickey-Fuller and Phillips-Perron tests were run and both tests rejected the null hypothesis of a unit root in GDP growth rates over the period 1950 to 1994. Based on economic theory, one would expect that these tests would also reject this hypothesis for the different spending categories, as the share of public expenditure in output should not grow indefinitely. The tests could not, however, reject the unit root hypothesis, indicating that these series may be characterized by an I(1) process.

As pointed out above, however, the data on public expenditure have the undesirable property of being prone to numerous structural shifts due to continuous changes in the legal framework for government spending and frequent adjustments of spending priorities within the recorded series. This specific problem with time-series has been discussed by SILVAPULLE (1996) who finds that a high number of such breaks is likely to bias the results of unit root tests towards non-rejection of the null hypothesis. This bias is further strengthened by the limited number of observations. In view of the presumably low indicative power of the unit root tests, the assumption of stationarity thus cannot a priori be rejected. Based on these arguments, we considered the expenditure data as stationary and ran OLS regressions. [2]

Equation (14) implies that a change in fiscal expenditure translates a period later into higher growth. Empirically, one would expect that this period extends over several years. In addition, the impact of other potential growth determinants needs to be considered, which can be achieved by introducing lagged growth as an explanatory variable. Reinterpreting equation (14) to allow fiscal expenditure and growth to interact over time and to take account of preceding growth would suggest the following dynamic relationship:

$$\Delta \ln y(t) = a_1 + a_2 \Delta \ln y(t-1) + B(L) \ln \left[\frac{G(t-1)}{Y(t-1)} \right] + \varepsilon_t$$

(15)

where $B(L)$ is a lag polynomial of order p. This equation can be rewritten as:

$$\Delta \ln y(t) = a_1 + a_2 \Delta \ln y(t-1) + B(1) \ln \left[\frac{G(t-1)}{Y(t-1)} \right] + C(L) \Delta \ln \left[\frac{G(t-1)}{Y(t-1)} \right] + \varepsilon_t$$

(16)

where $C(L)$ is a $(p-1)$th order lag polynomial such that:

2.   The possibility that the direction of causation could run from growth to public expenditure has been
      taken into account. It can be shown that all expenditure variables are likely to Granger cause growth.
      Moreover, the problems of simultaneity have been largely reduced by lagging the explanatory variables.

$$c_k = - \sum_{i=k+1}^{p} b_i \qquad\qquad k = 1,\ldots,p-1$$

The restriction implied by equation (14) can be interpreted in this dynamic relationship as the requirement that $B(1) > 0$, i.e. that the sum of the coefficients in the polynomial $B(L)$ is positive. A permanent shock to fiscal expenditure will in this case permanently raise the growth rate.

Equation (16) was estimated over the period 1950 to 1994, excluding 1975. In 1975, the oil-shock strongly affected Swiss output and has probably lowered the long-run trend of this variable. The growth rate at this date was therefore considered to be an outlier and this observation was omitted from the sample. The results of the regression are reported in Table 2. The number of lags and the order of the polynomials were set on the basis of the Akaike and Schwarz criteria.

Of the six categories of public expenditure considered, only two appear to have a significant permanent effect on the growth rate of the Swiss economy: education and health care. For the four others, the hypothesis $B(1) = 0$ cannot be rejected. The influence of education is positive and confirms the results obtained by OTANI and VILLANUEVA (1990) and by DIAMOND (1989) for instance. The effect of public spending on health care, by contrast, is negative, implying that in Switzerland increased expenditure on this item may not so much improve human capital as reduce the incentive for individuals to save, thus restraining long-run growth.

Fiscal expenditure on transport does not seem to have any statistically significant permanent effect on growth, as in LEVINE and RENELT (1992), LANDAU (1986) and KNIGHT et al. (1993). Consistent with LANDAU (1986), spending on social welfare has no significant impact on GDP growth either. The same is true for military expenditure as in BISWAS and RAM (1986), DEVARAJAN, SWAROOP and ZOU (1996), LANDAU (1986), LEVINE and RENELT (1992) and ASCHAUER (1989). These results remained robust when the statistically insignificant variables were omitted from the estimation (specifications [b] and [c] in Table 2).

Table 2: OLS estimation results

Dependent variable = GROWTH			
Independent variable	[a]	[b]	[c]
CONSTANT	−0.448**	−0.375**	−0.359**
	(2.371)	(3.625)	(5.359)
GROWTH $(t-1)$	0.239*	0.218*	0.205**
	(2.139)	(2.005)	(2.573)
EDUC $(t-1)$	0.528**	0.454**	0.450**
	(5.850)	(6.124)	(6.680)
HEALTH $(t-1)$	−0.260*	−0.358**	−0.347**
	(2.181)	(4.432)	(8.117)
SOCIAL $(t-1)$	0.014	0.004	–
	(0.213)	(0.058)	–
TRANS $(t-1)$	−0.062	−0.012	–
	(0.925)	(0.293)	–
JUST $(t-1)$	−0.241	–	–
	(1.482)	–	–
DEF $(t-1)$	0.009	–	–
	(0.058)	–	–
$\sum_{i=1}^{8} \Delta EDUC(t-1)$	−3.015** (4.108)	−2.700** (4.352)	−2.530** (7.951)
$\sum_{i=1}^{6} \Delta HEALTH(t-1)$	1.305** (3.204)	1.396** (3.797)	1.320** (5.040)
$\sum_{i=1}^{3} \Delta SOCIAL(t-1)$	−0.145 (0.889)	−0.142 (0.881)	−0.128 (1.548)
$\sum_{i=1}^{5} \Delta TRANS(t-1)$	0.437* (1.897)	0.194 (1.629)	0.204** (2.582)
$\sum_{i=1}^{5} \Delta JUST(t-1)$	0.331 (0.974)	−0.084 (0.434)	−0.124 (0.946)
$\sum_{i=1}^{4} \Delta DEF(t-1)$	−0.962** (2.311)	−0.971** (4.597)	−0.924** (6.102)
Adjusted R^2	0.913	0.911	0.924
No. of observations:	35	35	35

The order of the polynomials and the number of lags were optimized according to the Akaike and Schwarz criteria; all series are natural logs. Absolute t-values in parentheses: ** significant at the 5% level, * significant at the 10% level.

To illustrate the dynamic responses of the model, a permanent one percentage point increase in the ratios to GDP of the different expenditure categories has been simulated. For this purpose, the coefficients of estimation [c] were used. The results are plotted in Figures 3a and 3b. As one could expect, public spending on education has the longest dynamics. 10 years are required for such an increase to translate fully into a permanent shift of the long-run growth rate. Its impact has, however, also a clear positive temporary component as suggested by standard neo-classical growth models.

Health care also seems to exhibit such a positive short-run effect, strong enough to even offset, for some years, the permanent downward shift implied by an increase in spending on this item. The short-run effect could be due to improvements in the health of the population. Any illness or accident would be promptly and adequately cured and the productivity of the labor force would be enhanced. These transfers, however, reduce the incentive to save in view of a possible accident or serious illness. The impact on savings would therefore be negative and hence the long-run growth effect.

It is interesting to note the temporary negative influence exerted by an increase in military spending. Although this type of expenditure does not have any impact on the steady-state growth rate, it has an obvious temporary influence that could perhaps reflect a waste of resources. This effect could correspond to the one that FAINI et al. (1984) have observed. Unlike most of the literature, these authors found that higher military spending clearly reduces growth rates. The distinction between permanent and temporary effects could offer an explanation for their results. Accordingly, their findings are not necessarily in contradiction with the conclusions reached by other studies, but may simply reflect the fact that temporary effects can be different from permanent ones.

In this respect, the dynamic response of growth to a one percentage point increase in the ratio of spending on transport is even more interesting. Three effects can be observed. In the years following the increase, a crowding-out seems to occur inducing a negative temporary effect on growth. Then, as the projects are completed, the infrastructure built crowds in private investment and promotes growth. The permanent effect is, nevertheless, insignificant. DEVARAJAN, SWAROOP and ZOU (1996) observed a significantly negative influence of public expenditure on transport. CASHIN (1995), HADJIMICHAEL et al. (1995) and EASTERLY and REBELO (1993), by contrast, all found a positive effect, while LANDAU (1986), LEVINE and RENELT (1992) and KNIGHT et al. (1993) did not find any link whatsoever. These different results may be consistent and merely reflect the fact that they are referring to the same phenomenon but at different stages of its development.

Figure 3a: Dynamic response of the growth rate to a permanent one percentage point increase in the expenditure/GDP ratio: EDUC and HEALTH
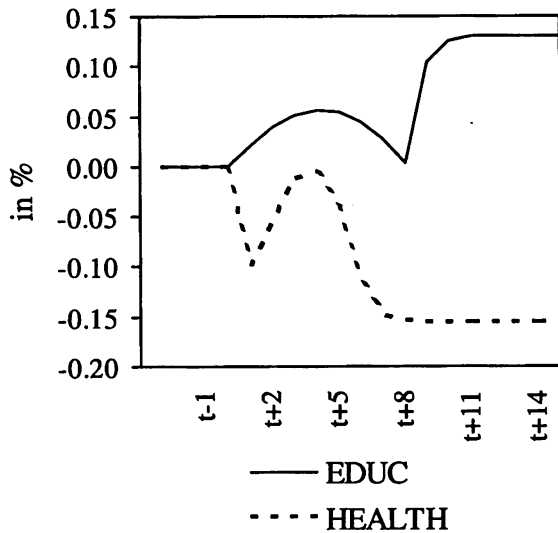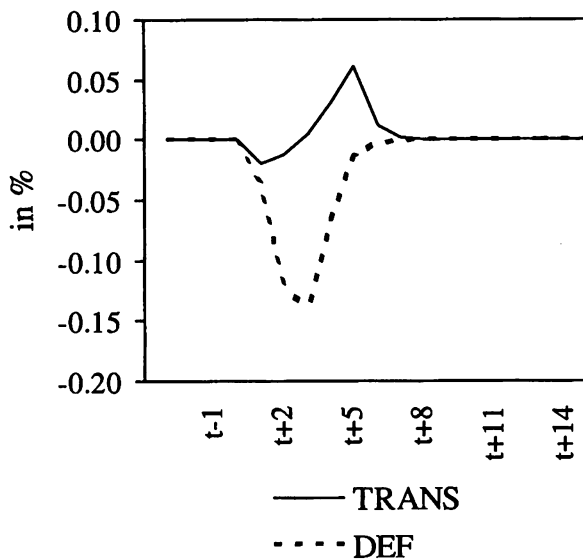

──── EDUC

- - - - HEALTH

Figure 3b: Dynamic response of the growth rate to a permanent one percentage point increase in the expenditure/GDP ratio: TRANS and DEF

──── TRANS

- - - - DEF

5. CONCLUSIONS

The development of endogenous growth models has allowed a more formal presentation of the link between fiscal expenditure, and even different categories of fiscal expenditure, and long-run growth rates. Empirically, however, the existence of this link is difficult to assess, existing literature reaching ambiguous and contradictory results. One reason for this could be that the limited number of selected explanatory variables are not able to capture the high heterogeneity among the countries included in a cross-country analysis.

This paper suggested that, if this were the case, time-series tests could usefully complement existing studies. If fiscal policy had a long-run effect on economic growth, then permanent shifts in public spending, or in some categories of public spending, would imply permanent movements in the growth rate. Such an approach is of course severely constrained by data availability. The size of the sample may not allow to reach results that are any more robust than those obtained in cross-country analyses.[3] Such a framework may nevertheless provide a new perspective on the issue, possibly reducing the ambiguity of existing results.

A preliminary analysis of Swiss data did not provide any hint of a long-run effect of fiscal policy on economic growth. OLS estimations, however, revealed some permanent influence. Two of the six categories of fiscal expenditure considered in this paper turned out to have a significant long-run effect on growth: education and health care. In addition, transport and military expenditure, although not affecting the steady-state growth rate, appeared to exert a temporary influence.

The dynamic responses on growth of an increase in spending on these different items indicated that the short-run effects of such increases can be rather different from their final permanent impact. Such discrepancies were particularly clear in the case of transport and military spending. Averaging these impacts and considering such observations across countries that may respond very differently to a given increase in fiscal spending may therefore yield misleading results, perhaps explaining some of the ambiguous and contradictory conclusions reached by the existing literature.

The results of the estimations would suggest that spending on education should be a priority for a government interested in promoting long-run growth. Health care, by contrast, would not be on its agenda. Even in the short-run, education would appear to be an interesting item to spend on. It needs less time than transport expenditure to translate into higher growth rates.

A government is, however, not only interested in promoting long-run economic growth. Its spending also has a redistributive function that aims at improving the welfare of its population. This improvement may not translate into national account figures.

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3. A recent comprehensive overview of the theoretical and empirical literature on the relationship between fiscal policy and long-run growth, including discussions on the robustness of empirical findings, is given by TANZI and ZEE (1996).

Therefore, it would be perfectly legitimate for a government to care for its old and sick even though it does not expect any positive growth effects from these activities.

Moreover, this analysis has not taken into account the interdependence between different instruments of fiscal policy. Growth rates depend not only on the spending behavior of a government but also on the level and composition of taxation. Depending on how the expenditure is financed, it may have a different impact on growth. This study focused only on the expenditure side, assuming taxation constant.

Furthermore, due to data constraints no adjustments accounting for shifts in the spending composition of each category of public expenditure over time were possible. In addition, goods and services provided by the government were assumed to be subject to congestion. This formulation might not be adequate. Fiscal expenditure was also assumed here to yield constant returns to scale. Continuously increasing the share of public spending in total output would continuously accelerate the growth rate of an economy. The possibility that fiscal policy faces decreasing returns to scale has not been considered. It is, however, conceivable that spending beyond a certain level, for at least some components of public expenditure, could simply be wasted or even be counterproductive. Such dynamic characteristics are not taken into account and could explain the insignificant effect of social expenditure and the negative influence of health care.

Finally, the findings do not allow to evaluate the cost-effectiveness of public expenditure in raising overall productivity in comparison to private spending. The private sector may be more efficient in providing some goods and services. In this case, although public spending on these items could be growth-promoting, this growth effect would be lower than the one achieved if the private sector were in charge. While this paper did not attempt to address this issue, it is a highly relevant topic for further study.

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SUMMARY

Using time-series tests, the paper provides evidence that fiscal spending can influence long-run growth. Data on six functional categories of public spending (education, health care, social welfare, transport, justice and national defense) over the period 1950 to 1994 are examined for Switzerland. Permanent growth effects are found only for two expenditure categories: education (positive) and health care (negative). In addition, higher spending on transport infrastructure and on defense appear to exert a temporary influence.

ZUSAMMENFASSUNG

Abgestützt auf Längsschnittanalysen gibt diese Untersuchung Hinweise darauf, dass die staatliche Ausgabenpolitik einen Einfluss auf das langfristige Wachstum haben kann. Gegenstand der Analyse sind schweizerische Datenreihen von 1950 bis 1994 für sechs Kategorien von Staatsausgaben (Ausbildung/Forschung, Transport, Gesundheitswesen, soziale Wohlfahrt, Justiz/Polizei, Landesverteidigung). Dauerhafte Wachstumswirkungen werden nur zwei dieser Ausgabenkategorien zugeschrieben: Der Ausbildung/Forschung (positiv) und dem Gesundheitswesen (negativ). Ferner scheinen höhere Staatsausgaben für Transportinfrastruktur und für die Landesverteidigung einen temporären Wachstumsimpuls zu erzeugen.

RESUME

Utilisant des séries temporelles, cette communication montre que les dépenses publiques peuvent influencer la croissance économique à long terme. Elle examine pour la Suisse des données sur six catégories fonctionnelles de dépenses publiques (enseignement, santé, prévoyance sociale, transport, justice et défense nationale) couvrant la période 1950 à 1994. Des effets permanents sur la croissance sont démontrés pour deux catégories: enseignement (positif) et santé (négatif). De plus, des dépenses accrues dans les domaines du transport et de la défense ont une influence temporaire.