A Simple and Indirect Approach to Estimating the Government Spending Multiplier for Lebanon

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Samih Antoine Azar

Contact Information

Samih Antoine Azar

Samih.azar@haigazian.edu.lb

By Invitation:

Dr Azar is with the Faculty of Business Administration and Economics, Haigazian University. The views expressed in this note are strictly his and do not necessarily reflect the views of BLOMINVEST Bank.

Public authorities have a panoply of policies to enhance the well-being of their people. Among these is the fiscal policy, which is one of the most visible and widely scrutinized policy. Governments choose the size and composition of their expenditures, and conduct the imposition and collection of taxes. For macroeconomists fiscal policy is understood to consist of affecting final output by controlling the level of spending. The inherent notion is that a given level of spending propels aggregate income. The relation is described as a multiplier effect, which means that the national product changes by a multiple of the change in spending. By definition a multiplier is a figure higher than 1, and this is a condition of success for the fiscal policy, and determines the extent of its effectiveness. If the multiplier is higher than 1 spending on public works and infrastructure are worthwhile, and will spur growth. The question which we address is how much is the spending multiplier for Lebanon? Subsequently we will derive the balanced budget multiplier. By balanced budget we mean additional spending compensated by an equal amount of additional taxes.

A model is constructed to represent the macro economy. It is characterized by the following features. One, taxes (T) are proportional to income (Y), while allowing some lump sum, constant or fixed taxes. The marginal effect is called the marginal propensity to tax and is defined as t, the income tax rate. Two, consumption (C) is proportional to disposable income, i.e. income after the deduction of all taxes. The marginal effect is called the marginal propensity to consume, and is denoted as c. Allowance for autonomous fixed consumption is made. Three, saving (S) is also proportional to disposable income, with a marginal effect equal to 1 minus the marginal propensity to consume. Dissaving, or negative saving, is permitted. Imports (M) are proportional to total income, with the marginal effect denoted as the marginal propensity to import, and is defined as m. Autonomous imports are allowed. Finally, saving is set equal to investment. Based on these trivial but realistic assumptions the government spending multiplier (k) is found to be[1]:

$$(1)\ k = \frac{1}{t+m}$$

Since both t and m are positive and fractional then the multiplier is expected to be greater than 1. This is true if: $t + m < 1$.

The multiplier in equation (1) is different from the usual multipliers in the literature. Two estimates can be derived:

$$(2) = \frac{1}{1-c}$$ in case $t = 0$, i.e, taxes are totally lump sum

$$(3) = \frac{1}{1-(1-t)c}$$ if taxes vary with income, and the marginal tax rate is constant.

Of course the assumptions for deriving equations (2) and (3) differ from this paper's assumptions, and these were listed above. Equations (2) and (3) depend on the proper estimation of c, the marginal propensity to consume. Unfortunately, data on consumption are not available in Lebanon. But income, or output, taxes and imports are all well measured. Hence using equation (1) is a simple and indirect approach to estimate the government spending multiplier. Only the parameters m and t need to be provided.

What is left to do is estimating the two parameters t and m. This is carried out by 8 different econometric procedures to ensure the robustness of the results. The two crucial models are the regression of taxes and imports over aggregate output. The slopes of these models are the estimates of t and m. The below table, Table 1, lists the estimates from the annual samples. The following table, Table 2, provides for the estimates from the monthly

[1] The derivation of this formula is mathematically demanding. For those interested, the whole proof is available from the author.

samples. What is remarkable in the two tables is the precision and similitude of the two parameter estimates. Whatever the sample frequency, whatever the size of the samples, and whatever the econometric procedure the results come very close. With annual samples the marginal propensity to tax is between 0.1545 and 0.1714, and the marginal propensity to import is between 0.5038 and 0.5217. These ranges are small, exact, and reasonable. The implied spending multiplier is between 1.411 and 1.519, and has an average of 1.470. With monthly samples the marginal propensity to tax is between 0.1651 and 0.1816, and the marginal propensity to import is between 0.4572 and 0.4755. Again these ranges are small, exact, and reasonable. The implied spending multiplier is between 1.542 and 1.594, and is on average 1.561. Overall, the grand average is 1.515.

Table 1: Results of the annual samples.

Econometric procedure	Estimate of the marginal propensity to tax t	Estimate of the marginal propensity to import m	**Estimate of the government spending multiplier**
Simple linear regression in levels & system OLS & System WLS	0.171373	0.504375	**1.480**
Robust Least Squares	0.154542	0.503796	**1.519**
Quantile regression	0.187019	0.521705	**1.411**
System SUR	0.172132	0.516969	**1.451**
System FIML	0.163822	0.504375	**1.497**
3SLS Instruments: IMP(-1) GDP(-1) REV(-1) C	0.165349	0.518027	**1.463**
Average	0.16904	0.51154	**1.470**

Notes: Tax revenues (REV) are annual from 1971 till 2020. Imports (IMP) are annual from 1989 till 2020. GDP is annual output.

Table 2: Results of the monthly samples.

Econometric procedure	Estimate of the marginal propensity to tax	Estimate of the marginal propensity to import	**Estimate of the government spending multiplier**
Simple linear regression in levels & system OLS & System WLS	0.177066	0.471122	**1.543**
Robust Least Squares	0.165125	0.462313	**1.594**
Quantile regression	0.165651	0.475516	**1.561**
System SUR	0.177314	0.471108	**1.542**
System FIML	0.177066	0.464764	**1.558**
3SLS Instruments: IMP(-1) GDP(-1) REV(-1) C	0.181591	0.457213	**1.565**
Average	0.17397	0.46701	**1.561**

Notes: Tax revenues (REV) are monthly from 2002M01 till 2018M11. Imports (IMP) are monthly from 1993M01 till 2020M06. Monthly GDP is obtained from: Azar and Bolbol. (2021). "Suggested Estimates of Monthly Real GDP: Lebanon, 1993-2020". Haigazian University Working Paper & BLOM Bank.

The estimates of the two propensities t and m are sensible. The first, i.e. t, is small because in Lebanon the income taxes are a small portion and proportion of the public budget. The second, i.e. m, is also sensible and relatively high because Lebanon consumes a large portion of goods from imports. However, the main conclusions are not totally comforting. Government spending has a positive multiplier effect and the multiplier is more than 1. *Equally interesting is that the same applies to export and autonomous private investment and consumption*. The policy consequence is that spending on infrastructure and public works is commendable, and so is on other components of aggregate demand.

However, one discordant note is that the balanced budget multiplier in this paper is found to be zero[2]. Therefore, government spending should not be accompanied by raising taxes, but by the alternative which is borrowing. However, if one accepts the notion that the debt will be repaid later by future taxes, then borrowing leads to gaining time, postponing structural adjustments, and, maybe, displacing the heavy weight of reckoning by increasing the burden on future generations. Whether the current additional government stimulus is financed by new current taxes, or by the present value of new future taxes, makes little difference because in both cases the

[2] For those interested, the whole proof is similarly available from the author.

balanced budget multiplier is zero. As a result, fiscal policy may not be attractive, and is probably powerless. But there is good news. First, sidelining fiscal policy is not necessarily bad as one pf the major aims of reform is to attain medium-term fiscal sustainability. Second, with other components of aggregate demand equally effective, this means that the focus of reforms should be as well on stimulating exports and private investment and consumption expenditures.

For your Queries:

BLOMINVEST BANK s.a.l.

Research Department

Bab Idriss, Weygand Str.

POBOX 11-1540 Riad El Soloh

Beirut 1107 2080 Lebanon

Research Department

Tel: +961 1 991 784

research@blominvestbank.com