

## Appendices

### Statistical Appendix to Chapter 1

Table 1: Selected Macroeconomic Indicators for Kenya 1976-1994

Year	GDP Growth %	Annual Inflation Rate %	Real Exchange Exchange Rate (1987=100)	Current Account Balance % of GDP	Government Overall Deficit % of GDP	Interest Rate, Treasury Bill	Private Savings % of GDP (current prices)	Government Savings % of GDP	Terms of Trade 1987=100
1976	4.4	11.45	90.38	-3.49	-5.9	3.78	14.81	1.9	126
1977	8.1	14.82	82.28	0.60	-3.6	1.22	20.23	2.8	159
1978	7.7	16.93	73.60	-12.14	-4.0	6.71	15.07	2.6	136
1979	4.9	7.98	77.16	-8.00	-6.5	4.48	12.15	2.1	129
1980	4.0	13.86	79.41	-12.28	-4.5	5.78	15.44	1.5	136
1981	6.0	11.60	89.52	-10.76	-6.5	9.96	16.17	-0.7	126
1982	3.4	20.67	89.44	-7.41	-7.8	12.38	12.80	-1.6	125
1983	2.5	11.40	94.87	-2.23	-4.8	14.36	17.14	-1.4	120
1984	0.9	10.28	92.48	-3.26	-4.8	12.39	15.94	-1.5	126
1985	5.1	13.01	95.41	-1.57	-6.2	14.4	23.19	-1.2	124
1986	5.5	4.80	97.29	-0.55	-4.4	12.12	19.72	-1.5	125
1987	4.9	7.62	100.00	-6.20	-6.3	12.99	16.20	-1.9	100
1988	5.1	11.20	104.15	-5.33	-4.1	13.56	18.33	-1.3	98
1989	5.1	12.94	108.17	-7.04	-6.5	14.00	16.25	-1.4	92
1990	4.2	15.59	114.54	-6.10	-3.8	16.02	15.70	-2.4	90
1991	2.1	19.82	119.02	-2.67	-2.6	16.6	17.19	-1.1	89
1992	0.5	29.54	111.26	-1.19	-0.4	16.64	14.30	-1.4	81
1993	0.2	45.80	133.34	1.67	-3.6	39.4	12.03	-3.9	80
1994	3.0	29.01	145.17	1.45	-3.4	17.9	15.53	-1.7	82

Source: Central Bureau of Statistics, *Economic Survey, Statistical Abstract- Various Issues*

\* The real exchange rate variable is obtained as the ratio of foreign prices to domestic prices multiplied by the nominal effective exchange rate. Where the nominal effective exchange rate is an index of Kenya's exchange rate against the currencies of major trading partners (US\$, Sterling £, French Franc, Italian Lira and Germany DM) each weighted by trade shares (1987=100). Terms of trade data is from World Bank, World Data, 1995

Table 2. Efficiency of Investment , Foreign Direct Investment and Net Private Capital flows

Year	GDP (1982 =100)	GINV	GDP Change	<u>INCREMENTAL CAPITAL-OUTPUT RATIO</u>							Net Foreign Direct Inv. % of GDP**	Net Private Foreign Capital Flows % of GDP
				Private Inv. as % of GDP	Public Inv. as % of GDP	1 Year	3 Year average	5 Year average	7 year average			
1975	2086.5	532.3		16.9	12.1						0.52	0.3
1976	2178.4	603.3	91.9	15.9	11.6	6.6					1.32	0.5
1977	2355.4	815.0	176.9	17.7	13.0	4.6	5.6				1.26	0.1
1978	2536.0	1007.4	180.6	20.0	13.6	5.6	5.4	6.5			0.64	0.9
1979	2661.5	766.2	125.6	16.0	13.6	6.1	7.1	6.4	6.5		1.34	0.8
1980	2768.2	1031.0	106.7	16.5	12.7	9.7	7.3	6.8	6.8		1.08	0.7
1981	2933.5	995.1	165.3	16.2	12.6	6.0	7.4	7.4	9.5		0.20	-0.0
1982	3049.3	767.7	115.7	12.1	9.9	6.6	7.1	11.0	9.5		0.20	-0.1
1983	3124.9	665.4	75.7	11.2	7.3	8.8	13.1	10.2	9.2		0.40	0.2
1984	3152.9	667.5	27.9	11.1	6.8	23.9	12.7	9.8	8.6		0.18	-0.3
1985	3314.5	876.7	161.6	10.4	7.5	5.4	11.1	9.5	8.4		0.29	0.1
1986	3498.2	746.0	183.7	10.4	6.7	4.1	4.9	8.7	8.2		0.46	0.1
1987	3668.4	870.6	170.3	10.6	7.7	5.1	4.7	4.9	7.7		0.54	0.4
1988	3857.0	949.1	188.5	11.6	6.8	5.0	5.1	5.0	5.7		0.00	0.3
1989	4053.1	992.7	196.1	10.7	8.0	5.1	5.2	6.1	10.1		0.74	0.5
1990	4223.6	955.9	170.5	9.4	9.1	5.6	6.8	12.2	19.3		0.66	0.2
1991	4311.5	852.3	87.9	8.7	8.4	9.7	17.0	25.1	19.5		0.23	0.6
1992	4332.2	741.9	20.7	8.9	7.7	35.8	38.2	25.3	19.4		0.07	0.1
1993	4342.8	731.2	10.6	9.0	6.9	69.1	37.0	25.0	19.3		0.03	-0.1
1994	4474.6	817.9	131.8	9.3	8.5	6.2	26.6	24.0			0.05	-0.6
1995	4690.1	942.2	215.6	12.3	7.4	4.4	5.1				0.35	-0.1
1996	4906.9	994.7	216.7	12.2	7.2	4.6						

Source: Ministry of Planning and National Development, Kenya Historical Data 1972-1992, and Economic Survey, 1997. ICOR's estimated by the Author.

Note:

GINV = Gross Investment 1982=100

Absolute Figures are K£ Millions

\*\*Foreign direct investment (FDI) is net inflows of investment to acquire a lasting management interest (10 percent or more of voting stock) in an enterprise operating in an economy other than that of the investor. It is the sum of equity capital, reinvestment of earnings, other long-term capital, and short-term capital as shown in the balance of payments.

Source of FDI data: World Bank- World Development Indicators, 1997.

Table 3: Agricultural Finance Corporation: Land Development Loans

Credit to Farmers: LAND DEVELOPMENT LOANS (K£, 000)						
	Land Purchase	Water & Irrigation	Others	Total	Land Purchase % of Total	Annual Growth in AFC finance
1976	2,308,550	54,993	279,797	2,643,340	87.3	
1977	962,725	275,070	958,500	2,196,295	43.8	-16.9
1978	1,448,450	326,738	2,362,175	4,137,363	35.0	88.4
1979	1,803,143	489,742	5,578,347	7,871,232	22.9	90.2
1980	1,139,585	293,239	4,102,012	5,534,836	20.6	-29.7
1981	2,734,442	448,470	3,394,499	6,577,411	41.6	18.8
1982	650,795	610,291	3,680,419	4,941,505	13.2	-24.9
1983	1,420,400	1,219,600	10,387,000	13,027,000	10.9	163.6
1984	2,175,642	856,860	20,502,340	23,534,842	9.2	80.7
1985	2,174,667	954,781	16,118,460	19,247,908	11.3	-18.2
1986*	739,315	261,890	23,895,511	24,896,716	3.0	29.3
1987	40,151	11,677	185,479	237,307	16.9	-99.0
1988	17,736	6,536	146,467	170,739	10.4	-28.1
1989	43,627	4,012	95,973	143,612	30.4	-15.9
1990	6,631	913	15,220	22,764	29.1	-84.1

Data Source: Statistical Abstract, 1986, 1995. Republic of Kenya

## Appendix to Chapter 5:

### Macroeconomic Model For Kenya: Program Instructions (Rats for Windows ver. 4.31)

```
*****
CAL 1975:1
ALLOCATE 1994:1
OPEN DATA KENYA.RAT
DATA(FORMAT=RATS)
*****

SET TREND = T
SET CHSTK2 = (CHSTK{1}+CHSTK{2})/2
SET LAND2 = (LANDU+LANDU{1})/2
SET D8388 = T>=83:1.AND.T<=88:1
SET D83 = T>=83:1.AND.T<=83:1
SET D92 = T>=92:1.AND.T<=92:1
SET D8789 = T>=87:1.AND.T<=89:1
SET D78 = T>=78:1.AND.T<=78:1
SET D89 = T>=89:1.AND.T<=89:1
SET D8889 = T>=88:1.AND.T<=89:1
SET D8182 = T>=81:1.AND.T<=82:1
SET D8081 = T>=80:1.AND.T<=82:1
SET D8990 = T>=89:1.AND.T<=90:1
SET D90 = T>=90:1.AND.T<=90:1
SET D9192 = T>=91:1.AND.T<=92:1
SET ACRP = CRE-CREPU
SET AC2 = (ACRP+ACRP{1})/2
SET WCURR = (WRATE*EMP)
SET RATE2 = (DEPOR+DEPOR{1})/2
SET WCOST = (WRATE*Y/EMP)
SET PREAL = ((GDPTC-WCURR-NMN-TAXC)/KDEF)*100-DEPR
SET PINV = INVES*Y/100
SET FSAVE = (SAV)*100
SET PPP1 = (PREAL*100/CAPST)
SET PP21 = ((PPP1+PPP1{1})/2)
SET CPIN = PINV{1}/PINV{2}
SET ACRP = CRE-CREPU
SET AC2 = (ACRP+ACRP{1})/2
SET GDPT2 = (GDPT+GDPT{1})/2
SET UTIL = GDPT/POTE
SET U2 = UTIL/UTIL{1}
SET RPX = (PX*EXCH)
SET LCPI = LOG(CPI)
SET INVES = (PINV/Y)*100
SET GROWFC = (Y/Y{1})
SET WRATE = WCURR/EMP
SET LWRATE = LOG(WRATE)
SET M2Y = (MONEY/200000000)*100/Y
SET WREAL2 = (WREAL+WREAL{1})/2
SET PMT = (PM/CPI)
SET PMT2 = (PMT+PMT{1})/2
SET LM2Y = LOG(M2Y)
SET LDEF = LOG(GDPDEF)
SET LEMP = LOG(EMP)
SET LCAPST = LOG(CAPST)
SET LW COST = LOG(WCOST)
SET WCURR2 = (WCURR+WCURR{1})/2
SET CONSP = PRCON*CONDEF/100
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```

SET LUTIL =LOG(UTIL)
SET CAPST2 = (CAPST+CAPST{1})/2
SET LPM = LOG(PM)
SET M2AV = (M2Y+M2Y{1})/2
SET LGROWFC = LOG(GROWFC)
SET AC2 = (ACRP+ACRP{1})/2
SET DOMAB = PRCON+PUBCO1+GROSINV+XTL
SET AVCPI = (CPI+CPI{1})/2
SET LAVCPI = LOG(AVCPI)
SET PREAL1 = ((PCURR*100/KDEF)*100

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INSTRUMENTS TREND PUBCO1 PUIINV{1} CAPST{1} Y PREAL FSAVE{1} TAXR WREAL{1} ACRP{1} TBRATE
EXCH{1} PRCON{1} MTL{1} AGR{1} PMX XTL{1}
AR1(FRML=INVESEQ, INST) PINV
# CONSTANT PP21{1} U2 ACRP PINV{1} VAR
AR1(FRML=CHSTKEQ,INST) CHSTK
# CONSTANT CHSTK2{1} GROWFC{0 1} D85 D89
AR1(FRML=INTREQ) INTRE
# CONSTANT TBRATE INTRE{1} D8388
AR1(FRML=SAEQ,INST) SA
# CONSTANT RATE2{1} PREAL1 SA{1} D83 D9192
LINREG(FRML=DEPOEQ,INST) DEPOR
# CONSTANT TBRATE DEPOR{1} D8990 D78
LINREG(FRML=TOCREQ,INST) CRE
# CONSTANT SA INTRE GDPT2 ELECT D8081
LINREG(FRML=CONSEQ,INST) CONSP
# CONSTANT PCURR WCURR2{1} SA
AR1(FRML=EXPEQ,INST) XTL
# CONSTANT RPX Y
AR1(FRML=IMPEQ,INST) MTL
# CONSTANT DOMAB PMT2
ar1(FRML=TAXEQ) TAX
# CONSTANT GDPT TREND
AR1(FRML=WRATEEQ) LWRATE
# CONSTANT LAVCPI LWRATE{1}
AR1(FRML=CPIEQ) LCPI
# CONSTANT LM2Y{1} LPM LWRATE LUTIL
AR1(FRML=DEFEQ) GDPDEF
# CONSTANT WRATE PM M2Y
LINREG(FRML=KDEFEQ,INST) KDEF
# CONSTANT PM GDPDEF KDEF{1}
AR1(FRML=EMPEQ,INST) LEMP
# CONSTANT LWRATE{1} TREND LGROWFC{1} LCAPST
AR1(FRML=DEFTAQ,INST) DEFTAX
# CONSTANT GDPDEF{1} D92

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FRML(IDENTITY) GRINV GROSINV = PINV+PUIINV+CHSTK
FRML(IDENTITY) CAPID CAPST = CAPST{1}-(DEP/100)*CAPST{1}+GROSINV
FRML(IDENTITY) TAXRD TAXC = TAX*DEFTAX/100
FRML(IDENTITY) CPIID CPI = EXP(LCPI)
FRML(IDENTITY) LCPIID LCPI = LOG(CPI)
FRML(IDENTITY) SAID SA2 = (SA+SA{1})/2
FRML(IDENTITY) DOMABD DOMAB = PRCON+PUBCO1+GROSINV+XTL
FRML(IDENTITY) GDPID GDPT = PRCON+PUBCO1+GROSINV+XTL-MTL
FRML(IDENTITY) PREALID PREAL = (((GDPT*GDPDEF/100)-WCURR-NMN-TAXC)/KDEF)*100-DEPR
FRML(IDENTITY) EMPD EMP = EXP(LEMP)
FRML(IDENTITY) WCUR WCURR = (WRATE*EMP)
FRML(IDENTITY) AVWAGE WRATE = EXP(LWRATE)
FRML(IDENTITY) PPPD PPP1 = (PREAL*100/CAPST)
FRML(IDENTITY) CPINVD CPIN = PINV{1}/PINV{2}

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FRML(IDENTITY) POTE = -268.962+.41904*CAPST
FRML(IDENTITY) UTIL UTIL = GDPT/POTE
FRML(IDENTITY) U2D U2 = UTIL/UTIL{1}
FRML(IDENTITY) PP2D PP21 = ((PPP1+PPP1{1})/2)
FRML(IDENTITY) RATEID RATE2 = (DEPOR+DEPOR{1})/2
FRML(IDENTITY) WREAL2D WCURR2 = (WCURR+WCURR{1})/2
FRML(IDENTITY) PRCOND PRCON = CONSP*100/CONDEF
FRML(IDENTITY) YD Y = GDPT-TAX
FRML(IDENTITY) Y2D GDPT2 = (GDPT+GDPT{1})/2
FRML(IDENTITY) GROWD GROWFC = (Y/Y{1})
FRML(IDENTITY) WC WCOST = (WRATE*Y/EMP)
FRML(IDENTITY) LGRO LGROWFC = LOG(GROWFC)
FRML(IDENTITY) LCAP LCAPST = LOG(CAPST)
FRML(IDENTITY) LWC LWRATE = LOG(WRATE)
FRML(IDENTITY) AC2D AC2 = (ACRP+ACRP{1})/2
FRML(IDENTITY) INVESD INVES = (PINV/Y)*100
FRML(IDENTITY) FSA FSAVE = (SA/Y)*100
FRML(IDENTITY) PCURRD PCURR = (GDPT*GDPDEF/100-WCURR-TAXC)
FRML(IDENTITY) ACRPD ACRP = CRE-CREPU
FRML(IDENTITY) STOCK CHSTK2 = (CHSTK{1}+CHSTK{2})/2
FRML(IDENTITY) PREAL1D PREAL1 = PCURR*100/KDEF

```

```

*****
GROUP KHA1999 INVESEQ>>F_PINV CHSTKEQ>>F_CHSTK INTREQ>>F_INTRE $
CONSEQ>>F_CONSP EXPEQ>>F_XTL TOCREQ>>F_CRE IMPEQ>>F_MTL $
TAXEQ>>F_TAX WRATEEQ>>F_LWRATE CPIEQ>>F_LCPI DEFEQ>>F_GDPDEF $
KDEFEQ>>F_KDEF EMPEQ>>F_LEMP SAEQ>>F_SA DEPOEQ>>F_DEPOR DEFTAEQ>>F_DEFTAX
GDPID>>F_GDPT $
PREALID>>F_PREAL FSA>>F_FSAVE CPIID>>F_CPI WC AC2D Y2D WREAL2D PRCOND>>F_PRCON $
TAXRD GROWD STOCK ACRPD SAID RATEID EMPD>>F_EMP AWWAGE>>F_WRATE LGRO LCAP WCUR $
CAPID>>F_CAPST GRINV>>F_GROSINV POTE PCURRD PP2D>>F_PP2 PPPD>>F_PPP YD>>F_Y DOMABD
INVESD>>F_INVES $

```

Note: There are differences in the notations as used in the model and in the text elsewhere. Readability and program requirements dictate this. For example, a lag in the program is written in the form {1}, whereby {1} represents one year lag. In the text a one year lag is represented as t.<sub>1</sub>. Some of the data used in the model is given below together with a glossary.

### Selected Macroeconomic Data as used in the Model

Year	PRCON	GDPT	XTL	MTL	Y	TAX	PM
1975	1798.27	2475.48	823.00	1150.98	2086.53	388.53	41.60
1976	1710.55	2564.59	846.00	1105.34	2178.44	385.06	42.90
1977	1888.07	2797.95	869.00	1333.74	2355.36	442.75	47.20
1978	2195.08	3017.20	884.00	1711.63	2535.95	509.17	52.40
1979	2258.69	3160.81	842.00	1385.69	2661.54	499.02	52.80
1980	2247.90	3347.75	888.00	1524.08	2768.24	569.04	63.50
1981	2163.79	3463.58	851.00	1203.47	2933.54	529.68	85.80
1982	2232.05	3516.26	878.00	1009.39	3049.25	466.15	100.00
1983	2159.40	3561.48	858.00	823.70	3124.93	436.54	105.00
1984	2360.58	3625.48	865.00	970.86	3151.67	473.50	108.00
1985	2172.95	3781.37	923.00	901.73	3314.48	466.55	141.00
1986	2584.66	4050.87	1013.00	1053.62	3498.19	552.94	137.00
1987	2814.76	4292.54	1015.00	1193.61	3668.44	623.21	152.00
1988	3047.36	4557.71	1063.00	1301.36	3856.97	700.90	193.00
1989	3228.25	4772.18	1168.00	1428.47	4053.10	718.55	202.00
1990	3265.46	4970.98	1378.00	1476.73	4223.63	748.05	278.00
1991	3340.25	5045.07	1365.00	1410.53	4311.49	731.69	307.00
1992	3256.67	5002.78	1391.00	1377.50	4327.43	675.45	318.00
1993	3184.41	5020.63	1847.94	1825.34	4342.79	677.75	565.00
1994	3543.79	5220.11	1609.46	2153.38	4474.58	742.82	492.00

### Selected Macroeconomic Data as used in the Model

Year	PX	WCURR	PCURR	EMP	INTRE	DEPOR	TBRATE
1975	39.60	451.47	635.61	819.10	10.00	5.00	5.70
1976	53.60	523.52	790.08	857.50	10.00	5.00	6.20
1977	76.00	607.24	1076.84	902.90	10.00	5.00	1.40
1978	64.20	689.90	1143.59	911.60	10.00	5.00	6.70
1979	68.50	803.20	1230.22	972.30	10.00	5.00	4.50
1980	82.40	935.87	1361.77	1005.80	11.00	6.00	5.60
1981	91.00	1070.19	1590.53	1024.30	14.00	10.00	9.99
1982	100.00	1215.26	1833.99	1046.00	16.00	12.50	13.30
1983	94.00	1352.26	2122.66	1093.30	15.00	12.50	14.99
1984	144.00	1537.78	2303.90	1119.70	14.00	11.00	12.42
1985	142.00	1791.30	2633.53	1187.80	14.00	11.00	14.14
1986	152.00	2092.58	3021.77	1223.50	14.00	11.00	12.15
1987	126.00	2360.03	3289.37	1273.00	14.00	11.50	12.59
1988	145.00	2682.05	3797.66	1323.60	15.00	11.50	13.50
1989	156.00	3107.55	4281.25	1363.70	18.00	13.50	14.00
1990	169.00	3523.67	4856.01	1409.40	19.00	14.50	15.50
1991	216.00	4005.25	5514.52	1441.80	20.03	13.51	16.77
1992	244.00	4672.80	6729.72	1461.90	22.34	13.63	16.96
1993	438.00	5616.61	8568.80	1475.50	38.55	23.46	39.30
1994	450.00	7288.20	9615.04	1505.50	30.93	15.73	17.50

## Selected Macroeconomic Data as used in the Model

Year	GPI	PUINV	PRINV	CHSTK	CREPU	CONDEF	KDEF
1975	25.78	251.84	353.05	-73.00	258.73	47.10	39.97
1976	28.73	250.52	345.53	5.00	217.62	54.40	48.56
1977	32.99	304.31	417.48	92.00	190.74	57.00	53.94
1978	38.57	342.10	508.30	155.00	284.86	58.90	60.31
1979	41.65	360.64	425.23	-21.00	283.09	66.50	68.63
1980	47.42	348.80	456.75	234.00	280.37	74.40	77.12
1981	52.92	367.87	474.14	151.00	412.52	88.50	86.32
1982	63.86	300.96	367.47	100.00	563.40	100.00	100.00
1983	71.14	228.43	350.01	89.00	396.24	112.90	124.56
1984	78.46	214.63	345.00	103.00	389.10	119.60	142.88
1985	88.66	247.92	363.30	280.00	410.57	134.50	147.62
1986	92.92	234.03	387.34	78.00	502.30	135.80	172.62
1987	100.00	280.64	446.13	163.00	645.87	145.00	181.75
1988	111.20	261.89	448.19	182.00	551.23	154.40	197.98
1989	125.59	325.87	434.22	233.00	464.78	172.10	218.14
1990	145.17	386.46	398.76	169.00	594.80	186.30	257.84
1991	173.95	363.89	376.22	90.00	628.19	208.10	279.87
1992	225.34	332.35	385.37	23.42	576.70	260.61	304.82
1993	328.54	297.92	391.83	58.55	391.28	309.15	401.70
1994	423.86	382.13	417.82	56.97	629.55	322.92	472.55

### Glossary

PRCON	Real Private Consumption K£ Million
GDPT	Real GDP at market prices K£ Million
XTL	Real Exports K£ Million
MTL	Real Imports K£ Million
Y	Real GDP at factor Cost K£ Million
TAX	Real Indirect taxes
PM	Import Price Index 1982=100
PX	Export Price Index 1982=100
WCURR	Nominal wage incomes
PCURR	Nominal non wage incomes
EMP	Modern Sector Employment '000's
INTRE	Commercial Lending Rate
DEPOR	Savings Deposit Rate
TBRATE	Treasury bill rate, 90 day
CPI	Consumer Price Index
PUINV	Real Public Investment K£ Million
PINV	Real Private Investment K£ Million
CHSTK	Change in stocks K£ Million
CREPU	Real Credit to the private sector K£ Million
CONDEF	Deflator for Consumption Expenditure 1982=100
KDEF	Deflator for Investment Goods 1982=100