A FRAMEWORK FOR MANAGING THE BUDGET

ANNEX 2

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1 Analysing Public Expenditure in a Consistent Framework

The Annex presents an approach to analysing public expenditures in Caribbean economies. The approach is set in the context of data that demonstrate the need for the partner governments to manage public expenditure in consistent modelling framework, which also guides optimal pursuit of growth and development. In order to get a picture of the trend or change in trend in the sub-accounts, the data should be studied over at least 10 years, or with reference to an event such as the Great Recession of 2007/8. Moreover, it should be studied in the wider context of the PER.

The basic elements of the context are presented first. Then, the data on the balance of payments and budget deficits are presented, followed by the framework and illustration of its application.

1.1 The Context

The general context of the analysis of the balance of payments and the budget deficits is the strategic framework of government budgeting, the economy-wide and local community profiles, and the profiles of the economic sectors. The following would normally be documented and studied as background:

1. Macroeconomic information, which define the general economic development challenges.
2. Industrial sector activity, summing to total value-added.
3. Population, labour force and employment profiles, including allocations by industrial sector.
4. The socio-economic profile of the economy and its localities:
    a. Public capital infrastructure, such as parks, road networks, drains, bridges, and water, sanitation, electricity and energy sources.
    b. Human capital infrastructure such as health and education.
5. Disguised unemployment, poverty and gender indicators, which define the social development challenges.
6. The government and its capacity to lead.
7. The strategic development imperatives and related objectives, which should focus on the summary picture presented by the effective consumption capacity of the society as a foundation for the elimination of disguised unemployment and poverty.
8. The link between (1-7) and the quantified strategic objectives, targets, and costs of the budget.

2 Balance of Payments Details of Partner Countries

The balance of payments data needed to do the PER are as reported in Table 1, Table 2, Table 3 and Table 4.

Table 2-1: Typical Balance of Payments Accounts for Antigua and Barbuda ($ million)

		2005	*2006*	*2007*	*2008*	*2009*	*2010*	*2011*	*2012*	*2013*	*Sum 2005-9*	*Sum 2010-15*
1	**Export of Goods**	82.74	74.03	59.35	65.46	50.74	45.72	56.15	59.04	64.20	266.86	225.11
2	**Imports of Goods**	-455.35	-559.70	-648.91	-669.89	-478.91	-453.88	-430.72	-483.55	-494.38	-2,142.87	-1,862.53
3	**Trade Balance =1+2**	-372.62	-485.67	-589.56	-604.43	-428.17	-408.17	-374.57	-424.51	-430.18	-1,876.01	-1,637.43
4	**Services Balance**	235.16	215.43	238.44	288.25	283.31	253.07	270.68	278.43	245.47	972.35	1,047.65
5	**Income Balance (Net Income from Abroad)**	-42.04	-46.74	-52.67	-61.08	-50.82	-31.49	-39.47	-51.09	-50.13	-192.27	-172.18
6	**Transfers**	8.00	25.22	18.24	28.75	26.65	19.48	25.67	30.35	30.45	78.11	105.94
7	**The Current Account Balance (3+4+5+6)**	-171.49	-291.76	-385.55	-348.51	-169.02	-167.11	-117.69	-166.82	-204.40	-1,017.83	-656.02
8	**The Capital Account**	214.33	31.57	11.11	14.81	0.46	16.57	8.47	2.47	11.85	257.47	39.36
9	**Net Capital Inflows**	118.19	436.01	464.51	411.92	-249.95	-267.20	-161.10	-197.11	-281.37	768.75	-906.78
10	**Net Capital Outflows**	-142.72	-149.76	-82.03	-80.09	70.72	129.20	28.29	53.10	80.46	-303.80	291.05
11	**of which, change in reserves**	-7.24	-15.36	-0.83	5.83	-10.11	-19.91	-0.04	-14.40	12.45	-33.54	-21.90
12	**Financial Account Balance (9+10)**	-24.53	286.24	382.48	331.83	-179.23	-138.00	-132.81	-144.00	-200.91	464.96	-615.73
13	**Errors and omissions (7+8+12)**	18.30	26.05	8.04	-1.86	-347.80	-288.54	-242.04	-308.35	-393.46	-295.40	-1,232.38

Table 2-2: Typical Balance of Payments Accounts for Belize ($ million)

		2005	*2006*	*2007*	*2008*	*2009*	*2010*	*2011*	*2012*	*2013*	*2014*	*Sum 2005-9*	*Sum 2010-14*
1	**Export of Goods**	650.5	854.3	851.1	960.3	766.2	956.4	1,207.1	1,243.0	1,217.0	1,177.9	4,082.4	5,801.4
2	**Imports of Goods**	-1,112.4	-1,223.9	-1,284.0	-1,576.5	-1,240.2	-1,305.9	-1,549.1	-1,636.2	-1,751.8	-1,877.5	-6,437.0	-8,120.6
3	**Trade Balance =1+2**	-462.0	-369.6	-432.9	-616.2	-474.0	-349.5	-342.0	-393.2	-534.8	-699.6	-2,354.7	-2,319.2
4	**Services Balance**	286.0	421.4	459.8	433.8	365.3	349.9	336.7	442.5	480.5	571.2	1,966.4	2,180.8
5	**Income Balance (Net Income from Abroad)**	-228.9	-250.6	-317.9	-330.4	-181.3	-277.0	-194.4	-240.3	-236.0	-275.6	-1,309.0	-1,223.3
6	**Transfers**	102.4	147.9	186.8	223.1	158.8	183.7	167.5	-261.0	145.9	147.9	819.0	384.1
7	**The Current Account Balance (3+4+5+6)**	-302.5	-50.8	-104.2	-289.7	-131.2	-93.0	-32.2	-452.0	-144.3	-256.1	-878.2	-977.6
8	**The Capital Account**	5.9	18.3	8.2	18.1	37.0	11.3	47.3	45.0	75.4	87.9	87.5	266.9
9	**Net Capital Inflows**	368.8	181.6	232.5	438.3	224.7	87.2	100.3	223.2	222.6	295.9	1,445.9	929.3
10	**Net Capital Outflows**	-80.2	-28.9	6.7	-27.3	17.0	-32.8	62.6	88.0	-46.2	-13.2	-112.7	58.4
11	**of which, change in reserves**	24.4	-99.6	-45.8	-115.8	-94.5	-8.6	36.2	105.6	227.7	163.5	-331.4	524.3
12	**Financial Account Balance (9+10)**	288.7	152.7	239.1	411.0	241.8	54.4	-37.8	-135.2	-268.8	-85.2	1,333.2	987.6
13	**Errors and omissions (7+8+12)**	-7.9	120.2	143.1	139.4	147.6	-27.3	-22.6	-542.2	-337.7	-253.4	542.5	276.9

Table 2-3: Typical Balance of Payments Accounts for St Kitts and Nevis ($ million)												
		2005	*2006*	*2007*	*2008*	*2009*	*2010*	*2011*	*2012*	*2013*	*Sum 2005-9*	*Sum 2010-13*
1	**Export of Goods**	63.51	58.29	57.70	68.96	37.44	57.90	67.72	62.82	58.05	285.90	188.44
2	**Imports of Goods**	-185.21	-219.57	-239.52	-285.84	-265.69	-252.68	-246.36	-227.74	-251.25	-1195.84	-726.78
3	**Trade Balance =1+2**	-121.70	-161.29	-181.82	-216.88	-228.26	-194.77	-178.64	-164.93	-193.20	-909.94	-538.34
4	**Services Balance**	68.23	76.31	71.35	41.00	36.89	38.85	59.49	74.85	110.12	293.77	173.20
5	**Income Balance (Net Income from Abroad)**	-35.14	-32.34	-29.98	-32.44	-33.90	-29.18	-29.65	-23.78	-14.62	-163.80	-82.61
6	**Transfers**	23.89	32.21	29.18	33.12	45.15	46.52	46.60	29.11	35.00	163.56	122.22
7	**The Current Account Balance (3+4+5+6)**	-64.72	-85.11	-111.27	-175.19	-180.12	-138.58	-102.20	-84.75	-62.70	-616.40	-325.53
8	**The Capital Account**	14.72	13.32	14.18	22.29	21.38	55.65	81.62	164.00	128.48	85.90	301.27
9	**Net Capital Inflows**	74.90	110.26	143.68	249.59	14.46	12.70	38.92	213.56	186.20	592.90	265.18
10	**Net Capital Outflows**	-45.97	-20.66	-42.58	-63.38	-227.06	-154.88	-106.77	-103.21	-123.97	-399.65	-364.87
11	**of which, change in reserves**	6.68	-17.15	-7.18	-14.73	22.68	33.30	40.33	-13.66	33.74	-9.70	59.97
12	**Financial Account Balance (9+10)**	28.93	89.60	101.10	186.21	-212.60	-142.18	-67.85	110.35	62.23	193.25	-99.69
13	**Errors and omissions (7+8+12)**	-21.06	17.82	4.01	33.32	-371.33	-225.12	-88.42	189.60	128.01	-337.25	-123.95

Table 2-4: Balance of Payments Accounts for Barbados ($ million)													
		2005	*2006*	*2007*	*2008*	*2009*	*2010*	*2011*	*2012*	*2013*	*2014*	*Sum 2005-9*	*Sum 2010-14*
1	**Export of Goods**	361.48	510.13	526.63	489.57	380.21	430.64	849.00	826.00	786.00	792.00	2268.01	3683.64
2	**Imports of Goods**	-1515.60	-1602.44	-1701.69	-1832.52	-1366.06	-1506.62	-1729.00	-1688.00	-1681.00	-1652.00	-8018.32	-8256.62
3	**Trade Balance =1+2**	-1154.12	-1092.31	-1175.07	-1342.96	-985.85	-1075.99	-880.00	-862.00	-895.00	-860.00	-5750.31	-4572.99
4	**Services Balance**	797.86	911.42	1032.98	1086.46	792.77	904.45	660.00	641.00	706.00	702.00	4621.49	3613.45
5	**Income Balance (Net Income from Abroad)**	-175.00	-256.37	-189.75	-245.96	-86.80	-113.09	-300.00	-172.00	-195.00	-197.00	-953.88	-977.09
6	**Transfers**	65.44	82.85	56.07	26.80	18.79	48.25	-39.00	-9.00	-13.00	-14.00	249.95	-26.75
7	**The Current Account Balance (3+4+5+6)**	-465.82	-354.41	-275.76	-475.66	-261.10	-236.38	-559.00	-402.00	-397.00	-369.00	-1832.74	-1963.38
8	**The Capital Account**	0.00	0.00	0.00	0.00	0.00	0.00					0.00	0.00
9	**Net Capital Inflows**	551.91	348.02	973.24	311.65	161.44	599.17					2346.27	599.17
10	**Net Capital Outflows**	-134.03	-145.75	-596.42	75.17	-195.13	342.59					-996.16	342.59
11	**of which, change in reserves**	-21.89	24.84	-169.72	102.65	66.53	-45.29	-264.00	-28.00	152.00	41.00	2.42	-144.29
12	**Financial Account Balance (9+10)**	417.88	202.27	376.82	386.82	-356.57	-256.58	972.00	159.00	234.00	306.00	1350.11	941.76
13	**Errors and omissions (7+8+12)**	-47.94	-152.14	101.06	-88.83	-617.66	-492.96	413.00	-243.00	-163.00	-63.00	-482.64	-1021.62

3 External Balance Required

It is useful to interpret the data algebraically with the following equation:

1. $p_x X - p_J J = dF_b + dF_p$

Here, X refers to gross exports, J refers to gross imports, dF_b refers to a change in the foreign assets held by banks, and dF_p refers to a change in the foreign assets held by the non-bank private sector. The equation shows that the current account balance is equal to the net accumulation of foreign assets by the banks and the non-bank private sector. The equation is also an accounting identity and it shows that the balance of payments must always balance. So, when the manual refers to balance of payments deficits, it really refers to one or more of the subaccounts within the balance of payments.

The most important of the sub-accounts is the *current account balance*. When this balance is in deficit, it indicates that the country is living above its means, spending more than it producing and borrowing from abroad to finance it. From the above Tables, the current account of each of the partner countries is in deficit. This is usually the main reason for government to cut the budget, and hence set up a PER to help find savings. The current account has two subcomponents – the balance of visible trade and the balance of invisibles. The PER should seek to determine if the main problem stems from the size of any of these elements:

a. the balance of trade in goods,
b. the balance of invisibles, of which,
    i. The balance of trade in services.
    ii. The income balance.
    iii. The net transfers (private remittances and government grants, such as overseas development assistance).

Problems might also arise on the capital account, which records the international purchases and sale of assets, and is where foreign loans to the country are recorded.[1] Within this, errors and omissions apart, *the financial account* has two key components, which are:

a. The net capital inflow, resulting from the purchases and sales of *domestic assets* by foreign residents. These include items such as
    i. Private foreign direct investment through subsidiaries.
    ii. Purchases of foreign stocks and bonds, and deposits in foreign bank accounts.
    iii. Private and government loans to the country's government.

b. The net capital outflow, resulting from the purchase and sale of *foreign assets* by domestic residents. This includes the purchases and sale of foreign currency assets by the monetary authorities, referred to as the change in official reserves.

[1] An asset is any form of wealth, such as stocks, bonds, bank accounts, buildings, plant and equipment. Note that the transactions in the assets themselves are recorded in the capital account, while income from the assets, which is to say payment of interest, dividends, or repatriated profits, is recorded in the current account. The latter are viewed as payment for the services of the assets.

For all partner countries, the deficit on the balance of trade is the dominant cause of the current account deficit. Another interesting pattern in the data on invisible trade for all of the countries, is that the net transfers and services balance are always in surplus while the net income balance is always negative. The available evidence suggests that the balance of trade in goods and services tends to be in deficit, and that this is compounded by deficits on the income account as net factor incomes flow abroad (from foreign investment in the economy, including loans). Further, a significant share of the demand for savings comes from excessive growth of the loans to a country's government. This suggests that in a PER, competing savings options should be judged by whether the activity or business unit fosters capital accumulation to support growth in export-competitiveness. Activities and business units that do not foster growth of exports and export competitiveness should be the first targets of reform.

3.1 Trade by Sector

To support the level of detail in the balance of payments, the PER should document the associated import and export competitiveness of the economic sectors should also be documented and analysed in this process. The trade of the partner countries is highly specialized and this specialization is not really captured in the shares of exports and imports in GDP. A more useful approach to the PER is to monitor variations in the ratio of exports of the individual sectors to output and the ratio of imports of the sectors to apparent consumption. Apparent consumption is defined as the sum of output plus imports minus exports. Then, the analysis must define a standard of classification of industries as import-competing and export-competing. Traditionally, a benchmark of 20% is used. That is, an industry that exports more than 20% of its output is export-competing. Similarly, an industry that has a ratio of imports to apparent consumption greater than 20% is import-competing.

Table 3-1: Trade by Sectors ($ million)

		Exports			Imports	
Sector	***2005***	***2010***	***2014***	***2005***	***2010***	***2014***
Food/agricultural products						
Raw materials						
Ores and other minerals						
Fuels						
Metals						
Total Primary Products						
Chemicals						
Semi-processed manufactures						
Steel						
Automotive products						
Machinery and equipment						
Other capital goods						
Textiles and clothing						
Other Consumer goods						
Total Manufactures						
Total Trade in Goods						
Services						
Tourism						
Travel						
Financial services						
Education						
Other services						
Total Services						

3.2 Fiscal discipline required

Tables 6-9 report the budget aggregates for all the partner countries. All the partner countries are running budget deficits and mounting up public debt. These conditions indicate that the countries must devise suitable strategies to control all the key aggregates under government's control: total revenue, total spending, the budget deficit (or borrowing requirements), and the consequential public debt.

Table 3-2: Government Budget Performance in Antigua ($ millions EC)

	2005	*2006*	*2007*	*2008*	*2009*	*2010*	*2011*	*2012*	*2013*	*2014*
Revenue	493.7	602.7	724.7	736.0	595.9	639.6	596.3	646.6	597.8	664.4
Expenditure	563.3	684.1	749.6	766.3	781.7	676.2	714.7	671.5	700.7	718.3
Interest Expenditure	89.3	98.1	104.5	102.6	95.6	72.6	77.3	80.0	66.3	88.9
Non-Interest Expenditure	474.0	586.0	645.1	663.7	686.1	603.6	637.4	591.5	634.4	629.4
Deficit	(69.6)	(81.4)	(25.0)	(30.3)	(185.9)	(36.6)	(118.4)	(24.8)	(102.8)	(53.9)

Table 3-3: Government Budget Performance in Belize ($ million B)

	2005	*2006*	*2007*	*2008*	*2009*	*2010*	*2011*	*2012*	*2013*	*2014*
Revenue	482.3	559.9	634.6	767.7	784.0	729.0	783.0	846.2	840.3	943.3
Expenditure	662.7	640.0	735.3	771.7	767.6	768.0	817.1	889.2	852.1	999.7
Interest Expenditure	177.8	268.6	266.9	193.7	162.4	153.2	162.8	158.0	123.8	153.2
Non-Interest Expenditure	484.9	371.4	468.4	578.0	605.2	614.8	654.3	731.2	728.3	846.4
Deficit	-180.4	-80.2	-100.7	-4.0	16.5	-39.0	-34.1	-43.0	-11.8	-56.4

Table 3-4: Government Budget Performance in St Kitts and Nevis ($ millions EC)

	2005	*2006*	*2007*	*2008*	*2009*	*2010*	*2011*	*2012*	*2013*	*2014*
Revenue	433.7	491.5	516.1	542.9	536.4	507.8	650.0	644.6	812.7	891.4
Expenditure	439.8	478.2	500.1	536.2	545.2	530.1	594.9	546.5	560.6	625.0
Interest Expenditure	95.8	109.2	115.9	128.3	123.2	131.0	125.8	116.7	81.1	77.9
Non-Interest Expenditure	344.0	369.0	384.2	407.9	422.1	399.1	469.2	429.8	479.5	547.1
Deficit	(6.1)	13.3	16.1	6.7	(8.9)	(22.3)	55.1	98.1	252.2	266.4

4 Aligning the Deficits: Need for a Macroeconomic Framework

The persistence of the current account deficits indicates that, generally, the countries have not solved the problem of under-exporting. The PERs must therefore assess and suggest how government might develop sufficient capacity to control all of the budget variables in a consistent manner, while addressing the problem of under-exporting. Consistency requires a budget that is an optimal allocation of resources among sectors subject to the country's strategic framework, rather than a mere compilation of a basket of Ministry requests. Optimal resource allocation refers to the distribution of resources among sectors and programs on the basis of their impact on the government's strategic objectives. In this case, the main strategic objective must be to bring the current account into adequate alignment with the budget balance. This entails shifting resources from old priorities to new ones, and from less to more economical, efficient, or effective ones from the standpoint of export-led growth and development. Assessments of efficiency evaluate the process and immediate results of the delivered infrastructure and services. Assessments of effectiveness evaluate the long term impact, which is to say the social and economic benefits, of the delivered infrastructure and services. Export-led growth and development are the main desired impacts and yield the highest social rate return to resource use. To make the necessary assessments and adjustments, and thus to evaluate the past budgets in a consistent manner, the PER should utilize a suitable macroeconomic model (Kazoora and Ogwang, 2010).[2] The best option is to use the model that normally guides preparation of the budget. Below is a simple framework that can be estimated if an alternative is not available.

4.1 The Required Framework

The required framework should address the nature of the link between the budget deficits and export-led growth. Ideally, for the countries in the project, it should rest on the concept of effective consumption capacity, which is aggregate supply capacity minus exports. Aggregate supply capacity is the sum of the GDP, imports and official reserves. The ratio of effective consumption capacity to imports defines the effectiveness with which imports are used to transform the economy and raise the standard of living. Let p_Y be the domestic price level, Y the GDP, R official reserves of foreign exchange, ε the exchange rate, p_E the price of exports, and X exports. Effective consumption capacity per dollar of imports (Z) is defined as:

$$2.\quad Z = \frac{\varepsilon p_J J + p_Y Y + R - \varepsilon p_X X}{\varepsilon p_J J} = 1 + \frac{p_Y Y}{\varepsilon p_J J} + \frac{R}{\varepsilon p_J J} - \frac{p_X X}{p_J J}$$

The historical challenge of economic development is to grow Z as the basis for bringing the balance of payments under control, and to do so in manner consistent with the need to manage the debt to GDP ratio, unemployment, and inflation.

[2] Kazoora, C. and Ogwang, P. (2010). Public Environmental Expenditure Review to Support Poverty Environment Initiative in Uganda: Training Manual. Report prepared by Glocoms Inc. USA, for UNDP and UNEP.

Equation (2) is an identity. To make it behavioral, observe that the component $\frac{R}{\varepsilon p_J J}$ is the import cover. It adjusts endogenously as a function of exports and of foreign capital inflows into the official accounts. It can be written as some proportion of $\frac{p_E X}{p_J J}$. Here, γ can be interpreted as the share of exports held as reserves. Also, the component $\frac{p_Y Y}{\varepsilon p_J J}$ can be viewed as a function of $\frac{p_E X}{p_J J}$. Since $\frac{p_E}{p_J}$ is an exogenous factor, we can also write it as some function of the export/import ratio. In seeking to influence Z, government has no significant influence over $\frac{p_x}{p_J}$. It might promote foreign exchange saving by growing the fraction of exports held as reserves. Government might also encourage growth of $\frac{p_Y Y}{\varepsilon p_J J}$, but as a rule this generates only a moderate effect in the absence of a strong pool of emerging non-traditional exporters. Currency depreciation always helps, but it adds a penalty in terms of a rising cost of imports. The major immediate opportunity for government to influence growth is to allow imports to grow as fast as possible, while encouraging diversification and growth of $\frac{X}{J}$. Thus, Z is modeled using five core independent factors that should grow exports while growing reserves and output even faster: the amount of aggregate demand generated per dollar investment over time (a_{t-v}), the capital-labour ratio (k), the ratio of the foreign rate of interest to the local rate of interest (r), and the reserves (ρ). It is important to observe that most of the capital in partner countries is imported and transmit exogenous technological spillovers. All the variables are in natural logarithms and the equation in dynamic OLS form as the multiplicative form:

3. $\frac{X}{J} = e^{\theta_1 + \theta_3 \frac{g}{\rho}} \left(\frac{K}{N}\right)^{\theta_2} (A_{t-v})^{\theta_3} \epsilon^{-\theta_5} (r_{t-s})^{\theta_6}$

Dynamic OLS makes sense since all the variables can be made stationary by simple first differencing, and so are integrated of order 1, and only 42 years of data are available.

Taking natural logs gives,

4. $x_j = \theta_1 + \theta_2 k + \theta_3 a_{t-v} + \theta_4 \frac{g}{\rho} - \theta_5 \epsilon + \theta_6 r_{t-s} + \sum_0^n \chi_n (d\, v_{t-n}) + e_x$

The estimated model for the case of Trinidad and Tobago is:

5. $x_j = \theta_1 + 0.12_{0.000} k + 0.15_{0.000} a_{t-1} + 0.12_{0.000} \frac{g}{\rho} - 0.36_{0.000} \epsilon - 0.03_{0.010} r_{t-s} - 0.08_{0.014} da_{t+2} - 0.37_{0.014} dx_{t+1}$

With an adjusted-R^2 of 0.92, the estimated equation explains about 92% of all the variation observed in the effective capacity to consume of Trinidad and Tobago.

Equation (3) can be integrated into a simple econometric specification of a macroeconomic development model that allows for long run changes in all variables in the system, including prices.

6. $b = \alpha_0 + \alpha_1 \frac{k_{yf}}{k_{yd}} + \alpha_2 p + \alpha_3 r + \alpha_4 g - \alpha_5 \tau - \alpha_6 \frac{m}{y} + \sum_0^n \varphi_j (d\, v_{t-j}) + e_b$
7. $u = \beta_0 + \beta_1 b + \beta_2 \frac{w}{y} - \beta_3 q + \beta_4 L + \beta_5 p_{cpi} + \sum_0^n \psi_j (d\, v_{t-j}) + e_u$
8. $p_{cpi} = \gamma_0 + \gamma_1 m + \gamma_2 p + \gamma_3 y + \gamma_4 \varepsilon - \gamma_5 \mu + \gamma_6 r + \gamma_7 \tau + \sum_0^n \gamma_j (d\, v_{t-j}) + e_p$
9. $y = \delta_0 + \delta_1 q + \delta_2 x + \delta_3 z + \delta_5 I_y + \delta_6 \frac{k_{yf}}{k_{yd}} - \delta_6 \frac{k_{lf}}{k_{ld}} + \delta_7 p_k + \delta_8 g_x + \delta_9 T + \sum_0^n \lambda_j (d\, v_{t-j}) + e_y$
10. $z = \theta_1 + \theta_2 k + \theta_3 a_{t-v} + \theta_4 \frac{g}{\rho} - \theta_5 \epsilon + \theta_1 r_{t-s} + \sum_0^n \chi_n (d\, v_{t-n}) + e_x$
11. $k_{ld} = \frac{K_d}{L_d}$
12. $K_d = K_{d,t-1} + I_d$
13. $K_f = K_{f,t-1} + I_f$
14. $k_{yd} = \frac{K_d}{Y_d}$
15. $g = g_0 + g_x$

The variables of the alternative model and their endogeneity status are as follows:

b – is the natural logarithm of the debt to GDP ratio

y- is the natural logarithm of per capita income or output per worker, an *endogenous* variable.

k_{yf}- is the natural logarithm of the benchmark capital-output ratio of the economy, which can be treated as that of the country's main trading partner.

k_{yd} – is the natural logarithm of the economy's capital output ratio.

p – is the natural logarithm of the GDP deflator, an indicator of the general level of prices

p_{cpi} – is the natural logarithm of the consumer price index

r – is the natural logarithm of the ratio of the foreign rate of interest to the domestic rate of interest, a variable which also proxies the flow of foreign direct investment.

g – is the natural logarithm of the ratio of government spending to GDP

τ – is the natural logarithm of the ratio of taxes to GDP.

m – is the natural logarithm of the money supply

w- is the natural logarithm of gross wages

L is the natural logarithm of the labour force

ε – is the natural logarithm of the exchange rate (the domestic price of a foreign currency, mainly the US dollar)

μ – is the natural logarithm of imports plus reserves plus exports divided by GDP

q – is the natural logarithm of GDP per capita

x – is the natural logarithm of exports per capita

z – is the natural logarithm of effective consumption capacity divided by imports

I_y – is the natural logarithm of the ratio of investment to GDP

K_d- is the gross capital stock, an *endogenous* variable.

k_{lf}- is the natural logarithm of the benchmark foreign capital-labour ratio

k_{lf}- is the natural logarithm of the (domestic) capital-labour ratio, an endogenous variable

p_k- is the natural logarithm of the price of capital, an exogenous variable.

I_d – is the natural logarithm of gross domestic investment, an exogenous variable

I_f – is the natural logarithm of gross investment in the benchmark foreign economy.

T – is $t - t_0$, an *exogenous* variable, with t_0 a reference year such as the year of the Great Recession, 2007.

g_x – is the natural logarithm of government spending targeting diversification in the export-competing sector as a share of GDP.

g_0 – is the natural logarithm of all other government spending as a share of GDP.

e_i- is the residual of equation i.

The signs in the equation are the result of model estimation using data for cases such as Trinidad and Tobago, Jamaica and Barbados.

The first five equations of the model are stochastic or behavioural equations. The second five equations are measurement identities. Equation (6) describes the debt to GDP ratio. It is essentially the debt/budget constraint of the government, and it responds to the ratio of the foreign rate of interest to the local rate of interest because of the latter's effect on FDI. As government spends, it must keep the debt-GDP ratio under some target of viability, such as the 60% recommended by the OECD when Maastricht was being signed in 1994.

Equation (7) describes the state of unemployment, including disguised unemployment. These are the two main internal balances that must be addressed by policy. Equation (8) describes the inflation rate through the CPI. This rate of inflation is directly proportional to the changing money supply and inversely proportional to the changing efficiency of import use (μ). Equation (9) describes the trajectory of per capita income. Government spending affects the rate of unemployment indirectly through this equation. As government spending targets the diversification of the export-competing sector in Equation (9), in order to influence per capita income, unemployment adjusts downwards (Equation 7). Equation (9) also captures the effects of increasing returns, hence economic size and the need for export-propulsion, through the variable $\frac{k_{lf}}{k_{ld}}$. The foreign repercussions of changing effective demand in the dominant trading partner is measured by the variable $\frac{k_{yf}}{k_{yd}}$.

The equation also includes the effects of effective consumption capacity on growth. The PER Team might find it interesting to further disaggregate Equation (9) by industrial sector to allow sharper consideration of the effects of sector policy, especially on the export-competing sectors. Suitable identities would have to be added if the Team chooses to move in this direction.

Equation (10) describes the path effective consumption capacity. This capacity grows with the capital-labour ratio, aggregate demand and the level of government spending relative to available reserves, with reserves pushed to grow as fast as possible. It declines with the exchange rate and the ratio of the foreign (US) rate of interest to domestic interest rate. The dependence of reserves on exports explains why policy should promote growth of exports as the main source of import capacity. The interest rate effects exists because an increase in the foreign rate of interest relative to the local will draw foreign investment funds away from the local financial market to the foreign (US) market in search of higher yields. Finally, of considerable importance to the PER exercise, effective consumption increases with government spending in two ways. The first is through interaction with the ratio of reserves to the sum of exports and reserves. Thus, if government spending targets growth of exports as a share of the total, and therefore lowers the share of exports held as reserves, effective consumption capacity will grow. The second effect of government is generated through the capital-labour ratio. Thus, if government spending is driven by the need to support growing investment relative to labour, then effective consumption capacity will grow.

This type of model allows the PER Team to deal with a time horizon long enough such that changes in the capital stock, population, and technology are all ongoing and some or all of these factors have a significant dominating influence on the level of production as well as prices. All of these changes affect employment capacity, debt capacity and effective consumption capacity. This is the perspective that the Team must adopt when addressing the fundamental challenges of development. The model features recursion from effective consumption capacity to income and then from income to price, and therefore uses an analytical framework that is supply led, with causality running from effective consumption to income and then to price. Variations in the employment capacity and rate generated by these long run changes are more important than variations in short run effective demand, and these variations manifest themselves as variations in the amount of labour and capital when demand fluctuations are ignored.

The model also allows analysis over the medium term as conceived by an integrated expenditure framework for say the next five years. In this time horizon, the model considers the business cycles, which is to say dynamic changes induced by the interplay of demand and supply factors, including changes in wages and prices.

The parameters of each of the four behavioural equations can be estimated independently with known precision using the Stock and Watson (1993) dynamic OLS. In each equation, $\sum_0^n \gamma_j (d\, v_{t-j})$ is an indication that lagged rates of change of all equation variables are used to address endogeneity and the general requirements of cointegration, with significant ones retained in the final specification model. These allow the model to provide an indication of the persistence of the effects of government spending. The dynamic OLS method escapes the small sample and other specification challenges of the large sample methods that dominate the modern cointegration literature. During the estimation process, constraints may also have to be imposed on some of the equation parameters.

4.2 Analysing Public Expenditure with the Model

Evaluation of the past budgets requires analysis of the *level* and *composition* of the total allocations. The first issue is the consistency of the method of adjustment of the deficits, and hence the expenditures and tax revenues, with the macroeconomic framework.

4.2.1 Managing the deficits

Consider a budget in deficit, so that spending is currently above revenues, as is evident in the data on the partner countries. The projected deficits will have consequences that depend on the way they are financed. In general, government will have to borrow.

1. By equation (6), if they are financed by borrowing, the public debt to GDP ratio will grow.
    a. If the borrowing is from foreign sources, it will increase foreign debt service payments and can lead to a foreign debt crisis if the borrowing is excessive. Foreign interest rates will be unaffected.
    b. If the borrowing is from domestic sources, it can lead to two initial effects.
        i. The domestic debt will grow and so will domestic debt service payments.
        ii. If the borrowing is excessively large, the domestic rate of interest will also rise. Then, by equation (6), that will further increase the gross debt to GDP ratio, usually by being forced to add debt to cover the interest due.
    c. However, if the domestic rate of interest rises, that will produce three additional effects.
        i. By equation (8), one is that the rate of inflation will increase.
        ii. The rate of private investment will also fall, which is a crowding-out effect. By equation (9), that would lead to a fall in per capita income, directly and through the fall in GDP per capita.
        iii. By equation (10), the rise in the domestic rate of interest will produce two different effects on effective consumption capacity.
            1. One is to increase effective consumption capacity by lowering the ratio of foreign to local interest. This is the result of the higher local rates attracting portfolio investment inflows from abroad through the financial sector.

2. Another is to slow the growth of effective consumption capacity by lowering private investment and slowing the growth of the capital-labour ratio.
3. Equation (10) indicates that three other effects are possible, depending on whether the monetary authority chooses to operate in the market for foreign exchange by buying foreign exchange inflows and building up official reserves.
    a. Growth of reserves will lower the government-reserves ratio and lower the effective capacity to consume.
    b. Growth of reserves will increase effective consumption capacity by raising the ratio of reserves to imports.
    c. Growth of reserves will reduce effective consumption capacity, by increasing reserves relative to exports as long as exports slowdown with falling investment.

2. By equation (9), the net change in effective consumption capacity will cause per capita income to fall. This will effectively lower the flow of taxes to government and worsen the deficit by equation (6), unless government steps in and raises the tax rate.
    a. An increase in the tax rate will lower the debt to GDP ratio, and this effect will also lower the unemployment rate by equation (7).

3. Government has the option to use the foreign reserves to cover its deficit. If this is done, then the model suggests that the team must consider the following consequences.
    a. The immediate effect of using foreign reserves to fund the deficit is a possible crises in the balance of payments, since the monetary authorities will have a reduced capacity to ensure that the accounts are brought into balance.
    b. The use of the reserves also has several spin-off effects made evident by equations (10) and (9). By equation (10), the use of foreign reserves will have lower the ratio of reserves to exports, leading to a rise in effective consumption capacity, if the purpose for which the reserves are used is to grow exports. Otherwise, by equation (2), the effect will be to lower the effective capacity to consume.
        i. The net effect is an empirical matter.
        ii. If the net effect is to lower the effective capacity to consume, the consequence will be to reduce per capita income. This will then lower taxes and raise the prospect that government will have to increase the tax rate to avoid worsening the budget deficit.

4. Some partner governments have the option to finance the deficit by printing money. This is possible in Barbados and Belize. The model provides guidance on the consequences of this approach.
    a. By equation (8), a decision to print money leads immediately to inflation if the money supply grows excessively.
    b. By equation (7) inflation leads to higher unemployment.
    c. Inflation will also hurt those who lose their jobs, those with savings, as well as the poor who tend to have incomes that are relatively fixed and little assets on which they can draw as their real balances fall.
    d. If high, inflation can lead to dual foreign exchange markets, as it becomes more attractive to hold foreign currency to hedge against the loss of value of the domestic currency.

5. All of the above consequences affect the pursuit of sector goals, including the social protection goals. For example, if debt service payments become excessive, government will lose the fiscal space to fund its key priorities in education, health and social protection.

6. Instead of financing large deficits, which worsens the current situation, government has the option to require budget cuts from all Ministries, aimed at avoiding the deficit as well as restoring external balance. The model also provides guidance on this choice.

    a. By equation (6), the cut on government spending will tend to lower the debt to GDP ratio.
    b. By equation (7), a direct effect of lowering the debt to GDP ratio is to reduce the rate of unemployment. This is usually a consequence of lowering the debt service requirements and freeing budget space to support key sectors like education, health and other activities that provide stepping stones to better employability.
    c. Budget cuts also lead to reduced demand and output. By equation (7), an immediate effect will be to raise the unemployment rate.
    d. By equation (10), an immediate effect of the fall in government spending will be to lower the effective capacity to consume. By equation (9), that effect will cause a fall in per capital income. This will lead to lower taxes, unless government moves to raise the tax rate. Lower taxes will grow the deficit.
    e. The budget cuts will also lower effective demand and therefore lower the level of imports. This will partially and directly restore balance on the current account.
        i. However, by equation (2), one effect of the fall in imports will be to increase the effective consumption capacity. This is because the ratio of reserves to imports will rise along with the ratio of exports to mports, as long as the fall in imports make domestic resources more attractive to exporting firms.

ii. By equation (9), the rise in the effective capacity to consume can generate an increase in per capita income. This is generally because the increase capacity is tied to the potential to grow output by growing exports.
    1. Reduced demand and unemployment makes resources available that can be used by exported.
    2. However, this response depends on whether a set of potential exporters exists (or can be developed) that can use the freed-up resources to supply the foreign market. Absence of this pool of responsive firms is the main development challenge of the partner countries.

7. If a responsive set of firms exist or can be developed in a timely manner, then when seeking to reduce the budget deficits, an across-the-board cut will normally prove to be worse that a targeted cut. This is because a targeted cut can be used to redirect resources to support the export-competing sectors and firms. Their absorption of the free resources under the stimulus can lead to a growth in exports. If this happens, then by equation (10), the ratio of reserves to exports will fall, causing the domestic effective capacity to consume to grow. By equation (9), lead to growth in per capital income. Growth in per capita income increases the flow of taxes, which, by equation (6) will reduce the deficit and lower the debt to GDP ratio. This will then improve fiscal space by reducing debt service payments.

The consequences described above are intended to illustrate the intricacies involved and thus suggest why a numerical model of the macroeconomic framework is helpful to the PER exercise. It also illustrates why the model must explicitly account for the effective capacity to consume. The sector PER Team will benefit from having access to the macroeconomic model or the experts who built it, if one was used by the government to develop its policy framework and budgets. In the absence of that, it would be helpful to the government for the sector PER Team to observe the challenges of trying to evaluate the choices made when managing the deficits and recommend that an appropriate model be developed as soon as possible.