

APPENDIX

Appendix 1

Based on the procedure of selection of countries within the country groups furnished in the United Nations' GFSY explained in **Chapter 1**, the details on how selection is made to compute the tax reliance ratio are presented in **Table A1**.

The calculation of tax reliance ratio for country groupings are shown in **Table A2a)** and **Table A2b)**. The superscript f^* tells us that the country in question has a forecasted data and the superscript p^* tells us that the country in question has a provisionally estimated data. In addition, the two-digit number placed at the end of some country's spellings tells us the year in which the data for the calculation of the tax reliance ratio are used. For example, Malaysia99 tells us that for such calculation, the 1999 data are used.

For the calculation of the tax effort ratios, it was intended that all countries that were selected above would be used. However, in some cases data are not available and thus some countries are substituted with other countries, chosen via the same systematic sampling. In addition, the year chosen is 1997 instead of 2000. Such decision is taken because the unavailability of data for the year 2000. The details of how selection is made to compute the tax effort ratio are presented in **Table A3**. The calculation of the tax effort ratio for country groupings are shown in **Table A4a)** and **Table A4b)**. The superscript f^* tells us that the country in question has a forecasted data and the superscript p^* tells us that the country in question has a provisionally estimated data. However, unlike those of the tax reliance ratio, the two-digit number placed at the end of some of these country's spellings tells us the year of the data for

the nominal GDP. In saying that, it is important to make it clear that the data for tax revenue and its categories are for 1997.

Table A1:
The Systematic Selection for Tax Reliance Ratio, 2000

Country Groupings	% of Selection	Countries Selected	Explanations
Industrial Countries	30% of 24 = 7.2 = 7.	United States, Canada, New Zealand, Denmark*, Austria99, Italy99 and Sweden99	Thirty percent of these are seven and thus seven countries must be selected from this country grouping in alphabetical order as readily furnished in Table 1.3. However, only four of the countries in this group have the 2000 data. Thus, we go backwards to the year 1999 and choose three more countries, and the selected countries are Austria, Italy and Sweden.
Developing Countries Africa	30% of 29 = 8.7 = 9.	Madagascar, Mauritius, Namibia*, Senegal, Seychelles, South Africa, Swaziland, Tunisia and Uganda*	Thirty percent of these are nine and thus nine countries must be selected from this country grouping in alphabetical order as readily furnished in Table 1.3.
Asia (excluding ASEAN)	30% of 19 = 5.6 = 6.	India*, Maldives*, Mongolia, Sri Lanka, China99 and Papua New Guinea99.	Thirty percent of these are six and thus six countries must be selected from this country grouping in alphabetical order as readily furnished in Table 1.3. However, only four of the countries in this group have the 2000 data. Thus, we go backwards to the year 1999 and choose two more countries, and the selected countries are China and Papua New Guinea.
Europe (excluding Industrial Countries)	30% of 24 = 7.2 = 7.	Belarus, Bulgaria, Czech Republic, Estonia, Georgia, Hungary and Kyrgyz Republic.	Thirty percent of these are six and thus six countries must be selected from this country grouping in alphabetical order as readily furnished in Table 1.3. The seventh country was actually Kazakhstan but because of the inconsistency of the data, it is left out and Kyrgyz Republic is then chosen.
Middle East	30% of 11 = 3.3 = 3.	Bahrain, Iran* and Israel.	Thirty percent of these are three and thus three countries must be selected from this country grouping in alphabetical order as readily furnished in Table 1.3.
Western Hemisphere	30% of 25 = 7.5 = 8.	Argentina, Bahamas, Bolivia, Chile, Costa Rica, El Salvador, Guatemala and Jamaica.	Thirty percent of these are eight and thus eight countries must be selected from this country grouping in alphabetical order as readily furnished in Table 1.3.
ASEAN	NA	Singapore, Thailand, Vietnam, Philippines, Myanmar99, Malaysia97 and Indonesia99.	Inclusion of all member countries furnished in the United Nation's GFSY, 2001. In this case, no systematic samplings are performed.
Oil Exporting Countries	NA	Indonesia99, Iran*, Oman, United Arab Emirates99, Yemen99* and Kuwait99.	Inclusion of all member countries furnished in the United Nation's GFSY, 2001. And thus, similar to ASEAN, no systematic samplings are needed.

Table A2a):
Calculation of Tax Reliance Ratio by Individual Countries
Within Country Groups

Country group	Revenue, Profits, & Indiv.	Corpor.	Security Payroll and	Liens on Prop	Assets on Goods	Turnover	natl. Trade	Other Taxe	tal Tax	Reven
INDUSTRIAL COUNTRIES										
United States	61.28	50.78	10.50	32.77	0.00	1.47	3.39	0.00	1.09	0.00
Canada	58.37	42.89	13.44	22.46	0.00	0.00	17.80	13.53	1.37	0.00
New Zealand	66.26	48.44	12.90	0.00	0.96	0.06	30.71	21.35	1.35	0.00
Denmark*	40.24	30.91	6.27	4.63	0.62	1.88	51.10	31.89	0.00	1.54
Austria99	26.97	0.00	0.00	42.19	4.47	0.13	26.22	0.00	0.02	0.00
Italy99	38.81	30.47	7.17	32.41	0.00	1.74	26.04	14.66	0.01	0.99
Sweden99	15.51	6.86	8.65	37.41	11.21	5.13	30.53	19.21	0.08	0.14
Average	43.92	30.05	8.42	24.55	2.47	1.49	26.54	14.38	0.56	0.38
Brunei Darussalam	95.57	0.00	95.57	0.00	0.00	0.00	0.00	0.00	3.80	0.62
DEVELOPING COUNTRIES										
Africa										
Madagascar	15.73	5.15	7.95	0.00	0.00	1.04	29.11	17.26	53.53	0.60
Mauritius	13.11	7.01	6.10	5.60	0.64	5.48	43.58	25.49	31.54	0.06
Namibiap*	35.26	NC	NC	0.00	0.00	0.57	23.06	NC	40.43	0.68
Senegal	24.21	11.74	9.32	0.00	0.00	2.10	38.41	NC	33.66	1.62
Seychelles	22.00	0.00	22.00	17.47	0.00	0.10	6.46	NC	52.05	1.10
South Africa	55.84	37.21	17.60	1.96	0.55	1.75	35.63	24.09	3.21	1.06
Swaziland	26.37	16.74	9.07	0.00	0.00	0.21	14.45	14.45	54.70	4.28
Tunisia	22.29	14.82	7.48	19.03	0.77	1.56	41.96	27.18	12.57	1.81
Ugandap*	18.02	8.71	4.92	0.00	0.00	0.96	66.90	32.66	10.96	3.16
Average	25.87	12.67	10.55	4.90	0.22	1.53	33.28	15.68	32.52	1.60
Brunei Darussalam	95.57	0.00	95.57	0.00	0.00	0.02	0.00	0.00	3.80	0.62
Asia										
India†*	35.76	15.77	19.99	0.00	0.00	0.08	37.24	0.08	26.75	0.17
Maldives†*	4.51	0.00	4.51	0.00	0.00	0.00	30.61	0.00	63.83	1.25
Mongolia	15.98	0.00	15.98	24.06	0.00	0.00	48.71	31.14	9.95	1.30
Sri Lanka	15.06	6.42	8.64	0.00	0.00	4.47	67.32	24.10	13.15	0.00
China, P.R.: Mainland99	6.79	0.01	6.76	0.00	0.00	0.00	79.23	63.28	10.10	3.88
Papua New Guinea99	51.26	36.44	14.67	0.00	0.00	0.00	11.23	0.17	32.94	4.56
Average	21.56	9.77	11.76	4.01	0.00	0.76	45.72	19.80	26.12	1.86
Brunei Darussalam	95.57	0.00	95.57	0.00	0.00	0.02	0.00	0.00	3.80	0.62
Europe										

Belarus	11.73	0.00	11.73	37.95	2.98	0.00	41.54	22.24	5.80	0.00	150.00
Bulgaria	15.87	7.80	6.39	33.43	0.00	0.00	47.70	32.03	3.00	0.00	100.00
Czech Republic	13.81	5.51	8.30	46.44	0.00	0.95	36.38	23.11	2.16	0.26	100.00
Estonia	15.83	12.24	3.58	37.63	0.00	0.00	46.40	34.13	0.14	0.00	100.00
Georgia	8.80	5.26	3.54	22.21	0.00	0.00	61.59	42.83	7.40	0.00	100.00
Hungary	23.38	16.46	6.92	30.47	0.36	1.29	40.47	27.33	3.21	0.77	100.00
Kyrgyz Republic change	17.98	9.82	7.46	0.00	0.00	0.00	78.44	41.83	3.58	0.00	100.00
Average	15.34	8.16	6.85	29.73	0.48	0.32	50.36	31.94	3.62	0.15	100.00
Brunei Darussalam	95.57	0.00	95.57	0.00	0.00	0.02	0.00	0.00	3.80	0.62	100.00
Middle East											
Bahrain	16.37	0.00	16.37	38.93	5.83	2.30	9.82	0.00	26.75	0.00	100.00
Iran, I.R. off*	41.73	15.17	26.31	21.33	0.00	1.94	15.67	1.41	18.35	0.98	100.00
Israel	45.66	31.87	10.80	15.94	2.72	0.38	33.92	28.90	0.78	0.60	100.00
Average	34.59	15.68	17.83	25.40	2.85	1.54	19.80	10.13	15.30	0.53	100.00
Brunei Darussalam	95.57	0.00	95.57	0.00	0.00	0.02	0.00	0.00	3.80	0.62	100.00
Western Hemisphere											
Argentina	18.67	5.86	12.81	25.65	0.00	3.49	46.70	32.24	5.36	0.13	100.00
Bahamas, The	0.00	NC	NC	0.00	0.00	10.38	1.53	0.00	58.80	29.29	100.00
Bolivia	9.95	0.00	9.95	11.10	0.00	9.59	61.16	31.82	7.14	0.17	100.00
Chile	22.90	NC	NC	8.02	0.00	0.00	57.19	44.57	7.62	4.27	100.00
Costa Rica	14.48	1.00	11.73	35.36	0.00	0.32	44.41	24.25	5.43	0.00	100.00
El Salvador	29.50	10.90	18.60	0.00	0.00	0.78	59.51	56.10	9.86	0.96	100.00
Guatemala	24.48	0.91	13.30	0.00	0.00	0.11	62.21	46.70	11.99	1.21	100.00
Haiti	43.13	22.35	12.12	0.00	0.00	0.00	39.46	35.36	9.27	8.14	100.00
Average	20.39	6.84	13.09	10.02	0.00	3.08	46.52	33.88	14.43	5.15	100.00
Brunei Darussalam	95.57	0.00	95.57	0.00	0.00	0.02	0.00	0.00	3.80	0.62	100.00
SEAN											
Singapore	50.18	NC	NC	0.00	0.00	6.53	31.20	8.62	2.46	9.14	100.00
Thailand	34.00	12.62	19.84	3.44	0.00	0.51	48.94	22.34	12.60	0.51	100.00
Vietnam	31.95	2.41	29.54	0.00	0.00	6.04	40.37	21.66	21.03	0.61	100.00
Philippines	44.31	17.78	18.63	0.00	0.00	0.10	30.30	11.56	20.72	4.56	100.00
Myanmar99	35.12	35.12	0.00	0.00	0.00	0.00	55.97	40.77	8.91	0.00	100.00
Malaysia97	44.35	12.45	31.66	1.50	0.00	0.79	32.22	10.74	15.42	5.11	100.00
Indonesia99	64.48	8.50	54.36	2.10	0.00	0.34	32.21	18.05	2.74	0.09	100.00

Average	43.48	14.81	25.67	1.01	0.00	2.04	38.74	19.11	11.98	3.02	100.00
Brunei Darussalam	95.57	0.00	95.57	0.00	0.00	0.02	0.00	0.00	3.80	0.62	100.00
OIL EXPORTING COUNTRIES											
Indonesia	64.48	8.50	54.36	2.10	0.00	0.34	32.21	18.05	2.74	0.09	100.00
Iran, I.R. of	41.73	15.17	26.31	21.33	0.00	1.94	15.67	1.48	18.36	0.98	100.00
Oman	79.75	0.00	79.02	0.00	6.73	0.80	4.28	0.00	8.43	0.00	100.00
United Arab Emirates99	0.00	NC	NC	2.57	0.00	0.00	97.43	NC	0.00	0.00	100.00
Yemen, Republic of99*	45.87	14.54	31.33	0.00	0.00	0.46	23.52	0.00	26.20	3.95	100.00
Kuwait99	8.24	0.00	8.24	62.01	0.00	1.61	0.30	0.00	27.84	0.00	100.00
Average	40.01	7.64	39.85	14.67	1.12	0.86	28.90	3.91	13.93	0.84	100.00
Brunei Darussalam	95.57	0.00	95.57	0.00	0.00	0.02	0.00	0.00	3.80	0.62	100.00

INDUSTRIAL COUNTRIES TAX RELIANCE RATIO BY COUNTRY GROUPS

Country group	me, Profits, a	Individ.	Corpor.	I Security	Payroll and	ies on Prop	es on Good	es Turnover	matl. Trade	Other Taxest	Tax Reven
INDUSTRIAL COUNTRIES	43.92	30.06	8.42	24.55	2.47	1.49	26.54	14.38	0.56	0.38	100
DEVELOPING COUNTRIES											
Africa	25.87	12.67	10.55	4.9	0.22	1.53	33.28	15.68	32.52	1.6	100
Asia	21.56	9.77	11.76	4.01	0	0.76	45.72	19.8	28.12	1.86	100
Europe	15.34	8.16	6.85	29.73	0.48	0.32	50.36	31.94	3.62	0.15	100
Middle East	34.59	15.68	17.83	25.4	2.85	1.54	19.8	10.13	15.3	0.53	100
Western Hemisphere	20.39	6.84	13.09	10.02	0	3.08	46.52	33.88	14.43	5.45	100
ASEAN	43.48	14.81	25.67	1.01	0	2.04	38.74	19.11	11.98	3.02	100
Oil Exporting Countries	40.01	7.64	39.85	14.67	1.12	0.86	28.9	3.91	13.93	0.84	100
AVERAGE DEV. COUNTRIES	28.75	10.80	17.94	12.82	0.67	1.45	37.62	19.21	16.84	1.92	100
Brunei Darussalam	95.57	0	95.57	0	0	0.02	0	0	3.8	0.62	100

**Table A3:
The Systematic Selection for Tax Effort Ratio, 1997**

Country Groupings	% of Selection	Countries Selected	Explanations
Industrial Countries	30% of 24 = 7.2 = 7.	United States, Canada, New Zealand, Denmark96, Austria96, Italy and Sweden.	Thirty percent of these are seven and thus seven countries must be selected from this country grouping, in alphabetical order as readily furnished in Table 1.3. For Denmark, Austria and Sweden, 1996 nominal GDPs are used.
Developing Countries Africa	30% of 29 = 8.7 = 9.	Lesotho96, Mauritius, Morocco, Namibia, Senegal96, Seychelles, South Africa, Tunisia and Zimbabwe96.	Thirty percent of these are nine and thus nine countries must be selected from this country grouping in alphabetical order as readily furnished in Table 1.3. Madagascar, Swaziland and Uganda are left out and substituted with Lesotho, Morocco and Uganda. Some of the reasons to why such action is taken are, inconsistency of data and the unavailability of data. To substitute these countries, the same system of selection is used again. (This system of selection will be followed throughout this Table)
Asia (excluding ASEAN)	30% of 19 = 5.6 = 6.	India, Korea, Mongolia, Sri Lanka, China and Papua New Guinea.	Thirty percent of these are six and thus six countries must be selected from this country grouping in alphabetical order as readily furnished in Table 1.3. Here, Maldives is substituted with Korea because of the unavailability of data.
Europe (excluding Industrial Countries)	30% of 24 = 7.2 = 7.	Belarus96, Bulgaria, Czech Republic, Estonia, Hungary95, Kyrgyz Republic and Lithuania.	Thirty percent of these are six and thus six countries must be selected from this country grouping in alphabetical order as readily furnished in Table 1.3. Here, Georgia is substituted with Lithuania.
Middle East	30% of 11 = 3.3 = 3.	Bahrain96, Iran and Israel.	Thirty percent of these are three and thus three countries must be selected from this country grouping in alphabetical order as readily furnished in Table 1.3.
Western Hemisphere	30% of 25 = 7.5 = 8.	Argentina, Bahamas95, Bolivia, Chile, Costa Rica, El Salvador, Guatemala and Jamaica.	Thirty percent of these are eight and thus eight countries must be selected from this country grouping in alphabetical order as readily furnished in Table 1.3.
ASEAN	NA	Singapore, Thailand, Vietnam, Philippines, Myanmar, Malaysia and Indonesia.	Inclusion of all member countries furnished in the United Nation's GFSY, 2001. In this case, no systematic samplings are performed.
Oil Exporting Countries	NA	Indonesia, Iran, Oman95, United Arab Emirates92, Yemen96 and Kuwait.	Inclusion of all member countries furnished in the United Nation's GFSY, 2001. And thus, similar to ASEAN, no systematic samplings are needed.

INDUSTRIAL COUNTRIES

DEVELOPING COUNTRIES											
United States	11.73	9.40	2.33	6.82	0.00	0.25	0.71	NC	0.23	0.00	19.75
Canada	12.04	9.05	2.63	4.24	0.00	0.00	3.80	2.67	0.33	0.00	20.40
New Zealand	21.19	15.67	3.52	2.00	0.00	0.35	0.23	9.25	6.47	0.95	31.96
Denmark96	16.57	12.80	2.46	1.72	0.32	0.72	17.53	10.72	0.00	0.40	37.26
Austria96	9.81	NC	NC	15.55	1.65	0.04	9.48	NC	-0.01	0.00	36.52
Italy	15.94	11.97	3.75	15.03	0.00	0.92	9.99	5.38	0.00	0.46	42.33
Sweden	4.86	1.92	2.93	17.05	1.80	1.98	12.08	7.53	0.21	0.06	38.04
Average	13.16	10.14	2.52	8.92	0.54	0.61	7.69	7.11	1.03	0.27	32.33
Brunei Darussalam	16.60	0.00	16.60	0.00	0.00	0.00	0.00	0.00	2.80	0.10	19.50
DEVELOPING COUNTRIES											
Africa											

Lesotho96

Africa

Europe

Fast

Bahrain96	1.51	0.00	1.51	1.57	0.50	0.20	0.93	NC	2.64	0.00	7.35
Iran, I.R. of	3.76	1.26	2.50	1.53	0.00	0.17	2.20	0.16	5.36	0.08	13.11
Israel	21.50	15.35	4.79	8.00	1.73	0.47	18.88	15.97	0.44	0.31	51.26
Average	8.93	5.54	2.93	3.70	0.74	0.28	7.34	5.37	2.81	0.13	23.91
Brunei Darussalam	16.60	0.00	16.60	0.00	0.00	0.00	0.00	0.00	2.80	0.10	19.50
Western Hemisphere											
Argentina	1.85	0.60	1.26	3.72	0.00	0.25	5.54	3.75	1.03	0.02	12.41
Bahamas, The95	0.00	0.00	0.00	0.00	0.00	1.80	0.34	NC	13.90	5.52	21.45
Bolivia	1.26	1.26	0.00	2.43	0.00	1.35	8.83	6.92	1.13	0.05	15.05
Chile	4.13	NC	NC	1.42	0.00	0.00	10.76	8.64	1.95	1.14	19.39
Costa Rica	2.22	0.48	1.12	5.87	0.00	0.09	8.10	5.14	1.87	0.12	18.27
El Salvador	2.99	1.30	1.69	0.00	0.00	0.12	6.07	5.33	1.34	0.04	10.56
Guatemala	15.40	1.27	7.31	0.00	0.00	0.08	35.94	28.20	10.30	1.13	62.86
Jamaica	8.66	4.94	2.68	0.00	0.00	0.17	9.87	9.04	2.63	2.09	23.43
Average	4.56	1.41	2.01	1.68	0.00	0.48	14.24	11.17	4.27	1.26	26.20
Brunei Darussalam	16.60	0.00	16.60	0.00	0.00	0.00	0.00	0.00	2.80	0.10	19.50
ASEAN											
Singapore	6.64	NC	NC	0.00	0.00	1.63	4.68	1.55	0.31	2.65	15.92
Thailand	5.85	2.36	3.37	0.28	0.00	0.20	7.80	3.65	2.23	0.10	16.46
Vietnam	4.43	0.50	3.93	0.00	0.00	1.61	6.83	4.00	4.58	0.50	17.96
Philippines	6.77	3.38	2.47	0.00	0.00	0.04	5.50	1.95	3.93	0.76	17.01
Myanmar	1.45	1.45	0.00	0.00	0.00	0.00	2.38	1.69	0.80	0.00	4.63
Malaysia1	8.58	2.41	6.14	0.29	0.00	0.15	6.24	2.08	2.99	1.11	19.38
Indonesia	10.40	5.51	4.89	0.52	0.00	0.09	5.10	4.04	0.50	0.00	16.62
Average	6.30	2.23	2.97	0.16	0.00	0.53	5.51	2.71	2.19	0.73	15.42
Brunei Darussalam	16.60	0.00	16.60	0.00	0.00	0.00	0.00	0.00	2.80	0.10	19.50
OIL EXPORTING COUNTRIES											
Indonesia	10.40	5.51	4.89	0.52	0.00	0.09	5.10	4.04	0.50	0.00	16.62
Iran, I.R. of	3.76	1.26	2.50	1.53	0.00	0.17	2.20	0.16	5.36	0.08	13.11
Oman	8.15	0.00	8.08	0.00	0.57	0.08	0.45	NC	0.83	0.00	10.09
United Arab Emirates	0.00	0.00	0.00	0.08	0.00	0.00	2.24	NC	0.00	0.00	2.32
Yemen, Republic of	6.97	1.68	5.29	0.00	0.00	0.26	3.02	NC	3.94	0.59	14.78
Kuwait	0.22	0.00	0.22	0.00	0.00	0.04	0.01	NC	0.90	0.00	1.17
Average	4.92	1.41	3.50	0.36	0.10	0.11	2.17	2.10	1.92	0.11	9.68
Brunei Darussalam	16.60	0.00	16.60	0.00	0.00	0.00	0.00	0.00	2.80	0.10	19.50

Asia

India	3.00	1.34	1.57	0.00	0.00	0.01	3.97	0.01	3.15	0.77	10.90
Korea	5.77	3.53	2.24	2.02	0.00	0.38	7.28	4.63	1.38	1.80	18.63
Mongolia	5.73	0.00	5.73	4.12	0.00	0.00	6.24	3.25	1.19	0.22	17.50
Sri Lanka	2.42	0.96	1.46	0.00	0.00	0.72	9.86	4.88	3.00	0.00	16.00
China, P.R.: Mainland	0.54	0.00	0.54	0.00	0.00	0.00	4.39	3.45	0.43	0.27	5.63
Papua New Guinea	14.43	6.27	8.13	0.00	0.00	0.00	2.66	0.05	7.84	0.55	25.48
Average	5.32	2.02	3.28	1.02	0.00	0.18	5.73	2.71	2.83	0.60	15.69
Brunei Darussalam	16.60	0.00	16.60	0.00	0.00	0.00	0.00	0.00	2.80	0.10	19.50

Country group	ne, Profits, €	Individ.	Corpor.	Security	Payroll and	ties on Prop	as on Good	as Turnover	natl. Trade	Other Taxe	al Tax	Reve
INDUSTRIAL COUNTRIES	13.16	10.14	2.52	8.92	0.54	0.61	7.69	7.11	1.03	0.27		32.33
DEVELOPING COUNTRIES												
Africa	9.01	5.07	2.87	1.73	0.06	0.47	8.35	11.72	10.73	0.23		30.58
Asia	5.30	2.00	3.30	1.00	0.00	0.20	5.70	2.70	2.80	0.60		15.70
Europe	5.82	2.81	3.01	10.80	0.72	0.13	14.53	9.05	1.76	0.12		33.88
Middle East	8.93	5.54	2.93	3.70	0.74	0.28	7.34	5.37	2.81	0.13		23.91
Western Hemisphere	4.56	1.41	2.01	1.68	0.00	0.48	14.24	11.17	4.27	1.26		26.20
ASEAN	6.30	2.23	2.97	0.16	0.00	0.53	5.51	2.71	2.19	0.73		15.42
Oil Exporting Countries	4.92	1.41	3.50	0.36	0.10	0.11	2.17	2.10	1.92	0.11		9.66
AVERAGE DEV. COUNTRIES	6.41	2.92	2.94	2.78	0.23	0.31	8.26	6.40	3.78	0.45		22.19
Brunei Darussalam	16.60	0.00	16.60	0.00	0.00	0.00	0.00	0.00	2.80	0.10		19.50

Appendix 2

Following James and Nobes (1992), we shall start with the partial approach model and then the general approach model.

For both models, let's assume the condition of perfect competition, no externalities and that Pareto-efficient allocation of resources exist before either income tax or excise tax is imposed. We will further assume that the supply of factors production is fixed, and that these factors are fully employed both before and after either the income tax or the excise tax is imposed. In addition, individual will be assumed to have the same income, tastes and so on. At this stage, we shall also suppose that neither tax involves any administrative or compliance costs¹. It is also assumed that the same amount of revenue has to be raised by whichever tax is used, and that a pattern of government spending is the same in both cases. The taxes will be applied to a simple two-model (A and B) model. Finally, let us suppose that the choice of tax is between a commodity tax, which is levied on good A, but not on good Y, and proportional income tax, which is levied on all incomes.

First, let's look at the partial approach model. This is an approach that confines itself to the effects of the taxes on the choice, which a typical consumer makes between the two goods. This is shown in **Diagram A1** below.

¹ Administrative costs include the full resource cost to the public sector of operating each tax. Compliance costs are costs associated with complying with the requirements of a tax.

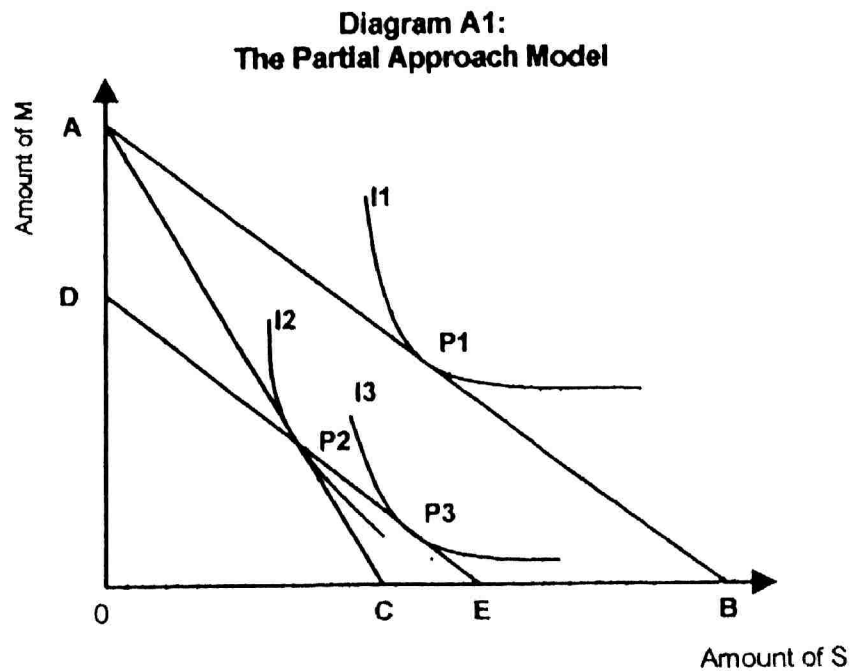


Diagram A1 represents the position of a typical individual with a choice of consuming different combinations of S and M. The initial point is at P1, where the individual faces an AB level of budget constraint. It also shows that the individual could consume a maximum of B of S and A of M, or some combination of S and M. The slope of AB gives the relative prices of S and M. The consumer's preferences are represented by a set of indifference curves, each of which is the locus of the combinations of S and M between which the individual is indifferent. If the consumer wishes to maximize the benefits he gets from consumption, he will choose that combination of A and M which enables him to reach his highest possible indifference curve, given his budget constraint. So initially, the highest attainable indifference curve is I1 and thus our individual will consume at point P1.

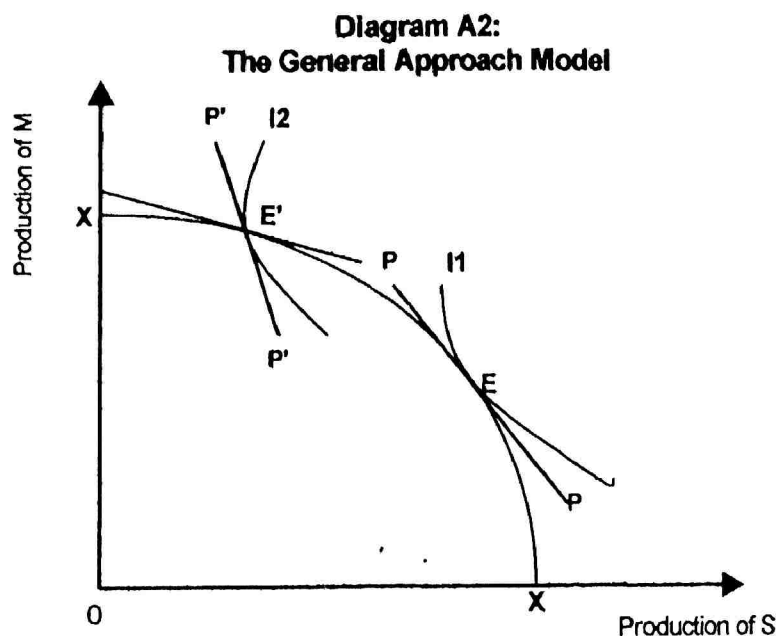
When a specific tax is levied on commodity S, this makes S more expensive relative to M and this shifted the budget constraint from AB to AC. The increase in the slope of the budget constraint reflects an increase in the relative price of S. In this

situation, we can see that the highest attainable indifference curve is at I2. The difference between the levels of benefits derived at P1 on indifference curve I1 and at P2 on indifference curve I2 represents the amount of consumer is worse off as a result of a tax. Thus, the implementation of the specific tax distorts consumer choice between consumption of good S and M.

If instead an income tax is imposed, a somewhat similar effect can be expected. But here, the budget constraint AB is shifted in parallel fashion to budget constraint DE. Income tax simply reduces his income so that he can afford less of both commodities. As the income tax is required to raise the same revenue as the excise tax, DE will pass through P2, so that individual is left with sufficient income to enable him to buy the same combination of goods, irrespective of the tax to which he is subjected. However, with a budget constraint of DE he can attain the higher indifference curve of I3. It is clear that he is better off on I3 than on I2. Therefore, with the assumptions given earlier, an income tax inflicts less excess burden on the taxpayer than does a specific tax of equal yield. It does so simply because it interferes less with consumer choice and the allocation of resources.

Thus, in this model, the crucial point is that the excess burden of taxation depends on the extent to which that tax distorts the price mechanism. This result suggests that a tax system with a broad tax base is likely to impose less excess burden than one with a narrow base. This simple model, however, is not the end of the story because it cannot be used to examine the total effects on the economy as a whole. So now, let's move on to a more general approach.

The general approach is not limited to the consumption side of the economy: it also includes the production of goods. This is presented in **Diagram A2** below.



XX represents the production possibility frontier (PPF) and shows the combinations of S and M, which can be produced. The slope of XX at any point represents the social opportunity cost of producing each good in terms of the other. The highest attainable indifference curve in this case is I1, which means that the most preferred combination is at E1. This is also the point, which maximizes profit for producers and is economically efficient. At E, the tangent to both XX and I1 is the line PP, the slope of the relative price ratio between S and M. Initially, both the producers and the consumers face the same price ratio. An additional simplifying assumption is that suppose that the tax revenue raised is shared out equally among taxpayers. If a specific tax is imposed on S, its price would rise, and the relative price ratio would become steeper as shown in **Diagram A2** as P'P'. As a result, consumers

purchase less of S and more of M. Because the tax revenue is redistributed among consumers, our representative individual is not forced inside the PPF. However, given the new relative price ratio, the highest attainable indifference curve is now I2. This means that producers still face the real opportunity cost of producing M in terms of S and this is shown by the slope of QQ. It is only the prices between producers and consumers that have been distorted. Because the tax revenue is redistributed to taxpayers, the difference in benefit between I1 and I2 is the excess burden of the specific tax.

Contrast this result with that of an income tax. Under the partial approach model, such a tax would not affect the relative prices facing consumers. Also because the tax revenue is returned to taxpayers, our representative individual could continue to attain I1. It follows, therefore, that in these circumstances the income tax imposes no excess burden of taxation.

For the purpose of this research paper, these 'conventional' models shall be used as the basis for the proposition that a specific indirect tax has a greater excess burden than the income tax.

Appendix 3

BUOYANCY ELASTICITY OF TAX REVENUE

LS // Dependent Variable is LN EXCISE DUTY

Date: 07/12/02 Time: 10:27

Sample: 1965 1991

Included observations: 27

Variable	Coefficient	Std. Error	T-Statistic	Prob.
C	0.299250	1.775648	0.168530	0.8675
LNGDP	0.178116	0.119776	1.487075	0.1495
R-squared	0.081267	Mean dependent var		2.931375
Adjusted R-squared	0.044518	S.D. dependent var		0.752152
S.E. of regression	0.735219	Akaike info criterion		-0.543986
Sum squared resid	13.51369	Schwartz criterion		-0.447998
Log likelihood	-28.96753	F-statistic		2.211392
Durbin-Watson stat	1.344174	Prob(F-statistic)		0.149500

LS // Dependent Variable is LN EXPORT DUTY

Date: 07/12/02 Time: 10:29

Sample: 1965 1972

Included observations: 8

Variable	Coefficient	Std. Error	T-Statistic	Prob.
C	4.267442	17.33313	0.246201	0.8137
LNGDP	-0.066659	1.321657	-0.050436	0.9614
R-squared	0.000424	Mean dependent var		3.393360
Adjusted R-squared	-0.166172	S.D. dependent var		0.795214
S.E. of regression	0.858747	Akaike info criterion		-0.092244
Sum squared resid	4.424680	Schwartz criterion		-0.072383
Log likelihood	-8.982533	F-statistic		0.002544
Durbin-Watson stat	1.488406	Prob(F-statistic)		0.961412

LS // Dependent Variable is LN IMPORT DUTY

Date: 07/12/02 Time: 10:31

Sample: 1965 2001

Included observations: 37

Variable	Coefficient	Std. Error	T-Statistic	Prob.
C	-2.636386	1.012076	-2.604929	0.0134
LNGDP	0.876297	0.067043	13.07061	0.0000
R-squared	0.829966	Mean dependent var		10.55637
Adjusted R-squared	0.825108	S.D. dependent var		1.080533
S.E. of regression	0.451881	Akaike info criterion		-1.536136
Sum squared resid	7.146865	Schwartz criterion		-1.449059
Log likelihood	-22.08221	F-statistic		170.8407
Durbin-Watson stat	0.214046	Prob(F-statistic)		0.000000

LS // Dependent Variable is LN LICENCE

Date: 07/12/02 Time: 10:34

Sample: 1965 2001

Included observations: 37

Variable	Coefficient	Std. Error	T-Statistic	Prob.
C	-4.017222	1.174230	-3.421155	0.0016
LNGDP	0.791014	0.077785	10.16923	0.0000
R-squared	0.747134	Mean dependent var	7.891581	
Adjusted R-squared	0.739909	S.D. dependent var	1.028020	
S.E. of regression	0.524281	Akaike info criterion	-1.238918	
Sum squared resid	9.620453	Schwartz criterion	-1.151842	
Log likelihood	-27.58073	F-statistic	103.4133	
Durbin-Watson stat	0.152276	Prob(F-statistic)	0.000000	

LS // Dependent Variable is LN STAMP DUTY

Date: 07/12/02 Time: 10:35

Sample: 1965 2001

Included observations: 37

Variable	Coefficient	Std. Error	T-Statistic	Prob.
C	-15.44524	1.396977	-11.05619	0.0000
LNGDP	1.441880	0.092541	15.58107	0.0000
R-squared	0.873996	Mean dependent var	6.262428	
Adjusted R-squared	0.870396	S.D. dependent var	1.732571	
S.E. of regression	0.623735	Akaike info criterion	-0.891522	
Sum squared resid	13.61657	Schwartz criterion	-0.804446	
Log likelihood	-34.00756	F-statistic	242.7696	
Durbin-Watson stat	0.358202	Prob(F-statistic)	0.000000	

LS // Dependent Variable is LN TOTAL INDIRECT TAX

Date: 02/26/97 Time: 08:28

Sample: 1965 2001

Included observations: 37

Variable	Coefficient	Std. Error	T-Statistic	Prob.
C	-2.528059	1.019463	-2.479795	0.0181
LNGDP	0.874844	0.067533	12.95438	0.0000
R-squared	0.827430	Mean dependent var	10.64282	
Adjusted R-squared	0.822499	S.D. dependent var	1.080394	
S.E. of regression	0.455179	Akaike info criterion	-1.521591	
Sum squared resid	7.251578	Schwartz criterion	-1.434514	
Log likelihood	-22.35130	F-statistic	167.8159	
Durbin-Watson stat	0.195875	Prob(F-statistic)	0.000000	

LS // Dependent Variable is LN ESTATE DUTY

Date: 07/12/02 Time: 10:23

Sample: 1965 2001

Included observations: 37

Variable	Coefficient	Std. Error	T-Statistic	Prob.
C	-6.229290	1.812318	-3.437194	0.0015
LNGDP	0.812230	0.120054	6.765530	0.0000
R-squared	0.566684	Mean dependent var	5.998930	
Adjusted R-squared	0.554303	S.D. dependent var	1.212064	
S.E. of regression	0.809180	Akaike info criterion	-0.370929	
Sum squared resid	22.91704	Schwartz criterion	-0.283852	
Log likelihood	-43.63854	F-statistic	45.77240	
Durbin-Watson stat	1.033356	Prob(F-statistic)	0.000000	

LS // Dependent Variable is LN CORPORATION TAX

Date: 07/12/02 Time: 10:33

Sample: 1965 2001

Included observations: 37

Variable	Coefficient	Std. Error	T-Statistic	Prob.
C	-4.111025	0.813246	-5.055080	0.0000
LNGDP	1.171007	0.053872	21.73676	0.0000
R-squared	0.931033	Mean dependent var	13.51863	
Adjusted R-squared	0.929062	S.D. dependent var	1.363308	
S.E. of regression	0.363105	Akaike info criterion	-1.973586	
Sum squared resid	4.614595	Schwartz criterion	-1.886509	
Log likelihood	-13.98939	F-statistic	472.4869	
Durbin-Watson stat	0.539662	Prob(F-statistic)	0.000000	

LS // Dependent Variable is LN DIRECT TAXES

Date: 02/26/97 Time: 08:24

Sample: 1965 2001

Included observations: 37

Variable	Coefficient	Std. Error	T-Statistic	Prob.
C	-4.105710	0.812961	-5.050316	0.0000
LNGDP	1.170709	0.053853	21.73886	0.0000
R-squared	0.931045	Mean dependent var	13.51946	
Adjusted R-squared	0.929075	S.D. dependent var	1.362952	
S.E. of regression	0.362978	Akaike info criterion	-1.974288	
Sum squared resid	4.611357	Schwartz criterion	-1.887211	
Log likelihood	-13.97640	F-statistic	472.5779	
Durbin-Watson stat	0.538939	Prob(F-statistic)	0.000000	

LS // Dependent Variable is **LN TOTAL TAX**

Date: 07/12/02 Time: 10:36

Sample: 1965 2001

Included observations: 37

Variable	Coefficient	Std. Error	T-Statistic	Prob.
C	-3.754100	0.716092	-5.242482	0.0000
LN GDP	1.152084	0.047436	24.28692	0.0000
R-squared	0.943987	Mean dependent var	13.59065	
Adjusted R-squared	0.942387	S.D. dependent var	1.332042	
S.E. of regression	0.319727	Akaike info criterion	-2.228036	
Sum squared resid	3.577891	Schwartz criterion	-2.140960	
Log likelihood	-9.282055	F-statistic	589.8545	
Durbin-Watson stat	0.614512	Prob(F-statistic)	0.000000	

INCOME ELASTICITY OF TAX REVENUE

LS // Dependent Variable is LN TOTAL INDIRECT TAXES

Date: 02/26/97 Time: 08:56

Sample: 1965 2001

Included observations: 37

Variable	Coefficient	Std. Error	T-Statistic	Prob.
C	-2.650797	1.659528	-1.597319	0.1203
LN GDP	0.890941	0.126276	7.055522	0.0000
D1	-0.414867	0.326736	-1.269729	0.2136
D2	0.700184	0.197085	3.552702	0.0012
D3	0.389213	0.287025	1.356025	0.1849
D4	-0.424040	0.262633	-1.614572	0.1165
R-squared	0.927311	Mean dependent var	10.64282	
Adjusted R-squared	0.915587	S.D. dependent var	1.080394	
S.E. of regression	0.313896	Akaike info criterion	-2.169992	
Sum squared resid	3.054457	Schwartz criterion	-1.908762	
Log likelihood	-6.355875	F-statistic	79.09511	
Durbin-Watson stat	0.641669	Prob(F-statistic)	0.000000	

LS // Dependent Variable is LN IMPORT DUTY

Date: 02/26/97 Time: 09:05

Sample: 1965 2001

Included observations: 37

Variable	Coefficient	Std. Error	T-Statistic	Prob.
C	-1.518509	0.872035	-1.741340	0.0909
LN GDP	0.793496	0.058467	13.57173	0.0000
D3	1.017387	0.275914	3.687338	0.0008
D4	-0.471912	0.309418	-1.525162	0.1367
R-squared	0.892620	Mean dependent var	10.55637	
Adjusted R-squared	0.882858	S.D. dependent var	1.080533	
S.E. of regression	0.369823	Akaike info criterion	-1.887654	
Sum squared resid	4.513386	Schwartz criterion	-1.713501	
Log likelihood	-13.57912	F-statistic	91.43989	
Durbin-Watson stat	0.438667	Prob(F-statistic)	0.000000	

LS // Dependent Variable is LN TOTAL TAX

Date: 07/12/02 Time: 10:44

Sample: 1965 2001

Included observations: 37

Variable	Coefficient	Std. Error	T-Statistic	Prob.
C	-12.26895	4.585780	-2.675433	0.0125
LN GDP	1.796340	0.349667	5.137286	0.0000
D1	10.02724	4.815070	2.082469	0.0469
D2	123.3308	257.6179	0.478735	0.6360
D3	-163.6909	289.4585	-0.565507	0.5764

D4	98.22454	136.2072	0.721140	0.4770
D1LNGDP	-0.729406	0.362288	-2.013333	0.0541
D2LNGDP	-7.887431	16.40421	-0.480818	0.6345
D3LNGDP	10.40072	18.40007	0.565254	0.5766
D4LNGDP	-6.189956	8.600836	-0.719692	0.4779
R-squared	0.978181	Mean dependent var	13.59065	
Adjusted R-squared	0.970908	S.D. dependent var	1.332042	
S.E. of regression	0.227196	Akaike info criterion	-2.738421	
Sum squared resid	1.393692	Schwartz criterion	-2.303038	
Log likelihood	8.160061	F-statistic	134.4967	
Durbin-Watson stat	1.554489	Prob(F-statistic)	0.000000	