Macroeconomic Volatility, Private Investment, Growth, and Poverty in Nigeria

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CHAPTER 7

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At the time when this paper was written, the latest nationally representative survey implemented in Nigeria dated back to 1996, and the available estimations suggested that two thirds of the population was poor. This high level of poverty was due in large part to macroeconomic volatility that depressed private investment and growth. Using cross-sectional data for 87 countries, we show that real per-capita growth over the period 1980–1994 was a function of productivity growth and investment rates, both of which were negatively effected by volatility (in terms of trade, real exchange rate, and public investments). When comparing Nigeria to high growth nations, we find that most of the growth differential can be attributed to Nigeria's higher macroeconomic volatility. Simulations suggest that if Nigeria had had lower levels of volatility and better macroeconomic policies, poverty would have been much lower than observed.

According to Nigeria's Federal Office of Statistics (1999), 66 percent of Nigeria's population was poor in 1996, the latest year for which a nationally representative household survey with consumption information was implemented at the time this paper was written.[27] This paper argues that this high level of poverty was due

*The authors are with the World Bank. This work was completed for recent World Bank (2003, 2004) studies respectively on policy options for growth in Nigeria, and on poverty and vulnerability in Nigeria. The views expressed here are those of the authors and need not reflect those of the World Bank, its Executive Directors or the countries they represent.

27. A new household survey has been implemented since then (in 2004) and the data have been made available for analysis in 2006. New measures of poverty are now available for that survey. However, there are important issues of comparability between these measures and the measures of poverty obtained for 1996, so we do not make reference in this paper to the new estimates of poverty for 2004. On poverty measurement and growth in Nigeria, see also Canagarajah and Thomas (2001), Aigbokhan (2000), Ali (2000), Amaghionyeodiwe and Osinubi (2004), and Canagarajah and Thomas (2001).

to poor growth performance, itself resulting in large part from high macroeconomic volatility.

Recent empirical and theoretical research has established that macroeconomic volatility can have an adverse impact on growth. Easterly, Kremer, Pritchett, and Summers (1993) find, for example, that country characteristics alone are not sufficient to explain cross-country growth patterns, with external shocks being an important part of the story. Similarly, Bleaney and Greenaway (2002) find that real growth is negatively affected by terms of trade volatility. As shown by Bleaney and Greenaway (2000) and Serven (2002), one of the channels through which macro shocks affect growth is through a negative impact on private investment, as firm managers are hesitant to invest if future economic conditions are uncertain (on Nigeria, see Marchat and others 2001).[28]

The impact of macroeconomic volatility is especially important for relatively poor countries such as Nigeria which are exposed to terms of trade and exchange rate shocks due to their dependence on basic commodities such as oil. Nigeria ranked among the most volatile countries in the world, especially over the period 1980–94 which preceded the 1996 survey on which official poverty measures are based. Since achieving higher growth in Nigeria is an urgent priority in order to reduce poverty, an understanding of the impact of macroeconomic volatility on growth is needed.

The objective of this paper is two-fold. In the first section, we use cross-sectional data for 87 countries to analyze the impact of volatility on private investment and growth over the period 1980–1994, which corresponds to the most volatile period in terms of the behavior of Nigeria's macroeconomic indicators. Nigeria's private sector invested an average only 7 percent of GDP per annum between 1980 and 1994[29], which is well below the average of 20 percent invested by the world's fastest growing economies, leading to an average year-to-year growth in per capita GDP of only 0.2 percent, and a drop in GDP over the period as a whole due to severe losses in the early 1980s. Our empirical framework consists of two regression equations. The first seeks to explain real per-capita growth as a function of productivity growth and investment rates where the former is a function of volatility and the latter are given. The second equation seeks to explain the private investment rate as a function of openness to trade, institutional quality and volatility. Our key findings are that volatility indeed is detrimental for growth, with both direct negative effects on growth, and indirect negative effects through a dampening impact on private investment.

28. This is especially true when the financial system is weak. One explanation for the ability of a strong financial system to reduce the negative impact of volatility is provided by Acemoglu and Zilibotti (1997), who suggest that there is a virtuous circle whereby risk is reduced by wealth and portfolio diversification while the investment needed for diversification is encouraged by falling risk and rising wealth. In a related paper, Denizer and others (2002) find empirical support for the positive effect that financial systems have in reducing macroeconomic volatility. It is important to note here that Nigerian firm managers complain about inadequate access to finance more often than any other problem except uncertainty and poor infrastructure (Marchat and others 2001). Lack of credit forces enterprises to rely on internally generated funds both for working capital and for investment. This hampers firms' ability to manage their working capital, making it difficult for them to increase sales and operate at full capacity. The shortage of finance also limits investments to improve technology, to lower costs and to expand output. The high cost and limited availability of credit is thus a major factor that raises the cost of doing business and lowers competitiveness in Nigeria.

29. The Federal Office of Statistics does not divide investment into government and private contributions. This estimate is from a World Bank database where private investment equals total investment less government investment.

Next, in the second section, we use the results from the first section to measure what poverty might have been in 1996—the latest year for which a nationally representative survey with consumption data is available in Nigeria—if the country had not suffered from high macroeconomic volatility. For this, four scenarios are considered, with each scenario resulting in progressively higher levels of private investment and growth. Apart from providing an indication of what counterfactual poverty measures might have been observed in 1996 under these alternative macroeconomic scenario, we also look at the magnitude of progress that the country could achieve by 2015 in terms of poverty reduction if it were able to implement policies that would lead to such macroeconomic outcomes.

Assessing the Cost of Macroeconomic Volatility

Macroeconomic Volatility and Growth

To model the determinants of growth, including the impact of macroeconomic volatility, we start with the basic Mankiw-Romer-Weil (hereafter MRW, 1992) model. Growth in GDP per worker depends on the savings rates s_k and s_h for physical and human capital, as well as on labor force growth n and capital decay δ, and productivity growth g. In MRW, s_k is proxied by the period average investment-to-GDP ratio, I/Y. Here, to see the relative impact of both public (I_g) versus private (I_p) investment, the variable s_k will be divided into private and government sector investment ratios. Because public investment may have a lower impact in countries with the least stable public investment rates, we also include a variable that interacts the logged government investment rate with the standard deviation of the government investment rate. Next, while in MRW s_h is proxied by the product of the secondary enrollment rate times the population of school aged children, we follow Benhabib and Spiegel (1994) who show that population multiplied by average educational attainment in years of schooling may be a better measure for s_h (again, we use period averages for each country). As in MRW, we assume an exogenous and constant rate of decay δ for both physical and human capital, and the labor force is proxied by population. Denoting the error term by μ, and accounting for baseline per capita GDP, we have:

$$\Delta \ln\left(\frac{Y}{L}\right) = \beta' Z_t + \alpha_1 \ln\left(\frac{IP}{Y}\right) + \alpha_2 \ln\left(\frac{IG}{Y}\right) + \alpha_3 \ln\left(\frac{IG}{Y}\right)\sigma\left(\frac{IG}{Y}\right) + \alpha_4 \ln s_h - \alpha_5 \ln(n+\delta) - \alpha_6 \ln\left(\frac{Y_0}{L_0}\right) + \mu, \text{ with } Z' = \left(\sigma(TOT), OECD\_Growth, (X+M)/Y, Governance\right) \quad (1)$$

In (1), a key modification versus MRW's model is that we will let productivity growth vary across countries through a vector of variables **Z.** This vector includes the standard deviation of the terms of trade, following Bleaney and Greenaway (2002) who find real growth is negatively affected by TOT instability. The average growth rate of each nations' OECD trade partners is also included following Easterly (2001) who finds that OECD recessions contributed to slower growth in the rest of the worlds' economies. Likewise, openness to trade (as measured by share of the sum of exports and imports in GDP), is included following Edwards (1998) and others who found openness contributes to growth.[30] Finally, we include

30. This remains the subject of debate. Rodriguez and Rodrik (1999), for example, agree that there is no credible evidence that trade restrictions contribute to growth, but disagree that trade openness unambiguously contributes to growth. They argue the contribution from openness is contingent upon other variables.

a measure of good governance and respect for property rights following Hall and Jones (1999) who find this is an important determinant of productivity. Similarly, Kaufmann, Kraay, and Zoido-Lobaton (1999) show that countries scoring higher on indices of rule of law, graft, voice and accountability tend to have lower infant mortality and higher literacy rates, as well as higher per capita incomes.[31]

The regression is estimated using a cross-country sample of 87 countries for the period 1980–94. Table 7.1 shows the results. Three variables appear to be insignificant at the 10 percent confidence level: the stock of human capital, the trade share and the quality of governance. Further testing of the results suggests only the latter two can be eliminated. The modified results are shown in column B. The regression results required the addition of three dummy variables for Botswana, Ghana and Uganda in order to make the error term (residual) normally distributed. The conclusion that none of the remaining variables can be rejected is not altered when the dummies are removed. This regression passes the RESET test for mis-specification but does display some heteroskedasticity corrected by using White's heteroskedastic-consistent estimators.

Note that if volatility in public investment is driven by TOT volatility, collinearity between the interactive public investment term and TOT volatility could weaken the statistical significance of, and/or change the sign of, the coefficient for TOT volatility. The results in Table 7.1 suggest, however, that both types of volatility—in TOTs and in public investment—have a negative impact on growth. In column C, human capital is eliminated since it is not statistically significant (this does not imply that there is no benefit from schooling: the public investment term continues to capture the beneficial impact of investments in schooling and other services).

Two more tests were made on the results in column C. The first uses the Hausmann test for contemporaneous correlation between the private sector investment rate and the error term. This could occur either due to omitted variables or endogeneity. The instruments used for this test come from the investment equation described below where the measurement of volatility is based on the real exchange rate.[32] The results failed to reject the null hypothesis of no contemporaneous correlation. The second test uses Bayesian Averaging of Classical Estimates as documented in Dopplehofer et al. (2000) to reveal weaknesses in the choice of variables when there are many regressors with collinearity, so that the sign and significance of one or more variables may not be stable when other variables are added to, or subtracted from, the regression. Column D of Table 7.1 reports that most of the variables are robust to the inclusion or exclusion of the remaining variables in the equation. The exceptions, when significance is conditional upon other variables, are the stock of human capital, the trade share and the measure of governance.

31. There are debatable assumptions in this model. In particular, one might question whether all countries are in fact converging to their steady-states as is assumed in the MRW formulation. The main utility of the augmented Solow model is its widespread acceptance and good results in terms of fit. One can also debate the choices of variables used. The final and authoritative word on what drives growth, and what does not, has yet to be spoken (see Soludo and Kim [2002] for a provocative survey of the current state of play in growth theory). Growth researchers are particularly vexed by the way many different variables tend to cluster together. For example, the wealthiest nations tend to have more open economies, low tariffs, low inflation, strong adherence to the rule of law and, often, practice democracy. This can lead to the conclusion that 'everything counts' with little guidance on what a nation's priorities should be.

32. The results do not change when the measure of volatility is based on the TOT.

Table 7.1. Determinants of Growth in Real GDP Per Capita, 1980–94, OLS

	A[a]	B[a]	C[a]	D[g]
Constant				
Coefficient	0.45	–0.68	3.38	
Probability	0.92	0.86	0.39	
Initial GDP per Capita[b]				
Coefficient	–0.92	–0.46	–0.42	
Probability	0.01	0.10	0.10	Robust
Private Investment Rate[b]				
Coefficient	1.59	1.91	2.22	
Probability	0.00	0.00	0.00	Robust
Gov't Investment Rate[b]				
Coefficient	0.78	0.92	1.37	
Probability	0.06	0.01	0.00	Robust
Gov't Investment Rate·SD Gov't Investment Rate				
Coefficient			–2.12	
Probability			0.00	Robust
Stock of Human Capital[b]				
Coefficient	0.25	0.27		
Probability	0.19	0.03		Conditional
Labor Growth & Depreciation[b]				
Coefficient	–3.96	–5.06	–4.81	
Probability	0.01	0.00	0.00	Robust
OECD Partner Growth				
Coefficient	2.58	2.55	2.09	
Probability	0.00	0.00	0.00	Robust
Trade Share (% of GDP)				
Coefficient	0.00			
Probability	0.87			Conditional
Governance & Property Rights				
Coefficient	2.68			
Probability	0.19			Conditional
Standard Deviation in TOT Growth Squared				
Coefficient	–0.08	–0.09	–0.07	
Probability	0.00	0.00	0.00	Robust
Observations	87	87	87	
Adjusted R-squared	0.55	0.64	0.66	
Hausmann (Probability)[c]	0.45	0.30	0.26	
Normal residual rejected ?[d]	No	No	No	
White (Probability)[e]	0.44	0.26	0.00	
RESET (Probability)[f]	0.04	0.17	0.14	

a. Calculated with White's heteroskedastic-consistent estimators.
b. In natural logs.
c. Probability refers to the significance of the fitted variable version of Ip/Y.
d. Requires Jarque-Bera statistic smaller than critical value calculated by Deb and Sefton (1996).
e. No cross terms.
f. Probability refers to the significance of one fitted variable (squared).
g. Bayesian Averaging of Classical Estimates. Based on the prior expectation that 10 out of 14 variables should be significant.
Source: Authors' estimations.

Macroeconomic Volatility and Private Investment

Apart from its direct effect on growth, macroeconomic volatility may also have indirect effects through some of the variables that affect growth. In this section, we also analyze the extent to which macro volatility dampens private investment, itself a key determinants of growth as demonstrated in the previous section. Following Bleaney and Greenaway (2000), we would expect that RER volatility/uncertainty depresses investment. Serven (2002) also found a negative impact of RER, especially at high levels, possibly implying a thresh-hold effect, with the impact depending upon the degree of openness to trade and the strength of the financial system. Private investment is reduced by RER uncertainty in nations with low trade openness and/or weak financial systems. Conversely, RER uncertainty appears to encourage private investment in nations with a high degree of openness and strong financial systems. Finally, we would also expect that good governance and respect for property rights will encourage private investment.

In our specification, the logged private investment rate is a function of the Hall and Jones (1999) measure of the quality of governance and respect for property rights, the degree of openness proxied by the sum of exports and imports as a share of GDP, the strength of the financial system proxied by domestic credit to the private sector as a share of GDP, real exchange rate uncertainty proxied either by RER or TOT volatility (that is, the standard deviation in the growth rate of the RER or TOT), the interaction between RER or TOT volatility and trade and, lastly, the interaction between RER or TOT volatility and our measure of financial system strength. We thus have:

$$\ln\left(\frac{IP}{Y}\right) = \eta_0 + \eta_1 Gov + \eta_2\left(\frac{X+M}{Y}\right) + \eta_3\frac{DCp}{Y} - \eta_4\sigma(TOT) + \eta_5\sigma(TOT)\frac{X+M}{Y} + \eta_6\sigma(TOT)\frac{DCp}{Y} + \varepsilon \quad (2)$$

Table 7.2 provide the regression results. The regression requires dummies for Hungary and Madagascar to make the residual normally distributed, but it passes the heteroskedasticity and misspecification tests. Private investment is higher with good governance and trade openness, and lower under RER volatility. The negative impact of volatility is, however, reduced for nations with strong financial systems. In fact, the impact of low to moderate RER volatility is positive for nations with sufficiently strong financial systems. When volatility in TOT is substituted for volatility in RER as the proxy for uncertainty, the results are similar, except that the proxy for openness no longer remains significant. The main conclusion remains intact: the impact of uncertainty (proxied by volatility) is negative for nations with weak financial systems.

Summary Results: Comparing Nigeria to High Growth Economies

In Table 7.3, the regression results have been transformed to provide a simple account of the contribution of various variables to growth. Nigeria's performance is recorded in column A while the average outcomes for a group of 15 high growth countries is in column B. Column C shows the differential between the two. Row 1 of the top part of the table give the observed growth rates. Rows 2 through 11 show contributions to growth from var-

Table 7.2. Determinants of the Logarithm of Private Sector Investment as a Share of GDP, 1980–94, OLS

	RER Volatility		TOT Volatility	
	A	B	C	D[d]
Constant				
Coefficient	1.91	1.88	1.96	2.03
Probability	0.00	0.00	0.00	0.00
Governance & Property Rights				
Coefficient	0.74	0.98	0.73	0.97
Probability	0.00	0.00	0.00	0.00
(X+M)/Y				
Coefficient	0.29	0.20	0.22	
Probability	0.02	0.06	0.14	
DCp/Y				
Coefficient	0.21		0.24	
Probability	0.27		0.26	
Volatility				
Coefficient	–4.46	–6.95	–5.14	–8.87
Probability	0.05	0.00	0.19	0.01
Volatility · (X+M)/Y				
Coefficient	–5.37		–7.38	
Probability	0.24		0.44	
Volatility · DCp/Y				
Coefficient	34.56	35.50	37.86	36.07
Probability	0.00	0.00	0.01	0.01
Observations	85	85	85	85
Adjusted R-squared	0.59	0.59	0.54	0.53
Normal residual rejected ?[a]	No	No	No	No
White (Probability)[b]	0.63	0.53	0.50	0.04
RESET (Probability)[c]	0.10	0.61	0.52	0.30

a. Requires Jarque-Bera statistic smaller than critical value calculated by Deb and Sefton (1996).
b. No cross terms.
c. Probability refers to the significance of one fitted variable (squared).
d. Calculated with White's heteroskedastic-consistent estimators.
Source: Authors' estimations.

ious variables. There are three major sources of discrepancies between the Nigerian growth experience and the outcomes in the fastest growing nations. First, the private sectors in the fast growing nations tend to contribute roughly 2.1 percent per-annum more in growth than the Nigerian private sector (row 4). Second, the positive effect of demand induced by OECD trading partner growth is higher for the fast growing nations than for Nigeria, with the difference at 0.8 percent of growth per year (row 8). Third, volatility in the terms of trade (row 9) and instability in the government investment rate (row 6) both adversely affect growth, with a combined growth loss to Nigeria of 2.8 percent per annum.

The simultaneous, negative impact of TOT volatility and instability in the government investment rate raises a question. If a major source of macroeconomic volatility in most nations is the TOT (another being capital flows, especially in Latin American countries), then less TOT volatility should be associated with less government investment volatility.

Table 7.3. Explaining the Growth and Investment Differentials for Nigeria, 1980–94

			15 High Growth Countries	
		Nigeria	Outcome	Differential
		A	B	C
1	Real Growth per Capita	0.24	4.07	3.83
2	Initial Income per Capita, 1979	–3.08	–3.30	–0.22
3	Investment Rates	6.39	8.42	2.03
4	Private	4.39	6.48	2.09
5	Government	3.25	2.90	–0.35
6	Government · (Volatility of Gov't Inv. Rate)	–1.24	–0.96	0.28
7	Population Growth & Capital Decay	–9.79	–9.54	0.25
8	Real Growth, OECD Partners	3.35	4.11	0.76
9	Terms of Trade Volatility	–1.57	–0.43	1.14
10	Errors and Omissions	1.56	1.43	–0.13
11	Constant	3.38	3.38	0.00
			15 High Growth Countries	
		Nigeria	Outcome	Differential
		A	B	C
1	Private Sector Investment Rate	4.39	6.48	2.09
2	Governance and Property Rights	0.93	1.41	0.48
3	Openness to Trade	0.25	0.41	0.16
4	RER Volatility	–1.99	–0.09	1.90
5	RER Volatility · (Dom. Credit as % GDP)	1.39	0.22	–1.17
6	Error	–0.37	0.36	0.73
7	Constant	4.17	4.17	0.00

a. All investment shares have been logged and converted to GDP growth contributions.
Source: Authors' estimations.

The data appear to support this. In our sample of 87 countries, most of the high TOT volatility countries displayed a lot of instability in the rate of government investment while most low TOT countries were also stable government investors. Ideally then, Governments would aim to reduce TOT volatility, thus making it easier to reduce instability in the government investment rate. However, it is quite possible for governments to make expenditure decisions independently of TOT volatility—and the data show that 23 out 87 countries did exactly that. Six of the high TOT volatility countries managed to reduce the instability in their rates of government investment while 17 low TOT volatility countries displayed high levels of volatility in their rates of government investment. This suggests that fiscal policy choices count, even in the face of strong TOT volatility.

The bottom part of Table 7.3 provides the interpretation of the results for the determinants of private investment. The first row provides the contribution to growth from private investment. Rows 2 through 7 show impacts on investment from various variables. Row 2 indicates that Nigeria loses almost half of a percent of growth relative to the performance of the fastest growing nations due to the poor quality of governance and respect for property rights. The country loses another 0.2 percent per annum in growth relative to the

fastest growing nations due to the latter's greater openness to trade. Rows 4 and 5 indicate that RER volatility also has a negative impact on private investment led growth, unless the financial sector is sufficiently strong. Unfortunately, net credit flows to the private sector for the period 1980–94 were worth an average of 2.6 percent of current price GDP in Nigeria, versus 6.6 percent of GDP in high growth countries. This means that Nigeria's financial sector was weak to overcome the impact of deep RER volatility. Taken together, rows 4 and 5 show that Nigeria loses another 0.6 percent per annum in growth through the private investment channel. Similar results are obtained when TOT volatility is used instead of ROR volatility to capture uncertainty.

From Higher Private Investment and Growth to Poverty Reduction

Methodology

A reduction in macroeconomic volatility in Nigeria would help to achieve higher rates of growth, and thereby lower rates of poverty. The objective of this section is to quantify this gain, using a number of macroeconomic scenarios and assumptions to relate the scenarios to poverty reduction.

To construct the macroeconomic scenarios, we assume that the parameter estimates obtained from the regressions in the previous section apply to the specific case of Nigeria. This means that we can use those parameters to simulate various economic scenarios for the country. Since we don't have enough (time series) data on Nigeria to test this hypothesis, it must be acknowledged that our scenarios are indicative only, that is, they are not meant to be predictions. Each scenario is based on targets for economic, social and institutional outcomes. These targets are all plausible in the sense that many other nations have already achieved them. The precise policies needed to achieve these outcomes in Nigeria, however, are not articulated here, although several key issues are identified. Again, this exercise is meant only to provide some indications as to how poverty reduction could be accelerated through higher per-capita growth under lower levels of macroeconomic volatility.

Next, in order to make the link between growth and poverty reduction, additional assumptions are needed. A first assumption is that growth in per capita GDP in the National Accounts is perfectly correlated with growth in per capita consumption as would be measured in household surveys. A second assumption is that growth in real terms, and the changes in policy that would enable the country to reach a higher level of growth, do not change the estimation of the poverty lines used for measuring poverty in Nigeria's 1996 survey. This means, for example, that relative prices and consumption patterns are not affected by policy changes implemented in order to reduce macroeconomic volatility. A third assumption is that inequality in per consumption also does not change with growth and under alternative macro-scenarios, so that growth is enough to project poverty measures. Under all these assumptions, assessing the impact of alternative growth scenarios on poverty is very simple since the procedure simply consists in multiplying the per capita consumption in the 1996 household survey by various factors reflecting different growth rates, and re-computing the poverty measures with the new vector of household consumption.

We use the first three poverty measures of the FGT class (Foster and others 1984), namely the head count (share of the population in poverty), the poverty gap (share of the population in poverty times the income gap for the poor which depends on the average distance separating the poor from the poverty line), and the squared poverty gap (which takes into

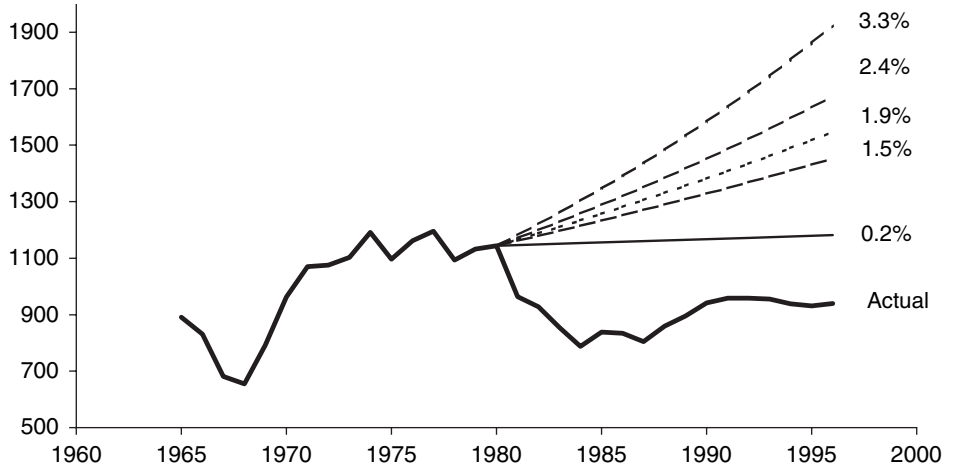
account the square of the distance separating the poor from the poverty line). If we denote by z the poverty line, n the number of households (population weighted), q the number of poor households, and c_k the per capita consumption of household k, the first three FGT poverty measures are defined for α equal to zero (head count), one (poverty gap), and two (squared poverty gap) in the following expression:

$$P_\alpha = \frac{1}{n}\sum_{k=1}^{q}\left[\frac{z - c_k}{z}\right]^\alpha. \tag{3}$$

Four different scenarios are used to assess the impact that a reduction in volatility and other reforms could have had on growth and thereby poverty. For each scenario, we provide counterfactual measures for the value that the FGT poverty measures could have taken in 1996 if macroeconomic volatility had been lower and growth higher during the preceding sixteen years.

In addition to these four scenarios, we also provide baseline poverty estimates, which are based on the average year-to-year per capita GDP growth observed over the period 1980–1994. The rationale for this baseline case can be seen in Figure 7.1, which shows the counterfactual growth paths from 1980 onwards for the various scenarios and the baseline case. Apart from the actual trend in per capita GDP, there are five lines in the Figure starting from 1980 onwards. The baseline case corresponds to an average growth rate of 0.2 percent per year, which is the historical average over the period 1980–1994. However, while the average growth rate was indeed positive over that period, GDP per capita decreased substantially, because Nigeria's economy collapsed in the early 1980s (a few years of sharp decrease in GDP per capita followed by a slow recovery may indeed lead to a positive year-to-year average annual growth rate despite an overall decrease in GDP per capita). When we assess the impact of reduced volatility and better macroeconomic policies on poverty using scenarios one to four, it is best to compare the poverty measures obtained under these scenarios to the baseline case rather than to the actual measures of poverty in 1996, in order not to

Figure 7.1. Per Capita GDP Under Alternative Macroeconomic Scenarios



Source: Authors' estimates using cross-country regression techniques.

overestimate the reduction in poverty that can be achieved through lower volatility. If we were comparing the counterfactual macroeconomic scenarios from 1980 onwards with the actual GDP trend and related poverty in 1996, we would get a very large difference in GDP and poverty versus 1996, which would overstate the findings from the regression analysis.

Scenarios and Results

The baseline case is obtained by assuming a year-to-year historical average growth rate of 0.2 percent per year from 1980 until 1996 (although our historical average is based on data from 1980 to 1994, we continue the simulations up to 1996 which corresponds to the household survey data year). This results in a baseline poverty head count of 54.9 percent, versus the 65.6 percent actually observed in the survey. The difference in GDP and poverty levels between our baseline case and the actual 1996 values is due to the especially sharp drop in GDP per capita in the first half of the 1980s, which can be attributed to a Dutch disease effect[33]—an issue that was in part related to macroeconomic volatility, but was not captured as such in our regression analysis, so that is better to not include this effect in our estimates of the GDP and poverty gains that could have been achieved under lower volatility and better macroeconomic management in Nigeria.

The first scenario corresponds to the implementation of ambitious macroeconomic reforms. This includes an expenditure smoothing fiscal rule leading to substantial reductions in the volatility of public expenditures and the real exchange rate. We assume that average RER volatility is reduced to one third the level observed in 1980–94. Such an outcome is possible though challenging: only a handful of countries with high TOT volatility were able to achieve this over the period 1980–94. We also assume also that the volatility in the public investment rate is reduced to 0.16 (the same as in fast growing nations) from the Nigerian historical average of 0.25. In addition, we assume that the stock of net domestic credit to the private sector grows to 20 percent of GDP (which is still far below the average of 44 percent of GDP achieved by the fast growing nations.) In this first scenario, private investment reaches 9.3 percent of GDP and real growth per-capita increases to 1.5 percent per annum. If this growth rate is applied from 1980 onwards up to 1996, the poverty head count obtained for 1996 is 45.5 percent, instead of the baseline case of 54.9 percent.

The second scenario maintains the policy targets set in the first scenario and adds two more. It is assumed that openness to trade is increased by 10 percent of GDP to a period average of 65 percent of GDP. At the same time, it is assumed that TOT volatility is reduced by 2015 to almost the same level already achieved by the fast growing nations. In this scenario, private sector investment reaches 9.5 percent of GDP and real per capita growth increases to 1.9 percent per year. Applying this growth from 1980 to 1996 yields a poverty head count in 1996 of 42.4 percent, equivalent to a decrease in head count of 12.5 points versus the baseline case of 54.9 percent.

33. The Dutch disease refers to the experience of the Netherlands during the 1970s, when natural gas exports led to an appreciation of the Dutch currency, thereby making other exports less competitive and leading to unemployment. The Nigerian story of the early 1980s is similar: as both the volume of oil exports and oil prices increased in the 1970s, Nigeria's real exchange rate appreciated by 83 percent over the decade. High inflation fueled by heavy government spending induced the real exchange rate to appreciate further between 1980 and 1984 even though oil prices were gradually falling. Urban consumers initially benefited from cheaper imports, but agricultural production and exports fell. This led to a loss in GDP and higher dependency on oil. This ultimately led to a devaluation and fiscal austerity measures.

In a third macroeconomic scenario, in addition to the targets set in scenarios 1 and 2, it is also assumed that the quality of governance and the defense of property rights are improved. The effect of this policy is another substantive boost in the rate of private investment to 11.9 percent of GDP. As a consequence, real per capita growth increases to 2.4 percent per annum. This reduces the poverty head count in 1996 to 39.4 percent when the scenario is applied from 1980 onwards.

In a fourth and last scenario, it is assumed that aggressive measures are taken to boost real per-capita growth to 3.3 percent per annum. First, in addition to the targets set in the scenarios above, it is assumed that Nigeria moves closer to the financial outcome of the fast growing nations, with the result that the stock of domestic credit to the private sector is increased to 30 percent of GDP. Second, TOT volatility in this scenario is reduced to half the 1980–94 average. As a result of these measures, the private sector investment rate is increased to an average of 12.7 percent of GDP and the real per capita GDP growth rate rises to 3.3 percent. The counterfactual head count of poverty is 33.2 percent in 1996 when the scenario is applied from 1980 onwards, leading to a reduction of poverty of almost 40 percent versus the baseline case of 54.9 percent of the population in poverty.

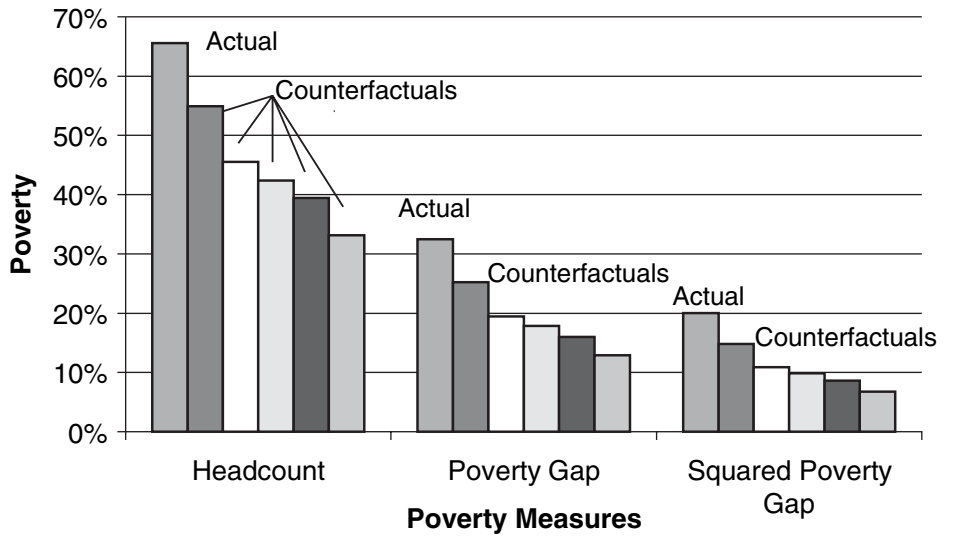
The results are summarized in Table 7.4 and Figure 7.2, where the first vertical bar provides the actual poverty measures observed in Nigeria, and subsequent vertical bar refer to

Table 7.4. Per Capita GDP Growth and Poverty Scenarios, 1980–96

	Outcomes					Policy Targets					
	Growth Rate	Private Investment Rate	Poverty Head Count	Poverty Gap	Squared Poverty Gap	RER Volatility	Gov't Inv. Rate Volatility[b]	Private Sector Domestic Credit (% GDP)	Trade Openness (% GDP)	TOT Growth Volatility	Governance
Benchmarks, 1980–94[a]											
Nigeria (baseline case)	0.2	7.2	54.9	25.3	14.8	0.36	0.25	14	55	0.23	0.43
High growth economies[b]	4.2	20.4	—	—	—	0.07	0.16	44	90	0.06	0.65
Macroeconomic scenarios											
Scenario 1	1.5	9.3	45.5	19.5	10.9	0.12	0.16	17	—	—	—
Scenario 2	1.9	9.5	42.4	17.9	9.9	0.12	0.16	17	65	0.17	—
Scenario 3	2.4	11.9	39.4	16.0	8.7	0.12	0.16	17	65	0.17	0.65
Scenario 4	3.3	12.7	33.2	12.9	6.8	0.12	0.16	30	65	0.12	0.65

a. Benchmarks for fiscal data are based on averages for 1993–2001. All others are based on averages for 1980–94.
b. Average for volatility of public investment rate excludes outlier observations for Lesotho and Singapore.
Source: Authors' estimations.

Figure 7.2. Poverty Under Alternative Macroeconomic Scenarios



Source: Authors' estimates using Nigeria's 1996 household survey.

the baseline case and the four scenarios. The impact of the alternative scenarios on poverty for the poverty gap and squared poverty gap measures is very similar to that observed for the headcount, as expected.

Conclusion

Policymakers seeking growth have faced strong challenges over the course of Nigerian history. Among these have been deep losses from a civil war, drought, disease and pests, and extremely volatile terms of trade due to oil price shocks. The war appears to have caused the deepest losses, both in terms of lives lost and in terms of economic losses. Yet, the economy rebounded when the war ended. However, oil volatility and real exchange rate uncertainty have continued to penalize growth and private investment, and thereby to lead to high levels of poverty.

While our results indicate a large negative impact of volatility on private investment and growth over the period 1980–94, and thereby a large negative impact on poverty, which was captured in Nigeria's 1996 household survey, the subsequent period has been one of substantive changes. Some of the key events include: the transition from military to civilian rule in 1999, the change from a fixed official exchange rate for government use to a more market determined exchange rate system in 1999, and the end of a drought, but also sharp fluctuations in the price of oil and escalating government expenditures especially at the local government level. A new household survey being implemented in 2004 in Nigeria should tell us whether these changes have been important and positive enough led to a reduction in poverty.

Finally, although we have not discussed this here, it is worth pointing out that volatility is detrimental for what has been referred to as the risk-adjusted standard of living of the poor, which is simply a measure of welfare that adjusts nominal income or consumption for their variability, on the basis of assumptions regarding the degree of risk aversion of households (see, for example, Makdissi and Wodon 2003). In simpler terms, most households would prefer to avoid large fluctuations in income or consumption over time. The consequences for the poor of income (or consumption) volatility over time can be especially negative as they may be forced to make decisions to survive that can be detrimental in the long run, such as selling assets or curtailing food intake. Said differently, standards of living would be higher, and poverty lower in a country with a similar mean level of income or consumption as Nigeria, but with lower volatility. Volatility, apart from having a negative impact on investment and growth, thus has a direct negative impact on households through a higher variation in their income or consumption from year to year. If we had taken into account these effects in the analysis, the negative impact of volatility on poverty would have been even stronger, because apart from the impact of volatility on growth and thereby mean income and consumption levels, we would have had to also factor in the direct negative impact of volatility in itself on households.

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