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The Benefits of Gradualism in Government Expenditure Changes: Theory and Experimental Evidence

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Abstract

Government expenditure can be highly variable, if used as a countercyclical instrument, or as a response to economic crises or as a means of rapidly altering other features of the economy. An alternative policy setting is to keep government expenditure changes gradual and modest. It is shown that whether a more discretionary or a more stable usage of government expenditures better attains official sector macroeconomic goals is difficult to determine theoretically, in part because of missed risk effects. But the detecting which policy better meets the official sector macroeconomic goals from analysis of historical data or inter-country comparisons suffers from confounding events and institutions. This study offers a fresh insight from laboratory experiments. Our laboratory results favour gradualism in government expenditures, ie support the advocacy of more stable government expenditures offered in Friedman (1969), in Vernengo and Rochon (2000), and in the 2006 German tax change controversy, by that country's local government sector.

Key words: gradualism, shock therapy, discretionary or counter-cyclical government expenditure, laboratory experiments

JEL classification E600, E620, E690, D800, D900, B200

Format

Part 1 of this paper gives a bird's eye view of current thinking and how it evolved on whether or not gradualism is desirable in changes to government expenditures. Part 2 discusses difficulties in using our standard economic theory of choice under uncertainty to capture the differential risk effects of stable or responsive government expenditures. Part 3 discusses associated difficulties in using field data, qualitative or econometric to determine whether more stable government expenditures help or hinder official sector goals. Part 4 describes a laboratory experiment for getting fresh insights and its results.

1 Background

In support of variations in government expenditure, even shock therapy, Keynes gave a couple of radio broadcasts in 1928 and 1929, advocating increasing government

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expenditure on infrastructure (including ditch digging) without a corresponding increase in taxes (ie deficit funding) to aid Britain out of its slump. In his subsequent publications, Keynes' advocacy of deficit funding is absent even though he energetically advocated a steep increase in government expenditures whenever an economy fell into a depression. That shock therapy of an abrupt increase in government expenditure, should be in the form of transfer payments from the taxpayers to those entrepreneurs bold enough to invest in the depression.[1]

Keynes' advocacy of additional government expenditure to overcome depressions influenced many governments to avoid a sudden sharp drop in government expenditure with the cessation of hostilities after World War 2. Governments avoided doing so by switching government expenditures, eg in the US some government expenditures switched from paying soldiers to fight, to educating them after demobilization under the GI bill. Like switching policies in other countries kept government expenditure relatively stable world wide. This relative stability is credited with the avoidance of a recession in the mid to late 1940s, unlike the recessions that sequelled the end of many prior wars.

The decision to moderate cuts in government expenditures in the late 1940s to maintain demand is generally interpreted as praise for a counter-cyclical government expenditure policy, and still today is deemed by many part of desirable macro-management. Eg there has been criticism of the Treaty of Maastricht that underlay the introduction of the EURO currency because it limits participating country's budget deficits. Such limits are deemed to unduly damp the scope of member governments to employ countercyclical fiscal policy, Eichengreen and von Hagen (1996a, 1996b), Kenen (2001, 2002). There is moreover some corroborating evidence for this criticism, including an upturn in European unemployment on adoption of the Maastricht Treaty, Galbraith and Garcilazo (2004).

The macroeconomic successes immediately after World War 2 can however be given the opposition interpretation. They can be interpreted as evidence of the value of gradualism in government expenditures. Economists did not then or since generally so interpret the late 1940s episode. But even by the late 1950s they were recognizing planning difficulties for government departments in changing markedly and rapidly government expenditure for countercyclical purposes.

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[1] The authors have not themselves digested the entirety of Keynes' Collected Writings(1971-83). Rather, in reporting the above rely on that historian of Keynes' thinking, Hans Jensen.

By the 1960s another difficulty had been discerned, discovering whether macro-economic changes would prove too transient to warrant counteractive government expenditures, even if these could be speedily implemented. Friedman (1969) advised against sharp changes in government expenditure to cope with macroeconomic fluctuations. He contended that it was difficult to discern even the current state of the cycle, and far too difficult to discern the future state of the cycle by the time the change in government expenditure could be implemented. This was because the impacts of these changes in government expenditure had such a delayed and variable impact period. The upshot, according to Friedman (1969) might well be exacerbating not damping the cycles.

Questioning of rapid substantial changes in government expenditure levels has continued since. Thus Vernengo and Rochon (2000) were critical of the sudden spurt in US government expenditure in the early 1980s, and the associated shocks to other countries.[2] German local governments have this year expressed their alarm at a proposed tax change that subjects them to the risk that these local government expenditures might have to change abruptly, Pope (forthcoming). The German local government point out that their infrastructure planning requires for efficiency a reasonable degree of knowledge ahead on how much they can spend, not high uncertainty. This is the dual of the issue academic economists were raising by the late 1950s – the difficulties of getting the civil servants to alter government expenditures rapidly in sizable amounts to furnish the advocated countercyclical swings in these magnitudes.

2 Theories for Assessing the Private to Public Sector Transfer of Risk-Bearing under Less Stable Government Expenditures

Any policy that introduces additional variation into government expenditure, changes the risks and uncertainties faced by the official and private sectors of the economy.[3] When we look at these changes in risk bearing, we see, as in the 2006 German tax debate, an issue of transfer. A tax base on profits transfers some risks from firms to governments that firms shoulder under alternative payroll or sales tax bases. Likewise a discretionary expenditure policy in its countercyclical and crisis modes, is designed to transfer risks out of the private

[2] At least initially, Friedman expressed lack of concern at President Reagan's sharp increase in fiscal provisions for military purposes, but on the grounds that he was not anticipating these would not rapidly translate into actual expenditures, Lenser (1981).

[3] We shall use the terms risk and uncertainty interchangeably. This is because the issues we shall raise apply regardless of whether or not the risks are specifiable or specified in numerical terms.

sector, but this not being a free lunch, augments the risks and uncertainties faced by the government sector as German local governments noted. It makes government infrastructure planning harder. No economist would disagree that organizations like local governments and firms should be concerned about increases in the costs of risk bearing in the form of planning inefficiencies. The government needs to plan – even if it is spending the discretionary funds on ditch digging, or simply locating the unemployed or the entrepreneurs or the firms to transfer funds to them.

But can we analyse the planning effects of alternative government expenditure regimes with our standard theoretical tool, EUT, axiomatised expected utility theory, or its child, standard game theory? The answer is no. To model situations in which planning inefficiencies can arise, EUT's atemporal axioms need to be re-specified with timed onset and expiries of the non-degenerate probabilities. Even after this is done, only a few of these cost-bearing risk /uncertainty effects in highly restricted situations by accident coincide with how EUT would choose, Pope, Leitner and Leopold, Chapter 6 (in press). The specifications are so complex, this temporal attempt to fix up EUT has not been pursued to any degree since the seminal contributions of Kreps and Porteus (1978, 1979). Further, this temporal fix-programme failed to grapple with the contradiction that von Neumann and Morgenstern encountered in themselves going beyond EUT so as to include obviously important omitted costs and benefits of risk bearing that EUT omits. Non-temporal proposals for including these uncertainty effects such as elaborated outcomes or more fully described decision situations, likewise fail to resolve the contradiction von Neumann and Morgenstern and moreover destroy that EUT's axiomatic base and derivation of its representation theorem in the usual sense, Pope (1984, 1985, 2000).

In game theory and EUT, *when conforming to the von Neumann Morgenstern or equivalent axioms*, the axiomatic implications are: (i), only those segments of the outcome flow that occur *after* all risk is resolved, Samuelson (1952), and (ii), each of these post risk segments must be evaluated "as if certain", even though uncertain at the point of choice, Friedman and Savage (1948), Samuelson (1952).[4] In other words, under EUT, there can be many periods, but all the periods (with outcomes that matter) have to be *after* all risk is resolved, Samuelson (1952). It immediately follows that planning problems are basically incompatible with EUT's knowledge-ahead-wise atemporal or "as if certain" world. There

[4] See Pope (2004) on the alternative Ramsey version of EUT.

is nothing to plan for if everything that will ever happen is already known with complete certainty until the end of time – or has to be evaluated "as if certain".

When we can go outside EUT, and employ SKAT, the Stages of Knowledge Ahead Theory, we can grapple with these planning problems, Pope (1983, 1995), Pope, Leitner and Leopold (forthcoming). A contrast between usage of SKAT and the planning mistakes for a university, based on a real-life problem of one Australian university, is in Pope (2006). It would be illuminating to develop some models within SKAT tracing key cause-effect chains introduced by efforts to switch the risk-bearing from firms to governments. A key challenge in such modeling will be the issues raised in Friedman (1969).

3 Empirical Evidence on Gradualism in Government Expenditure Changes

There is a sizable body of empirical work supporting countercyclical, shock therapy and other policies causing variations in public expenditure (eg endorsement of Reagan's early 1980s US arms expenditure spurt, endorsement of Howard's abrupt cutting annually Australian universities budgets in the mid to late nineties). There is a counterpart body of empirical work reaching the opposite conclusion as regards countercyclical, shock therapy, and many of the other special purpose sudden changes in government expenditure.

In determining where the greater weight of evidence lies, difficulties stem from many factors. A major one is having the appropriate counterfactual. Cross sectional evidence suffers from inter-country and inter-regional differences. Time series evidence suffers from all the other factors that have changed over the time period, but can only be inadequately taken into account, eg via additive dummies. Both forms of evidence suffer question marks over their theoretical underpinnings. Few studies have sought to grapple at all with the costs of risk bearing in the different expenditure regimes being analysed. All studies can be challenged as to whether they adequately captured the responses of the private and public sector agents. Do such agents seek to optimize some expectations, follow an aspiration-adaptation procedure such as Selten (1998), or algorithms that are that mix of hedging and optimism detect in Kaiser and Kube (2005), or what?

4 Laboratory Experiment

Our laboratory set-up avoids some of these problems, enables in some respects a more appropriate counterfactual. Each player (a higher level economics student at Bonn university) has a set of objectives, and is paid by extent of meeting these objectives. But how each player decides to seek to attain those objectives is up to him. This avoids the

problem of assuming unduly simplistic and in other respects questionable, reaction functions for governments, central bankers, firms, union and employer representatives and so forth, in how they seek to attain their objectives. In addition a laboratory set-up keeps conditions in the different treatments of variable or rather stable government expenditure policies decidedly more comparable in other respects than is the case when we employ cross sectional or time series data, and thus avoids many of the questionable "other things equal" assumptions imposed on us when we have field data.

A laboratory investigation can also avoid the obviously false independence assumptions arsising out of field data. In using field data, after dubious doctoring of the series for glaring serial correlation, we assume independence of what happens in sequential periods with historical series and in different regions with cross sectional series. In the laboratory by contrast, we can run independent sessions in which nobody who was in one session or has any knowledge of what happened in that session in its sequential periods, participates in another session, and thus have genuine independence allowing in this regard more genuine tests of statistical significance.

Our laboratory investigation concerns two countries, symmetric in every respect. In each country there is in the two currency case: 1 government, 1 central bank, 1 union representative, 1 employer representative, 5 firms who buy local and imported materials produced under competitive conditions that are used in fixed proportions to produce a homogenous final good sold in a Cournot market, with nominal demand set by the government. Firms buy their imports on credit, and must pay for them only next period. They face fixed costs, must produce at least a minimum amount, and face a capacity constraint on the maximum that they can produce. They can hedge or speculate in the current period, and thus face uncertainty concerning both the current and the future exchange rate. Their importing and hedging / speculative activity helps determine the exchange rate whenever the two central banks conflict on their exchange rate goals. In such conflicts, the amounts of each country's central bank intervention to attain its exchange rate target depends on that government's nominal expenditure.

4.1 Official Sector Tasks and Instruments

In addition to the government setting nominal expenditure, the official sector, in the form of its central bank, sets its interest rate and announces its price and exchange rate goals. Thus between its government and central bank, a country's official sector has four instruments of macro-management. In having only four instruments, it is, as in real life, under-instrumented for meeting goals. In having the official sector short on instruments,

we offer a reasonable setting on whether the official sector ought compensate for its handicap of too few instruments by making big changes in government expenditure.

From Table 1, it can be see that the macro-management goals are six in the currency union set-up, seven in the two currency case: 1 keeping prices steady; 2, meeting its price target; 3, keeping its ideal interest rate; 4, maintaining its ideal level of competitiveness in its cost structure relative to the other country; 5, meeting its exchange rate target (a goal absent in the one currency case; 6 avoiding unduly low employment; 7, avoiding unduly high employment. This latter goal is less important than underemployment, and accordingly is given less weight in the overall objective function. Although the decisions on instruments were allotted (as in most countries) either to the government or the central bank, the payoff was joint: both work for the national good. The specific penalties for the official sector deviating from each of its goals in our set-up were as in Table 1.

Table 1: Official Sector Objectives

Variables

q actual price of the home country consumption good
p_+ next period's target price of consumption good
p current period's target price of consumption good
e exchange rate, the number of unit of home currency needed to buy one unit of foreign currency and thus as e rises, the home currency depreciates
m actual price of home materials in home currency
m^* actual price of foreign materials in foreign currency
r interest factor (1+ he marginal interest rate)
f exchange rate aim
B official sector (government and central bank) objective function
L actual employment

Parameters

r_0 ideal interest rate, set at 0.05
L_a minimal acceptable employment, set at 600
L_b maximum acceptable employment, set at 720
b_i weight parameters, $i = 1..5$. The b_i are positive constants, set respectively as 6, 6, 3, 3, 0.02 and 0.01

Official Sector Objective function

$$B = b_0 - b_1\left(\frac{p_+}{p} - 1\right)^2 - b_2\left(\frac{q}{p} - 1\right)^2 - b_3(r - r_0)^2 - b_4\left(\frac{m}{em^*} - 1\right)^2 - b_5\left(\frac{e}{f} - 1\right)^2 - b_6 \mid L_a - L \mid_+ - b_7 \mid L - L_b \mid$$

The notation $\mid x - y \mid_+$ has the meaning $x - y$ for $x > y$ and zero else. $\mid x - y \mid_+$ is the *positive part* of $x - y$.

4.2 The Private Sector

After the official sector has set its four targets and made these public knowledge, in each country the union and employer representative bargain over nominal wages. In this bargaining the union representative's payoff is real wages measured as nominal wages divided by the announced official sector target price, while that of the employer representative, is the average profit of the firms. If after set time allowed of 8 minutes, an agreement had not been reached, there was strike, with both negotiators receiving zero pay, a government set wage, and firms subject to a lower maximum production level and a cut in nominal demand relative to that announced by the government.

Once the wage rate (from bargaining or a strike) was announced for both countries, firms decided on output and on the amounts of a currency (home or foreign) to borrow in order to offer on the foreign exchange market in order to either hedge, speculate. The currency market then operated, and set the period's exchange rate, followed by the consumer market, determining the consumer price, followed by firms paying for last period's imported materials, and profits flowing to the firm's owners.

4.3 Rounds, Sessions, Independence

A round is the above sequence of decisions and their outcomes played by both the official and private sectors. A round was played by the same participants 20 times, with a lunch break, typically after the 8th period. The first round was preceded by an hour's instruction by Sebastian Kube on details of the game giving participants practice on acts. Sebastian Kube also programmed the experiment and the monitor viewed by two of the authors during the experiments, and made the statistical computations requested of the other authors for analyzing afterwards the experiments. The participants were economics students at Bonn University who had passed two or more years of economics, ranging in skill from those in their third year of undergraduate economics up to doctoral candidates. There were twelve such sessions run on 12 different days in 2003. Each of the 12 sessions contained different participants. Six of the sessions had two currencies. Six had only one currency, and only one central bank. This allowed us a comparison of the situation with and without a currency union. There is interdependence between rounds in a single session: participants are influenced by what happened last period. This means that we do not have 12 times 20 = 240 independent observations. The rounds interdependence means that we have only 12 independent observations so that only strong effects are detectable.

The sessions were typically on Saturdays, since few participants were available for an entire Monday to Friday weekday.

4.4 Results

No government kept it expenditure level fixed. There were however marked differences in the extent to which different governments varied this. Some pursued a policy of gradualism in their changes, others a policy of shock therapy. Varying expenditure markedly adversely affected attainment of the official sector objectives and of the firms, as hypothesized in Friedman (1969). There is also evidence that it adversely affected the foreign country, as argued in Vernengo and Rochon (2000). This can be inferred from the correlation of the symmetrised sum of the volatilites of the two countries's levels of government expenditure with the sum of the two countries' official sector goal attainment, and the sum of the two countries' firm profits. On a Spearman rank 2-tailed test, the reduction in official goal attainment for the pair of countries is significant at the 2% level for the official sector, and the reduction in firm profits for the pair of countries is weakly significant (at the 11% level). These results suggest that a government may do better to employ gradualism rather than sharp shocks in its macro-management.

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