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Macroeconomic Adjustment and Growth

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Macroeconomics of Public Sector Deficits

The Case of Zimbabwe

Felipe Morande
and
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To improve growth prospects in Zimbabwe, foreign trade must be reformed and the country's high public deficits — which crowd out private consumption and private investment — must be reduced.

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This paper — a product of the Macroeconomic Adjustment and Growth Division, Country Economics Department — is part of a PRE series of case studies on the macroeconomics of public sector deficits. Copies are available free from the World Bank, 1818 H Street NW, Washington, DC 20433. Please contact Susheela Jonnakuty, room N11-039, extension 39074 (109 pages with figures and tables, plus 9 pages of appendix).

Zimbabwe has the uncommon combination of a high public deficit, a balanced current account, low inflation, and low levels of investment and growth.

Despite a surplus in the current account, the nonfinancial public sector has run deficits exceeding 10 percent of GDP since 1981. Inflation is low but interest rates are rising because of partial financial liberalization and rising domestic public debt stocks.

Heavy public spending crowded out private consumption and investment in the 1980s. The private saving rate is a staggering 20 percent of GDP, which finances all of Zimbabwe's investment.

The fiscal adjustment begun in 1987 helped stabilize the public debt and improved recovery of investment. But more fiscal adjustment is needed to improve macroeconomic and financial stability and growth prospects.

Public deficits must be reduced to ensure a sustainable path for public debt. High deficits are crowding out both private consumption and private investment. The public sector must be adjusted and foreign trade must be reformed to improve capital formation — a prerequisite for improving growth prospects in Zimbabwe.

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1. INTRODUCTION

The Zimbabwean economy presents a rather infrequent combination of stabilized external accounts with heavy public imbalances financed by the domestic private sector. While the current account is in surplus, the non-financial public sector has run deficits exceeding 10% of GDP since 1981/82. (see table 1.1). Inflation is low while domestic interest rates are increasing significantly, reflecting partial financial liberalization and, possibly, rising domestic public debt stocks. Total (foreign and domestic) debt of the non-financial public sector rose steadily from 55.4% in June 1980 to 82.8% of GDP in June 1987. A partial, although important, fiscal adjustment took place in 1987/88 and thereafter, implying a decline in NFPS deficit from 14.4% of GDP in 1986/87 to 10% in 1988/89, contributing to the stabilization of public liabilities to GDP ratios during the last two years.[1]

High public sector spending has crowded out both private consumption and investment during the eighties. Crowding out of private spending has been supported by restrictions imposed on consumer and capital imports, and in the case of private investment, by lingering uncertainty with regard to possible policy changes which could affect future property rights, taxes and relative prices. Hence the private sector is saving a staggering portion of GDP: since 1984/85 it saves more than 20% of GDP, financing more than 100% of Zimbabwe's gross investment.

The fiscal adjustment started in 1987/88 is a significant step in the right direction. It contributed not only to a more stable public debt path but also to a partial recovery of private and aggregate gross investment. This study suggests, however, that additional fiscal adjustment is required to enhance both macroeconomic and financial stability and growth prospects in Zimbabwe.

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[1]Among recent papers on Zimbabwe's macroeconomic situation and prospects are Chibber et al. (1989), Dailami and Walton (1989), Davies and Rattso (1990), Khadr et al. (1989), and McKay (1989).

TABLE 1.1
ZIMBABWE MACROECONOMIC INDICATORS

	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
A. Aggregate Indicators										
GDP growth (%)	10.6	12.5	2.6	1.6	-1.9	6.8	2.6	-1.5	6.5	4.9
Capacity Utilization	79.7	89.3	88.0	85.4	80.5	84.3	85.8	83.8	88.8	..
Inflation	10.3	14.5	14.2	19.6	3.5	2.6	15.2	9.2	11.9	12.9
Real Wage (1980=100)	100.0	103.7	114.5	110.2	111.5	120.7	112.3	110.1	110.1	107.2
Real Exchange Rate (1980=100)	100.0	115.1	132.0	134.2	123.3	108.7	119.7	108.2	92.5	85.6
Nominal Int. Rate on Public Debt	4.4	5.9	7.8	7.7	8.0	10.4	12.5	13.0	13.3	13.0
Nominal Int. Rate on Deposits (%)	3.5	7.8	8.0	8.0	8.0	8.1	8.0	8.2	8.3	8.3
B. Composition of Output (% of GDP)										
Private Consumption	64.5	67.0	65.0	66.1	62.4	63.2	60.1	52.7	51.7	50.9
Public Consumption	19.7	17.2	19.8	18.4	21.3	22.2	21.8	24.1	23.0	23.0
Private Fixed Investment	10.6	13.3	10.0	8.2	10.6	7.9	8.4	7.8	9.0	9.4
Public Fixed Investment	4.7	5.3	9.9	11.4	7.9	8.2	7.4	7.7	8.9	9.2
Change in Stocks	3.5	4.4	1.2	-3.7	0.4	4.9	3.6	3.6	3.6	3.6
Exports	30.3	25.2	22.0	21.3	26.7	29.9	30.9	31.2	31.2	33.7
Imports	33.3	32.5	27.9	24.5	26.1	28.7	26.5	27.1	27.5	29.8
C. Consolidated NFPS Deficit and Debt										
1. Fiscal Year Data (% of GDP)										
NFPS Deficit	9.1	13.5	13.1	14.4	12.7	14.3	14.4	10.9	10.4	..
NFPS Foreign Debt	12.0	17.6	23.3	27.0	33.3	42.2	40.6	41.1	38.0	..
NFPS Domestic Debt	43.4	37.2	33.7	31.3	35.7	35.5	36.6	41.7	42.9	..
2. Calendar Year Data (% of GDP)										
NFPS Deficit									8.8	9.7
NFPS Foreign Debt									36.9	37.8
NFPS Domestic Debt									47.4	46.9
D. Monetary System (% of GDP)										
Base Money	6.9	7.1	7.3	6.2	6.7	7.5	7.2	7.0	7.7	7.7
M1	18.4	15.3	15.9	11.9	13.5	14.3	13.3	13.7	15.1	15.1
Quasi Money	16.8	16.3	17.7	14.9	15.2	16.4	13.7	18.1	17.5	17.5
E. Balance of Payments (US$ mill.)										
Current Account	-301.0	-739.0	-762.0	-527.0	-177.0	-166.0	-51.0	-3.0	-3.0	..
Capital Account	176.0	419.0	668.0	203.0	285.0	225.0	159.0	149.0	91.0	..
Errors and Omissions	56.0	94.0	-43.0	5.0	28.0	40.0	-44.0	-6.0	14.0	..
Position above the line	-69.0	-226.0	-136.0	-319.0	136.0	99.0	64.0	140.0	102.0	..
Stock of Gross Reserves	326	269	224	187	156	208	217	264	224	..

Sources: Reserve Bank of Zimbabwe, Ministry of Finance of Zimbabwe, Schmidt-Nebbel (1990), and World Bank Data

The paper is organized as follows. Section 2 presents 1980-1989 data for public sector deficits and liabilities, necessary for carrying out the decomposition of public sector deficits and the analysis of their sustainability over time. Similarly, these data are also required for subsequent sections devoted to the implications of public sector deficits on private sector spending, the functioning of financial markets and the determination of the exchange rate and external accounts.

Section 3 identifies the main macroeconomic and fiscal policy variables which have contributed to the above-the-line NFPS deficit calculated in Section 2, focusing in addition on the sensitivity of the current public finance structure to its main determinants. This shows, among other things, how a secular rise in domestic debt has made domestic interest payments an important component of public sector spending. Also, changes in interest rates and tax regimes prove to affect significantly the public sector deficit.

Next, the focus of Section 4 is on the sustainability of public sector deficits. Deficit magnitudes consistent with stable public liability to GDP ratios were obtained for different macroeconomic scenarios. This exercise allowed us to conclude that current public sector deficits are clearly unsustainable under adverse macro shocks or when significant devaluations are required in response to policy changes.

The following section analyses the macroeconomic impact of public sector deficits as transmitted through financial asset markets. The model developed and tested in this section follows Easterly's (1989) framework but amended in a way that seems appropriate for the many peculiarities of the Zimbabwean economy, in particular the combination of a strict system to allocate foreign exchange, a huge public sector deficit, and well developed financial markets. The empirical evidence supports some simulations of different deficit financing strategies that tend to indicate that debt financing would only be postponing inflationary pressures.

Section 6 goes a step further by analyzing the impact of the public sector on private sector spending (consumption and investment) and, therefore, with implications for both short-term stabilization issues and long-run growth prospects. As it turns out, there is clear evidence of a crowding out process, especially after 1980. But this crowding out has been implemented not only through an increased interest rate, but also by applying quantitative constraints on imports that have resulted in a large excess of private saving over investment.

Next, Section 7 deals with the effect of the public sector deficit and its financing on external accounts, particularly the trade deficit and real exchange rates. Here we follow a model by Rodríguez (1989) which again is modified in order to take into account the foreign exchange allocation mechanism and the binding restraints placed on capital movements. In exploring the determination of external accounts and real exchange rates, these Zimbabwean features make the levels of public sector deficits and public sector spending more relevant than deficit financing.

Section 8 deals with growth prospects and the supply side effects of public sector deficits and other distortions.

Finally, section 9 concludes.

2. CONSOLIDATED PUBLIC SECTOR DEFICITS AND BALANCE SHEETS, 1980-1989

This section presents comprehensive, consolidated and stock-flow consistent data for public sector deficits and balance sheets, required for carrying out sensible analyses of decomposition and sustainability of public sector deficits as well as for drawing the implications for private sector spending, discussed in the following sections.

The non-financial public sector (NFPS) is comprised by the central government (BUD) and the aggregate of the public enterprises and local authorities (PLA). The financial public sector in Zimbabwe is mostly comprised by the Reserve Bank of Zimbabwe (RBZ) and the Post Office and Savings Bank (POSB). The latter financial institutions do not carry out quasi-fiscal operations and do not present significant deficits or surpluses. Hence the analysis of the public sector deficit will be restricted to the consolidated NFPS. However, consolidated balance sheets are presented for both the NFPS and the total public sector, the latter defined as the consolidation of the NFPS and the two above mentioned public financial institutions. While the decomposition of the deficit performed in section 3 below is referred to the NFPS, the public sector sustainability analysis in section 4 will be carried out for the total public sector's asset and liability holdings.

The 1980-1988 data presented here is based on Schmidt-Hebbel (1990), which is the most comprehensive attempt to date to construct consolidated and stock-flow consistent data for non-financial public sector deficits and non-financial and financial public sector balance sheets.[2]

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[2]A first application to Zimbabwe of a framework for macroeconomic consistency in current and constant prices for a six-sector disaggregation (for 1981 and 1987) can be found in Khadr and Schmidt-Hebbel (1989a,b). An application of the RMSM-X macroeconomic consistency model for a 5-sector disaggregation to Zimbabwe, covering the 1985-1987 historical period and the 1988-1995 projections period, was done by Khadr, McKay, Schmidt-Hebbel and Ventura (1989). A significant extension of the former, in terms of behavioral specification, sector disaggregation and period coverage is the consistent macroeconomic general equilibrium model for Zimbabwe by Elbadawi and Schmidt-Hebbel (1991a,b), with base year 1988 and simulations covering 1988-1995.

Table 2.2 presents data for consolidated NFPS deficit and financing, for the 1980/81 to 1989/90 fiscal years[3], distinguishing between the central government (BUD) and public enterprises and local authorities (PLA) flows. It reflects the structure of sectoral and consolidated above-the-line nominal deficit or excess of investment over saving (lines I - VII), and the structure of sectoral and consolidated below-the-line financing flows.[4] The above-the-line deficit structure is presented both by major budgetary items (current expenditure, current revenue, and investment) and by disaggregating between the primary deficit and net interest payments. The notation for this and subsequent tables is defined in table 2.1.

Table 2.3 shows the BUD, PLA and consolidated NFPS balance sheets aggregated by major economically meaningful categories of liabilities and assets for June 30, 1980 to June 30, 1988. The disaggregation into cash balances, net foreign debt, net domestic debt, and equity holdings will be useful for performing sustainability analyses in section 4 below.[5]

Note that the change in the value of the consolidated NFPS net asset holdings (line D in table 2.3, repeated as line IX in table 2.2) does not match the nominal deficit financing flows (line VII, table 2.2) adjusted for extraordinary income and foreign grants (lines VIIIA 1 and 2, table

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[3]The 1980/81 to 1988/89 data are historical series, while the 1989/90 figures are budgetary projections of the Ministry of Finance.

[4]The source of these figures is the Ministry of Finance's Financial Statements. A detailed discussion of sources and methodologies for the data presented in this section is in Appendix A. The notation is defined in table A1, Appendix A.

[5]More disaggregated balance sheets for BUD and PLA are presented in Schmidt-Hebbel (1990). The latter's table A3, appendix A for BUD matches the Ministry of Finance's disaggregation of assets and liabilities by types of instruments with a disaggregation by holders derived from the balance sheets of the institutions comprising the financial system of Zimbabwe. There is no direct source of information for the consolidated balance sheet of PLA. The balance sheet constructed in Schmidt-Hebbel (1990) and presented here combines information on PLA liabilities held by BUD and the public and private financial institutions, drawing on BUD holdings from the Ministry of Finance's Financial Statements and on the financial institutions' holdings from the Reserve Bank of Zimbabwe's Quarterly Economic and Statistical Review.

Table 2.1

VARIABLE DEFINITIONS

This table spells out the variable definitions and notations used in tables 2.2 - 2.5.

General Notation

BUD	Central Government
PLA	Parastatals and Local Authorities
RBZ	Reserve Bank of Zimbabwe
POSB	Post Office and Savings Bank
S	Saving
I	Investment
Int Pays	Interest Payments
Int Recs	Interest Receipts
For	Foreign
Dom	Domestic
Nom	Nominal
Curr	Current
Def	Deficit
Accum	Accumulation
Ass	Assets
Liabs	Liabilities
Chg	Change
CNI	Current Non-Interest
Tbo	Transfers from BUD to PLA
SLbo	Stock of Loans from BUD to PLA
SLob	Stock of Loans from PLA to BUD
SEbo	Stock of PLA equity held by BUD

Consolidated NFPS Deficit and Financing (Table 2.2)

Budget categories in table 2.2 aggregate the following budget items presented by tables VI and VII in the Ministry of Finance's Financial Statements:

Direct taxes	= Taxes on Income and Profits
Indirect Taxes	= Sales Tax + Excise Duties
Other Taxes	= Customs Duties + Betting Tax + Other Taxes on Goods and Services + Miscellaneous Taxes
Other Revenue	= Fees + Recoveries of Development Expenditure + Reserve Bank Foreign Reserve Adjustment Surplus + Other

TABLE 2.2
ZIMBABWE
CONSOLIDATED NON-FINANCIAL PUBLIC SECTOR DEFICIT AND FINANCING
(Current Z$ million)

	80-81	81-82	82-83	83-84	84-85	85-86	86-87	87-88	88-89
I. CONS CNI DEF	62	-36.9	-101.6	-118.2	-229.8	-320.3	-313.1	-751.6	-869.8
I.A BUD CNI DEF	144.8	-4.4	-84.1	85.1	44.4	48.5	180.6	-310.2	-417.8
1. Curr NI Expend	1036.9	1306.7	1619.6	1952.1	2082.6	2476.3	3007.9	3182.7	3666.4
1.1 Goods + Servs	398.6	763.3	910.1	1053.1	1111.3	1346.1	1761.2	2285.3	2682.6
Wages	374.6	473.3	558.5	621.4	681.6	826.6	1063.9	1516.9	1750
Oth Goods + S	224	290	351.6	431.7	430.2	521.5	697.3	768.4	932.6
1.2 Transfs + Subs	438.3	543.4	709.5	899	970.8	1130.2	1246.7	897.4	983.8
Tbo	64.1	79.5	103.8	207.1	287.6	302.6	406.4	457.5	482
Oth Trans Subs	374.2	463.9	605.7	691.9	683.2	827.6	840.3	439.9	501.8
2. Curr NI Revenue	892.1	1311.1	1703.7	1867	2038.2	2427.8	2827.3	3492.9	4084.2
2.1 Tax Revenue	777.8	1233.6	1579.5	1743.6	1902.1	2247.7	2638.1	3116.3	3795.2
Direct Taxes	437.5	664.2	792.4	801.6	901.9	1069.8	1356.1	1666.4	1925.2
Indirect Taxes	263.4	410.8	536.1	627.3	638.8	730.7	796.3	866.9	1082.7
Oth Taxes	76.9	158.6	251	314.7	361.4	447.2	485.7	577	787.3
2.2 Oth Inv+Pr Rev	3.7	3.6	15.6	18.1	5.9	5.7	10.3	14.9	16.6
2.3 Oth Revenue	110.6	73.9	108.6	105.3	130.2	174.4	178.9	367.7	272.4
I.B PLA CNI DEF	-82.8	-32.5	-17.5	-203.3	-274.2	-368.8	-493.7	-441.4	-452
1.1 Gross CNI Def	-18.7	47	86.3	3.8	13.4	-66.2	-87.3	16.1	30
1.2 Transfrs (Tbo)	64.1	79.5	103.8	207.1	287.6	302.6	406.4	457.5	482
II. CONS NET INT P	93.7	171.8	249.5	346.8	431.1	554.2	647.7	749.8	908.2
II.A BUD NET INT P	41.5	94.3	139.2	194.8	262.2	337.7	396.1	465.9	588.2
1. Interest Pays	100.2	142.4	200.4	271.2	355.3	429.1	523.4	632.4	770.7
For Int Pays	24.7	33.5	58	109	115.4	148.8	166.9	180.6	204
Dom Int Pays	75.5	108.9	142.4	162.2	240.1	280.3	356.5	451.8	566.7
Int Pays SLob	1.838352	2.482138	3.325843	4.221924	5.706712	8.065691	11.47373	11.58909	13.60242
Oth Dom Int P	73.66165	106.4178	139.0742	157.9781	234.3933	272.2343	345.0263	440.2109	553.0976
2. Interest Recs	58.7	48.1	61.2	76.4	93.3	91.4	127.3	166.5	182.5
Int Recs SLbo	52.873	42.95091	52.39122	62.53274	74.56684	69.03822	93.29452	125.5735	140.0814
Oth IDP Recs	5.827005	5.149086	8.80878	13.86726	18.73316	22.36178	34.00548	40.92651	42.41859
II.B PLA NET INT P	52.2	77.5	110.3	152	168.9	216.5	251.6	283.9	320
1. Interest Pays	54	80	113.6	156.2	174.6	224.6	263.1	295.5	333.6
For Int Pays	3.387274	19.90113	45.37979	95.30159	119.3542	105.3485	86.60688	92.93297	87.86192
Dom Int Pays	50.61273	60.09887	68.22021	60.89841	55.24576	119.2515	176.4931	212.567	245.7381
Int Pay SLbo	52.9	43	52.4	62.5	74.6	69	93.3	125.6	140.1
Oth Dom IP	-2.28727	17.09887	15.82021	-1.60159	-19.3542	50.25145	83.19312	86.96703	105.6381
2. Interest Recs	1.8	2.5	3.3	4.2	5.7	8.1	11.5	11.6	13.6
Int Recs SLob	1.8	2.5	3.3	4.2	5.7	8.1	11.5	11.6	13.6
Oth Int Recs	0	0	0	0	0	0	0	0	0

TABLE 2.2 (Cont.)
ZIMBABWE
CONSOLIDATED NON-FINANCIAL PUBLIC SECTOR DEFICIT AND FINANCING
(Current Z$ million)

	80-81	81-82	82-83	83-84	84-85	85-86	86-87	87-88	88-89
III. CONS SAVING	-155.7	-134.9	-147.9	-228.6	-201.3	-233.9	-334.6	1.8	-38.4
IV. CONS INVESTM	201.3	516.4	603.9	688.3	650.4	864.7	908.4	1072.4	1123
IV.A BUD INVEST	65.1	122.2	191.9	208.7	203.2	221.2	293.1	485	523
IV.B PLA INVEST	136.2	394.2	412	479.6	447.2	643.5	615.3	587.4	600
V. CONS PRIM DEF	263.3	479.5	502.3	570.1	420.6	544.4	595.3	320.8	253.2
V.A BUD PRIM DEF	209.9	117.8	107.8	293.8	247.6	269.7	473.7	174.8	105.2
V.B PLA PRIM DEF	53.4	361.7	394.5	276.3	173	274.7	121.6	146	148
VI. CONS NET INT P	93.7	171.8	249.5	346.8	431.1	554.2	647.7	749.8	908.2
1. NIP For Debt	28.08727	53.40113	103.3798	204.3016	234.7542	254.1485	253.5069	263.533	291.8619
2. NIP Dom Debt	65.61273	118.3989	146.1202	142.4984	196.3458	300.0515	394.1931	486.267	616.3381
VII. CONS NOM DEF	357	651.3	751.8	916.9	851.7	1098.6	1243	1070.6	1161.4
VIII CON NOM DEF FI	356.9	650.9	751.7	917.3	852.3	1098.5	1241.8	1070.6	1161.2
VIIIA BUD NO DEF F	251.3	211.7	246.9	489	510.4	607.3	868.6	640.7	693.2
1. Extraord Income	49.3	0	0	0	0	0	0	0	0
2. Foreign Grants	0	5.4	24.2	56.9	81.1	99.5	106.3	123.6	89.7
3. Net Financing	220.4	316	244.5	428.6	813.5	737.9	843.7	977.1	1045.4
3.1 Net For Financ	-25.4	-35	-181.1	50.8	489.2	211	213.5	149.6	128.8
3.2 Net Dom Financi	245.8	351	425.6	377.8	324.3	526.9	630.2	827.5	916.6
4. Net Lending	79.6	109.7	234.5	186.5	278.5	168.6	227.8	376.9	507.3
5. Net Cash Accum	-61.2	0	-212.7	-190	105.7	61.5	-146.4	83.1	-65.4
VIIIB PLA NO DEF F	105.6	439.2	504.8	428.3	341.9	491.2	373.2	429.9	468
1. Net For Financin	257.4	278.2	445.6	102.1	-86.2	-75.1	16.7	-10.9	0
2. Net Dom Fin-Le	-151.8	161	59.2	326.2	428.1	566.3	356.5	440.8	468
VIIIC CON NO DEF F	356.9	650.9	751.7	917.3	852.3	1098.5	1241.8	1070.6	1161.2
1. Extraord Income	49.3	0	0	0	0	0	0	0	0
2. Foreign Grants	0	5.4	24.2	56.9	81.1	99.5	106.3	123.6	89.7
3. Net Financing	246.4	645.5	514.8	670.4	876.9	1060.5	989.1	1030.1	1006.1
3.1 Net For Financ	232	243.2	264.5	152.9	403	135.9	230.2	138.7	128.8
3.2 Net Dom Fin-Le	14.4	402.3	250.3	517.5	473.9	924.6	758.9	891.4	877.3
4. Net Cash Accum	-61.2	0	-212.7	-190	105.7	61.5	-146.4	83.1	-65.4
VIII CON NOM DEF FI	356.9	650.9	751.7	917.3	852.3	1098.5	1241.8	1070.6	1161.2
IX. CHG CON NET AS	-549.4	-537.3	-941.8	-883.7	-933	-873	-1136.5	-1119	

TABLE 2.3

ZIMBABWE

CONSOLIDATED NON-FINANCIAL PUBLIC SECTOR BALANCE SHEET

(Current Z$ million)

	June 80	June 81	June 82	June 83	June 84	June 85	June 86	June 87	June 88
A. BUD NET ASSETS	-1074.3	-1364.2	-1582	-1973.6	-2463.6	-3084	-3646.5	-4424.5	-5121
1. Assets	592.2	576.5	681	680.1	708.8	1090.8	1545.3	1712.4	2173.8
1.1 Cash Balances	46	-16.8	-21.9	-258.3	-419.3	-315.2	-248.5	-395.4	-315.2
1.2 Loans	518.8	497.9	596.8	792.8	969.2	1235.6	1399.7	1609	1805.7
SLbo	467.3	444.6	510.9	648.9	774.6	933.3	1025.8	1213.5	1386
Oth Loans	51.5	53.3	85.9	143.9	194.6	302.3	373.9	395.5	419.7
1.3 Equity	27.4	95.4	106.1	145.6	158.9	170.4	394.1	498.8	683.3
SEbo	26.9	62.3	70.6	102.1	99.2	104.7	323.2	423.6	598.7
Other Equity	0.5	33.1	35.5	43.5	59.7	65.7	70.9	75.2	84.6
2. Liabilities	1666.5	1940.7	2263	2653.7	3172.4	4174.8	5191.8	6136.9	7294.8
2.1 Foreign Debt	364.6	488.5	678.8	909.5	1047.7	1735.2	2215.2	2515.2	2824.5
2.2 Domestic Debt	1301.9	1452.2	1584.2	1744.2	2124.7	2439.6	2976.6	3621.7	4470.3
SLob	31.7	33.1	37	45.4	50.5	70.2	95.8	92.9	107.3
Oth Dom Debt	1270.2	1419.1	1547.2	1698.8	2074.2	2369.4	2880.8	3528.8	4363
B. PLA NET ASSETS	-788.5	-1048	-1367.5	-1917.7	-2311.4	-2624	-2934.5	-3293	-3715.5
1. Assets	31.7	33.1	37	45.4	50.5	70.2	95.8	92.9	107.3
1.1 Loans	31.7	33.1	37	45.4	50.5	70.2	95.8	92.9	107.3
SLob	31.7	33.1	37	45.4	50.5	70.2	95.8	92.9	107.3
Other Loans	0	0	0	0	0	0	0	0	0
2. Liabilities	820.2	1081.1	1404.5	1963.1	2361.9	2694.2	3030.3	3385.9	3822.8
2.1 Foreign Debt	50	290.2	531.1	795.2	1083.6	1228.5	1149.5	1155	1216.5
2.2 Domestic Debt	743.3	728.6	802.8	1065.8	1179.1	1361	1557.6	1807.3	2007.6
SLbo	467.3	444.6	510.9	648.9	774.6	933.3	1025.8	1213.5	1386
Oth Dom Debt	276	284	291.9	416.9	404.5	427.7	531.8	593.8	621.6
2.3 Equity (SEbo)	26.9	62.3	70.6	102.1	99.2	104.7	323.2	423.6	598.7
C. CONS NET ASSETS	-1862.8	-2412.2	-2949.5	-3891.3	-4775	-5708	-6581	-7717.5	-8836.5
1. Cash	46	-16.8	-21.9	-258.3	-419.3	-315.2	-248.5	-395.4	-315.2
2. Net For Debt	414.6	778.7	1209.9	1704.7	2131.3	2963.7	3364.7	3670.2	4041
3. Net Dom Debt	1494.7	1649.8	1753.2	1971.8	2284.1	2494.8	3038.7	3727.1	4564.9
4. Equity	0.5	33.1	35.5	43.5	59.7	65.7	70.9	75.2	84.6
D. CHG CONS NET AS		-549.4	-537.3	-941.8	-883.7	-933	-873	-1136.5	-1119

2.2). Two main reasons for this stock-flow inconsistency can be mentioned: statistical errors (which probably are of secondary importance) and capital gains and losses on domestic and foreign assets and liabilities, which affect the changes in the value of public net asset holdings but not the financing flows of net cash outlays. One important source of capital losses -- exchange rate depreciations -- will be considered below.

Table 2.4 shows the implicit interest rates paid on the public sector's asset and liability holdings.[6] Interest rates paid on foreign debt increased from 6.8% in the early eighties to almost 12% in 1983-84, to decline subsequently to 7.2% in 1988/89.

Interest rates paid by the central government on domestic debt have increased continuously, from 5.8% in 1980/81 to 12.7% in 1988/89. The interest paid on net domestic debt of the consolidated NFPS shows an even steeper increase throughout the eighties, from 4.4% to 13.5%. This reflects both that the central government's interest receipts on domestic loans were paid at a relatively flat rate during the eighties (around 10%), and the steep increase in interest rates paid by PLA on its domestic debt held by the financial sector and the non-financial private sector.

Table 2.5 is the summary table for this section. It presents deficit and net liabilities of the consolidated non-financial and total public sector as ratios to GDP. Figure 2.1 reflects the evolution of the primary and total nominal deficits in Zimbabwe during the eighties, while figure 2.2 does the same for Zimbabwe's domestic and foreign debt ratios.

After 1980/81, public sector deficits grew from less than 10% of GDP to figures around 13 - 14% maintained over a 6-year span. Initially, most of the increase in the primary deficit took place in the PLA sector, to be followed soon by an expansion in the BUD primary deficit. Continuously

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[6]Current-period interest rates are calculated as current-period fiscal-year interest payments divided by the corresponding preceding end-of-period (June 30) liability or asset stocks. However if actual interest payments correspond to the outstanding asset or liability value at a later date, the rates presented in table 7 are biased by the change of the outstanding stock at that date with respect to the preceding end-of-period value.

increasing nominal interest rates on domestic debt and rising foreign debt/output ratios explain continuously rising net interest payments throughout the eighties and until today.

However, starting in 1987/88 a partial fiscal adjustment took place in the budget, reducing the deficit by 3.5 percentage points during that fiscal year and an additional percentage point in 1988/89, allowing a decline of the consolidated non-financial sector deficit to 10% in the latter year. While this figure is still high, as will be judged in sections 4 and 5 below, it represents a significant improvement over the recent past.

The financing requirements of high public sector deficits have contributed to a steady and massive rise in public (total or consolidated non-financial) liabilities, from 54.1% of GDP in June 1980 to 86.4% in June 1987. The lower 1987/89 deficits have allowed a slight reduction in the public sector net liabilities to GDP ratio in June 1988. An interesting fact to note is that the composition of public debt has changed drastically. During the early 1980s public deficits relied massively on foreign financing, pushing up the 7.4% foreign debt to GDP ratio of the total public sector in 1980 to reach a peak of 41.9% in 1985.[7] This allowed a reduction in the domestic debt to GDP ratio from 42.3% in 1980 to a trough of 26% in 1983. A strong reversal of the composition of debt-financing occurred afterwards, allowing the foreign debt ratio to fall by a couple of percentage points, while the domestic debt ratio increased to reach in 1988 levels only slightly below those observed in 1980.

Monetary financing of the total public sector has been relatively steady over the 1980s. Consequently, the base money to GDP ratio, after increasing slightly in the early 1980s has remained stable at around 6.4%.

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[7]A similar evolution is observed in the case of the non-financial public sector debt to GDP ratios, as shown in table 12 and figure 2.

TABLE 2.4
ZIMBABWE
NON-FINANCIAL PUBLIC SECTOR INTEREST RATES

	80-81	81-82	82-83	83-84	84-85	85-86	86-87	87-88	88-89
A. CENTRAL GOVERNMENT INTEREST RATES									
1. Rates of Int Pays									
1.1 On For Debt	0.067745	0.068577	0.085445	0.119846	0.110146	0.085754	0.075343	0.071803	0.072225
1.2 On Dom Debt	0.057992	0.07499	0.089888	0.092994	0.113004	0.114896	0.119768	0.124748	0.12677
On SLob	0.057992	0.07499	0.089888	0.092994	0.113004	0.114896	0.119768	0.124748	0.12677
On Oth Dom D	0.057992	0.07499	0.089888	0.092994	0.113004	0.114896	0.119768	0.124748	0.12677
2. Rates of Int Recs									
2.1 On Dom. Loans	0.113146	0.096606	0.102547	0.096367	0.096265	0.073972	0.090948	0.10348	0.101069
On SLbo	0.113146	0.096606	0.102547	0.096367	0.096265	0.073972	0.090948	0.10348	0.101069
On Oth Dom L	0.113146	0.096606	0.102547	0.096367	0.096265	0.073972	0.090948	0.10348	0.101069
B. PUBLIC ENTERPRISES AND LOCAL AUTHORITIES									
1. Rates of Int Pays									
1.1 On For Debt	0.067745	0.068577	0.085445	0.119846	0.110146	0.085754	0.075343	0.071803	0.072225
1.2 On Dom Debt	0.068092	0.082485	0.084978	0.057139	0.046854	0.08762	0.113311	0.117616	0.122404
On SLob	0.113204	0.096716	0.102564	0.096317	0.096308	0.073931	0.090953	0.103502	0.101082
On Oth Dom Deb	-0.00829	0.060207	0.054197	-0.00384	-0.04785	0.117492	0.156437	0.146458	0.169945
2. Rates of Int Recs									
2.1 On Dom. Loans	0.056782	0.075529	0.089189	0.092511	0.112871	0.115385	0.120042	0.124865	0.126747
On SLbo	0.056782	0.075529	0.089189	0.092511	0.112871	0.115385	0.120042	0.124865	0.126747
C. CONSOLIDATED NON-FINANCIAL PUBLIC SECTOR									
1. On Net For Debt	0.067745	0.068577	0.085445	0.119846	0.110146	0.085754	0.075343	0.071803	0.072225
2. On Net Dom Debt	0.043897	0.071766	0.083345	0.072268	0.085962	0.120271	0.129724	0.130468	0.135017

TABLE 2.3
ZIMBABWE
CONSOLIDATED PUBLIC SECTOR DEFICIT AND NET LIABILITIES

A. DEFICIT AS PERCENTAGE OF FISCAL YEAR GDP

	80-81	81-82	82-83	83-84	84-85	85-86	86-87	87-88	88-89
CONS NFPS DEFICIT	0.091	0.135	0.131	0.144	0.127	0.143	0.144	0.109	0.100
1. Prim Deficit	0.067	0.100	0.087	0.090	0.063	0.071	0.069	0.033	0.022
Bud Prim Def	0.054	0.024	0.019	0.046	0.037	0.035	0.055	0.018	0.009
PLA Prim Def	0.014	0.075	0.069	0.043	0.026	0.036	0.014	0.015	0.013
2. Net Int Pays	0.024	0.036	0.043	0.055	0.064	0.072	0.075	0.077	0.078
NIP For Debt	0.007	0.011	0.018	0.032	0.035	0.033	0.029	0.027	0.025
NIP Dom Debt	0.017	0.025	0.025	0.022	0.029	0.039	0.046	0.050	0.053
CONS TPS DEFICIT	0.088	0.131	0.126	0.143	0.126	0.138	0.137	0.103	0.093
1. Prim Deficit	0.067	0.100	0.087	0.090	0.063	0.071	0.069	0.033	0.022
Bud Prim Def	0.054	0.024	0.019	0.046	0.037	0.035	0.055	0.018	0.009
PLA Prim Def	0.014	0.075	0.069	0.043	0.026	0.036	0.014	0.015	0.013
2. Net Int Pays	0.021	0.032	0.039	0.053	0.064	0.067	0.068	0.070	0.071
NIP For Debt	0.004	0.011	0.018	0.034	0.038	0.033	0.029	0.026	0.024
NIP Dom Debt	0.016	0.021	0.020	0.019	0.025	0.034	0.040	0.045	0.047

B. PUBLIC SECTOR LIABILITIES AS PERCENTAGE OF CALENDAR YEAR GDP

	June 80	June 81	June 82	June 83	June 84	June 85	June 86	June 87	June 88
CONS NFPS LIABILS	0.541	0.544	0.568	0.617	0.746	0.813	0.793	0.864	0.830
1. Cash	0.013	-0.004	-0.004	-0.041	-0.065	-0.045	-0.030	-0.044	-0.030
2. Net For Debt	0.120	0.176	0.233	0.270	0.333	0.422	0.406	0.411	0.380
3. Net Dom Debt	0.434	0.372	0.337	0.313	0.357	0.355	0.366	0.417	0.429
4. Equity	0.000	0.007	0.007	0.007	0.009	0.009	0.009	0.008	0.008
CONS TPS LIABILS	0.541	0.544	0.567	0.617	0.746	0.813	0.793	0.864	0.830
1. Base Money	0.058	0.061	0.064	0.057	0.059	0.058	0.060	0.064	0.064
2. Net For Debt	0.074	0.169	0.237	0.289	0.366	0.419	0.393	0.393	0.365
3. Net Dom Debt	0.423	0.318	0.270	0.260	0.309	0.312	0.319	0.375	0.380
4. Other Liabs	-0.014	-0.004	-0.003	0.010	0.012	0.024	0.021	0.031	0.021

FIGURE 2.1

Zimbabwe
Consolidated Public Sector Deficit
(% of fiscal year GDP)

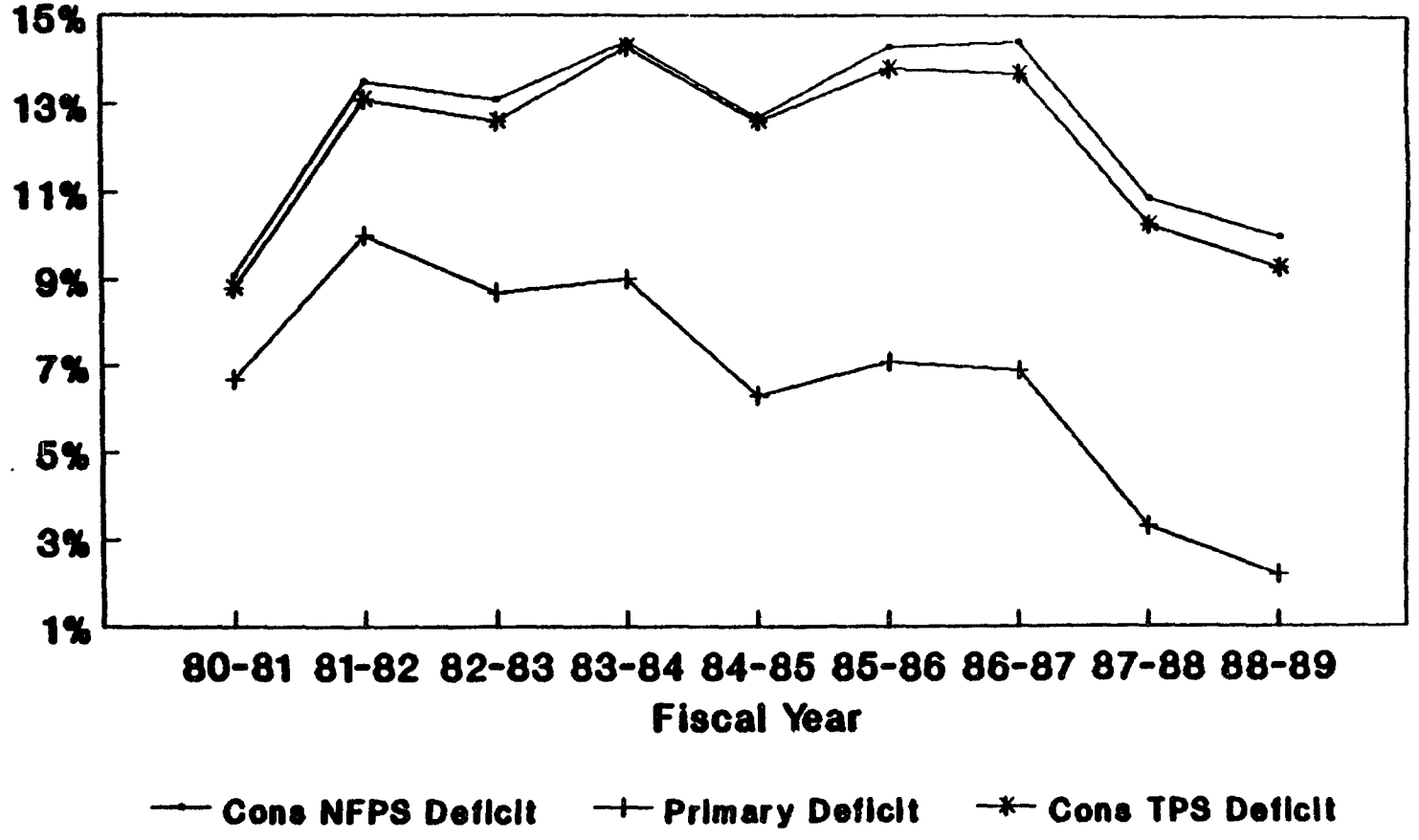
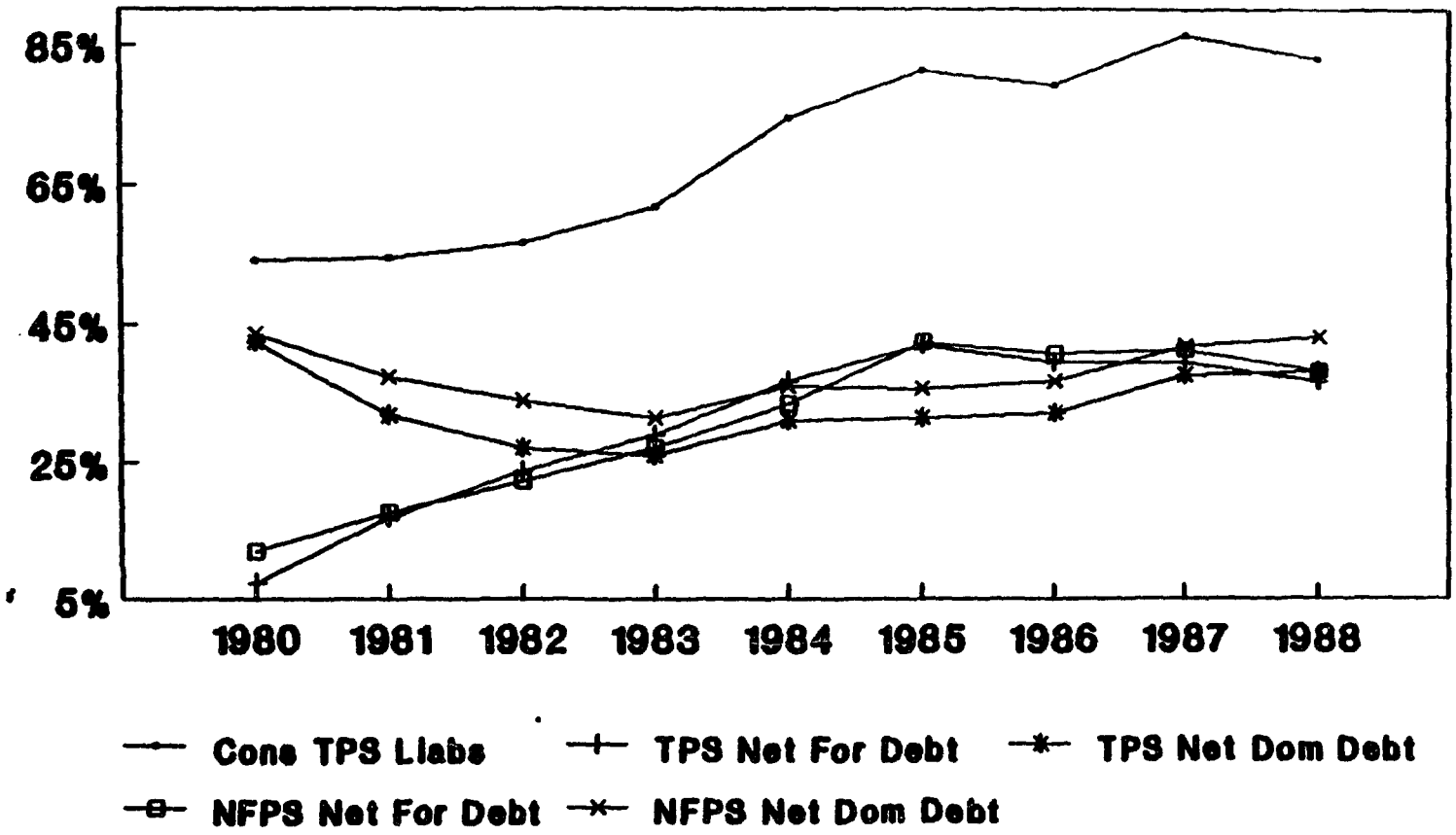


FIGURE 2.2

Zimbabwe
Consolidated Public Sector Liabilities
(% of GDP)



Note: Figures are for June of each year.

3. ECONOMIC AND POLICY DETERMINANTS OF PUBLIC SECTOR DEFICITS, 1980-1989

This section presents a decomposition of Zimbabwe's public sector deficits during the eighties according to the main economic and policy determinants of the deficit. In particular, here we identify the role played by major macroeconomic domestic and foreign variables as well as by fiscal policies, in generating the initial expansionary phase and the subsequent partial fiscal adjustment taking place since 1987/88.

The methodology applied here to Zimbabwe, based on the framework developed by Marshall and Schmidt-Hebbel (1989), is developed in the appendix. It starts by identifying the main budgetary items of the consolidated non-financial public sector deficit. By making use of estimated tax revenue functions, the Fisher equation for domestic interest rates, and simple variable transformations, it is possible to identify the effect of the main macroeconomic and policy variables on the deficit. This allows us to measure the sensitivity of Zimbabwe's public budget structure to changes in the macroeconomic and policy determinants.

3.1 Tax Revenue Functions

The methodology's only behavioral equations are tax revenue functions. These are estimated separately for direct taxes, indirect taxes, and customs duties using fiscal and fiscalized-year data for 1970/71 to 1988/89. Table 3.1 presents the main results.

Direct taxes depend positively on GDP (y) -- our proxy for the tax base -- inflation (π), and the real exchange rate (RER). The reason that inflation increases real direct tax revenue is a result of progressive personal taxes under non-indexed tax bases -- the opposite effect of the

Table 3.1

ESTIMATION RESULTS FOR TAX REVENUE FUNCTIONS
(1970/71 - 1988/89)

A. Direct Taxes

$$dt_t = \alpha_0 + \alpha_1 y_t + \alpha_2 \pi_t + \alpha_3 RER_t + \alpha_4 CW_t + \alpha_5 DTR70_t + \alpha_6 DTR82_t + \alpha_7 DTR88$$

Regression	α_0	α_1	α_2	α_3	α_4	α_5	α_6	α_7	DW	R^2A
1.	-205	0.160	277	91	-50	-118	-2	108	2.22	0.97
	(-1.9)	(5.2)	(1.7)	(1.5)	(-2.1)	(-5.1)	(-0.1)	(2.0)		
2.	-209	0.161	280	92	-50	-118	-	105	2.23	0.97
	(-3.2)	(7.7)	(1.9)	(1.7)	(-2.3)	(-5.4)		(4.1)		

B. Indirect Taxes

$$it_t = \beta_0 + \beta_1 y_t + \beta_2 \pi_t + \beta_3 RER_t + \beta_4 CW_t + \beta_5 ITR70_t + \beta_6 ITR81_t$$

Regression	β_0	β_1	β_2	β_3	β_4	β_5	β_6		DW	R^2A
1.	-5	0.047	119	79	15	-91	106	2.08	0.99	
	(-0.1)	(3.2)	(1.4)	(2.5)	(0.9)	(-6.3)	(4.9)			
2.	25	0.049	-	60	-	-104	102	2.43	0.99	
	(0.6)	(3.5)		(2.1)		(-10.9)	(5.8)			

C. Customs Duties

$$cd_t = \gamma_0 + \gamma_1 imp_t + \gamma_2 \pi_t + \gamma_3 CDR82_t + \gamma_4 CDR83_t + \gamma_5 CDR88_t$$

Regression	γ_0	γ_1	γ_2	γ_3	γ_4	γ_5			DW	R^2A
1.	-73	0.100	63	83	149	228	1.70	0.96		
	(-2.2)	(3.6)	(0.8)	(4.0)	(14.6)	(12.2)				
2.	-65	0.098	-	88	148	229	1.63	0.96		
	(-2.0)	(3.6)	(4.5)	(14.8)	(12.5)					

Note: All equations were estimated by ordinary least squares. In addition, all equations were estimated by maximum likelihood in order to estimate the first-order residual correlation coefficients, which were systematically not significant at standard confidence levels.

Keynes-Olivera-Tanzi effect of inflation negatively affecting (general) tax revenue when tax bases are indexed and tax payments are subject to significant payment lags, the latter combination often observed in high-inflation countries. A real exchange rate depreciation (a higher RER according to our definitionof the real exchange rate) raises direct tax revenue probably because ex-post direct tax rates are higher in the traded-goods producing sectors than in the non-traded sectors. Finally, the 1978-1980 pre-independence period of conflict (captured by the CW dummy) contributed to an erosion in tax revenue, while the tax regime change in 1982 (DTR82) had no discernible effects on revenues and the 1988 tax regime change (DTR88) increased tax revenue significantly.

For indirect tax revenue GDP was also used as the relevant tax base. A fraction of indirect taxes are set in nominal currency units per unit sold, hence inflation should affect negatively this part of indirect tax revenue. However, aggregate indirect taxes are positively (though not significantly) affected by the rise in the GDP deflator. As in the case of direct taxes, a real exchange rate depreciation raises revenue. During the 1970/71-1975/76 period indirect tax revenue fell as compared to the 1976/77-1980/81 years, while after 1980 revenue rose with the new 1980/81 tax regime, as reflected by the corresponding tax regime dummies.[8]

For customs duties the relevant tax base is imports (imp), with a marginal tariff rate of about 10% for the 1970/71 - 1981/82 period. Changes in the customs tax regime in 1982, 1983, and 1988 (reflected by dummies CDR82, CDR83, and CDR88) (refelcted by dummies CDR82, CDR83, and CDR88) raised revenues in customs duties gradually above that 10% level.

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[8]The ITR70 dummy covers the 1970/71 - 1975/76 period, while the ITR81 covers 1981/82 - 1988/89. The non-significant level of CW (which stands for a separate 1978/79 - 1980/81 dummy) suggests that indirect taxes did not fare worse during those years as compared to 1976/77 - 1977/78.

3.2 Decomposition of the Public Sector Deficit

According to the methodology spelled out in the appendix, table 3.2 presents the annual (fiscal-year) changes in the main economic and policy determinants of the consolidated NFPS over fiscal years 1981/82 - 1988/89. The domestic macroeconomic variables considered are real GDP, real imports, real interest rate paid on domestic NFPS debt, inflation (as measured by the rate of change of the GDP deflator), and the real exchange rate. The only foreign variable considered is the nominal interest rate paid on NFPS foreign debt.[9]

Finally, the set of policy variables is comprised by the real domestic and foreign debt stocks, three budgetary current expenditure variables (wages, expenditure on other goods and services, and transfers and subsidies), six tax regime variables, the gross current non-interest primary deficit of public enterprises and local authorities, and NFPS investment expenditure.

With regard to the latter set of variables, which are under (higher) control of fiscal policy makers, table 3.2 shows that real wages and expenditure on other goods and services increased massively throughout the 1980s, while transfers and subsidies were cut down during the late 1980s. Indirect tax revenue increased with the 1981 tax regime change and customs duties were raised in 1982, 1983 and again in 1988 as a result of regime changes. The PLA deficit hovered around zero during the 1980s. NFPS investment more than doubled in 1981/82, without a clear trend afterwards, excepting a further, significant increase in 1985/86. The evolution of public debt stocks, a result of below-the-line financing needs and its composition, was already discussed in section 2: while NFPS real foreign debt grew massively during the early 1980s, its role was taken over by real domestic indebtment after the mid 1980s.

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[9]It is not clear - and we did not attempt to identify - how the deficit is affected by changes in Zimbabwe's external terms of trade.

Table 3.3 decomposes the changes in NFPS deficit to GDP ratios according to the changes in the main budgetary variables, consistent with the NFPS deficit figures of table 2.2. The table distinguishes between the main budgetary changes included in our decomposition ("included budget variables") and the changes in variables excluded from the analysis ("excluded budget variables") due to their either minor or unsystematic role. The changes in the former set of variables is exactly consistent with equation (4) in the appendix.

Table 3.4 presents the final result of the decomposition, which allows to identify the changes in the consolidated NFPS according to their underlying macroeconomic and policy causes. To illustrate the usefulness of this approach, we will briefly discuss the role of the main variables in the 1987/88 - 1988/89 partial fiscal adjustment in Zimbabwe.

GDP growth was the main macroeconomic variable contributing to deficit reduction during the two last fiscal years. Its positive effect on tax bases (the "economic effect" in line 2) reduced the deficit by 0.5-1.2 percentage points of GDP, in addition to the 0.4-0.9 percentage point reduction due to the simple fact that the deficit and every budgetary item are expressed as ratios to GDP (the "denominator effect" in line 3). Other macro variables (apart of imports, whose decline in 1987/89 increased the deficit) tended to cause minor changes of opposite signs in these last two fiscal years.

Among fiscal variables, a major stabilization effort was obtained by reducing significantly transfers and subsidies in 1987/88, and by increasing revenue from customs duties in 1988/89. However, other variables under control of policy makers contributed to an increase in the deficit: the budgetary wage bill expanded significantly, and to a lesser extent higher expenditure on goods and services and a higher PLA deficit increased the NFPS deficit. In addition, the secular rise in domestic debt raised domestic interest payments.

TABLE 3.2
ZIMBABWE
CHANGES OF ECONOMIC AND POLICY
DETERMINANTS OF CONSOLIDATED NON-FINANCIAL
PUBLIC SECTOR DEFICITS

	81-82	82-83	83-84	84-85	85-86	86-87	87-88	88-89
1. Domestic Variables								
Real GDP ($Y^{\odot}$)	0.075	0.021	-0.002	0.024	0.047	0.006	0.025	0.057
Real impo($imp^{\odot}$)	0.122	-0.043	-0.068	-0.002	0.040	-0.024	-0.083	0.000
Domestic (dr)	0.008	-0.013	0.045	0.095	-0.022	-0.025	0.017	-0.012
Domestic (dpi)	0.020	0.024	-0.056	-0.081	0.056	0.034	-0.016	0.016
Real exch($RER^{\odot}$)	0.030	0.072	0.201	0.269	0.104	-0.075	-0.016	0.051
2. Foreign Variables								
Foreign n(di*)	0.001	0.017	0.034	-0.010	-0.024	-0.010	-0.004	0.000
3. Foreign Variables								
Foreign r($(D^*/P^*)^{\odot}$)	0.594	0.241	0.055	-0.044	0.159	0.094	0.003	-0.066
Domestic ($(D/P)^{\odot}$)	-0.035	-0.090	0.011	0.124	0.005	0.086	0.110	0.092
Wage bill($(WB/P)^{\odot}$)	0.105	0.010	0.000	0.064	0.113	0.150	0.290	0.028
Goods/ser($(GS/P)^{\odot}$)	0.132	0.038	0.104	-0.033	0.115	0.192	-0.003	0.082
Transfers($(TS/P)^{\odot}$)	0.084	0.118	0.027	-0.042	0.114	-0.095	-0.526	0.017
Political(dCW)	-1.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
1988 dire(dDTR88)	0.000	0.000	0.000	0.000	0.000	0.000	1.000	0.000
1981 indi(dITR81)	1.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
1982 cust(dCDR82)	0.000	1.000	-1.000	0.000	0.000	0.000	0.000	0.000
1983 cust(dCDR83)	0.000	0.000	1.000	0.000	0.000	0.000	0.000	-1.000
1988 cust(dCDR88)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.000
PLA prima($(PD/P)^{\odot}$)	-3.198	0.572	-0.960	2.421	-5.545	0.176	-1.167	0.661
NFPS inve($(I/P)^{\odot}$)	1.243	0.001	0.025	-0.083	0.223	-0.063	0.068	-0.066

Note: rc denotes annual rate of change
c denotes annual change.

TABLE 3.3
ZIMBABWE
DECOMPOSITION OF THE CHANGES IN CONSOLIDATED
NON-FINANCIAL PUBLIC SECTOR DEFICITS,
ACCORDING TO CHANGES IN BUDGETARY VARIABLES
(Ratios to GDP)

	81-82	82-83	83-84	84-85	85-86	86-87	87-88	88-89
I. CHGS OF INCLUDED BUDGET VARIABLES								
Wage bill	0.003	-0.001	0.000	0.004	0.006	0.016	0.032	-0.004
Goods/services	0.003	0.001	0.007	-0.004	0.004	0.013	-0.002	0.002
Transfers/subsi	0.001	0.009	0.003	-0.007	0.007	-0.011	-0.053	-0.002
Direct taxes	0.026	0.000	-0.012	0.008	0.006	0.017	0.013	-0.004
Indirect taxes	0.018	0.008	0.005	-0.003	0.000	-0.003	-0.004	0.005
Customs duties	0.014	0.011	0.006	0.002	0.005	-0.002	0.002	0.008
PLA primary def	0.015	0.005	-0.014	0.001	-0.011	-0.001	0.012	0.001
Net interest pa	0.004	0.007	0.014	0.003	-0.006	0.000	-0.002	-0.002
Net interest pa	0.008	0.001	-0.003	0.007	0.014	0.002	0.004	0.003
NFPS investment	0.056	-0.002	0.003	-0.011	0.016	-0.008	0.004	-0.013
Sum of chgs. of	0.031	0.001	0.011	-0.014	0.020	-0.001	-0.017	-0.023
II. CHGS. OF EXCLUDED BUDGET VARIABLES								
Other taxes	-0.001	0.000	-0.000	0.002	0.000	0.000	0.001	0.001
Other revenue	-0.013	0.004	-0.002	0.003	0.001	0.000	0.003	-0.001
Other investmen	-0.000	0.002	0.000	-0.002	-0.000	0.000	0.000	-0.000
RBZ foreign res	0.000	0.000	0.000	0.000	0.002	-0.002	0.014	-0.013
Sum of chgs. of	0.014	-0.006	0.002	-0.003	-0.003	0.002	-0.018	0.013
CHG CONSOLIDATE	0.044	-0.005	0.013	-0.017	0.017	0.000	-0.045	-0.008

TABLE 3.4
ZIMBABWE
DECOMPOSITION OF THE CHANGES IN CONSOLIDATED
NON-FINANCIAL PUBLIC SECTOR DEFICITS,
ACCORDING TO CHANGES IN ECONOMIC AND POLICY DETERMINANTS
(Ratios to GDP)

	81-82	82-83	83-84	84-85	85-86	86-87	87-88	88-89
1. Changes Due to Domestic Variables								
Real GDP (Y^{Θ})	-0.009	-0.003	0.000	-0.004	-0.007	-0.001	-0.004	-0.009
Real GDP (Y^{Θ})	-0.016	-0.004	0.000	-0.005	-0.010	-0.001	-0.005	-0.012
Real impo(imp$^{\Theta}$)	-0.012	0.004	0.007	0.000	-0.004	0.002	0.008	0.000
Domestic (dr)	0.003	-0.004	0.014	0.029	-0.007	-0.009	0.006	-0.005
Domestic (dPI)	0.006	0.007	-0.013	-0.020	0.015	0.010	-0.005	0.005
Real exch(RER$^{\Theta}$)	-0.001	-0.003	-0.009	-0.018	-0.008	0.005	0.001	-0.003
2. Changes Due to Foreign Variables								
Foreign n(di*)	0.000	0.003	0.007	-0.003	-0.008	-0.004	-0.001	0.000
3. Changes Due to Policy Variables								
Foreign r((D*/P*)$^{\Theta}$)	0.004	0.003	0.001	-0.001	0.006	0.003	0.000	-0.002
Domestic ((D/P)$^{\Theta}$)	-0.001	-0.002	0.000	0.003	0.000	0.004	0.005	0.005
Wage bill((WB/P)$^{\Theta}$)	0.010	0.001	0.000	0.006	0.011	0.016	0.036	0.004
Goods/ser((GS/P)$^{\Theta}$)	0.008	0.002	0.006	-0.002	0.007	0.013	-0.000	0.006
Transfers((TS/P)$^{\Theta}$)	0.008	0.011	0.003	-0.005	0.012	-0.010	-0.051	0.001
Political(dCW)	-0.014	0.000	0.000	0.000	0.000	0.000	0.000	0.000
1988 dire(dDTR88)	0.000	0.000	0.000	0.000	0.000	0.000	-0.024	0.000
1981 indi(dITR81)	-0.028	0.000	0.000	0.000	0.000	0.000	0.000	0.000
1982 cust(dCDR82)	0.000	-0.022	0.022	0.000	0.000	0.000	0.000	0.000
1983 cust(dCDR83)	0.000	0.000	-0.037	0.000	0.000	0.000	0.000	0.034
1988 cust(dCDR88)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	-0.052
PLA prima((PD/P)$^{\Theta}$)	0.015	0.006	-0.014	0.001	-0.011	-0.002	0.012	0.001
NFPS inve((I/P)$^{\Theta}$)	0.064	0.000	0.003	-0.009	0.022	-0.007	0.007	-0.007
SUM OF CHGS. DUE TO	0.038	-0.003	-0.010	-0.026	0.018	0.020	-0.016	-0.034
CHGS. DUE TO OTHER	0.006	-0.002	0.023	0.008	-0.001	-0.020	-0.028	0.026
CHG CONSOLIDATED NF	0.044	-0.005	0.013	-0.017	0.017	0.000	-0.045	-0.008

3.3 Sensitivity of the Deficit to Economic and Policy Determinants

More interesting than a historical comparison is to identify the structural sensitivity of Zimbabwe's NFPS deficit to its main determinants. Table 3.5 computes measures of the responsiveness (or semi-elasticities) of the deficit to changes in underlying macroeconomic andpolicy variables, computed as absolute changes of the NFPS deficit (in percentage points of GDP) for 1% (or 1 percentage point) changes in the corresponding determinants in the recent past.[10] These elasticities reflect the share in the budget of the corresponding budgetary variable (which may change over time) and, in the case of the behavioral tax revenue functions, the size of the corresponding (estimated as time-invariant) coefficients.

The deficit appears to be quite sensitive to changes in macroeconomic variables. Its semi-elasticity with respect to GDP is -0.37 (the sum of the denominator-elasticity of -0.16 and the economic elasticity of -0.21), only surpassed by that of the domestic real interest rate (0.40). The responsiveness with respect to inflation is also relatively high (0.31), which is lower than the real interest rate semi-elasticity due to the negative effect of inflation on the deficit via raising direct taxes, which reduces somewhat its positive effect on the deficit via higher domestic interest payments. Slightly lower (0.25) is the semi-elasticity of the deficit with respect to foreign nominal interest rates. Finally, it is interesting to note that the deficit is only weakly responsive to the real exchange rate. A 1% real depreciation will reduce the deficit by 0.06 percentage points of GDP; i.e. the strong effect on the deficit via higher interest payments on foreign debt is almost neutralized by the higher tax revenue, as both direct and indirect tax payments are boosted by a depreciation.

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[10]The semi-elasticities were computed for 1987/88 - 1988/89. If the semi-elasticities changed over the 1980s, the values for the early 1980s (1981/82-1982/83) were added in parentheses after the 1987/88 - 1988/89 values.

Among policy variables, changes in tax regimes (due to higher tax burdens or stricter controls of evasion) tend to affect the NFPS deficit significantly. This is not adequately captured by the corresponding semi-elasticities, which have varied between 1.4 and 5.2[11] Among expenditure variables, by decreasing order of importance there are the wage bill, investment, transfers/subsidies and expenditure on other goods and services. Finally, although it has been omitted from the table, a change in the PLA primary non-interest current deficit is obviously of enormous importance, as the consolidated NFPS deficit changes 1 by 1 with the former.

The preceding discussion has shed light on the sensitivity of Zimbabwe's public finances to the major macroeconomic and fiscal policy determinants of the deficit. Future fiscal programming and stabilization efforts could be based on this kind of quantitative framework, which complements the usual policy considerations with a clear identification of the effectiveness of policy instruments.

---

[11]Take, for instance, the 1988 customs duties regime change (d CDR88), which implied a staggering deficit reduction of 5.2 percentage points of GDP in 1988/89 (see table 3.4). Dividing it by the corresponding change in the dummy (=1.0, see table 3.2), a huge semi-elasticity of -5.2 is obtained.

Table 3.5
SENSITIVITY OF NON-FINANCIAL PUBLIC SECTOR DEFICITS
TO CHANGES IN ECONOMIC AND POLICY DETERMINANTS

CHANGES IN ECONOMIC AND POLICY DETERMINANTS	CHANGES IN NFPS DEFICIT (Percentage Points of GDP)
1. Domestic Variables	
1% growth Real GDP: Denominator Effect	-0.16
Economic Effect	-0.21
1% growth Real Imports	-0.10
1 pp. Increase Domestic Real Interest Rate	0.40 (0.30)
1 pp. Increase Domestic Inflation	0.31
1% growth Real Exchange Rate	-0.06 (-0.04)
2. Foreign Variables	
1 pp. Increase Foreign Nominal Interest Rate	0.25 (0.18)
3. Policy Variables	
1% growth Foreign Real Debt	0.03 (0.01)
1% growth Domestic Real Debt	0.05 (0.02)
1% growth Real Wage Bill	0.14 (0.10)
1% growth Goods/Services Expenditure	0.07
1% growth Transfers/Subsidies	0.10
Change 1980 Political Regime	-1.4
Change 1988 Direct Tax Regime	-2.4
Change 1981 Indirect Tax Regime	-2.8
Change 1982 Customs Duties Regime	-2.2
Change 1983 Customs Duties Regime	-3.5
Change 1988 Customs Duties Regime	-5.2
1% growth NFPS Investment	0.10 (0.05)

Notes

1. The changes in NFPS deficits were obtained by dividing the 1987/88 - 1988/89 change in the deficit caused by the corresponding economic or policy determinant (as reflected by table 3.4) by the change in the corresponding determinant (as reflected by table 3.2). The values in parentheses refer to 1981/82 - 1982/83 when they differ from the 1987/88 - 1988/89 levels.

2. pp denotes percentage points.

3. The changes in political and tax regimes are measured by the changes in the corresponding dummies estimated by the tax revenue functions, as shown in table 3.1.

4. SUSTAINABILITY OF THE DEFICIT

This section focuses on obtaining bounds for sustainable deficits of the public sector. The sustainability concept applied here refers to the feasibility of the dynamic path of public liabilities for given demands by the domestic private and foreign sectors for these liabilities. It follows work on fiscal sustainability developed by Buiter (1983, 1985) and van Wijnbergen (1989), with applications by van Wijnbergen, Anand and Rocha (1988) to Turkey and by De Melo (1990) to Morocco.

The analysis starts with the standard equation for the consolidated total public sector current price deficit and its financing, as ratios to current-price GDP:

$$(4.1) \qquad \frac{PD}{P\,y} + \frac{i\,B}{P\,y} + \frac{E\,i^{*}\,F^{*}}{P\,y} = \frac{\dot{H}}{P\,y} + \frac{\dot{D}}{P\,y} + \frac{E\,\dot{F}^{*}}{P\,y} - \frac{\dot{O}L}{P\,y}$$

where PD is the consolidated total public sector primary deficit, P is the GDP deflator, y is real GDP, i is the domestic nominal interest rate, B is the domestic public debt stock, E is the nominal exchange rate, i^* is the foreign nominal exchange rate, F^* is the foreign public debt stock (in foreign currency units), H is total base money, and OL is other public liabilities. Dots over variables denote absolute (not relative) rates of change per time unit.[12]

By making use of the relations between changes in current-price public liabilities and changes in the liability to GDP ratios, rewrite equation (4.1) to obtain:

$$(4.2) \qquad pd + (r + \hat{P})\,b + i^{*}\,f = \dot{h} + h(\hat{P} + \hat{y}) + \dot{b} + b\,(\hat{P} + \hat{y}) + \\ + \dot{f} + f\,(-\hat{e} + \hat{P}^{*} + \hat{y}) + \dot{o}l + ol\,(\hat{P} + \hat{y})$$

---

[12]Below, hats denote relative rates of change and lower-case letters denote ratios of the corresponding variables to current price GDP; for instance, pd is equal to PD/(P y) and f is defined as (E F)/(P y). The real exchange rate, denoted by e, is defined as (E P^*/P), and the real domestic and foreign interest rates, denoted by r and r^*, respectively, are defined according to the Fisher equations in their simple linear form.

Now let's introduce the steady-state notion of fixed public liability to GDP ratios. A sustainable deficit is hence defined as a level consistent with maintaining unaltered holdings of public liabilities, in proportion to GDP, by domestic private and foreign creditors. Imposing this condition

$(\dot{h} = 0 = \dot{b} = \dot{f} = \dot{o}l)$ and after simple re-arranging of (4.2), obtain the following expression

for the sustainable primary deficit:

$$(4.3) \qquad pd = h\hat{P} + h\hat{y} + b(\hat{y} - r) + f(\hat{y} - r^*) - f\hat{e} + ol(\hat{P} + \hat{y})$$

Equation (4.3) states that the primary deficit level which can be sustained over time results from the following six financing sources: inflation tax on base money, seigniorage from GDP growth effects on base money demand, the excess of domestic growth over the domestic real interest rate affecting domestic debt, the excess of domestic growth over the foreign real interest rate affecting foreign debt, capital gains on foreign debt resulting from real exchange rate appreciations (implying $\hat{e}$ less than 0), and inflation tax cum seigniorage on other liabilities.

Table 4.1 presents simulation results for sustainable public sector deficits in Zimbabwe, consistent with the structure of its public finances and with its recent evolution of macroeconomic variables.

The first part of the table presents the recent evolution of the relevant macroeconomic variables required for applying equation (4.3). This helps us to identify reasonable values for the base, favorable and unfavorable scenarios considered in section 3 of the table. Next the ratios to GDP of the four main liabilities of the consolidated total public sector at the most recently available date (June 1988, obtained from table 2.5), are presented, which will be used as the relevant constant liability ratios for the simulations.

As mentioned above, three scenarios are considered. The first is a base scenario, which assumes GDP growth and real interest rates broadly consistent with the recent Zimbabwean experience, while

the real exchange rate is maintained at its current level. Under a favorable scenario, growth increases by one percentage point and the domestic real interest rate falls by one percentage point as compared to the base scenario. The unfavorable fiscal scenario implies lower growth, higher real interest rates, and a real exchange rate depreciation of 7%.

Changes in growth and interest rates have the strongest effects on the sustainable public sector deficit due simply to the fact that domestic and foreign debt stocks are high as compared to base money and other public liabilities. In addition, capital losses on the foreign debt due to real exchange rate devaluations can limit severely sustainable deficits, as shown in the unfavorable scenario.

Under the base scenario, the sustainable primary public deficit is estimated at 1.7% of GDP, increasing slightly to 2.9% under the favorable case, and dropping significantly, to -4.2%, under the unfavorable scenario. The total nominal deficits vary accordingly.

The actual 1988/89 primary deficit of 2.2% of GDP (see table 2.5) is at the mid-point of the base and favorable scenarios, and exceeds the unfavorable scenario deficit by the significant amount of 6.4 percentage points. The nominal deficits of the base and unfavorable cases are quite similar to the actual total public sector and NFPS nominal deficits (see table 2.5) but, again, the unfavorable scenario shows a sustainable nominal deficit which is almost 5 percentage points below the latter measures.

Hence we may conclude that while current public sector deficits in Zimbabwe may be sustainable from the limited perspective of constant liability to GDP ratios and under macroeconomic conditions ranging from normal to favorable, they are clearly unsustainable under adverse macro shocks or when significant devaluations are required in response to policy changes.

TABLE 4.1
ZIMBABWE
SUSTAINABLE PUBLIC SECTOR DEFICIT

1. MACROECONOMIC VARIABLES

	86-87	87-88	88-89
GDP growth (y°)	-0.038	-0.014	0.044
Domestic Inflation (P°)	0.172	0.148	0.137
Domestic Nominal Interest Rate (i)	0.130	0.130	0.135
Domestic Real Interest Rate (r)	0.042	0.018	0.002
Foreign Nominal Interest Rate (i*)	0.075	0.072	0.072
Foreign Inflation ($P^{*\circ}$)	0.022	0.042	0.045
Foreign Real Interest Rate (r*)	0.013	0.030	0.028
Domestic Devaluation (E°)	0.015	0.044	0.129
Real Exchange Rate Depreciation (e°)	-0.114	-0.053	0.037

2. CONSOLIDATED TOTAL PUBLIC SECTOR LIABILITIY-GDP RATIOS AT JUNE 1988

Total Base Money	0.065
Net Foreign Debt	0.380
Net Domestic Debt	0.365
Other Liabilities	0.021

3. SUSTAINABLE NON-FINANCIAL PUBLIC SECTOR DEFICITS

	Base Scenario	Favorab Scenario	Unfavor Scenario
GDP growth (y°)	0.040	0.050	0.020
Domestic Inflation (P°)	0.110	0.110	0.110
Domestic Nominal Interest Rate (i)	0.140	0.130	0.170
Domestic Real Interest Rate (r)	0.030	0.020	0.060
Foreign Nominal Interest Rate (i*)	0.080	0.080	0.090
Foreign Inflation	0.040	0.040	0.040
Foreign Real Interest Rate (r*)	0.040	0.040	0.050
Real Exchange Rate Depreciation (e°)	0.000	0.000	0.070
Inflation Tax [h P°]	0.007	0.007	0.007
Seigniorage [h y°]	0.003	0.003	0.001
Domestic Debt Effect [b (y°-r)]	0.004	0.011	-0.015
Foreign Debt Effect [f (y°-r*)]	0.000	0.004	-0.011
Foreign Debt Capital Gain [-f e°]	0.000	0.000	-0.027
Other Liabs. Effect [ol (P°+y°)]	0.003	0.003	0.003
Sustainable Primary Deficit	0.017	0.029	-0.042
Interest Pays on Foreign Debt (i* f)	0.029	0.029	0.033
Interest Pays on Domestic Debt (i b)	0.053	0.049	0.065
Sustainable Nominal Deficit	0.099	0.107	0.056

5. DEFICIT FINANCING AND FINANCIAL MARKETS

This section discusses the macroeconomic impact of public sector deficits on financial markets in Zimbabwe. The model developed below is a simple version of Easterly (1989), which places the main emphasis on the determination of the real interest and inflation rates and where the money demand is the main behavioral piece. Our framework incorporates additional features peculiar to the Zimbabwean economy, in particular the combination of a strict system to allocate foreign exchange, a huge public sector deficit, and well developed financial markets.

The stylized facts that support our way of modeling financial markets and their relation to public sector deficits and inflation are the following. First, private consumption and private investment are limited by the bare availability of foreign goods, most of which have no close domestic substitutes. Second, private saving is unusually high for developing countries similar to Zimbabwe -- about 20% of GDP in the last four years. Third, private saving has significantly and increasingly exceeded private investment in the last four years. Fourth, due to strict restrictions on capital outflows, not much of the high private saving leaves the country. Fifth, the public sector deficit was rarely below 10% during the 1980s. Sixth, real interest rates have been consistently negative or close to zero for many years, although they show an equally consistent upward trend; while nominal interest rates have been controlled to a large extent, no clear sign of excess demand for credit has arisen. Seventh, the current account deficit has been reduced to figures close to zero in recent years and Zimbabwe has been transferring resources to developed countries in net terms. Eighth, the inflation rate has been moderate - between 10 and 20% - during the 1980s.

The interpretation of these stylized facts, which is taken up again in section 6 on consumption and investment, goes like this: the centralized foreign exchange allocation mechanism effectively constrains private consumption and private investment, with respect to what would result with less

restricted access to foreign exchange. Zimbabweans are not able to substitute domestic goods for foreign goods to the extent that total private consumption and total private investment do not decline. The restriction on aggregate private consumption implies that effective private saving exceed "notional" saving levels[13]. Similarly, the restriction on private investment leads to an effective private investment less than a "notional" level. Both factors together explain the high private sector surplus observed in the last four to five years. This, in turn, helps to understand two related stylized facts: first, the non-inflationary and exclusively domestic financing of the public sector deficit, which in gross terms has been similar to the private sector surplus; and second, the sustained negative or low real interest rates - albeit slightly increasing - with no sign of excess demand in credit markets.

In the end, financial markets have played the role of transferring the private sector surplus to the public sector such that the latter is able to cope with its deficit. This has been facilitated by several regulations in the financial markets that make such transfer somewhat compulsory, and by low real interest rates resulting from both the abundance of private saving and an adequate monetary policy management.

As said above, the financial system in Zimbabwe is exceptionally deep for a developing country of its characteristics. Monetary assets amount to more than 40% of GDP, while other financial institutions - excluding institutional investors - add assets by an amount close to 25% of GDP. And despite that the M1 to GDP ratio is rather low and unstable, there is a plethora of institutions comprising the monetary sector: the Reserve Bank of Zimbabwe, two discount houses, five commercial banks and accepting houses. The non-monetary sector is comprised by building societies (mortgage companies), finance houses, the public Post Office Saving Bank, insurance companies, and pension funds. This sector is significantly larger than the monetary sector, in part

[13]That is, the saving level that would result if the foreign exchange allocation mechanism were not binding for private consumption.

because the institutional investors - insurance companies and pension funds - have been capturing most long-term savings [14]. The pattern and depth of the financial system were inherited from the pre-independence period and have remained intact because the system itself has been successful in precluding the development of an informal credit sector. Three elements have cooperated to this success: a) a strict regulatory framework that has prevented destabilizing speculation; b) relatively conservative monetary and exchange rate policies; and c) a high confidence in public debt due to strict servicing.

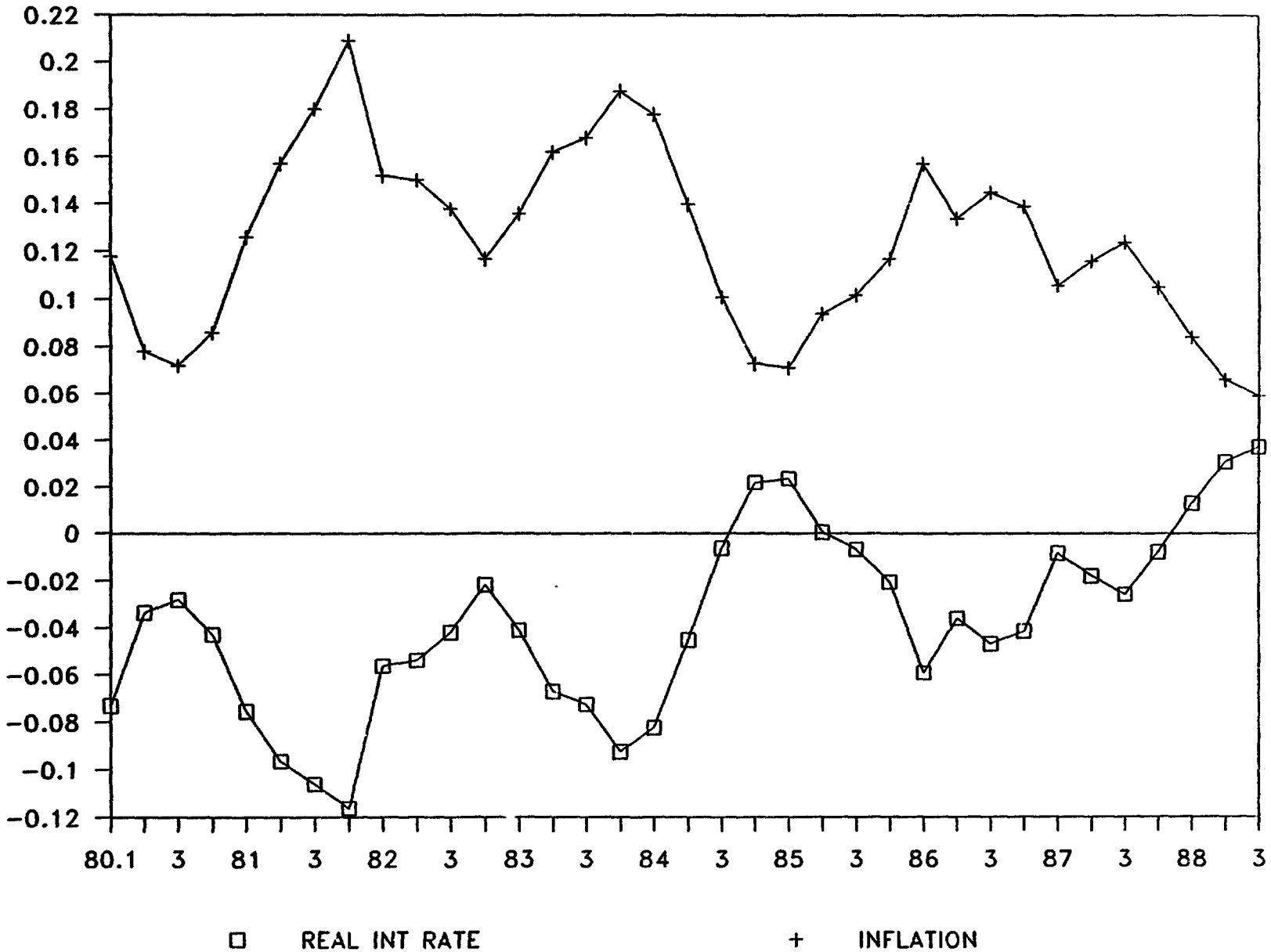
For the purpose of this paper, it is most important to describe the functioning of the system. In this sense, two aspects are crucial: the determination of interest rates and the regulation of financial activities. With respect to the first aspect, some interest rates are free but tend to follow controlled rates. Both types of rates have shown remarkable stability, with the exception of a big upward jump in the early 1980s, lagging a clear upsurge in inflation. As a result of such stability, real interest rates have fluctuated much more, reflecting the greater variability of inflation rates (see Figure 5.1), but showing negative or low positive values for the entire 1980s. As explained above, our hypothesis[15] contends that these negative or low real interest rates are basically the result of the constraints on private consumption (and thus on savings deposited in financial markets) and private investment (and thus on credit demand) imposed by the foreign exchange allocation mechanism. But there are also some other factors that help explain this feature. In particular, the many regulations designed to channel financial resources to the public sector, like prescribed asset ratios for both

[14]According to information reported in Chhibber et al. (1989), the size of the insurance companies assets relative to GDP are roughly the same as Australia's.

[15]Which is not original in many respects, since it can be found in Chhiber et al. (1989) and World Bank (1987).

FIGURE 5.1

INFLATION RATES AND REAL INTEREST RATE



institutional investors [16] and the POSB. On top of this, Chhibber et al. (1989) argue that the monetary authority manages required reserve ratios in order to contribute to the overall stability of nominal interest rates whenever there is the perception that net credit demand - specially by the private sector - is being inconsistent with that stability. In spite of this management, real interest rates have been showing a consistent, albeit slight, upward trend during the eighties.

Regulations of financial institutions play also a very important role in limiting the substitutability among financial assets and its relation to public sector deficit financing. Indeed, the public sector has a sort of captive source of funds in the institutional investors which, in turn, specialize in medium to long term saving and whose depositors are compelled to save some minimum proportions of their incomes in these institutions. In practice, much of the central government deficit has been financed through this form of forced saving. What is left after forced saving is mainly distributed between deposits within the monetary sector of the economy, on one side, and the POSB and building societies, on the other side [17]. A smaller portion of private saving is devoted to the direct acquisition of treasury bills and government stocks and bonds.

5.1 The Model Structure and Estimation Results

The model starts with a specification of the consolidated government budget constraint, as found in Easterly (1989), and similar to equation (4.1) of the preceding section:

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[16] 60% of institutional investor assets are required to be held in the form of public sector liabilities.

[17] Other non-monetary institutions, like finance houses, are of lesser importance.

$$(5.1) \quad E_t i^*(F_{gt} - R_{bt}) + i_{gt-1}[B_{rt-1}+L_{st-1} + L_{pt-1}] + G_t =$$
$$E_t\,(DF_{gt} - DR_{bt}) + H_t + B_{rt} + L_{st} + L_{pt} - H_{t-1} -$$
$$B_{rt-1} - L_{st-1} - L_{pt-1}$$

where B_r is public sector bonds in private sector hands, L_s represents government stock and bonds plus treasury bills in the banking system, G is the government's primary deficit, E is the exchange rate, i^* is the world interest rate, F_g is the government's foreign debt, R_b are foreign exchange reserves, H is base money and L_p is the stock of captive loans from institutional investors to the public sector. D is the difference operator. It is assumed that all public sector debt pays the same interest rate, i_g. This is not a strong assumption since, as we said before, most interest rates move closely together.

Note that this definition of the government budget constraint includes the possibility of using base money issuance as a source of funding, but it does not include debt of parastatals and local governments due to lack of complete quarterly information. This could be an important omission if the public sector deficit moves differently than the government budget deficit but this is not the case during the 1980s.

The government budget constraint could be simplified because: a) roughly the government can take command of most resources deposited in institutional investors and, in turn, people are forced to save a portion of their incomes at such financial institutions; thus, it is of less interest for our purposes in this section [16]; and b) Zimbabwe has no access to voluntary foreign lending, thus changes in the foreign debt position are basically determined by what foreign multilateral and government institutions decide to lend to Zimbabwe.

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[16]Although it is a decisive factor in explaining the actual financing of the government budget deficit.

This would imply:

$$(5.2) \quad G'_t = A_t + G_t - DL_{pt} + i_{gt-1}L_{pt-1},$$

where $A_t = E_t[(i^*F_{gt-1} - R_{bt-1}) - (DF_{gt} - DR_{bt})]$. That is, we aggregate in a single term, G', both the primary deficit G and the change in foreign debt plus the change in the public debt with institutional investors.

Taking lower case letters to represent nominal variables deflated by the price index and solving for real base money, we obtain:

$$(5.3) \quad h_t = g'_t - b_{rt} - l_{st} + (1 + \pi_t)^{-1}[z_{t-1}]$$

where $z_{t-1} = h_{t-1} + (1 + i_{gt-1})(b_{rt-1} + l_{st-1})$ and where π_t is the inflation rate between t-1 and t.

The non-financial private sector holds (voluntarily) three broad assets: money, interest-earning deposits in the banking system, and public sector bonds. Domestic residents are neither allowed to hold foreign assets nor foreign liabilities, a prohibition which seems to be effective. Private bank loans to the private sector are netted from the demand for interest-earning deposits. These demands are supposed to behave according to the following portfolio equations[19]:

$$(5.4) \quad (M1/P)^d = m^d = m(i_o, i_g, (NFA/P)); \qquad m_1, m_2 < 0\ ,\ m_3 > 0$$

$$(5.5) \quad (OD/P)^d = od^d = od(i_o, i_g, (NFA/P)); \quad od_1, od_3 > 0,\ od_2 < 0$$

---

[19]The expected signs fo the partial derivatives are denoted behind each equation.

(5.6) $(B_r/P)^d = b_r^d = (NFA/P) - (L_p/P) - (M1/P) - (OD/P)$

$\equiv nfa - l_p - m^d - od = nfa' - m^d - od^d$

where NFA is the value of the private sector's net financial asset holdings or net wealth, inclusive of compulsory savings in the pension funds and insurance companies, L_p. OD are interest-earning deposits at the banking system by the latter to the private non-financial sector; they earn an interest rate of i_o. Total demand for public sector debt net of the resources obtained from pension funds is:

(5.7) $b_t^d = l_{st}^d + b_{rt}^d$,

where l_s^d results from the banking system balance sheet, as can be seen in Chart 5.1; that is:

(5.8) $l_s^d = od^d(\,,\,,\,) + (1-u)(1-c)\, m^d(\,,\,,\,)$,

where u is the banks' reserve requirement ratio and c is the preference for currency. Note that the term (1-u)(1-c) is equal to (s-1)/s, with s being the simple money multiplier. In other words, the non-financial private sector holds OD as an indirect way to demand public sector debt, through the financial system. This leads to the following total demand for government debt, after substituting (5.6) and (5.8) into equation (5.7):

(5.7') $b^d = nfa' - (1/s)\, m^d(i_o, i_p, nfa)$

This way, the central behavioral piece ends up being the demand for money, which is what is estimated in the next sub-section. But before doing so, it is necessary to take into account what was said above about the functioning of financial markets and, in particular, the determination of interest

rates. In the first place, both nominal interest rates in eq. (5.7') are closely linked. Indeed, if we assume zero profits in the banking system, it turns out that:

(5.9) $i_{\alpha} = (1-u)i_{\beta}$

Second, in spite of the fact that real interest rates follow closely the path of effective inflation because nominal interest rates are fairly stable, Figure 5.[1] in the previous sub-section also indicates an upward trend in those real interest rates. So, in the setting of the nominal interest rates, the authority, in trying to avoid an excess demand for credit, has managed a slow increase in real interest rates - which should be related to the building up of public sector debt - although they still remained low as of the third quarter of 1988[20].

These two considerations induced us to postulate a demand for money of the form:

(5.10) $m^d = m(r_c, \pi^e_{+1}, nfa)$,

where r_c is the real interest rate corresponding to i_c and π^e_{+1} is the expected inflation to prevail between t and t+1.

Since we have in the end just two financial markets, one for money and the other for public sector bonds, equilibrium in one of them should suffice to determine either the real interest rate or the expected inflation rate. We opt for concentrating on the determination of the real interest rate, while assuming that the expected inflation rate is linked to the effective inflation rate, which in turn is related to the real sector of the economy. Indeed, we pose the following stochastic equation for inflation:

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[20]This does not contradict, in principle, our assertion that real interest rates are low and even negative during the 1980s as a result of quantitative constraints on private consumption and private investment.

(5.11) $\pi = \pi\,(dH\,,\, dE,\, dW) + \epsilon, \qquad \pi_1\,,\pi_2\,,\,\pi_3 \geq 0.$

where ϵ is a zero mean, constant variance random shock, W is average wages, and the operator "d" accounts for percentage variation. This inflation function could be thought of as a reduced-form equilibrium equation for the goods market.

In addition, inflationary expectations are assumed to be rational, such that [21]:

(5.12) $\pi^e = EX\{\,\pi\,(\,,\,,\,)/\text{all available information}\}.$

where EX denotes expected value.

The model is comprised by three equations: (5.11) and (5.12) determine the effective and the expected inflation rates, and (5.10) with m^d equating the supply of money, determines the real interest rate. To this system, we could add equation (5.3), the government budget constraint, if we want to endogenize the behavior of the money supply. This would help in determining the effects of changes in the government deficit and the corresponding financing decisions on the real interest rate and inflation.

As an alternative to the money market equilibrium condition for determining the real interest rate, one can use the equilibrium condition in the public sector bonds market, which also depends on the demand for money. That is:

(5.13) $b = b^d = nfa' - (1/s)\, m(r, \pi^e_{+1}, nfa)$

[21]In the next sub-section, when the model is estimated, an alternative assumption of adaptive expectations is also considered.

CHART 5.1

BALANCE SHEETS OF THE NON-FINANCIAL PRIVATE SECTOR AND THE FINANCIAL SECTOR

NON-FINANCIAL PRIVATE SECTOR

M_1	NFA
OD	
B_r	

FINANCIAL SECTOR

L_s	OD
R (= uDD)	DD

where R is the banks' reserves at the Reserve Bank, and DD is demand deposits at the banking system, which is equal to (1-c) M_1.

CONSOLIDATED BALANCE SHEET

L_s	NFA
B_r	- L_p
(1/s) M_1	

where s is the simple monetary multiplier.

This equation, plus the government budget constraint in eq. (5.3), enables to determine the amount of budget deficit financing that does not resort to monetary financing.

As said above, the central behavioral equation in our setup is the demand for money. We estimate an implicit log-linear adjustment cost-version of equation (5.10), which is:

$$(5.14) \quad \ln m^d_t = b_0 + b_1 r_t + b_2 \pi^e_{t+1} + b_3 \ln nfa_t + b_4 \ln m_{t-1} + v_t,$$

where b_1 , $b_2 \leq 0$ and b_3 , $b_4 \geq 0$. The term v_t is a assumed to be a zero mean, constant variance random residual. The real interest rate is defined, in turn, as the nominal interest rate less expected inflation. In the reported results we do not restrict b_1 to equate b_2, although this was tried. It turns out, however, that both estimates are close but not to the extent to reject the hypothesis that they are significantly different to each other.[22]

Estimating equation (5.11) for inflation allows to obtain values for expected inflation according to the rational expectations hypothesis. We estimate a linear version of equation (5.11) where inflation and the percentage variation of H, W and E are measured in annual terms, in order to be consistent with the estimated demand for money.[23]

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[22]Some aspects concerning the data series follow. First, the money series is seasonally adjusted M1; second, the nominal interest rate is a weighted average of the public sector stock and bonds annual interest rates and deposit rates at commercial banks, also on an annual basis; and third, net financial assets (nfa) is a constructed series following equation (5.6). All series are deflated by the consumer price index of the rich, which is less affected by - at some times pervasive - price controls than the CPI of the poor during the sample period. The same CPI of the rich is utilized to calculate the inflation rate and, indirectly, the (annualized) expected inflation rate as well.

[23]The data frequency is quarterly and the sample period is 1979,1 to 1988,3 in most estimations. The choice of the sample period obeys strictly to the availability of data.

The best results for both equations are shown in Table 5.1. The regressions were run using OLS and Cochrane-Orcutt procedures whenever necessary[24]. As can be seen, the demand for money exhibits semi-elasticities with respect to the real interest rate and the inflation rate that are significantly different from zero and similar to each other, as expected. The long-run values of such semi-elasticities are -4.55 in the case of the real interest rate, and -3.65 in the case of expected inflation. The elasticity with respect to private net financial assets is also significantly different from zero and its point values are 0.26 in the short run and 0.84 in the long run. The goodness of fit is reasonable and no sign of autocorrelation is visible [25].

The results reported for the inflation rate equation only include as independent variables the one-quarter lagged percentage variations of base money and the exchange rate (plus the one quarter lagged inflation rate itself). Coefficients of other variables in equation (5.11), like wages, proved to be not significantly different from zero. To some extent, in the case of the latter variable this could be attributed to data problems. In any case, it seems that there is a strong inertia as evidenced by the high value reached by the one quarter lagged inflation rate. This result was also confirmed by the inspection of the autocorrelation and partial autocorrelation functions (not reported here), which tended to indicate results close to a martingale for π.

5.2 Simulation Results for Alternative Deficit Financing Forms

Based on the results in Table 5.1, we can perform simulations of the effects of government policies, specially those concerning the size and financing of the fiscal deficit. To proceed, we first

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[24]The results shown do not include this type of adjustment.

[25]Judged on the basis of a visual inspection of residuals, since the DW statistic could be biased due to the presence of lagged real balances as an independent variable.

note that the point estimates of the money demand allow us to obtain an expression for the real interest rate (by inverting the demand for money), which is the following:

$$(5.15)\quad r_t = -0.71 \ln m_t + 0.18 \ln nfa_t - 0.80\, \pi^e_t + 0.49 \ln m_{t-1} - 0.71\, \epsilon_t.$$

Also, for convenience, let's restate the estimated inflation equation:

$$(5.16)\quad \pi_t = 0.128\, dH_{t-1} + 0.092\, dE_{t-1} + 0.723\, \pi_{t-1} + v_t$$

Equations (5.15) and (5.16), plus the government budget constraint in eq. (5.3) and the assumption of rational expectations, form the basis of the simulations below. Note that the effect of policies like increases in the money supply are not restricted to single elasticities as several indirect effects and feedbacks are present. For instance, the sensitivity of the real interest rate with respect to changes in real money is such that a one percent increase in the latter variable at time t causes a reduction in the real interest rate of 0.7 percentage points and then an increase of 0.49 percentage points in t+1, ceteris paribus. However, if changes in m originate in changes in base money, there are several other indirect effects, like the effect of the change in base money on inflation in t+1 (see equation (5.16)) and changes in the real value of private net financial assets, that will modify the effect, specially starting in period t+1.

The simulation exercises that follow will begin with increases in our modified primary deficit variable, G', which are financed in alternative ways. Later we discuss the implications of a purely monetary policy of altering reserve requirement ratios without changing the monetary base.

a) Effects of a 10% Primary Deficit Increase Financed by Base Money Creation

This experiment assumes a 10% increase in G' at t and then no further changes in such variable - that is, $G'_{t+s} = 0$, $s > 0$. The increase in the primary deficit is financed by base money creation, that is, $dH_t > 0$. According to the relative magnitudes of G' and H, a 10% increase in G'_t requires a 2.83% increase in H_t. Since there are no further increments in G', $dH_{t+s} = 0$, $s > 0$. Also, very importantly, we make the assumption that the nominal interest rates remained fixed all along the experiment.

The results of this simulation are reported in Table 5.2a, where we have taken - just for illustration purposes - 1990.1 as period 1, initiating a simulation horizon of 16 quarters. Also, it is assumed that at time 0, before the change in G' occurs, the system is at a state of rest, with all changes in variables set to zero. The level of the real interest rate and the inflation rate are also supposed to be zero initially. Figure 5.2 shows the evolution of the latter two variables after the increase in G' financed by an increase in H. As it is clear from both the table and the figure, there is at first a significant decline in real interest rates, as the increase in base money brings an increase in real money balances since inflation is not affected until the t+1 quarter (1990.2). The positive lagged effect of real balances on the real interest rate brings the latter back to a level closer to its initial value of zero in 1990.2. This effect is offset, however, by the upward jump in the inflation rate in that quarter. Afterwards, the persistence of a positive inflation rate will dominate in the determination of the real interest rate, in spite that the same positive inflation implies reductions in real balances and in nfa that will put an upward pressure on r. In the end, the price level went up by a cumulative 1.31%, about half of the initial increase in base money. The final effect on the real interest rate is a 1.3 percentage point reduction, while, by assumption, the nominal interest rate remains unchanged.

b) Effects of a 10% Primary Deficit Increase financed by Debt, with Future Payments paid by Base Money Creation

In this simulation, the government does not resort to money creation, but to new debt creation to finance the increased deficit at t; however, it issues base money beginning in t+1 in order to pay for the interest payments generated by the new debt issued at t. All basic assumptions remain the same as in the previous simulation.

The new debt issued at t has a significant positive impact on the real interest rate during that period, 1990.1, while no effect on inflation is detected since no change in base money has occurred. This situation changes starting in t+1 (1990.2), when the government decides to pay for the interest payments generated by the new debt issued at t by resorting to base money creation. This brings a gradual reduction in the real interest rate due to the forces at work in the previous simulation. Simultaneously, the increases in base money also result in a positive inflation rate from 1990.3 onwards. These paths and numbers are reflected by Table 5.2b and Figure 5.3.

We also include in this experiment the assumption that the principal of the new debt issued at time t (1990.1) is paid back in full after 15 quarters, in 1993.3, again by resorting to base money creation. This, as expected, provokes a big downward jump in the real interest rate at the time, and an upward jump in the inflation rate in the following quarter, 1993.4. Although one can imagine government debt to stay at its increased level for a long time, while interest payments are financed through base money creation, it implies an unsustainable path of positive, slightly increasing inflation rates. Then, at some point in time, it will be convenient to pay back the debt and assume a higher but decreasing inflation rate. All in all, under these assumptions, the debt financing strategy ends up being more inflationary after 16 quarters (1.88% of cumulative inflation) than the alternative of financing the increased deficit at t by directly resorting to base money creation in the same period.

TABLE 5.1

Estimation Results for the Demand for Money and Inflation (1980-1988)

Equation (5.14): Demand for Money

Variable	Coefficients	Estimates	T value
Constant	b0	-0.18	-0.56
Real interest rate	b1	-1.41	-2.76
Expected inflation	b2	-1.13	-2.33
Net financial assets	b3	0.26	2.37
Lagged m (1 quarter)	b4	0.69	7.27

R^2 = 0.868; Adjusted R^2 = 0.850; F-Statistic = 47.653; DW = 1.84.

Equation (5.11): Inflation Rate

Variable	Lags	Coefficient	Estimates	T value
Constant	0	a0	-0.003	-0.18
Base Money Growth	1	a1	0.128	4.02
Nom.Exch. Rate Grwoth	1	a2	0.092	3.09
Lagged Inflation rate	1	a3	0.723	7.39

R^2 = 0.757; Adjusted R^2 = 0.732; F-Statistic = 35.32; Q = 23.46.

TABLE 5.2

SIMULATION OF EFFECTS OF DIFFERENT BUDGET FINANCING POLICIES

A. EFFECTS OF A 10% INCREASE IN G' (t) FINANCED WITH BASE MONEY CREATION IN t.

YEAR	dG'	dH	dB	PI	dm	dnfa	Dr	r	db(d)
1990.1	10	2.83	0	0.0	2.8300	0.8094	-1.8636	-1.8636	-0.6524
1990.2	0	0	0	0.3679	-0.3679	-0.1052	-1.3346	-0.5290	0.4479
1990.3	0	0	0	0.2649	-0.2649	-0.0758	-0.2177	-0.7467	-0.0731
1990.4	0	0	0	0.1907	-0.1907	-0.0545	-0.1568	-0.9035	-0.0526
1991.1	0	0	0	0.1373	-0.1373	-0.0393	-0.1129	-1.0164	-0.0379
1991.2	0	0	0	0.0989	-0.0989	-0.0283	-0.0813	-1.0976	-0.0273
1991.3	0	0	0	0.0712	-0.0712	-0.0204	-0.0585	-1.1562	-0.0196
1991.4	0	0	0	0.0513	-0.0513	-0.0147	-0.0421	-1.1983	-0.0141
1992.1	0	0	0	0.0369	-0.0369	-0.0106	-0.0303	-1.2286	-0.0102
1992.2	0	0	0	0.0266	-0.0266	-0.0076	-0.0218	-1.2505	-0.0073
1992.3	0	0	0	0.0191	-0.0191	-0.0055	-0.0157	-1.2662	-0.0053
1992.4	0	0	0	0.0138	-0.0138	-0.0039	-0.0113	-1.2775	-0.0038
1993.1	0	0	0	0.0099	-0.0099	-0.0028	-0.0082	-1.2857	-0.0027
1993.2	0	0	0	0.0071	-0.0071	-0.0020	-0.0059	-1.2915	-0.0020
1993.3	0	0	0	0.0051	-0.0051	-0.0015	-0.0042	-1.2958	-0.0014
1993.4	0	0	0	0.0037	-0.0037	-0.0011	-0.0030	-1.2968	-0.0010

B. EFFECTS OF A 10% INCREASE IN G' (t) FINANCED WITH DEBT IN t.
INTEREST PAYMENTS STARTING IN t+1 ARE PAID FOR WITH BASE MONEY CREATION

YEAR	dG'	dH	dB	PI	dm	dnfa	Dr	r	db(d)
1990.1	10	0.0000	1.300	0.0	0.0000	0.6637	0.6221	0.6221	0.2088
1990.2	0	0.2819	0.000	0.0000	0.2819	0.0806	-0.1856	0.4365	-0.0623
1990.3	0	0.2819	0.000	0.0366	0.2453	0.0701	-0.0527	0.3838	-0.0177
1990.4	0	0.2819	0.000	0.0630	0.2189	0.0626	-0.0744	0.3094	-0.0250
1991.1	0	0.2819	0.000	0.0820	0.1999	0.0572	-0.0900	0.2194	-0.0302
1991.2	0	0.2819	0.000	0.0957	0.1862	0.0533	-0.1012	0.1182	-0.0340
1991.3	0	0.2819	0.000	0.1056	0.1763	0.0504	-0.1093	0.0088	-0.0367
1991.4	0	0.2819	0.000	0.1127	0.1693	0.0486	-0.1152	-0.1063	-0.0387
1992.1	0	0.2819	0.000	0.1178	0.1641	0.0469	-0.1194	-0.2257	-0.0401
1992.2	0	0.2819	0.000	0.1214	0.1605	0.0459	-0.1224	-0.3481	-0.0411
1992.3	0	0.2819	0.000	0.1241	0.1578	0.0451	-0.1246	-0.4727	-0.0418
1992.4	0	0.2819	0.000	0.1260	0.1559	0.0446	-0.1261	-0.5968	-0.0423
1993.1	0	0.2819	0.000	0.1274	0.1545	0.0442	-0.1273	-0.7261	-0.0427
1993.2	0	0.2819	0.000	0.1283	0.1536	0.0439	-0.1281	-0.8541	-0.0430
1993.3	0	3.1119	-1.300	0.1291	2.9828	0.8531	-1.9923	-2.8464	-0.6686
1993.4	0	0.0000	0.000	0.4975	-0.4975	-0.1423	1.3912	-1.4552	0.4669

TABLE 5.2 (Cont.)

C. EFFECTS OF A 10% INCREASE IN G'(t) FINANCED WITH DEBT IN t. INTEREST PAYMENTS STARTING IN t+1 ARE PAID FOR WITH NEW BOND ISSUES UNTIL 1993.3, WHEN THE INITIAL DEBT IS REPAID WITH BASE MONEY CREATION.

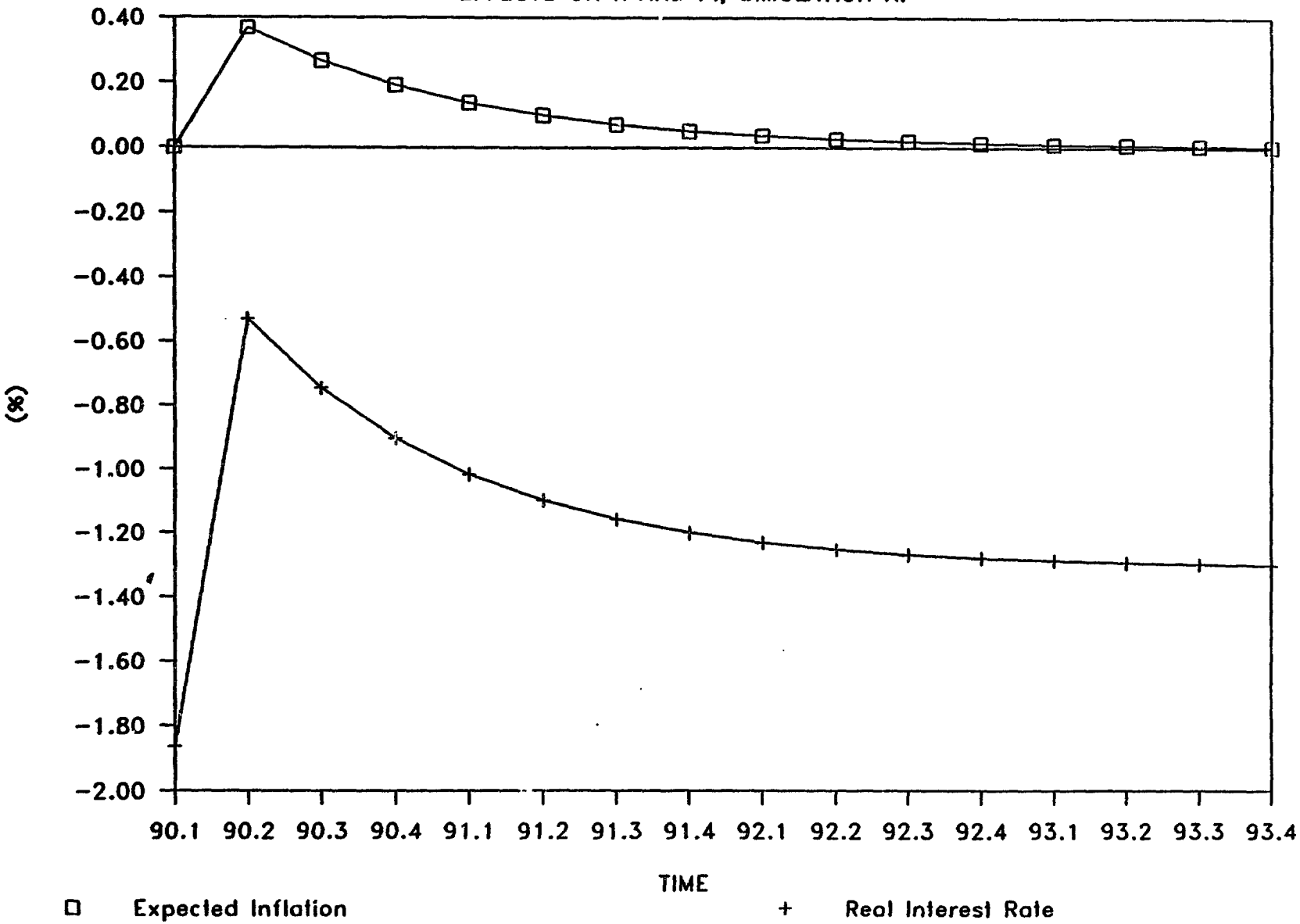
YEAR	dG'	dH	dB	PI	dm	dnfa	Dr	r	db(d)
1990.1	10	0.000	1.30	0.0000	0.0000	0.6637	0.6221	0.6221	0.2088
1990.2	0	0.000	0.13	0.0000	0.0000	0.0664	0.0622	0.6843	0.0209
1990.3	0	0.000	0.13	0.0000	0.0000	0.0664	0.0622	0.7465	0.0209
1990.4	0	0.000	0.13	0.0000	0.0000	0.0664	0.0622	0.8087	0.0209
1991.1	0	0.000	0.13	0.0000	0.0000	0.0664	0.0622	0.8709	0.0209
1991.2	0	0.000	0.13	0.0000	0.0000	0.0664	0.0622	0.9332	0.0209
1991.3	0	0.000	0.13	0.0000	0.0000	0.0664	0.0622	0.9954	0.0209
1991.4	0	0.000	0.13	0.0000	0.0000	0.0664	0.0622	1.0576	0.0209
1992.1	0	0.000	0.13	0.0000	0.0000	0.0664	0.0622	1.1198	0.0209
1992.2	0	0.000	0.13	0.0000	0.0000	0.0664	0.0622	1.1820	0.0209
1992.3	0	0.000	0.13	0.0000	0.0000	0.0664	0.0622	1.2442	0.0209
1992.4	0	0.000	0.13	0.0000	0.0000	0.0664	0.0622	1.3064	0.0209
1993.1	0	0.000	0.13	0.0000	0.0000	0.0664	0.0622	1.3686	0.0209
1993.2	0	0.000	0.13	0.0000	0.0000	0.0664	0.0622	1.4308	0.0209
1993.3	0	6.495	-2.99	0.0000	6.4948	0.3311	-4.5517	-3.1208	-1.5275
1993.4	0	0.000	0.00	0.8443	-0.8443	-0.2415	3.0630	-0.0579	1.0279

Definitions:

dG' : Percent Change in G'
dH : Percent Change in H
dB : Percent Change in B
Pi : Inflation Rate
dM : Percent Change in Real Base Money, h
dnfa : Percent Change in Real Private Net Financial Assets, nfa
Dr : Change in Real Interest Rate
r : Level of the Real Interest Rate
db(d) : Percent Change in the Demand for Government Bonds

FIGURE 5.2

EFFECTS ON R AND PI, SIMULATION A.



c) Effects of a 10% Primary Deficit Increase financed by Debt with Interest Payments financed by further Debt until 1993.3, when Total Debt is repaid by Base Money Creation

This time, the government pays the interests of the new debt with further new debt [26], and again it rescues the total cumulative debt 15 quarters later by creating base money. As can be seen in Table 5.2c and Figure 5.4, while the stock of debt is increasing, the real interest rate also goes up, and the price level is not affected since no change in base money takes place. This state of matters is strongly altered when total government debt is paid back. In 1993.3, a drastic reduction in the real interest rate occurs, followed by an increase in the inflation rate the next quarter. Afterwards, both variables follow the path in the first simulation. The difference lies, however, in the magnitude of the changes. In effect, the increase in base money should be sufficiently large as to pay back the accumulated debt, and this fact brings such a drastic increase in inflation, then in just three more quarters (1994.3), accumulated inflation in this exercise exceeds that in the two previous exercises.

All in all, in spite of their simplicity, the reported simulation exercises are useful on two accounts. On one hand, they show the dynamic sensitivity of our two main endogenous variables, the real interest rate and the inflation rate, with respect to government budget deficit financing decisions and to the decision to increase such a deficit in the first place. In this sense, it is clear that positive inflation rates result in all cases, but cumulative inflation after several quarters never matches the increase in base money that follows the increment in G'. This results from not including similar increases in the nominal exchange rate rather than from non-neutrality features.[27] We run a simulation for case (a) but adding a devaluation of 2.83% in 1990.1 and distinguishing between an

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[26]Since the changes in B to pay the interest obligations are low, no account is taken of the compounded effect on the total debt.

[27]Indeed, the empirical estimates of the coefficients of the inflation equation "almost" add up to one. Moreover, when eq. (5.11) is estimated with the price homogeneity-of-degree-one restriction that the sum of these estimates is equal to one, results do not change by much in terms of inflation.

almost - neutral case (the one presented above) and a fully neutral case, in which the estimated coefficients of eq. (5.11) are constrained to add up to one. The comparison between these two cases is presented in Figure 5.5, for expected inflation and the real interest rate.

Real interest rates, meanwhile, follow very different patterns which crucially depend on the way the government finances its increased deficit and the assumption of fixed nominal interest rates.

In a similar aspect, the simulations are also a nice illustration of the prevalence of Sargent and Wallace's (1981) "unpleasant monetarist arithmetic", as debt financing of government deficits in Zimbabwe would only be postponing inflationary pressures. Of course, this is true as long as government debt can not be increased beyond some point in time. The issue is then when this "saturation" point is achieved; the answer will depend on both macroeconomic conditions (that is, the extent to which private consumption and private investment can continue to be restricted) and, to a lesser degree, the conditions in financial markets. We have found that changes in deficit financing decisions have some effects on real interest rates that could destabilize financial markets, specially if nominal interest rates are fixed for long periods of time, as assumed here.

Finally, the implications of a purely monetary policy that is effected through, say, the required reserve ratio, should be equivalent to those of an increase in base money whose proceedings are accumulated as profits (losses) of the Reserve Bank. As such, they would impinge on the government budget constraint sooner or later.

FIGURE 5.3

EFFECTS ON R AND PI, SIMULATION B.

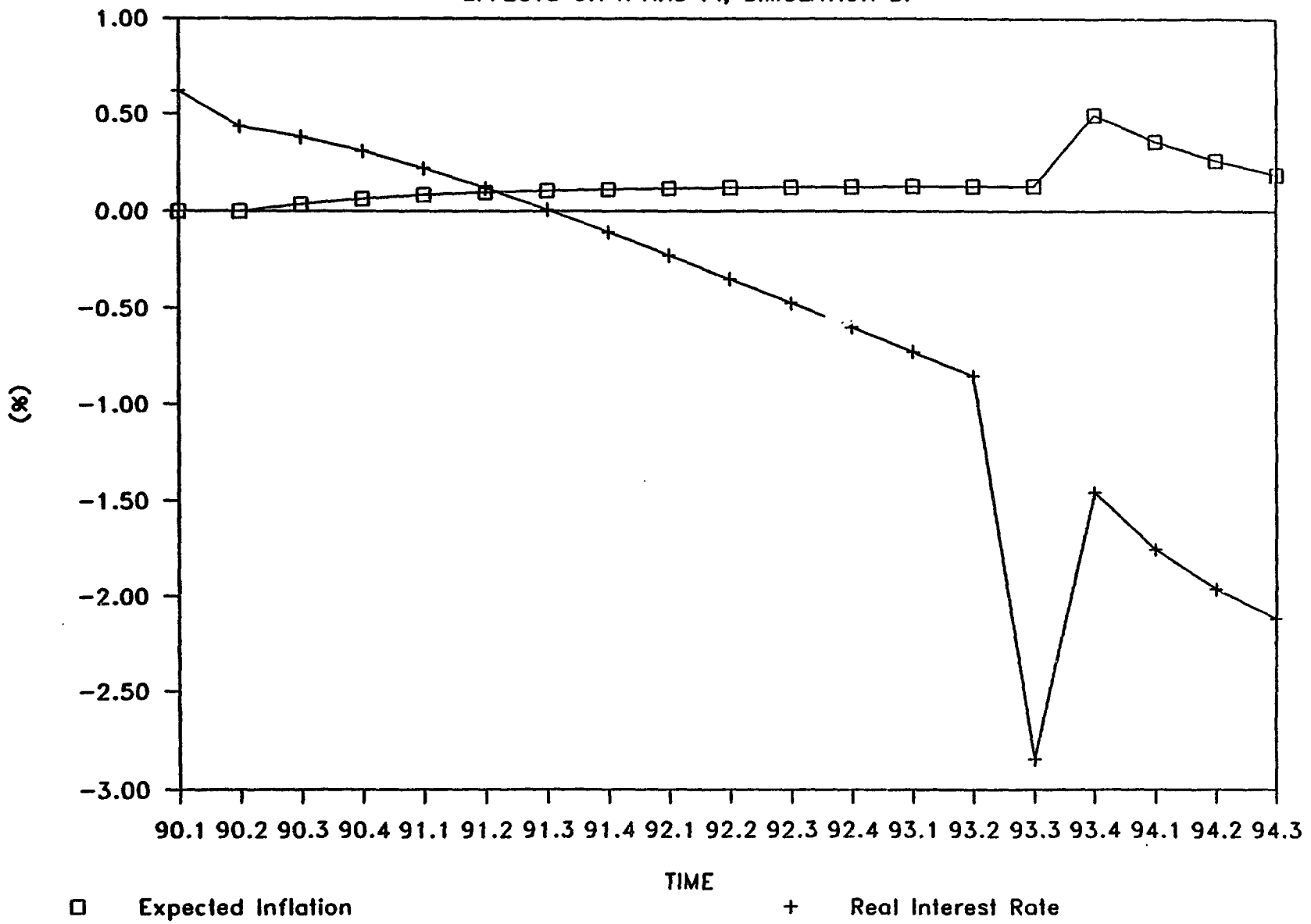


FIGURE 5.4

EFFECTS ON R AND PI, SIMULATION C.

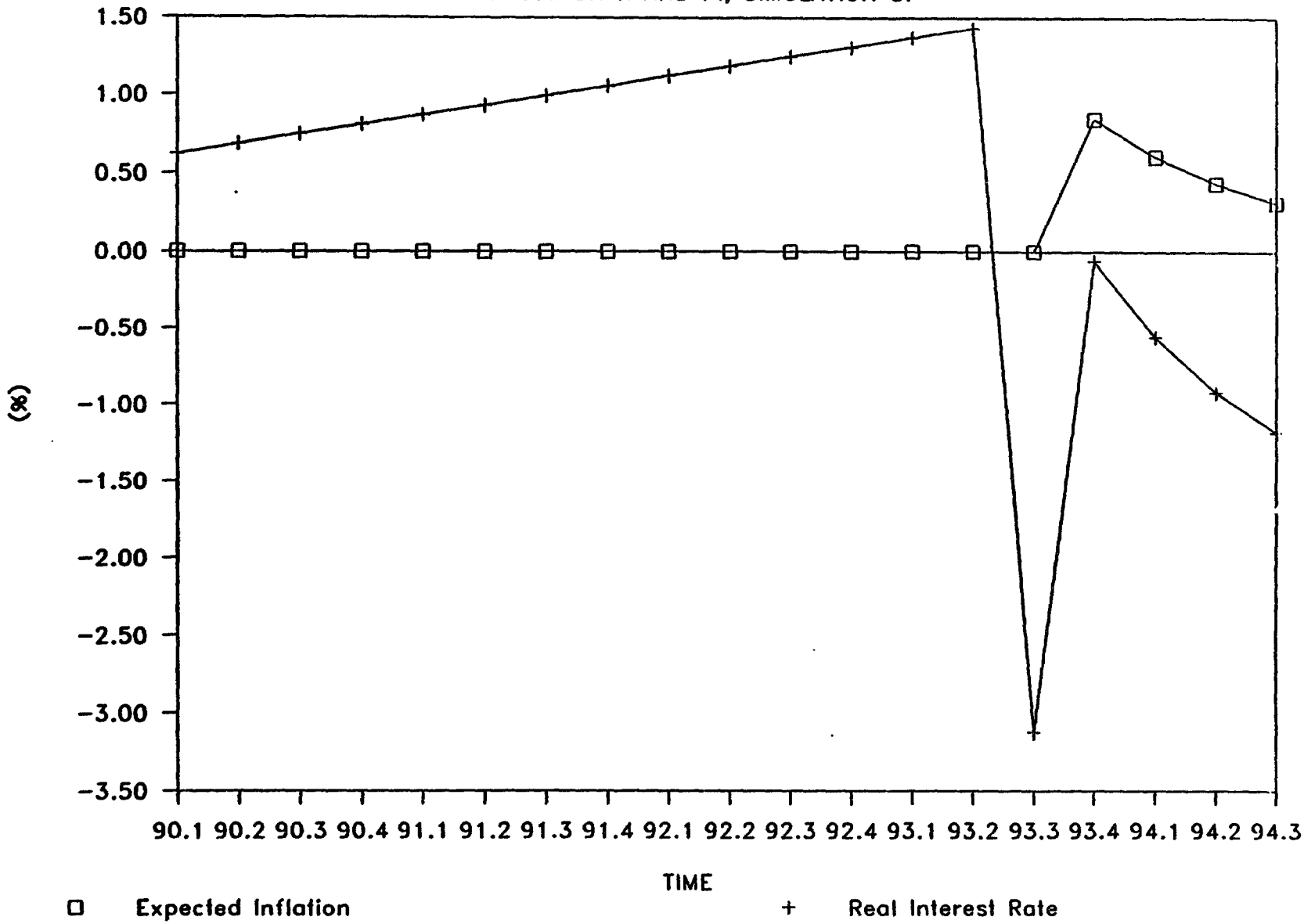
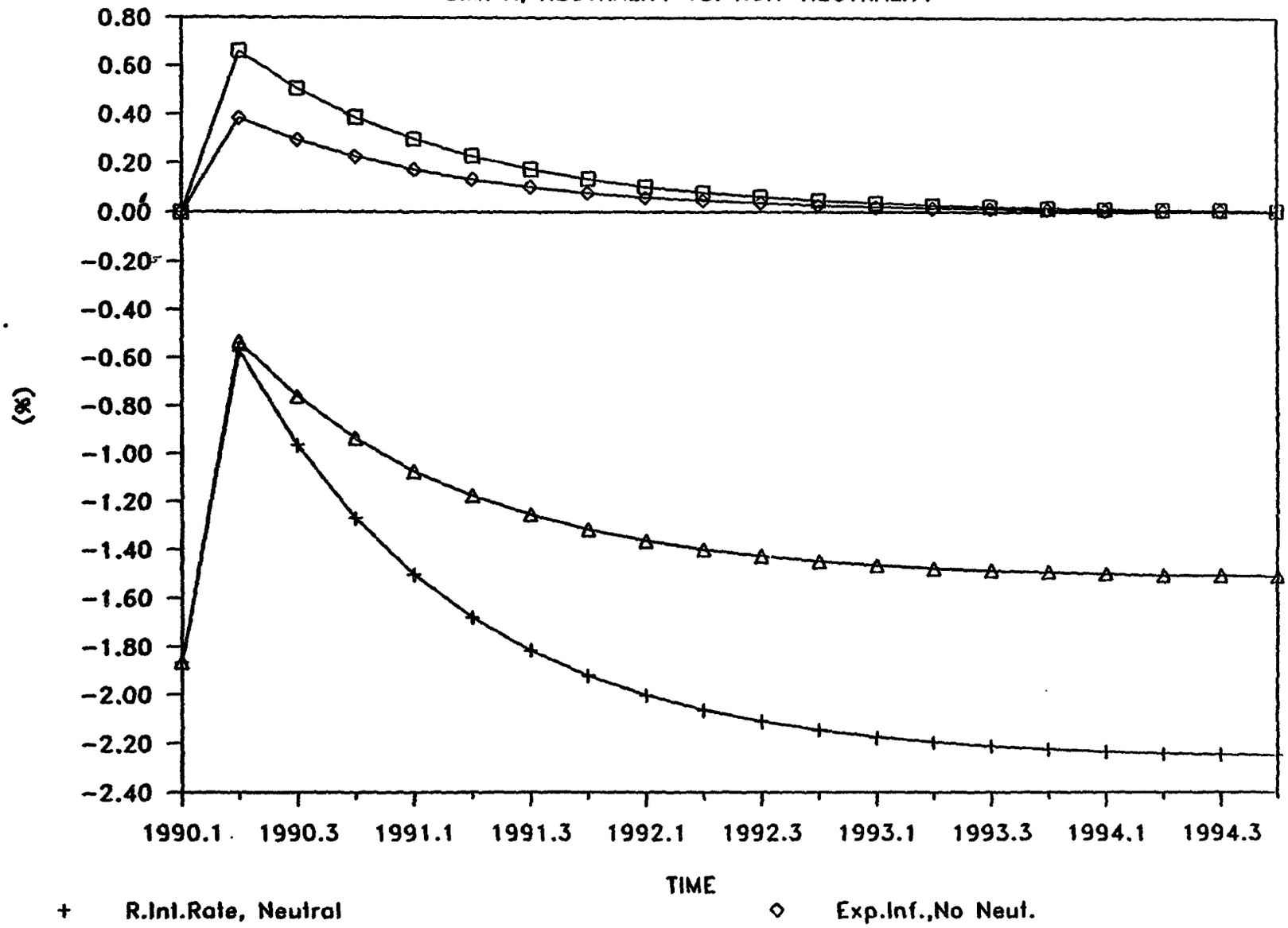


FIGURE 5.5

SIM. A, NEUTRALITY VS. NON-NEUTRALITY



6. CROWDING OUT OF PRIVATE CONSUMPTION AND PRIVATE INVESTMENT

This section goes a step further in analyzing the macroeconomic implications of public sector deficits by analyzing the impact of the public sector on private sector spending. Hence the focus is on the sensitivity of private consumption and investment to fiscal variables, in addition to indirect effects of them via interest rates, inflation or private disposable income. How private saving and capital formation are affected by fiscal policies has significant implications for both short-term stabilization issues and long-run growth prospects.

Table 6.1 presents data on the 1980/81 - 1988/89 sectoral saving and investment record of Zimbabwe.[28] Between 1982/83 and 1987/88 a major external adjustment took place, implying a 10 percentage point (of GDP) reduction in the current account deficit, achieving slight surpluses in the last two years. This improvement in external accounts relied exclusively on the private sector: while up to 1986/87 the non-financial public sector deficit hovered around 14% of GDP, t In fact, during the latter fiscal year, when the public deficit reached again its previous record 14.4%, 100% of that deficit was financed by the private sector. As discussed in section 4 above, a partial public sector adjustment took place starting in 1987/88, implying a reduction of 3.5 percentage points in the deficit and an additional 0.9 percentage point decline in 1988/89. The private sector benefitted directly from this decline, with a similar reduction in its required surplus.

Let's focus now on the evolution of the components of private and public deficits. Figure 6.1 shows foreign, private and public saving ratios and Figure 6.2 presents private and public investment ratios during the 1980s.

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[28]The fiscal-year macroeconomic aggregates of table 6.1 (foreign saving, national saving, gross domestic investment and GDP) are consistent with calendar-year data from national accounts. Non-financial public sector (central government and public enterprises and local authorities) saving and investment figures are from tables 2.2 and 2.5.

TABLE 6.1
ZIMBABWE
PUBLIC AND PRIVATE SECTOR SAVING AND INVESTMENT

	80-81	81-82	82-83	83-84	84-85	85-86	86-87	87-88	88-89
1. CURRENT-PRICE INVESTMENT AND SAVING (Z$ mill.)									
Foreign Saving	270.8	451.8	440.8	293.1	166.2	91.1	1.7	-45.8	-30.8
Gross Nat Saving	544.6	611.1	610.0	810.4	1173.8	1453.5	1658.1	2026.5	2544.1
Central Governmen	-186.4	-89.9	-55.1	-279.8	-306.6	-386.1	-575.6	-155.6	-170.4
Publ Ent and LA	30.6	-45	-92.8	51.3	105.3	152.3	242.1	157.5	132
NF Public Sector	-155.8	-134.9	-147.9	-228.5	-201.3	-233.8	-333.5	1.9	-38.4
Private Sector	700.4	746.0	757.9	1038.9	1375.1	1687.3	1991.6	2024.6	2582.5
Gross Dom Investm.	815.4	1062.8	1050.9	1103.5	1340.0	1544.5	1659.8	1980.7	2513.3
Central Governmen	65.1	122.2	191.9	208.7	203.2	221.2	293.1	485	523
Publ Ent and LA	136.2	394.2	412	479.6	447.2	643.5	615.3	587.4	600
NF Public Sector	201.3	516.4	603.9	688.3	650.4	864.7	908.4	1072.4	1123
Private Sector	614.1	546.4	447.0	415.2	689.6	679.8	751.4	908.3	1390.3
NF Public S Deficit	357.1	651.3	751.8	916.8	851.7	1098.5	1241.9	1070.5	1161.4
Private S Deficit	-86.3	-199.5	-311.0	-623.7	-685.5	-1007.4	-1240.2	-1116.3	-1192.2
2. INVESTMENT AND SAVING RATIOS (To GDP)									
Foreign Saving	0.069	0.094	0.077	0.046	0.025	0.012	0.000	-0.005	-0.003
Gross Nat Saving	0.139	0.127	0.106	0.128	0.175	0.190	0.193	0.207	0.219
Central Governmen	-0.048	-0.019	-0.010	-0.044	-0.046	-0.050	-0.067	-0.016	-0.015
Publ Ent and LA	0.008	-0.009	-0.016	0.008	0.016	0.020	0.028	0.016	0.011
NF Public Sector	-0.040	-0.028	-0.026	-0.036	-0.030	-0.031	-0.039	0.000	-0.003
Private Sector	0.179	0.155	0.132	0.163	0.205	0.220	0.231	0.207	0.223
Gross Dom Investm.	0.209	0.221	0.183	0.174	0.200	0.202	0.193	0.202	0.217
Central Governmen	0.017	0.025	0.033	0.033	0.030	0.029	0.034	0.050	0.045
Publ Ent and LA	0.035	0.082	0.072	0.075	0.067	0.084	0.071	0.060	0.052
NF Public Sector	0.052	0.107	0.105	0.108	0.097	0.113	0.105	0.110	0.097
Private Sector	0.157	0.113	0.078	0.065	0.103	0.089	0.087	0.093	0.120
NF Public S Deficit	0.091	0.135	0.131	0.144	0.127	0.143	0.144	0.109	0.100
Private S Deficit	-0.022	-0.041	-0.054	-0.098	-0.102	-0.132	-0.144	-0.114	-0.103

To generate a surplus which finances 100% or more of the public deficit since 1986/87, the private sector raised significantly its saving rate: since 1984/85 it exceeds 20% of GDP and finances more than 100% of the economy's gross domestic investment. This private saving rate is extremely high for a developing economy -- a counterpart of very low private consumption rates, barely exceeding 50% of GDP during the last 5 years. High private saving channeled through Zimbabwe's developed financial system to the public sector, is probably a result of restrictions on private consumption (particularly imported consumer durables) and on formal or illegal capital outflows, coupled to a perception by the private sector that the domestic financial system is stable. However, some of these conditions might change, particularly those related to direct consumption repression if trade reform is enacted in the future.

Aggregate or domestic gross investment has not shown a strong downward trend during the 1980s; however, in 1986/87, when the public deficit reached again its record high, the domestic investment rate was a couple of percentage points lower than in 1980/81 - 1981/82 when the high deficits started. And conversely, when fiscal adjustment took place after 1986/87, the domestic investment rate recovered by 2.4 percentage points of GDP. On the other side, the composition of investment changed significantly with the fiscal expansion of the early 1980s; in fact, the deficit increased approximately one by one with the increase of public investment, while private investment fell. With fiscal adjustment after 1986/87, both the absolute level and the share of private investment in domestic capital formation recovered, with a more than 3 percentage points rise in the private investment rate, while public investment did not suffer significantly.

The fact that both total investment and the share of private investment recover under fiscal adjustment is a significant step in the right direction, as growth -- which has been rather modest throughout the 1980s -- is strongly dependent on the quantity and quality of investment, the latter

FIGURE 6.1

Zimbabwe
Gross Total Saving Ratios
(% of GDP)

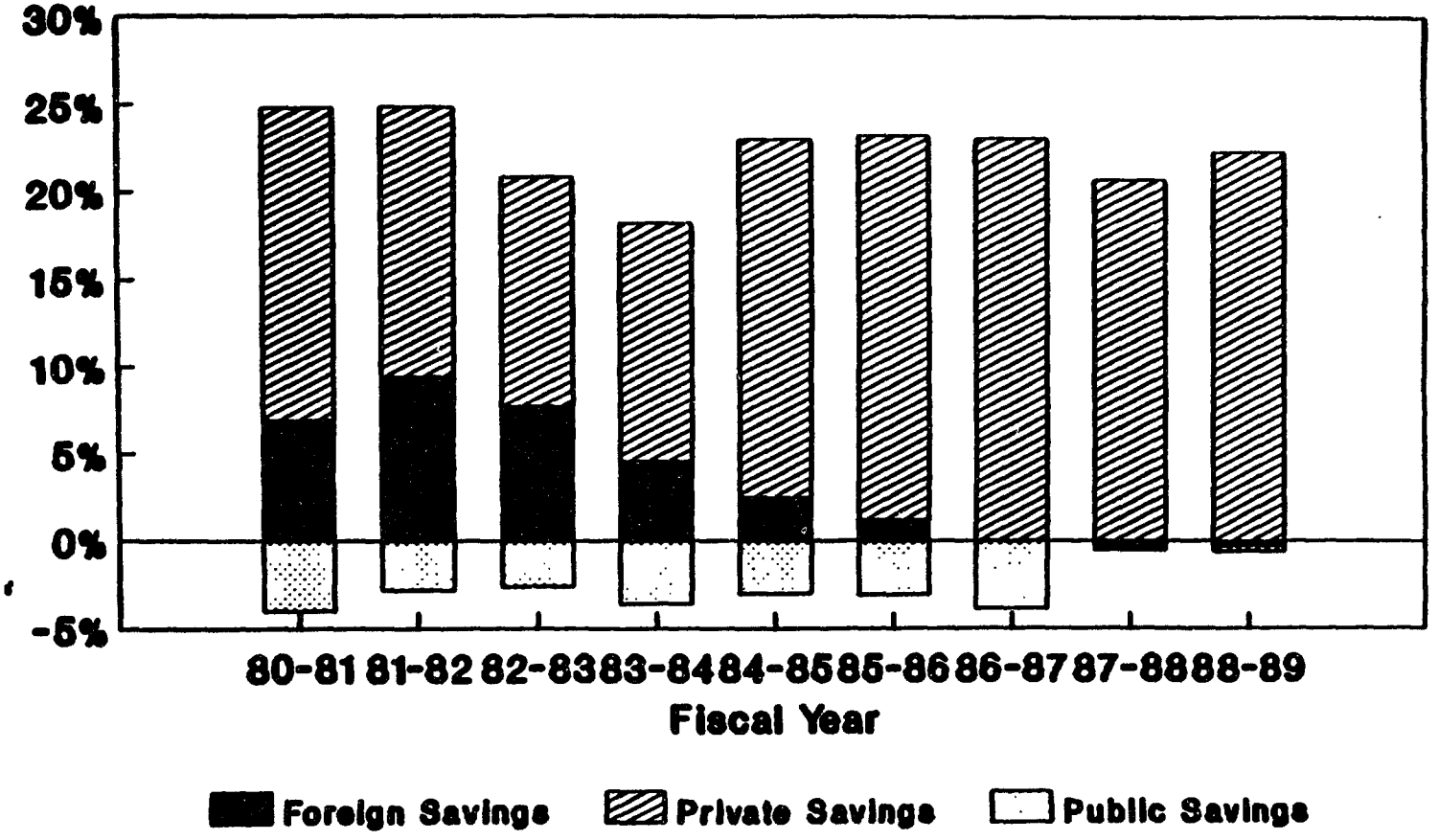
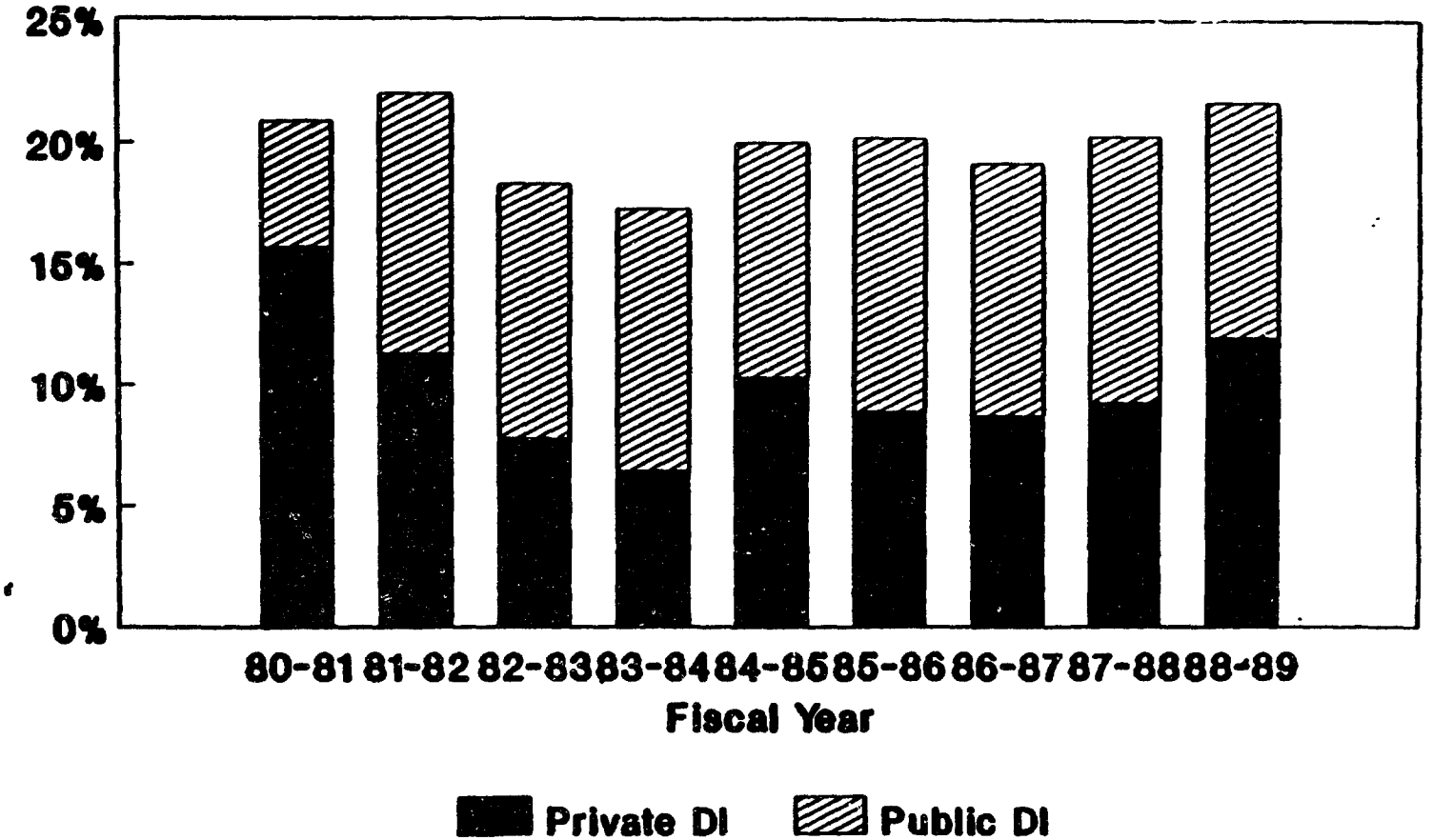


FIGURE 6.2

Zimbabwe
Gross Domestic Investment Ratios
(% of GDP)



probably positively influenced by higher private investment shares. Hence additional investment gains, particularly in the private sector, could be positively influenced by continued fiscal adjustment. Fiscal adjustment should rely on additional gains in public saving, over and above the increase of the public saving rate from -3.9% in 1986/87 to -0.3% in 1988/89.

6.1. Private Consumption

This subsection, significantly based on a framework developed by Corbo and Schmidt-Hebbel (1991), addresses the effects of public policies on consumption in Zimbabwe.[29] Private consumption (as a ratio to private disposable income) depends on neoclassical determinants (permanent income, interest rates, and relative prices), Keynesian variables and liquidity constraints (current income, consumer credit money, foreign saving), public saving, inflation, and public spending on private goods. The presence of permanent public saving reflects two very different hypotheses: the first is the Ricardian equivalence hypothesis, which states that private consumption increases one on one with an increase in permanent public saving, while the second asserts that under an institutional arrangement by which the public sector captures private saving either directly or through the domestic financial markets, current private saving is crowded out one by one by current public saving. In the case of Zimbabwe, we think that the second interpretation is much more valid than that of rational forward-looking private consumers who internalize the public sector's intertemporal budget constraint.

[29]In fact, Zimbabwe is one of the 13 countries which comprise the panel sample for the consumption functions estimated by Corbo and Schmidt-Hebbel (1991).

The following specification for the private consumption to private disposable income ratio[30] reflects these variables, which in addition allows for testing the simple Keynesian, permanent income and Ricardian/direct crowding out hypotheses:[31]

$$(6.1) \quad \frac{C_{pt}}{DY_{pt}} = \beta_0 + \beta_1 \frac{PDY_{pt}}{DY_{pt}} + \beta_2 \frac{PS_{gt}}{DY_{pt}} + \beta_3 r_{ct} + \beta_4 \pi_{ct} + \beta_5 \frac{P_{cmt}}{P_{cnt}} + \beta_6 \frac{CPTR_t}{DY_{pt}} + \beta_7 \frac{H_t}{DY_{pt}} + \beta_7 \frac{H_t}{DY_{pt}} + \beta_8 \frac{FS_t}{DY_{pt}} + \beta_9 \frac{CC_t}{DY_{pt}} + \nu_{1t}$$

where DY_p is current private disposable income, PDY_p is permanent private disposable income, PS_g is permanent public saving, r_c is the consumption-based real interest rate, π_c is the private consumption deflator rate of change, P_{cm} and P_{cn} are the deflators for imported and national private consumption goods, respectively, CPTR is the sum of public expenditure on privately appropriated services and direct transfers to consumers,[32] H is base money, FS is foreign saving, CC is banking sector credit to consumers, and ν_1 is a stochastic error term.

Expected signs of the coefficients are the following: $\beta_0, \beta_1, \beta_2, \beta_7, \beta_8, \beta_9 > 0$; $\beta_6 < 0$; $\beta_3, \beta_4, \beta_5 <> 0$.

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[30]All non-stationary variables are scaled to current private disposable income in order to avoid spurious correlation. An alternative procedure, combining cointegration tests and dynamic error-correction models, is not feasible due to the short time series.

[31]Three simple null hypotheses are tested with this specification: (i) Keynesian: $\beta_0 > 0$, $\beta_1 = \beta_2 = 0$; (ii) Permanent income hypothesis without Ricardian equivalence: $\beta_1 > 0$, $\beta_0 = \beta_2 = 0$; (iii) Ricardian equivalence or direct crowding-out hypothesis: $\beta_0 = 0$, $\beta_1 = \beta_2 > 0$.

[32]Privately appropriated series paid by government are measured as the sum of public expenditure on education and health. These, plus direct transfers to consumers, could reduce private consumption if they are substitutes of the latter.

Expected permanent private disposable income and permanent public saving are consistent with the following definitions for their corresponding current values:

$$(6.2) \quad DY_{Pt} \equiv GDP_t - NFP_{Pt} - T_t + r_t D_t$$

$$(6.3) \quad S_{Gt} \equiv T_t - C_{Gt} - NFP_{Gt} - r_t D_t$$

where GDP is gross domestic product, NFP_P is net foreign payments made by the private sector, S_G is current public saving, C_G is public consumption, and NFP_G is net foreign payments made by the public sector. Note that D refers now only to the domestic public debt.

For the expected permanent values of any variable (private disposable income and public saving in this section, and other variables in the investment section below) we specify two alternatives. The first is partial perfect foresight, defined as the simple average of the contemporaneous variable and two periods into the future, for any variable x:

$$(6.4a) \quad Qx_t = [x_t + x_{t+1} + x_{t+2}]/3$$

The second alternative is the static-expectations specification which allocates a 100% weight to the contemporaneous value in (6.4a), as follows:

$$(6.4b) \quad Qx_t = x_t$$

Similar assumptions are made with respect to expected consumption inflation (and expected investment inflation below). A first alternative takes actual inflation between today and tomorrow as the relevant proxy for rationally expected inflation. The second alternative is adaptive

expectations, specifying the expected price change either from an ARMA backward-looking process or giving 100% of the weight to the actual price change between yesterday and today, consistent with static expectations.

Table 6.2 reports the main results of implementing equation (6.1) to Zimbabwe, using annual data for the 1965-1988 period.[33]

The complete specification renders not very satisfactory results for both expectational alternatives. Most variables are not statistically significant and two liquidity constraints (consumer credit and base money), present opposite, although not significant, signs to those expected a priori. Less surprising is the low significancy of the inflation and interest rates, with ambiguous a priori signs. As in most other developing countries (see for instance the cross-country studies by Giovannini (1983), Corbo and Schmidt-Hebbel (1991), and Schmidt-Hebbel, Webb and Corsetti (1991)), the well-known substitution and wealth effects seem to offset each other in Zimbabwe.

A different approach was followed next by concentrating on the Keynesian (current income), permanent income and Ricardian/direct crowding out (public saving) determinants. Adding to these variables two dummies for the 1987-88 structural decline in private consumption and the 1984 outlier, the results reported under 1.2 and 2.2 are obtained.

Both the overall fit and the separate significance of the contributing variables is more acceptable under the static expectations alternative for permanent income and permanent public saving.

The magnitude of current income is surprisingly high as compared to permanent income -- a feature which is even more extreme under the partial perfect foresight specification. In fact, the 0.61/0.12 relative magnitude of current/permanent income is much higher than the 0.60/0.24 ratio

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[33]The results including CPTR are not reported in table 6.2 due to the high positive sign of its coefficient, which affects seriously signs and significancy levels of other variables.

obtained for 13 developing countries applying a similar methodology.[34] This suggests that current income is a more stringent liquidity constraint, effectively limiting intertemporal consumption smoothing.

By contrast, public saving strongly affects private consumption in Zimbabwe under the static expectations alternative. The fact that the current public saving alternative (the measure for permanent public saving under static expectations) is significant while the three-year moving average of current and future public saving is not (under partial perfect foresight), confirms the initial presumption that it is direct crowding out of private saving by public saving and not Ricardian anticipation of future taxes which is behind this high value.

The main conclusion of our results points toward the overwhelming dominance of the direct effects of public sector deficits (or dissaving) over other indirect effects of deficit financing (via interest or inflation rates) on private consumption. A Z$1 increase in the deficit (caused by a corresponding rise in public consumption) reduces private consumption by Z$0.67, without significant additional effects of how different deficit financing forms affect interest and inflation rates.

6.2 Private Investment

Following Easterly et al. (1989) we specify a behavioral function for private investment which will depend on neoclassical profit and cost variables, liquidity constraints and risk determinants. To avoid again spurious correlation, we scale all non-stationary variables to GDP. Therefore we specify the following generic equation for the private investment to GDP ratio:

[34]From the panel data results reported in table 3.2 by Corbo and Schmidt-Hebbel (1991).

$$(6.5)\quad \frac{I_{pt}}{Y_t} = \frac{I}{Y}\Big(PUCK_t\underset{(-)}{,}\ PMPK_t\underset{(+)}{,}\ \frac{P_{ipmt}}{P_{ipnt}}\underset{(?)}{,}\ \frac{PCOT_t}{Y_t}\underset{(-)}{,}\ \frac{K_{gt-1}}{Y_t}\underset{(+)}{,}\ \frac{PRO_t}{Y_t}\underset{(+)}{,}\ \frac{FC_t}{Y_t}\underset{(+)}{,}\ \frac{H_t}{Y_t}\underset{(+)}{,}\ \frac{FS_t}{Y_t}\underset{(+)}{,}\ VUCK_t\underset{(-)}{,}\ VY_t\underset{(-)}{}\Big)$$

where I_p is private fixed-capital investment, Y is GDP, UCK is the user cost of capital and PUCK is the estimated permanent UCK, MPK is the marginal product of capital (defined below) and PMPK is its permanent estimate, P_{ipm}/P_{ipn} is the price ratio of imported and national private investment components, COT is corporate tax revenue and PCOT is its permanent estimate, $K_{g,-1}$ is the lagged-end-of-period public sector capital stock, PRO is corporate profits, FC is banking credit flows to firms, H is base money, FS is foreign saving, VUCK is the coefficient of variation of UCK, and VY is the coefficient of variation of GDP. The expected signs of the corresponding partial derivatives are denoted below each variable.

The current real user cost of capital is defined as:

$$(6.6)\quad UCK_t = (P_{It}/P_t)\,[(i_{Pt} - \hat{P}^e_{It})\,(1+\hat{P}^e_{It}) + \delta]$$

where P_I is the private investment deflator, i_P is the nominal interest rate on banking loans to firms, $\hat{P}^e_{It}$ is the expected rate of change of the private investment deflator, and δ is the (real) capital depreciation rate.

The marginal product of private sector capital is approximated by the average product (the latter being a linear transformation of the former under a Cobb-Douglas technology, for instance), defined

as the ratio between current-period GDP and the lagged-end-of-period private sector capital stock (K_{pt-1}):

(6.7) $MPK_t = y_t/K_{pt-1}$

The total capital stock (K) satisfies the adding-up constraint:

(6.8) $K = K_g + K_p$

Expected investment inflation will be based on an auto-regressive structure, while all expected permanent variables will be specified according to two hypotheses: the partial perfect foresight alternative of equation (6.4a) and the static version of equation (6.4b).

The two coefficients of variation, which reflect risk variables, are defined as five-period moving coefficients, based on two periods back, the current period, and two into the future.

A linear form of equation (6.5) was estimated for Zimbabwe using annual private investment to GDP ratios covering the 1965-1988 period. The main results are presented in table 6.3.

Some differences arise between the initial structures of equation (6.5) and the reported results. In the first place, better results were obtained when splitting the user cost of capital into its two components, the relative price of investment goods (P_I/P) and the real interest rate relevant for investment decisions net of the rate of depreciation, $RIL\ ((i_{Pt}-\hat{P}^e_{It})\ (1+\hat{P}^e_{It}) + \delta)$. For the latter, as well as for other variables involving estimates of permanent values (the relative price of

investment goods, the marginal product of capital, and corporate tax revenue), only the static expectations versions are reported[35].

The results are very satisfactory, as opposed to the consumption equations discussed above. Most neoclassical, liquidity constraint, and uncertainty variables present expected signs and are highly significant.

Just for reference the results for the most general specification are reported in equation 1.1, although there are not many degrees of freedom left over. Of all variables only the corporate tax revenue to output ratio is significant and presents a sign opposite to what is expected a priori. This variable, in addition to the firm credit to output ratio and the coefficient of variation of GDP, is deleted from the next results.

The two components of the user cost of capital are highly significant. The magnitude of their signs differ: private investors in Zimbabwe react three times as strong to the real interest rate than to the relative price of investment goods. The private capital stock to output ratio (the inverse of the current average product of capital) presents the correct sign but achieves acceptable significancy levels only under the maximum likelihood estimations correcting for residual first order correlation (ML (AR1)). In addition, its magnitude is small relative to the real interest rate.

The significant role of the public capital stock to output ratio (similar in magnitude and significance to the private capital stock) suggests a strong complementarity between public and private capital in Zimbabwe. This crowding in effect of public investment on private capital formation is an important result reflecting that the composition of public expenditure matters for the country's growth prospects.

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[35]The relative price of investment components is omitted from the reported results, due to its unplausibly high coefficient and disturbing effect on parameters related to theoretically more important variables, probably due to colinearity between the former and the latter.

Two flow variables (firms profits and foreign lending as reflected by the current account deficit) and one stock variable (base money) are (or proxy) significant liquidity constraints faced by private investors, which is not surprising for a period dominated by interest rate controls, which are being relaxed only throughout the last years. Even under complete domestic financial liberalization one should expect that borrowing constraints would affect private capital formation, in addition to the influence of totally liberalized interest rates.

Finally, there is only weak evidence for the role of our uncertainty proxies in affecting private capital formation. In the most general specification (line 1.1), the coefficient of variation of GDP affects negatively and significantly private investment. In lines 1.2 and 1.2A the influence of the coefficients of variation of the relative price of investment goods (VPIP) and the real interest rate (VRIL) is negative though weak, not achieving acceptable significancy levels.

The main conclusions from our results with regard to the role of public sector deficits and their structures in determining private investment in Zimbabwe are referred to the indirect effect of deficit financing and the direct effects of taxes and public expenditure. Real interest rates have a strong negative influence on private investment -- hence domestic debt financing of public sector deficits, which tends to push up interest rates as has been observed during the eighties in Zimbabwe, has a significant crowding out effect. Public investment, on the other side, has a significant crowding in effect (although probably of a smaller magnitude than the deleterious effect via interest rates of domestic debt financing). For each one-percentage-point of GDP increase of public investment (which will raise the public capital stock to GDP ratio by a similar amount), private investment could rise by 0.15 - 0.25 percentage points of GDP.

TABLE 6.2

PRIVATE CONSUMPTION (Zimbabwe, 1965-1988)

Dependent Variable: Private Consumption to Private Disposable Income Ratio ($\frac{Cp}{DYp}$)

Equations	C	$\frac{PDYp}{DY_p}$	$\frac{PSg}{DY_p}$	r_c	π_c	$\frac{Pcm}{Pcn}$	$\frac{CC}{DY_p}$	$\frac{H}{DY_p}$	$\frac{FS}{DY_p}$	D74	D6586	Rho	R2A	DW
1. Static Expectations														
1.1 OLS	1.10	0.01	0.21	-0.53	-0.30	-0.15	-4.64	-0.86	0.08	-	-	-	0.62	1.91
	(8.4)	(0.1)	(0.4)	(-0.8)	(-0.4)	(-2.3)	(-1.3)	(-1.1)	(0.4)					
1.2 ML	0.61	0.12	0.67	-	-					-0.06	0.06	0.72	0.50	1.61
	(7.6)	(1.7)	(3.3)							(-2.0)	(2.4)	(5.0)		
2. Part. Perf. Foresight														
2.1 OLS	1.06	0.02	0.08	-0.39	-0.07	-0.16	-3.9	-0.93	0.06				0.62	1.97
	(8.0)	(0.1)	(0.1)	(-0.6)	(-0.1)	(-2.1)	(-0.7)	(-0.8)	(0.3)					
2.2 ML	0.66	0.09	0.03							-0.03	0.03	0.13	0.16	
	(10.6)	(1.7	(0.2)							(-0.8)	(1.8)	(0.6)		

TABLE 6.3
PRIVATE INVESTMENT (Zimbabwe, 1965-1988)

Dependent Variable: Private Investment Ratio to GDP (Ip/Y)

Equation	C	$\frac{Pi}{F}$	RIL	$\frac{E_{p-1}}{Y}$	$\frac{E_{g-1}}{Y}$	$\frac{FCOT}{Y}$	$\frac{PRO}{Y}$	$\frac{FS}{Y}$	$\frac{H}{Y}$
1.1 OLS	-0.09 (-0.6)	-0.01 (-0.1)	-0.27 (-1.5)	0.22 (1.1)	-0.27 (-1.1)	1.68 (2.4)	0.28 (2.0)	0.16 (1.7)	-0.15 (-0.2)
1.2 OLS	0.11 (1.2)	-0.13 (-3.7)	-0.42 (-2.6)	-0.18 (-1.3)	0.23 (1.2)	-	0.47 (3.5)	0.33 (3.9)	1.07 (3.5)
1.2A ML (AR1)	0.16 (2.4)	-0.16 (-6.5)	-0.41 (-3.3)	-0.21 (-2.4)	0.25 (2.0)	-	0.40 (4.1)	0.34 (5.1)	1.29 (6.0)
1.3 OLS	0.09 (1.1)	-0.12 (-4.1)	-0.45 (-4.3)	-0.12 (-1.4)	0.14 (1.2)	-	0.49 (4.1)	0.31 (4.4)	1.08 (3.7)
1.3 ML (AR1)	0.14 (2.2)	-0.14 (-6.8)	-0.49 (-5.7)	-0.14 (-2.8)	0.15 (2.1)	-	0.44 (4.8)	0.30 (5.6)	1.31 (6.3)

Equation	$\frac{FC}{Y}$	VPIP	VRIL	VY	D7375	D84	RHO	R2A	DW
1.1 OLS	0.18 (1.7)	0.68 (0.9)	1.68 (0.9)	-0.0001 (-1.9)	0.01 (1.5)	0.02 (1.0)	-	0.95	2.26
1.2 OLS	-	-0.37 (-0.5)	1.12 (0.9)	-	0.02 (2.3)	0.03 (1.4)	-	0.93	2.76
1.2A ML (AR1)	-	-0.62 (-1.1)	-0.86 (-0.4)	-	0.02 (4.1)	0.06 (2.3)	-0.70 (-3.5)	0.99	2.40
1.3 OLS	-	-	-	-	0.02 (2.3)	0.05 (4.1)	-	0.94	2.74
1.3A ML (AR1)	-	-	-	-	0.02 (4.0)	0.06 (5.2)	-0.66 (-3.2)	0.98	2.32

7. EXTERNAL ACCOUNTS, REAL EXCHANGE RATES, AND THE FISCAL DEFICIT

Zimbabwe's external accounts and real exchange rates are determined to a large extent by the foreign exchange allocation system. Indeed, in deciding on how to allocate foreign exchange, the foreign exchange allocation commission first makes a projection of the availability of foreign financial funds, subject to the government's goal concerning the country's foreign debt position. Then the commission projects total exports under different assumptions with respect to the domestic value of foreign prices and supply variables - like upcoming harvests of main crops. This provides an idea around how much imports the country can afford and, thus, the basis for the foreign exchange allocation. The allocation itself proceeds then according to sectoral and historical criteria.

In the last seven or eight years, the objective of reducing dependence on foreign financing has been central in the strictness of the commission in terms of providing foreign exchange for imports. In effect, as a result of this effort, the current account deficit as a proportion to GDP has declined from 10.3% in 1982 to a small surplus in 1988. As mentioned in previous sections, this has been done while the fiscal deficit has not declined from 10% of GDP, which means that domestic debt financing has replaced foreign indebtness.

The government, however, does not only manage the quantitative mechanism of centrally allocating foreign exchange; it also controls the exchange rate and sets import tariffs. The exchange rate policy could be important when the foreign exchange projection is made for total exports, sensitive to the real exchange rate, which in turn can be affected by the nominal exchange rate policy. The setting of trade taxes, however, seems to have responded in the past more to the objective of raising fiscal revenues than to the purpose of protecting national production or limiting imports in general. In spite of this, custom duties have significantly increased in the last decade, cooperating to the goal of reducing imports in order to adjust to the diminished availability of foreign exchange and the desire of decreasing foreign indebtness.

7.1 The Model

The existence of quantitative restrictions to foreign trade, especially to imports, casts some doubts on the relevance of the two-step procedure in the model proposed for this research project[36]. In particular, the reduced-form equation for the trade balance mixes the effects of several variables, without allowing for a clear understanding of the possible effects of the quantitative restrictions. Less trouble there is, however, with the real exchange rate equations, in spite of the assumption of instantaneous clearing of the non-tradables market that underlies it. Indeed, even though domestic prices have been subject to some form of control by the government, inflation rates - especially of the price index for the rich - have tended to reflect effectively changes in the monetary and exchange rate conditions in the economy, at least when one works with annual data[37]. This, coupled to a crawling peg exchange rate policy (at least in the last few years) has avoided also any serious misalignment of relative prices.

In estimating the relationship between external variables like the trade balance and the real exchange rate, on one side, and fiscal policies on the other, we have proceeded following the two-step procedure proposed in Easterly et. al. (1989) amended in two ways. First, less emphasis is placed on the accumulation of net foreign assets (or debt) as a medium to long-term driving force, due to the lack of access of domestic private agents to foreign financial markets. Second, the determination of the trade balance in each period is in itself a two-step procedure of the type described above. At the beginning of the year, the government projects the trade balance on the basis of the difference between income and absorption (which is equivalent to running a regression with the explanatory variables proposed by Rodríguez (1989)). Simultaneously, it projects total exports based on the value of the appropriate relative prices - the terms of trade and the real export exchange rate. Given

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[36]See Easterly, Rodríguez, and Schmidt-Hebbel (1989) and Rodríguez (1989).

[37]See section 5 for the behavior of the CPI for the rich.

projected trade balance and export levels, the government instructs the foreign exchange allocation commission to allocate projected available foreign exchange to imports. Naturally, projected ex ante and actual ex post foreign exchange resources will differ due to unexpected changes in the exogenous variables driving trade balance and export behavior.

The government can also affect the actual trade balance through its exchange rate policy, if the real exchange rate is affected by the nominal exchange rate policy. The extent of these effects can be tested in the empirical work that follows.

The described amendments to the original model result in a set-up comparable to Rodríguez' (1989) in one important respect: fiscal policies are still reflected in the trade balance and the real exchange rate equations. The relative prices of (or relevant exchange rates for) exports and imports are specified as follows:

$$(7.1) \quad ex \equiv (P_X/P_N) = ex(TT^*, t_M, TS/Y, G/Y, G_N/G),$$

$$ex_1, ex_3 \geq 0; \; ex_4, ex_5 \leq 0; \; ex_2 ? \; 0.$$

$$(7.2) \quad em \equiv (P_M/P_N) = em\ TT^*, t_M, TS/Y, G/Y, G_N/G),$$

$$em_2, em_3 \geq 0; \; em_1, em_4\ em_5 \leq 0.$$

The trade surplus ratio to GDP is given by:

$$(7.3) \quad TS/Y = ts\ (ird, OD_G/Y, NFA/Y, B_{-1}/Y, \pi tax)$$

$$ts_5 \geq 0; \; ts_1, ts_2, ts_3, ts_4 \leq 0.$$

Finally the export function is specified as:

$$(7.4) \quad X/Y = x\ (TT, Y/YP); \text{ or } (4') \; X/Y = x'\ (ex, Y/YP);$$

$$x_1, x'_1 \geq 0; x_2 \leq 0,$$

where the uncovered interest rate differential is defined as:

$$(7.5) \qquad ird \equiv (i-(i^* + \hat{E}^e + i^*\hat{E}^e))/(1+(i^* + \hat{E}^e + i^*\hat{E}^e));$$

and where P_X is price of exports; P_M is price of imports, P_N is price of non-tradeable goods, TT^* is foreign terms of trade, TT is domestic terms of trade, t_M is the average tariff rate, TS is the trade surplus, G is government spending (public consumption plus public investment), G_N is government spending on non-tradeable goods, i is the average domestic interest rate, i^* is the foreign interest rate, $\hat{E}^e$ is the expected rate of nominal devaluation, OD is the operational public sector deficit, B_{-1} is the lagged-end-of-period domestic public sector stock, Y is GDP, YP is potential GDP, CA is the capital account surplus, X is total exports, and πtax is the inflation tax.

The signs below equations (7.1) to (7.3) denote expected signs of the corresponding partial derivatives, and are consistent with Easterly et. al. (1989) and in Rodríguez (1989). Also, the effect of the relative price of exports - either TT or ex - on exports is clearly positive for a small country like Zimbabwe, while the effect of the cyclical indicator of economic activity (Y/YP) should be negative.

TABLE 7.1

ESTIMATION RESULTS FOR REAL EXCHANGE RATES

Independent Variables

Dependent Variable	Constant	Ln(G/Y)	Ln(GN/G)	Ln(TS/Y)(-1)	Ln(TT*)	tM
Equation 7.1:						
ex	-0.94	-0.52	-0.23	0.06	0.37	-0.26
(t value)	(-4.13)	(-3.84)	(-1.58)	(2.15)	(1.77)	(-1.15)
R Square		0.68				
Ad. R. Square		0.61				
D.W.		1.78				
Rho		0.58				
Equation 7.2						
em	-0.55	-0.38	-0.11	0.06	-0.6	0.15
(t value)	(-2.16)	(-2.74)	(-0.85)	(2.02)	(-2.93)	(.93)
R Square		0.61				
Ad. R Square		0.53				
D.W.		1.79				
Rho		0.68				

Note: The deflator for the real exchange rate is the average wage index.

TABLE 7.2

ESTIMATION RESULTS FOR TRADE SURPLUS AND EXPORTS

Independent Variables

Dependent Variable	Constant	ird	Ln(ODG/Y)	Ln(TS/Y)(-1)	Ln(CA/Y)	Ln(B(-1)/Y)	Pltax
Equation 7.3							
Ln(Ts/Y)							
(T value)	-4.67	-3.47	-0.65	0.38	-0.24	0.46	--
R Squiare		0.85					
Ad. R Square		0.78					
D.W.		1.76					
Rho		•					
Ln(TS/Y)	-3.62	-2.3	-0.58	0.35	-0.23	--	-0.56
(t value)	(-0.82)	(-0.44)	(-2.36)	(1.95)	(-2.28)		(-0.40)
R Square		0.83					
Ad. R. Square		0.76					
D.W.		1.75					
Rho		--					

	Constant	Ln(ex)	Ln(TT)	Ln(Y/YP)
Equation 7.4				
Ln (X/Y)	-1.25	0.54	--	-0.43
(t value)	(-15.55)	(3.81)		(-1.66)
R Square		0.73		
Ad. R. Square		0.70		
D.W.		1.78		
Rho		0.87		
Ln (X/Y)	-1.31	--	0.25	-0.52
(t value)	(-17.34)		(1.29)	(-1.54)
R Square		0.59		
Ad. R Square		0.55		
D.W.		1.68		
Rho		0.78		

7.2 Empirical Results

Equations (7.1) to (7.4) were estimated in log linear form, with annual data for the 1965-1988 period. Regressions were run by using generalized least squares (GLS), with a maximum likelihood procedure to correct for first order autocorrelation and instrumental variables to correct for simultaneity bias.[38] Results are reported in Tables 7.1 and 7.2.[39]

The goodness of fit of both equations - around 60% - is not highly satisfactory, although the results reported are the best found in this and other respects. The lack of slow-adjustment mechanisms in the specification can not be blamed for this because the inclusion of lagged ex or em as explanatory variables (in non-reported results) did not contribute to the estimations.

In terms of the effects of individual variables, things look better. Both real exchange rates present significantly negative elasticities with respect to the share of government spending in GDP confirming the theoretical prediction. In addition, the proportion of government spending devoted to non-tradeable activities is also found to affect negatively both real exchange rates, although we cannot reject the hypothesis that this effect is not significantly different from zero. Foreign terms of trade also exhibit the right sign in both equations, but they affect more significantly the real imports

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[38]The application of logarithms to series that can have negative values forced the addition of a constant to all series in order to eliminate those negative values.

[39]In the estimations of equations 7.1 and 7.2, for the real export exchange rate and the real import exchange rate, respectively, non-tradeable prices - the deflator in the definition of both ex and em -were proxied alternatively by the average wage index and the domestic price level. Results were clearly better when using the former, which is what is reported in Table 7.1. The price of Exports and the price of imports were proxied by the corresponding deflators in the national accounts. Also, variables like G, G_N, TS, and Y are represented by the corresponding series at current prices. G_N is the government spending in health, housing, and education and tries to represent spending in non-tradeable goods. The series for foreign terms of trade, TT*, was constructed from the ratio between the exports deflator and the imports deflator, adjusted by the average tariff rate implicit in custom duties revenues of the central government. This implicit average tariff rate is also present in the regression as t_M. The expected rate of devaluation was assumed to be equal to the actual rate, a perfect-foresight approximation of the rational expectations hypothesis. The foreign interest is Libor and the domestic interest rate is a weighted average of active financial rates.

exchange rate. The coefficients accompanying the series reflecting implicit tariff rates also show the correct signs[40], but again they are not significantly different from zero. Finally, the effect of the one year lagged trade surplus is small but significant, and shows the expected sign.[41] [42].

Estimation results for equations 7.3 and 7.4 are reported in Table 7.2. In the case of the trade surplus equation, we estimated two versions, depending on the way in which the government finances its deficit. Following Rodríguez (1989), we first tried with debt financing by including the variable B_{-1}/Y; and later with the option of inflationary financing by including the variable πtax. The overall adjustment looks slightly better in the former case, in spite of the fact that the sign of the coefficient of B_{-1}/Y is wrong. In both cases, the overall fit is reasonable and there are no signs of autocorrelation. However, we cannot rule out multicollinearity given the low t-values.

In terms of individual variables, all coefficients show the right signs in both equations, except for the case of the public debt to GDP ratio already mentioned above. The coefficient of the interest rate differential is not significantly different from zero in both estimated versions of equation (7.3). We tried with a different definition of ird based on the actual implicit interest rate paid by Zimbabwe for its foreign debt, but results did not improve in terms of increasing the significance of ird.

What is most interesting about these estimations of equation (7.3) are the computed effects of the operational deficit of the public sector, on one side, and of the capital account surplus to GDP ratio (denoted by CA/Y), on the other. The latter variable is used as a flow proxy for net foreign assets (NFA), in Rodríguez (1989) set-up, and it seems even more appropriate than NFA in Zimbabwe's contex , given the way in which the government decides upon the allocation of foreign

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[40]In the real export exchange rate, the theoretical sign is ambiguous.

[41]By using the lagged interest of the current surplus, possible simultaneity biases are ruled out. In this sense, the one-year-lagged TS/Y is an instrumental variable.

[42]We also used the current account deficit as an explanatory variable alternative to the trade surplus, without success.

exchange. As one could expect from a theoretical point of view, the effect of CA/Y on the trade surplus to GDP ratio is negative: the more foreign funds flowing in, the more financing is available for imports without resorting to increased exports. What the estimated elasticities indicate is that an increase in capital inflows does not bring an equal increase in the trade surplus, but substantially less[43]. This could be indicating that the government uses to "save" some of those capital inflows in the form of foreign reserve accumulation, which in turn coincides with the government's objective of reducing net foreign indebtness.

In the case of the operational deficit of the public sector, the estimations indicate that a 10% increase in this variable will imply a reduction in the trade surplus of around 6%, confirming the theoretical presumption in this respect: the rise in OD_G increases absorption and, thus, for the same income level, reduces TS. However, the mechanism for financing this deficit does not apparently influence the trade surplus to GDP ratio to any significant extent. Indeed, neither the outstanding stock of public sector debt nor the inflation tax seem to be statistically significant. The reason is clear. Most of the public sector deficit has been financed in the last eight years by issuing domestic public debt, which is either compulsory - like the share held by institutio. nvestors - or is voluntary but attractive to private savers due to the lack of alternative portfolio choices. In addition, private savings have significantly increased as consumption of foreign goods is strictly limited. Simultaneously, private investors have not been much crowded out by this public indebtness process because the acquisition of foreign capital goods has also been cut by the foreign exchange allocation system. So, in the end, it is not strange that the increase in public sector bonds has not been reflected by a lower trade surplus. They are, temporarily at least, disconnected to each other.

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[43]Since we are considering percentage rates of change, there could be some differences between a 1% of CA/Y and a 1% of TS/Y. But on average these differences should not be large.

The low significance of the inflation tax is not surprising either, due to the same reason. The public sector has resorted to debt issuance for financing its deficits, while the Reserve Bank of Zimbabwe has been quite conservative in limiting monetary financing of the deficit. This has paid off so far in terms of a moderate inflation rate, unthinkable in most other countries with public sector deficits of the magnitude of Zimbabwe's.

Exports were also specified according to two different versions. One is more in agreement with the spirit of Rodriguez' (1989) model by inserting the domestic terms of trade as the relevant relative price variable, while the other specifies the real export exchange rate in such a role. Both versions include the ratio of current to potential GDP as an additional explanatory variable. The reasoning is that the higher this ratio, the lower is the share of exportable goods produced that effectively ends up in foreign markets. Both the sign of this variable and the sign of either measure of relative prices are correct, although in the case of Y/YP in neither case it achieves significancy levels high enough to reject the null hypothesis.

Overall fit of the version with the real export exchange rate as the relevant relative price variable is reasonable, while in the other case it is rather low. We feel comfortable with the former, since the eventual feed-back of the export-GDP ratio to the real exchange rate is diffused through the trade surplus effect on ex. Furthermore, in such equation the estimation indicates that the one-year lagged trade surplus is the significant variable rather than its contemporaneous value.

The reported empirical results tend to confirm the relevance of public sector deficits and public sector spending on the external sector of Zimbabwe's economy. But this relevance pertains more to the levels of these variables than to deficit financing. The particular way in which Zimbabwe's government administrates imports through the foreign exchange allocation commission and the binding restraints placed on capital movements are the central pieces of this scenario.

As an example, let's do the following exercise based on the above reported empirical results. Let's take a 2% increase in the government spending to GDP ratio. This, supposedly, leads to an 8% increment in OD_G/Y and to an equal 2% increase in G_N, such that G_N/G remains unchanged. The increase in G/Y would imply a reduction of 1% in ex and 0.8% in em, ceteris paribus. It does not matter how this increase in G is financed. These numbers would be taken by the government in its projections. Simultaneously, the 8% increase in OD_G would bring a reduction in the trade surplus to GDP ratio of about 4.8%, which in turn would not affect immediately neither real exchange rate. The projected reduction in ex would. in turn, provoke a reduction in the exports to GDP ratio of about 0.5%. With all these numbers, the government would instruct the foreign exchange allocation commission to limit imports such that they, as a percentage of GDP, decline by around 5% [44], if the goal is to avoid a deterioration of the trade surplus.

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[44]The exact magnitude would depend on the relative weights of imports and exports in the trade surplus.

8. PROSPECTS OF GROWTH[45]

This section attempts to underline Zimbabwe's growth prospects in connection with the previous discussion on the macroeconomic effects of public sector deficits.

As a first step, the construction of a potential output series is undertaken in order to get an idea on how the evolution of total investment and changes in the incentive system have affected potential growth in the past and how it will affect future growth prospects. As a second step a behavioral function for the ratio of actual to potential GDP is specified in accordance to a neoclassical output supply function, dependent on relative prices of factor and intermediate goods prices.

Finally, a discussion on the effects of public sector deficits and distortions to the price incentive system follows, emphasizing the overall performance of the Zimbabwean economy and its prospects of future growth.

8.1 Potential Output and Growth

The usual way to determine potential output amounts to using a "sensible" relation between this concept, the capital stock and full-capacity levels of variable factors and interemediate goods. Unfortunately, all these time series are inexistent for Zimbabwe and thus, have to be derived by making some simplifying assumptions, that should take into account the major structural changes which have affected the Zimbabwean economy since the early 1970s.

A first simplifying assumption is to relate potential capital only to the fixed-capital stock, excluding full-capacity levels of variable factors and inputs. This assumption seems to be relatively innocuous for a period dominated by an excess supply of labor, with fixed capital being the

[45]This section draws significantly from Elbadawi and Schmidt-Hebbel (1991a).

constraining factor. Second, combine the following steady-state aggregate capital and output growth assumption (listed below for shorter time intervals):

(8.1) $DK/K = Dy/y$

with the following capital accumulation function (valid for any period):

(8.2) $DK = fi - \delta K$

to obtain a capital/output ratio for a representative base year:

(8.3) $$\frac{K}{y} = \frac{fi/y}{\frac{Dy}{y} + \delta}$$

where y is constant-price GDP, K is the constant-price aggregate domestic capital stock, fi is aggregate gross fixed investment, and δ is the capital depreciation rate.

To derive the capital-output ratio from (8.3) for a representative, "normal" year, recent medium-term (1985-1988) average gross investment and GDP growth rates were combined with three alternative depreciation rates, yielding the following K/y ratios:

	$\delta_1 = 0.035$	$\delta_2 = 0.045$	$\delta_3 = 0.055$
I/y = 0.1795 Dy/y = 0.0337	2.6141	2.2818	2.0244

1985, both a "normal" and recent year, was chosen as the base year for deriving the capital series making use of equation (8.2), assuming in addition the intermediate depreciation rate δ_2. The corresponding output/capital evolution during 1965-1988 is shown in figure 8.1.

Three distinct periods characterize the output/capital and growth paths of Zimbabwe during the last 25 years. The first one, culminating in 1972, is characterized by high growth and stable y/K ratios. The 1973-1979 pre-independence period of oil shocks and growing internal conflict shows a protracted recession and imploding output/capital ratios. Finally, a partial, hesitant recovery starts in 1980 up to the present.

A major problem is how to interpret the 1981-1988 y/K ratio. Does it reflect lower efficiency in the use of capital (as compared to the 1960s) or lower capacity utilization, or both?

In the absence of reliable data on capacity utilization and labor unemployment, we opted for assuming that it is due to both reasons. This implies that the potential output/capital ratio during the 1980's is a weighted average of the actual output/capital ratio of the 1960s and the 1980s. Lacking information, we assumed (arbitrary) weights of 0.5, which allow to draw the potential output/capital (yp/K) ratio in figure 8.1[46]. Hence, starting in 1981, and continuing into the future, we postulate the following relation between potential output and capital:

$$(8.4) \quad yp = 0.5174\, K_1$$

The corresponding actual to potential output ratio for 1965-88 is depicted in figure 8.2. Next a neoclassical output supply is specified for GDP obtained by substituting conditional factor demands into a production function depending on capital, variable factors (labor and working capital),

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[46]In addition, it is assumed that actual output reaches its potential level in 1969 and that the 1972-1981 efficiency decline is reflected by a linearly increasing potential output/capital ratio during that period.

and intermediate imports. By substituting capital by potential output, GDP supply can be defined as the deviation between actual and potential output, depending on the real wage adjusted for productivity gains, the real exchange rate relevant for intermediate imports, the real interest rate, and the period-specific dummies for Zimbabwe's conflictive pre-independence period:

$$(8.5) \quad \ln\left(\frac{y}{yp}\right) = \gamma + \lambda\left[\alpha \ln\frac{P}{W e^{-\mu t}} + (1-\alpha)\ln\frac{P}{P_{Impint}}\right] + \beta\,(r_p - 0.05) + \sum_s \delta_s D_s$$

where P is the GDP deflator, W is the nominal unit wage, P_{Impint} is the price of intermediate imports, t is time, D_s are supply-specific dummies, and r_p is the real interest rate relevant for production decisions, defined as:

$$(8.6) \quad r_p = \frac{i_L - \hat{P}^e}{1 + \hat{P}^e}$$

where i_L is the nominal lending interest rate and $\hat{P}^e$ is expected (GDP deflator) inflation.

The real wage in (8.5) is adjusted for Harrod-neutral productivity increases at an annual rate of $\mu = 0.008$. The latter is the 1965-1972 trend growth rate in real wages, assessed to be representative for a normal period of productivity-related wage increases when the economy was operating at levels close to full employment (see figure 8.2). From 1972 to 1979 real wages stagnated and after 1979 they grew strongly, probably reflecting both the partial output recovery and the

political regime change. Figure 8.3 shows the evolution of actual and productivity-adjusted real wages during 1965-1988, taking 1980 as the base year.

A final feature of relative output supply equation (8.5) is that it is homogeneous of degree zero in absolute prices - a desirable property to avoid real effects stemming from changes in absolute prices.

The output supply function for the actual to potential output ratio in eq. (8.5) was estimated by different estimation techniques. Results are shown in Tables 8.1, 8.2, and 8.3. No evidence exists for the presence of a "Cavallo effect"; the non-significance of the real interest rate made us drop this variable from the following runs.

The results are reported in table 8.1. Line 1 shows the estimate for the complete specification, with a positive but not significant coefficient for the "Carallo effect" represented by the real interest rate. Hence this variable is dropped from the following estimations.

Line 2 presents two-stage least square results to take care of possible simultaneity biases due to the non-independence of the real wage and the real price of imports stemming from the interaction of aggregate supply and demand. The results do not differ much from the LS run reported in line 3, both in terms of the excellent overall fit and the individual coefficients.

The price-elasticity of aggregate supply is relatively low --- 0.44 in the NLTSLS equation. It implies that aggregate demand shocks (for a given aggregate demand elasticity) will have a strong relative price response and a weak output effect.

The coefficient α (which is related to the share of labor in gross output net of capital value added) is very high and significant, reflecting a strong weight of the real product wage in comparison to the real exchange rate in determining short-run output.

TABLE 8.1

ESTIMATION RESULTS FOR THE RELATIVE OUTPUT SUPPLY (1966-1988)

$$\ln\left(\frac{y}{yp}\right) = \gamma + \lambda\left[\alpha \ln\frac{P}{W e^{-\mu t}} + (1-\alpha)\ln\frac{P}{P_{Impint}}\right] + \beta\,(r_p - 0.05) + \sum_s \delta_s D_s$$

Equation	γ	λ	α	β	δ_1	δ_2	R2A	DW
1. Non-linear LS	-0.10	0.45	0.92	0.19	-0.13	-0.25	0.92	2.26
	(-4.7)	(4.7)	(6.7)	(1.2)	(-5.8)	(-9.2)		
2. Non-linear TSLS	-0.11	0.44	0.85	-	-0.12	-0.25	0.91	2.12
	(-2.9)	(2.6)	(3.1)		(-3.7)	(-5.6)		
3. Non-linear LS	-0.11	0.40	0.80		-0.12	-0.24	0.91	2.12
	(-5.9)	4.6	(0.14)		(-5.9)	(-9.3)		

Note: The first dummy is 1.0 for 1974, 1975, 1976, 1980, 1984 (0 otherwise) and the second dummy, for the stronger recessionary years, is 1 for 1977, 1978 and 1979 (0 otherwise). The two-stage least squares estimation in line 2 uses the following list of instruments: the constant, lagged values of the logarithms of the productivity-adjusted real wage, the real price of intermediate imports and the dependent variable, in addition to contemporaneous values of the two dummies and the log of the public expenditure to potential output ratio.

Figure 8.1

Output/Capital and Potential Output/Capital Ratio

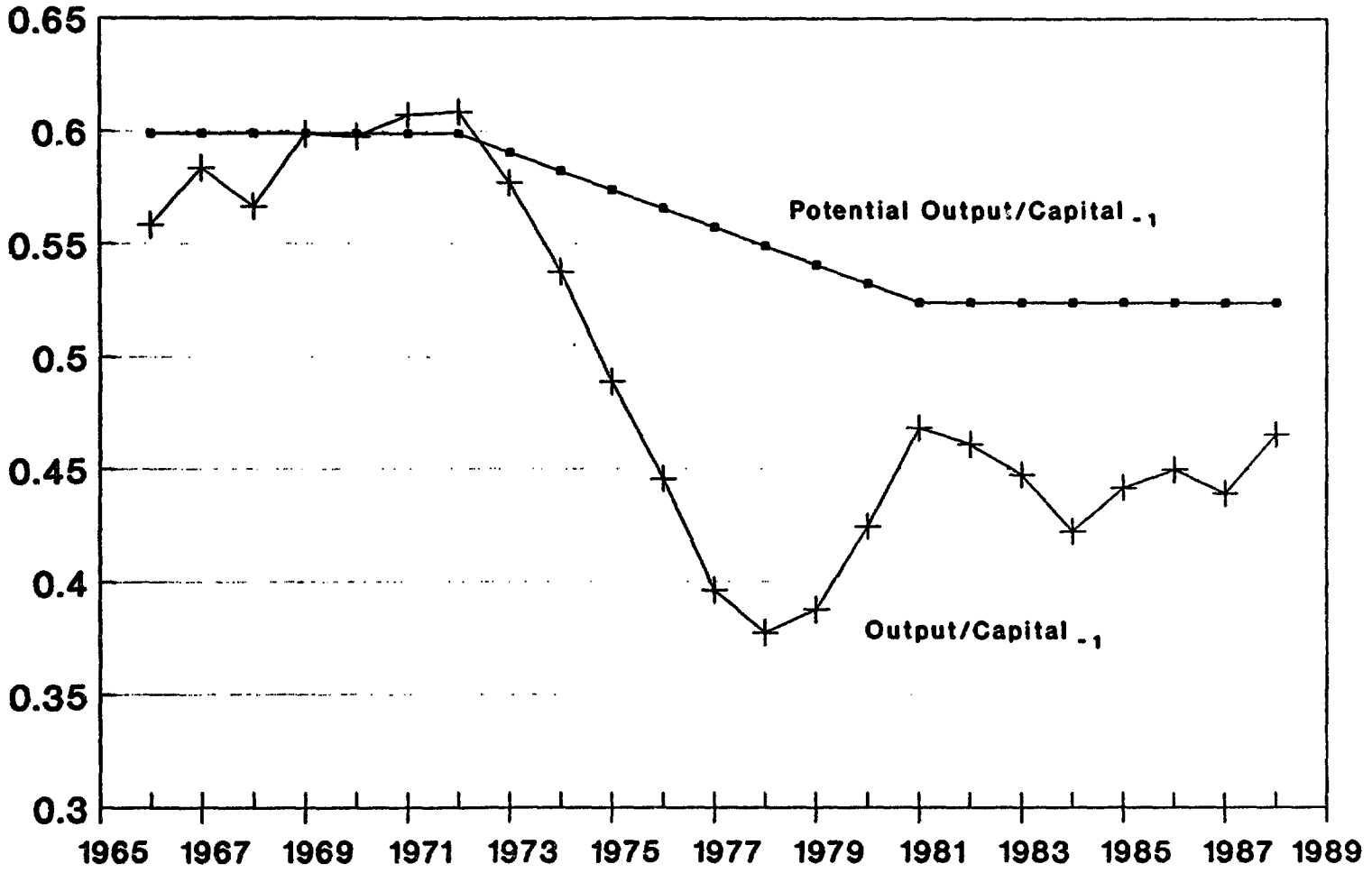


Figure 8.2

Actual/Potential Output Ratio

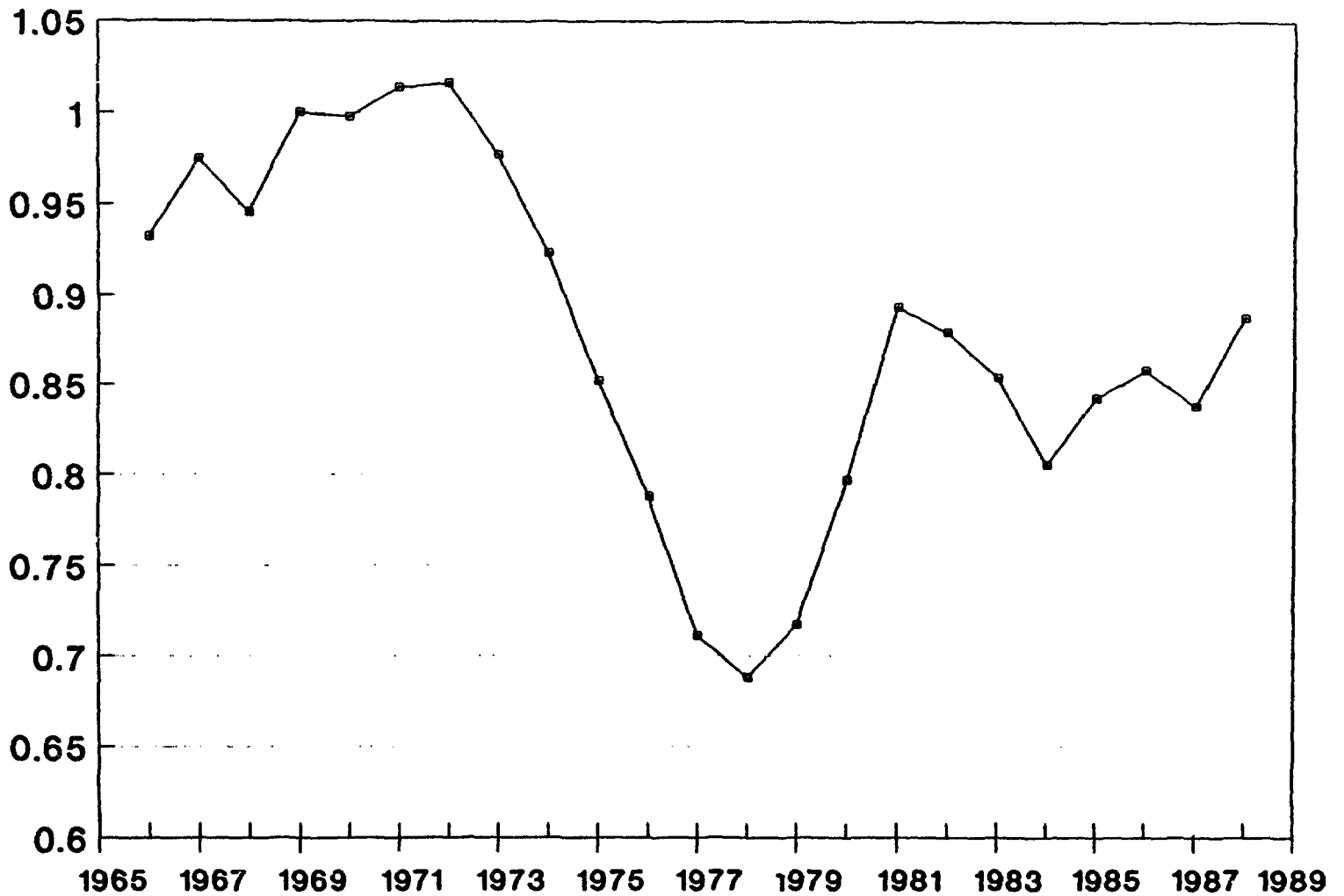
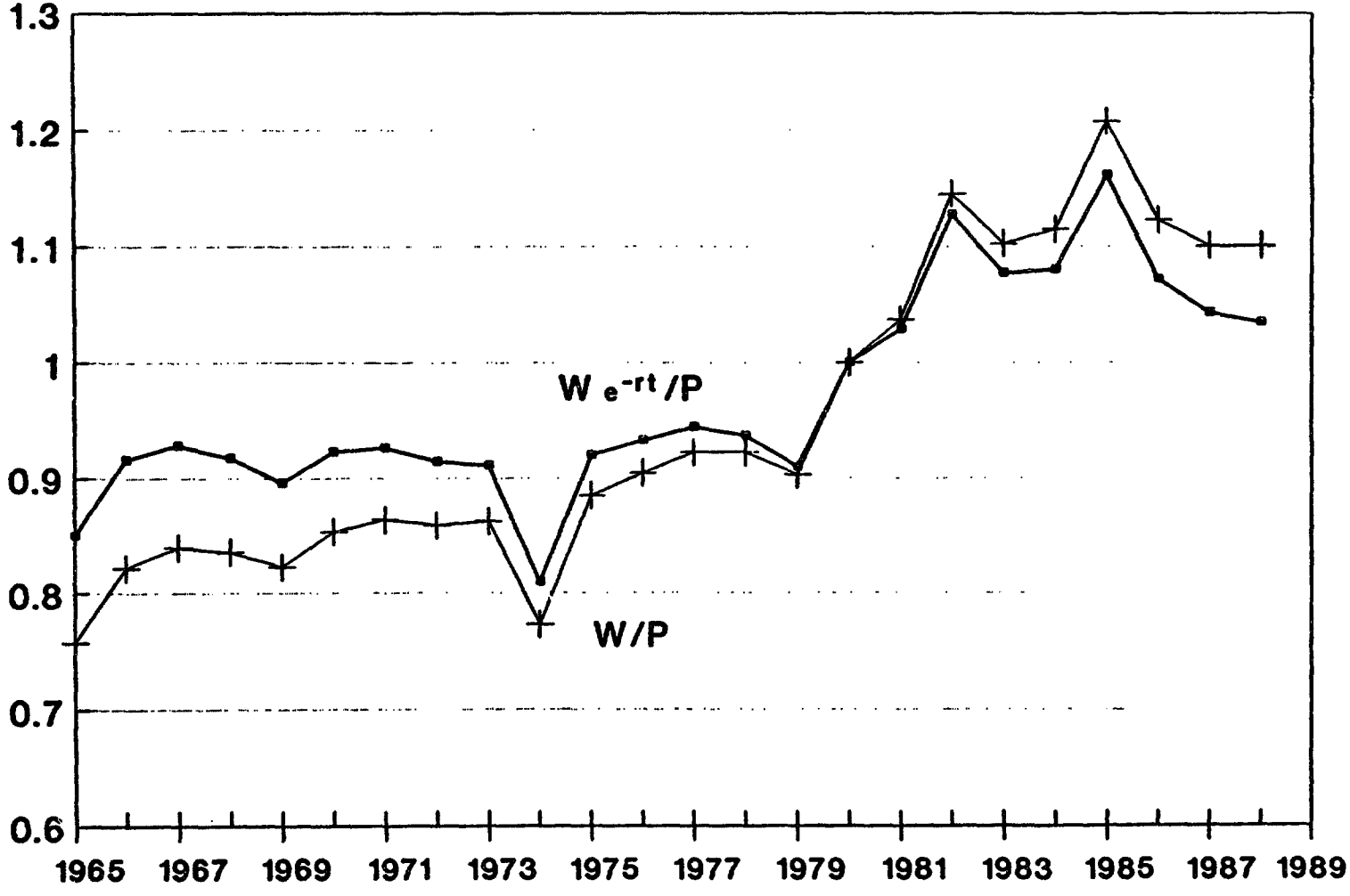


Figure 8.3

Unadjusted and Productivity-Adjusted Real Wages



Finally, δ_1 and δ_2 reflect the relative intensity of the supply disruptions during the 1974-1975-1976-1980-1984 and 1977-1978-1979 periods, which coincide mostly with the pre-independence period of foreign oil shocks and domestic civil war.

8.2 Public Sector Deficits, Distortions and Growth

As mentioned in previous sections, Zimbabwe's economic position in the late 1980s was fragile. A stagnating economy showing low rates of growth and employment were the symptoms of deeper problems affecting the prospects of sustained growth in the medium and long term. The key problems were inadequate investment levels, the budget deficit, weak export performance and a poor domestic incentive environment for the process of economic restructuring. How do these problems reflect in the empirical results shown above?

Figure 8.1 illustrates a sharp contraction in economic activity starting in the early 1970s, as the oil shocks and the tumultuous domestic political situation hit the economy. With independence achieved, in 1980, a hesitant recovery started, initially financed by external indebtness. When foreign capital inflows fell after 1982 a major successful reduction in current account deficits was achieved between 1982 and 1986. Growth remained sluggish after an initial significant increase in public sector spending. The large public spending program, in turn, was financed to a large extent by domestic debt, that is, with transfers from Zimbabwe's private sector. As discussed in section 6, both an increase of private saving and a decline in private investment were behind the rise in the private surplus necessary for huge public sector deficits that hovered around 10-14% of GDP. The decline in private investment was not accompanied by similar increases in public physical investment, so that total fixed-capital investment has been decreasing as a percentage of GDP. It is in this sense that public sector deficit financing has been detrimental to Zimbabwe's growth prospects, as indicated by

only slightly increasing potential output in the last seven years (see Figure 8.2), at an annual average rate of 2.3%.

The objective of the government's expenditure program was to improve the living conditions of the population through a number of social programs, especially in education and support of small farmers. It is likely that the share of this incremental spending that goes to human capital formation will have positive growth results some time into the future.

On the other hand, private investment has not only been discouraged by higher interest rates created by high public sector deficits, but also by two other reasons. The first one also concerns deficit financing, although indirectly so. Indeed, the main instrument used by the economic authority to effect the reduction in current account deficits was to enact a very strict foreign exchange allocation mechanism that acts primarily on private sector imports, both of consumption and investment goods. This mechanism has been so severe that there has been no way for domestic production to substitute for the decrease in imports. In the end, this has been an effective constraint on aggregate private investment demand.

The other factor affecting private investment has been an overall environment not friendly enough to private business, which reflects in scarce financial resources available for private investment projects in a regulated financial system, a number of regulations to private operations, and a heavy tax burden.

These last elements do not only affect the level of total investment, but also its overall productivity. Indeed, distortions of different sorts, but in particular the strict foreign exchange allocation system, generate a relative price structure not really reflecting the relative scarcity of goods and factors. Hence the same investment flows to the wrong sectors yielding low returns reflected by both the stagnation of the potential output to capital ratio (see figure 8.1) and the low rate of labor productivity gains (see figure 8.3).

The influence of the foreign exchange allocation mechanism is not apparent in the estimation of equation (8.5). Indeed, the coefficient showing the sensitivity of the actual to potential GDP ratio with respect to the real exchange rate is low. However, since the mechanism alluded to is of a quantitative nature, this is not a surprising result. On the contrary, it tends to reflect the fact that the foreign exchange allocation mechanism has virtually closed the economy to international trade (particularly on the side of imports) and, thus, the importance of the real exchange rate in aggregate supply decisions has diminished vis-a-vis the real wage.

Concluding Remarks

The 1980s witnessed a recovery of the output/capital ratio after the sharp deterioration of this ratio in the tumultuous 1970s. However, this recovery was only partial and potential output in the last five years has shown only a modest increase at best. This has been the result of a combination of factors that will also impinge on future growth unless some reforms are undertaken. Foremost among these factors are the huge public sector deficit financed by the transfer of resources from the domestic private sector, and the foreign exchange allocation mechanism that, while being instrumental in the financing of the public sector deficit by constrained private sector spending, has also precluded private investment from being the engine of growth. Therefore, reforms to the public sector aimed to reduce the large deficit and a simultaneous dismantling of the foreign exchange allocation mechanism would improve Zimbabwe's long run growth prospects.

9. CONCLUSIONS

This paper has analyzed the various macroeconomic effects of public sector deficits in Zimbabwe within the framework specified by Easterly, Rodriguez and Schmidt-Hebbel (1989). Because of the coexistence of significant and persistent high public sector deficits and moderate inflation rates, the Zimbabwean case is most interesting. Section 2 has brought together flow and stock information on non-financial and financial public sub sectors to draw a comprehensive picture of the consolidated public sector deficit, its financing, and public asset and liability holdings. This picture shows the following:

(i) After 1980/81 consolidated non-financial public sector deficits grew from less than 10% of GDP to 13-14%, maintained over a 6-year span. In 1987/88 a significant, although still partial fiscal adjustment took place, lowering the deficit by 3.5 percentage points and 0.9 additional percentage points during 1988/89. This adjustment reflected mostly an improvement in central government current expenditure, in particular, a cut in non-interest transfers and subsidies.

(ii) Nominal interest rates paid on NFPS domestic debt have increased continuously during the 1980s (from 4.4% in 1980/81 to 13.5% in 1988/89) while the stock of foreign debt rose from 12% to 38% of GDP during the same period. Both factors explain why NFPS net interest payments increased from 2.4% of GDP to 7.8% between 1980/81 and 1988/89. As both interest rates and debt stocks are unlikely to decrease significantly in the near future, subsequent fiscal adjustments will require correcting the size and possibly the sign of the consolidated non-financial primary deficit, which stands at 2.2% of GDP in 1988/89.

Section 3 of the paper identified the main macroeconomic and policy variables affecting the above-the-line NFPS deficit during the eighties. More illuminating than the year-by-year decomposition of the deficit is to assess its structural sensitivity with respect to its main determinants. Our analysis shows the following:

(iii) The early financing requirements of high public deficits have contributed to a steady and massive accumulation of public liabilities, from 54.1% in June 1980 to 86.4% in June 1987. While monetary base stayed relatively constant at low levels throughout the period, the composition and magnitude of public debt changed dramatically. Total public sector foreign debt increased from 7.4% of GDP in 1980 to 41.9% in 1985, to start a slight decline thereafter. Domestic public debt first slowed down during the early 1980s, but started to increase significantly thereafter, from 25% in 1983 to 38% in 1988. An encouraging sign is that the 1987/88 fiscal adjustment allowed total public sector liabilities and total public debt to decline for the first time in the 1980s. This reflects the fact that the 1987/88 adjustment brought the deficit closer to levels which avoid increasing the public liabilities to GDP ratios if macroeconomic conditions are as favorable as during the last two years.

(iv) Among macroeconomic variables, and in decreasing order, real GDP growth, real import growth, and a real exchange devaluation have a negative impact on the public sector deficit. On the contrary, and also in decreasing order, increases in the domestic real interest rate, domestic inflation, and foreign nominal interest rate tend to boost the deficit.

(v) Among central government policy variables, and reflecting directly their size, percentage cuts in the wage bill, transfers/subsidies, public investment, and expenditure on other goods and services impact in decreasing magnitude on the deficit. Further policy measures on the revenue side, such as tax reforms and reductions in the public enterprise deficit, can have major and immediate effects on public finances, while reductions in domestic and foreign debt

stocks and hence interest payments come only slowly as a result of lower past deficits and indebtment.

Section 4 was devoted to obtain bounds for sustainable public deficits, calculated from relating the above-the-line primary deficit and interest payments to below-the-line financing through monetization or floating of domestic or foreign debt. Sustainability was used in the sense of holding June 1988 total public sector liability to GDP ratios constant. The main conclusions are:

(vi) Under a base scenario showing a macroeconomic environment similar to that of the recent past, the sustainable primary deficit is estimated at 1.7% of GDP, increasing to 2.9% under a more favorable scenario of higher growth and lower real domestic interest rates. The corresponding nominal (primary plus interest payments) deficits are 9.9% and 10.7%, which are comparable to the 10-11% actual nominal deficit range of 1987/88 and 1988/89.

(vii) However, under an unfavorable scenario of lower growth, higher reai domestic and foreign interest rates, and a real exchange rate depreciation of 7% per year, the sustainable deficit has to reverse its sign: a 4.2% primary surplus (or a 5.6% nominal deficit) is required to avoid exploding public sector liabilities. Hence, current public sector deficits in Zimbabwe seem to be unsustainable under negative macroeconomic developments and/or required real exchange rate depreciations to support structural changes such as a trade reform.

In Section 5, we found that:

(viii) The government has taken advantage of the many regulations of the financial markets in order to recycle the private sector surplus. This has allowed the public sector to finance its huge deficits starting in 1983, when foreign financing became less available, while domestic inflation has been kept moderate. However, our simulations tend to indicate that this situation

is not sustainable and that a greater inflation will result sooner or later, following Sargent and Wallace (1981) "unpleasant monetarist" dictum.

(ix) In spite of financial sector regulation and the significant amount of resources that the private sector is saving in net terms, the moderate but increasing trend of real interest rates in the last decade is shown to be a result of the increasing public debt that has resulted from both the magnitude and the financing of the public sector deficits.

Section 6 poses the following question: how have high public sector deficits affected private saving and investment? Zimbabwe's recent experience suggests the following:

(x) Between 1981/82 and 1987/88 the country achieved a major improvement in its external accounts, turning a 9.4% current account deficit into a balanced account. This improvement relied exclusively on the private sector, as the public sector deficit hovered around 10-14% of GDP. Both an increase in private saving and a decline in private investment were behind the rise in the private surplus. Since 1984/85 private saving exceeds 20% of GDP and finances more than 100% of the economy's domestic investment. Low private consumption was made possible from combining consumer import repression and strict controls on capital outflows with a perception of stability of the financial system.

(xi) Declining private investment until 1986/87 implied lower aggregate capital formation and, probably, lower efficiency of domestic investment, contributing to Zimbabwe's modest growth record after 1981. The effect of the 1987/89 fiscal adjustment on private investment is encouraging, as it allowed a recovery of 2.4 percentage points of the gross domestic investment rate.

(xii) Our results indicate that real interest rates have a strong negative influence on private investment - hence domestic debt financing of public sector deficits, which tends to push up

interest rates as has been observed during the 1980s, has a significant crowding o· · ffect. This is partly compensated by crowding-in of private investment from higher public investment.

Section 7 points out:

(xiii) The empirical results confirm the impact of public sector deficits and public sector spending on the trade surplus, and the relative export and import prices in Zimbabwe. But this relevance pertains more to the levels of these variables than to how deficits are financed. The particular way in which Zimbabwe's government administrates imports through the foreign exchange allocation commission and the binding restraints placed on capital movements are the central pieces for this outcome.

Finally, Section 8 deals with the growth prospects of Zimbabwe's economy:

(xiv) The early 1980s witnessed a recovery of the output/capital ratio after the sharp deterioration of this ratio in the tumultuous 1970s. However, this recovery was only partial and potential output in the last five years has shown only modest increases at best. Overall and labor productivity gains have been very low throughout the 1980s. This has been the result of a combination of factors that will also impinge on future growth unless some reforms are undertaken. Foremost among these factors are the huge public sector deficit financed by the transfer of resources from the domestic private sector, and the foreign exchange allocation mechanism that, while being instrumental in the financing of the public sector deficit by constrained private sector spending, has also precluded private investment from being the engine of growth. Therefore, public sector reforms aimed at reducing the large deficit and

a simultaneous dismantling of the foreign exchange allocation mechanism will point to better prospects of growth in the long run.

The major conclusion of this study is that more fiscal adjustment is required for both macroeconomic/financial stability and growth reasons. On one side lower public deficits are required to assure that sustainable public debt paths are maintained even under more adverse macroeconomic circumstances than the current ones. On the other side, high deficits have crowded out both private consumption and private investment. Low private investment rates throughout the 1980s have affected adversely the quantity - and probably the quality - of aggregate capital formation and hence the country's growth prospects. Therefore additional public sector adjustment, deepening the process which already has taken place, would contribute significantly to Zimbabwe's stability and growth outlook.

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APPENDIX

DECOMPOSITION OF THE CHANGE IN THE PUBLIC SECTOR DEFICIT: APPLICATION TO ZIMBABWE

This appendix presents an application to Zimbabwe of the methodology of decomposition of public sector deficits according to their main economic and policy determinants, based on Marshall and Schmidt-Hebbel (1989). Section B.1 introduces the notation, section B.2 decomposes the tax revenue functions according to the structure estimated for Zimbabwe in section 3.1 and section B.3 decomposes the consolidated non-financial public sector (NFPS) deficit equation.

B.1 Notation

CPSD	Consolidated Non-Financial Public Sector Deficit
P	GDP deflator
y	Real GDP
WB	Central Government Wage Bill
GS	Central Government Current Expenditure on (Other) Goods and Services
TS	Central Government Expenditure on (Other) Transfers and Subsidies
DT	Direct Tax Revenue
IT	Indirect Tax Revenue
CD	Customs Duties Revenue
PD	Parastatals and Local Authorities and Primary (Gross) Deficit
E	Nominal Exchange Rate (Z$/US$)
RER	Real Exchange Rate
D^*	Foreign Debt (in US$)
D	Domestic Debt
i^*	Nominal Foreign Interest Rate
i	Nominal Domestic Interest Rate
π	Domestic Inflation Rate
r	Domestic Real Interest Rate
P^*	US Consumer Price Index
RES	Residual
dt	real direct tax revenue
it	real indirect tax revenue
cd	real customs duties revenue

The RER is defined as: $RER_t = \frac{E_t^* P_t^*}{P_t}$. Domestic inflation is defined as: $\pi_t = (P_t - P_{t-1})/P_{t-1}$. All prices are defined as average-period prices. Domestic and foreign debt stocks are defined as end-of-preceding period stocks. This introduces slight valuation problems for the dating of domestic and real currency values of both debt stocks. However, this dating

inconsistency has no significant effects on the decomposition performed below.[1]

Interest rates are contemporaneous period-average rates, obtained as ratios between contemporaneous interest payments and preceding end-of-period debt stocks.

B.2 Tax Revenue Functions

Tax revenue functions in levels and changes are introduced here for direct taxes, indirect taxes, and customs duties. The corresponding estimation results are presented in section 3.1.

Direct Taxes

$$(1)\quad \frac{DT_t}{P_t} \equiv dt_t = \alpha_0 + \alpha_1 y_t + \alpha_2 \pi_t + \alpha_3 RER_t + \alpha_4 DTR70_t + \alpha_5 CW_t + \alpha_6 DTR88$$

$$(1')\quad \Delta\left(\frac{dt_t}{y_t}\right) = \left(\frac{dt_{t-1}}{y_{t-1}}\right)\left[\alpha_2 \frac{1}{dt_{t-1}}(d\pi_t) + \alpha_3 \frac{RER_{t-1}}{dt_{t-1}} \hat{RER}_t + \alpha_4 \frac{1}{dt_{t-1}}(d\ DTR70_t) + \alpha_5 \frac{1}{dt_{t-1}}(d\ CW_t) + \alpha_6 \frac{1}{dt_{t-1}}(d\ DTR88_t) + \alpha_1 \left(\frac{y_{t-1}}{dt_{t-1}} - 1\right)\hat{y}_t\right] + resdt_t$$

Indirect Taxes

$$(2)\quad \frac{IT_t}{P_t} \equiv it_t = \beta_0 + \beta_1 y_t + \beta_2 RER_t + \beta_3 ITR70_t + \beta_4 ITR81_t$$

$$(2')\quad \Delta\left(\frac{it_t}{y_t}\right) = \left(\frac{it_{t-1}}{y_{t-1}}\right)\left[\beta_2 \frac{RER_{t-1}}{it_{t-1}} \hat{RER}_t + \beta_3 \frac{1}{it_{t-1}}(d\ ITR70_t) + \beta_4 \frac{1}{it_{t-1}}(d\ ITR81_t) + \left(\beta_1 \frac{y_{t-1}}{it_{t-1}} - 1\right)\hat{y}_t\right] + resit_t$$

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[1] For a major discussion of this issue and a solution involving a distinction between average and end-of-period deflators, applied to Zimbabwe, see Khadr and Schmidt-Hebbel (1989 a, b).

Customs Duties

$$(3)\quad \frac{CD_t}{P_t} \equiv cd_t = \gamma_o + \gamma_1\, imp_t + \gamma_2 CDR82_t + \gamma_3 CDR83 + \gamma_4 CDR88_t$$

$$(3')\quad \Delta\left(\frac{cd_t}{y_t}\right) = \left(\frac{cd_{t-1}}{y_{t-1}}\right)\left[\gamma_1 \frac{imp_{t-1}}{cd_{t-1}}\, \hat{imp}_t + \gamma_2 \frac{1}{cd_{t-1}}(d\,CDR82_t) + \right.$$

$$\left. \text{resecd}_t + \gamma_3 \frac{1}{cd_{t-1}}(d\,CDR83_t) + \gamma_4 \frac{1}{cd_{t-1}}(d\,CDR88_t) - \hat{y}_t \right] +$$

where the residuals are due both to estimation errors (the α_i, β_i, and γ_i are estimated coefficients) and the omission of the cross-derivative terms.

B.3. Deficit Decomposition

The decomposition of the consolidated NFPS deficit is performed according to the 10 main above-the-line budgeting variables (the "included" variables in table 15) while the remaining variables ("excluded" variables in table 15) are captured by the residual RES. Hence the change in the deficit to GDP ratio is given by the following expression:

$$(4)\quad \Delta\left(\frac{CPSD}{P_t y_t}\right) = \Delta\left(\frac{WB_t}{P_t y_t}\right) + \Delta\left(\frac{GS_t}{P_t y_t}\right) + \Delta\left(\frac{TS_t}{P_t y_t}\right) -$$

$$\Delta\left(\frac{DT_t}{P_t y_t}\right) - \Delta\left(\frac{IT_t}{P_t y_t}\right) - \Delta\left(\frac{CD_t}{P_t y_t}\right) + \Delta\left(\frac{PD_t}{P_t y_t}\right) +$$

$$+ \Delta\left(\frac{E_t \overset{*}{i}_t \overset{*}{D}_{t-1}}{P_t y_t}\right) + \Delta\left(\frac{i_t D_{t-1}}{P_t y_t}\right) + \Delta\left(\frac{I_t}{P_t y_t}\right) + RES_t$$

Substitute the tax revenue functions (1') - (3') into (4) use the Fisher equation for domestic interest rates, and perform simple variable transformations on (4) to obtain:

$$(5)\quad \Delta\frac{CPSD_t}{P_t y_t} = \left[\frac{WB_{t-1}}{P_{t-1} y_{t-1}}\right]\left\{\left(\frac{\hat{WB}_t}{P_t}\right) - \hat{y}_t\right\} +$$

$$+ \left[\frac{GS_{t-1}}{P_{t-1}y_{t-1}} \right] \left\{ \left(\frac{\hat{GS}_t}{P_t} \right) - \hat{y}_t \right\} +$$

$$+ \left[\frac{TS_{t-1}}{P_{t-1}y_{t-1}} \right] \left\{ \left(\frac{\hat{TS}_t}{P_t} \right) - \hat{y}_t \right\} -$$

$$- \left[\frac{dt_{t-1}}{y_{t-1}} \right] \{ \alpha_2 \frac{1}{dt_{t-1}} (d\pi_t) + \alpha_3 \frac{RER_{t-1}}{dt_{t-1}} \hat{RER}_t$$

$$+ \alpha_4 \frac{1}{dt_{t-1}} (d\ DTR70_t) + \alpha_5 \frac{1}{dt_{t-1}} (d\ CW_t) +$$

$$+ \alpha_6 \frac{1}{dt_{t-1}} (d\ DTR88_t) + (\alpha_1 \frac{y_{t-1}}{dt} - 1) \hat{y}_t \} -$$

$$- \left[\frac{it_{t-1}}{y_{t-1}} \right] \{ \beta_2 \frac{RER_{t-1}}{it_{t-1}} \hat{RER}_t + \beta_3 \frac{1}{it_{t-1}} (d\ ITR70_t) +$$

$$+ \beta_4 \frac{1}{it_{t-1}} (d\ ITR81)_t + (\beta_1 \frac{y_{t-1}}{it_{t-1}} - 1) \hat{y}_t \} -$$

$$- \left[\frac{cd_{t-1}}{y_{t-1}} \right] \{ \gamma_1 \frac{imp_{t-1}}{cd_{t-1}} \hat{imp}_t + \gamma_2 \frac{1}{cd_{t-1}} (d\ CDR82_t) +$$

$$+ \gamma_3 \frac{1}{cd_{t-1}} (d\ CDR83_t) + \gamma_4 \frac{1}{cd_{t-1}} (d\ CDR88_t) - \hat{y}_t \} +$$

$$+ \left[\frac{PD_{t-1}}{P_{t-1} y_{t-1}} \right] \{ (\frac{\hat{PD}_t}{P_t}) - \hat{y}_t \} +$$

$$+ \left[(\frac{E_{t-1} P^*_{t-1}}{P_{t-1}}) i^*_{t-1} (\frac{D^*_{t-2}}{P^*_{t-1}}) \frac{1}{y_{t-1}} \right] \{ (\frac{\hat{D}^*_{t-1}}{P^*_t}) +$$

$$+ \frac{1}{i^*_{t-1}} di^*_t + \hat{RER}_t - \hat{y}_t \} +$$

$$+ \left[\frac{i_{t-1} D_{t-2}}{y_{t-1} P_{t-1}} \right] \{ (\frac{\hat{D}_{t-1}}{P_t}) + \frac{1}{i_{t-1}} (dr_t + d\pi_t) - \hat{y}_t \} +$$

$$+ \left[\frac{I_{t-1}}{P_{t-1} y_{t-1}} \right] \{ (\frac{\hat{I}_t}{P_t}) - \hat{y}_t \} + RES'_t$$

where RES' is the new residual due to the exclusion of other explanatory variables (RES), the omission of cross-derivative terms, and the regression errors of the tax revenue functions.

Rearrange equation (5) to obtain the deficit change decomposition as a function of macroeconomic changes ($\hat{y}$, $\hat{imp}$, dr, $d\pi$, $\hat{RER}$, and di^*), changes in debt stocks ($D^*_{t-1}\hat{/}P_t$ and $D_{t-1}\hat{/}P_t$) and policy variable changes ($WB_t\hat{/}P_t$, $GS_t\hat{/}P_t$, $TS_t\hat{/}P_t$, d $DTR70_t$, d $DTR88_t$, d $ITR70_t$, d $ITR81_t$, d $CDR82_t$, d $CDR83_t$, d $CDR88_t$, $PD_t\hat{/}P_t$ and $I_t\hat{/}P_t$).

$$(6) \quad \Delta (\frac{CPSD_t}{P_t y_t}) = \hat{y}_t \{ - \frac{WB_{t-1}}{P_{t-1} y_{t-1}} - \frac{GS_{t-1}}{P_{t-1} y_{t-1}} - \frac{TS_{t-1}}{P_{t-1} y_{t-1}} -$$

$$- (\frac{dt_{t-1}}{y_{t-1}}) (\alpha_1 \frac{y_{t-1}}{dt_{t-1}} - 1) - (\frac{it_{t-1}}{y_{t-1}}) (\beta_1 \frac{y_{t-1}}{it_{t-1}} - 1) -$$

$$- (\frac{cd_{t-1}}{y_{t-1}}) (-1) - \frac{PD_{t-1}}{P_{t-1} y_{t-1}} -$$

$$- (RER_{t-1}\ i^{*}_{t-1})\left(\frac{D^{*}_{t-2}}{P^{*}_{t-1}}\right)\left(\frac{1}{y_{t-1}}\right) - \left(\frac{i_{t-1}D_{t-2}}{P_{t-1}y_{t-1}}\right) - \frac{I_{t-1}}{P_{t-1}y_{t-1}} \Big\} +$$

$$+ \hat{imp}_t \left\{ \left(\frac{cd_{t-1}}{y_{t-1}} \right) \left(\gamma_1 \frac{imp_{t-1}}{cd_{t-1}} \right) \right\} +$$

$$+ dr_t \left\{ \left(\frac{i_{t-1}D_{t-2}}{P_{t-1}y_{t-1}} \right) \frac{1}{i_{t-1}} \right\} +$$

$$+ d\pi_t \left\{ - \left(\frac{dt_{t-1}}{y_{t-1}}\right) \alpha_2 \frac{1}{dt_{t-1}} + \left(\frac{i_{t-1}D_{t-2}}{P_{t-1}y_{t-1}}\right) \left(\frac{1}{I_{t-1}}\right) \right\} +$$

$$+ \hat{RER}_t \left\{ - \left(\frac{dt_{t-1}}{y_{t-1}}\right) \alpha_3 \frac{RER_{t-1}}{dt_{t-1}} - \left(\frac{it_{t-1}}{y_{t-1}}\right) \beta_2 \frac{RER_{t-1}}{it_{t-1}} + \right.$$

$$\left. + (RER_{t-1}\ i^{*}_{t-1} \left(\frac{D^{*}_{t-2}}{P^{*}_{t-1}}\right) \left(\frac{1}{y_{t-1}}\right) \right\} +$$

$$+ d\, i^{*}_t \left\{ (RER_{t-1}\ i^{*}_{t-1} \left(\frac{D^{*}_{t-2}}{P^{*}_{t-1}}\right) \left(\frac{1}{y_{t-1}}\right) \frac{1}{i^{*}_{t-1}} \right) \Big\} +$$

$$+ \left(\frac{\hat{D^{*}}_{t-1}}{P^{*}_t}\right) \left\{ (RER_{t-1}\ i^{*}_{t-1} \left(\frac{D^{*}_{t-2}}{P^{*}_t}\right) \frac{1}{y_{t-1}} \right) \Big\} +$$

$$+ \left(\frac{\hat{D}_{t-1}}{P_t}\right) \left\{ \frac{i_{t-1}\ D_{t-2}}{P_{t-1}\ y_{t-1}} \right\} +$$

$$+ \left(\frac{\hat{WB}_t}{P_t}\right) \left\{ \frac{WB_{t-1}}{P_{t-1}\, y_{t-1}} \right\} +$$

$$+ \left(\frac{\hat{GS}_t}{P_t}\right) \left\{ \frac{GS_{t-1}}{P_{t-1}\, y_{t-1}} \right\} +$$

$$+ \left(\frac{\hat{TS}_t}{P_t}\right) \left\{ \frac{TS_{t-1}}{P_{t-1}\, y_{t-1}} \right\} +$$

$$+ d\,CW_t \left\{ - \left(\frac{dt_{t-1}}{y_{t-1}}\right) \left(\alpha_5 \frac{1}{dt_{t-1}}\right) \right\} +$$

$$+ d\,DTR70_t \left\{ - \left(\frac{dt_{t-1}}{y_{t-1}}\right) \left(\alpha_4 \frac{1}{dt_{t-1}}\right) \right\} +$$

$$+ d\,DTR88_t \left\{ - \left(\frac{dt_{t-1}}{y_{t-1}}\right) \left(\alpha_6 \frac{1}{dt_{t-1}}\right) \right\} +$$

$$+ dITR70_t \left\{ - \left(\frac{it_{t-1}}{y_{t-1}}\right) \left(\beta_3 \frac{1}{it_{t-1}}\right) \right\} +$$

$$+ d\,ITR81_t \left\{ - \left(\frac{it_{t-1}}{y_{t-1}}\right) \left(\beta_4 \frac{1}{it_{t-1}}\right) \right\} +$$

$$+ d\,CDR82_t \left\{ - \left(\frac{cd_{t-1}}{y_{t-1}}\right) \left(\gamma_2 \frac{1}{cd_{t-1}}\right) \right\} +$$

$$+ d\,CDR83_t \left\{ - \left(\frac{cd_{t-1}}{y_{t-1}}\right) \left(\gamma_3 \frac{1}{cd_{t-1}}\right) \right\} +$$

$$+ d\,CDR88_t \left\{ - \left(\frac{cd_{t-1}}{y_{t-1}}\right) \left(\gamma_4 \frac{1}{cd_{t-1}} \right) \right\} +$$

$$+ \left(\frac{\hat{PD}_t}{P_t}\right) \left\{ \frac{PD_{t-1}}{P_{t-1}\, y_{t-1}} \right\} +$$

$$+ \left(\frac{\hat{I}_t}{P_t}\right) \left\{ \frac{I_{t-1}}{P_{t-1}\, y_{t-1}} \right\}$$

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