Journal of Economics
Volume 24, Number 2, 1998, Pages 1-15

An Econometric Analysis of the Nigerian Consumer Price Index
JEL Category O11, Developing Country Macroeconomic Analysis

Thomas M. Fullerton, Jr.
Department of Economics and Finance &
Texas Center for Border Economic Development
University of Texas at El Paso
El Paso, TX 79968-5043
Telephone: 915-747-7747
Facsimile: 915-747-6282
Email: tomf@utep.edu

Sylvanus I. Ikhide
Department of Economics
Obafemi Awolowo University
Ile-Ife, Nigeria

Acknowledgments: Partial funding support for this research was provided by the Public Policy Research Center at the University of Texas at El Paso, the University Research Institute at the University of Texas at El Paso, the Center for the Study of Western Hemispheric Trade at the University of Texas at El Paso, and by El Paso Electric Company. Econometric research assistance was provided by Mika Laaksonen and Juan Alberto Luevano.

An Econometric Analysis of the Nigerian Consumer Price Index

Introduction

Similar to other developing regions, many African economies have faced generally high rates of inflation in recent years (for discussions, see Gerdes, 1989, and Ikhide, 1993a). While prices have trended upward, it is worth noting that price instability in most African economies such as Nigeria has never reached the hyperinflationary conditions experienced in Latin American countries such as Argentina, Brazil, Bolivia, Nicaragua, and Peru. African inflation, nevertheless, has been sufficiently problematic to warrant additional research. This paper attempts to provide insights with respect to one facet of price movements in this region of the world, namely short-run price dynamics. With more than 110 million inhabitants, Nigeria is arguably one the most important economies in Africa. It is selected, therefore, to provide a case study of developing country macroeconometric research for the region as a whole.

Concern over inflation is a legitimate policy concern. Occasionally, governments attempt to reduce price pressures as a means for improving social welfare by enabling the domestic economy to operate more efficiently. This argument applies equally well in advanced economies such as the United States (Motley, 1993), as well as in developing nations (Zind, 1993). In the case of developing economies, anti-inflationary policy efforts may also be in response to loan disbursement conditions established by multilateral agencies. What generally distinguishes the two groups of countries, however, is the magnitude of the disinflationary goals set by the monetary authorities. As a result, short-run price stabilization goals are frequently of critical importance in government policy programs in developing economies (Fullerton, 1993c, 1995).

Almost invariably, two principal adjustment tools, slower liquidity growth and a reduced rate of currency depreciation, are utilized to induce disinflation in developing countries. This paper is built around this basic proposition in order to shed some light on inflationary dynamics in Nigeria. A modeling framework is proposed, tested, and used to develop policy simulation exercises for quarterly Nigerian data. Subsequent sections of the study present a review of the literature, theoretical model, and empirical results. Suggestions for future research are summarized in the conclusion.

Previous Research

The seminal research on inflationary dynamics in developing countries was conducted on Chilean data by Harberger (1963). That early paper interestingly points out that analyzing nominal data in level form could result in spurious correlations in equations estimated for highly inflationary economies. To circumvent this problem, percentage rates of change are utilized in a linear regression framework based on the quantity theory of money. What became known as the "Harberger" framework incorporates real income, current and lagged values of the money supply, and the opportunity cost of holding cash balances.

The success of this initial effort conducted on Chilean data spurred a series of replicated studies for other developing countries. However, following numerous applied econometric studies utilizing this approach, it became apparent that its reliance on domestic variables alone often rendered only partial characterizations of developing country inflationary processes (for example, see Gerdes, 1989). Bomberger and Makinen (1979) provide a thorough examination of the Harberger model using quarterly data for Korea, Taiwan, and Vietnam. Although parameter heterogeneity as a function of sample period selection is not encountered, strong evidence is reported indicating that several theoretical implications of the basic Harberger framework are frequently violated.

To overcome these shortcomings, Hanson (1985) extends the Harberger framework in a systematic fashion to incorporate an important missing component, import costs. An implicit cost function is utilized to derive an aggregate supply curve which includes local prices of imported inputs. When the underlying production function is homogeneous of degree one, inflation becomes a weighted sum of money supply changes and import prices. As pointed out below, this innovation effectively reduces data requirements in a useful manner. The model also implies that the elasticity of inflation with respect to money growth is less than one. Empirical results in the Hanson article strongly support the inclusion of import prices or the rate of devaluation in models of inflation.

Subsequent research has provided additional evidence in favor of the augmented Harberger-Hanson approach wherein the effect of import prices on inflation is considered. Koch, Rosensweig, and Witt (1988) and Fullerton, Hirth, and Smith (1991) both report positive linkages between the trade-weighted exchange value of the dollar and consumer prices in the United States. These empirical studies indicate a unidirectional channel of influence from the exchange rate to domestic prices exists in the United States economy. As will be discussed below, causality direction has important implications for both model form and estimation technique.

Developing country studies have also confirmed the usefulness of an augmented modeling treatment of inflationary dynamics. Sheehey (1976) reports some of the early econometric work along these lines. Sheehey (1980) reaches additional conclusions on the basis of empirical tests that indicate that accurate assessment of austerity policy efforts will likely require explanatory variables representing cost push factors. More recently, Brajer (1992) provides evidence that the latter category of models may offer better specifications than those which rely solely on domestic economic factors. Conclusions in that article are reached on the basis of F-tests for different regressor sets. Similarly, Fullerton (1993a, b) successfully imbeds a variant of this approach in large-scale macroeconometric forecasting models for Colombia and Ecuador using annual data. Amin and Rashid (1994) also utilize a more complete framework for examining aggregate price behavior in Bangladesh.

There have been very few dynamic models estimated on the basis of either monthly or quarterly data for developing economies. Given that most business decisions in highly inflationary countries are reached within a short-range context, this is an area which needs to be addressed.

Fullerton (1993c) empirically examines Colombian anti-inflationary efforts utilizing monthly data in a time series modeling context via an autoregressive-moving average (ARMA) transfer function. The estimated model is found to generate realistic simulation scenarios for policy analysis. The results also support the hypothesis of inflation rate inelasticity with respect to monetary growth. Fullerton (1995) generates similar results using an econometric model for monthly price movements in Ecuador. The latter class of models is appealing from a theoretical perspective and is utilized to develop the Nigerian model discussed below.

Theoretical Model

Harberger's (1963) model is based on the traditional Cambridge school equation:

1. $MV = PQ$,

where M represents some measure of the money stock, V is the velocity of circulation, P is the price level, and Q is real output. Velocity is assumed to be a predictable function of other macroeconomic variables, most generally, the cost of holding cash balances.

To utilize percentage changes, the variables can be transformed by natural logarithms and first differenced. Introduction of a time subscript, and rearrangement of the terms, yields the basic Harberger equation:

2. $DP_t = DM_t - DQ_t + D(DP_{t-1})$,

where the last term results from substituting for velocity and D represents a difference or backshift lag operator. For many developing countries, the velocity term is substituted with the lagged inflation rate as shown in Equation 2. In industrial economies, interest rates are generally utilized (Fullerton and Araki, 1997). The goal is to utilize a variable that reflects the true opportunity cost of holding idle cash balances, because movements in the latter will lead to changes in the velocity of circulation. Lagged inflation rate proxies are frequently adopted in developing economy price studies because government regulations on interest rates have occasionally caused savings and loan rates to become negative in real terms. Unadjusted interest rates from these periods would not, therefore, provide accurate estimates for the cost of holding cash.

Equation 2 implies that inflation will vary positively with the money supply and inversely with respect to real output. A statistically significant intercept term will enter the estimated equation if there is a trend in the velocity of circulation. If only contemporaneous lags of M and Q enter in the equation, the parameters for both variables are hypothesized to be unitary. The latter implication is directly testable:

3. $DP_t = a_0 + a_1DM_t - a_2DQ_t + a_3D(DP_{t-1}) + u_3$,

where a_1 and a_3 are hypothesized to be positive, and the absolute values of a_1 and a_2 should both be statistically indistinguishable from one. The last argument in the expression represents a random error term.

Hanson (1985) suggests incorporating an implicit cost function dual of an aggregate production function which is homogeneous of degree one. Derived output supply functions from this framework will be homogeneous of degree zero in input and output prices. Equation 4 expresses a two-country version this relationship using logarithmic first differences:

4. $DQ_t = b_0 + b_1DP_t - b_2DPI_t + u_4$,

where PI represents imported input prices. When the relative prices of imported inputs increase, output is assumed to decline. The standard homogeneity assumptions for production and derived supply relations imply that $b_1 - b_2 = 0$.

Substitution of Equation 4 into Equation 3 eliminates the output term from the expression to be estimated. This step is potentially useful from a policy monitoring perspective because price and exchange rate data typically become available well in advance of national income and product account estimates. The resulting equation can be written as follows:

5. $(1 + a_2b_2)DP_t = a_0 - a_2b_0 + a_1DM_t + a_2b_2DPI_t + a_3D(DP_{t-1}) + u_5$.

Equation 5 can be further simplified prior to estimation. Dividing through by the left-hand side constant term and rearranging terms such that the price series remains as the dependent variable yields the following relation:

6. $DP_t = c_0 + c_1DM_t + c_2DPI_t + c_3D(DP_{t-1}) + u_6$,

which also has testable properties. The most significant change in terms of model characteristics is that the coefficient on the monetary variable, c_1, is now hypothesized to be significantly less than one. With the possible exception of the intercept, all of the regression parameters in Equation 6 are expected to be positive.

As indicated in the literature review, Equation 6 provides a useful framework for analyzing price dynamics. But because the lag structure in this model is fairly short, it may require additional modification prior to estimation. This possibility does not reflect any deficiencies in the theoretical model as such, but arises due to the fact that this paper relies upon quarterly data. As a result, if the inflationary impact of a change in the money supply is felt over the course of one calendar year, the implied lag structure for a model estimated with data published at a monthly frequency would potentially range up to 4 quarters in length. Equation 7 takes into account this empirical issue which has confronted and confounded researchers for many years (see Laidler, 1993):

7. $DP_t = c_0 + c_1DM_{t-i} + c_2DPI_{t-i} + c_3D(DP_{t-1-i}) + u_7$,

The above model provides an attractive starting point for examining inflationary trends in an economy. It is not, however, without potential problems for analyzing price movements in relatively high inflation countries. Similar to other studies, first differenced, log-transformed time series data are utilized in the equation to be estimated. If the resulting series are stationary, the equation can be estimated without risk of obtaining spurious correlations in the results. As shown in many studies of hyperinflationary economies, however, higher order differencing may be required to induce stationarity during periods in which prices increase rapidly (see Engsted, 1993).

The version of the model to be estimated appears in Equation 8 where an exchange rate series, measured in local currency units per dollar, is substituted in place of import prices. This step is taken solely to avoid the publication lag associated with GDP statistics. Although incorporation of the exchange rate index is helpful from a policy monitoring vantage point, it may introduce other problems due to the fact that import prices are affected by global supply and international demand conditions in addition to exchange rate movements. Additional testing with an implicit price deflator for imports may be useful for examining this possibility. The model to be estimated takes the following form:

8. $DP_t = g_0 + g_1DM_{t-i} + g_2DXR_{t-i} + g_3D(DP_{t-1-i}) + u_8$,

where DXR stands for logarithmic first differences of the Nigerian exchange rate.

Empirical Analysis

Sample descriptive statistics for the level data underlying all of the series utilized in the econometric equations reported below appear in Table 1. Although Equation 8 is intuitively appealing on hypothetical grounds, several issues must be considered prior to estimation. The first involves which money supply measure to utilize, M1 or M2. Broader estimates of liquidity such as M2 are sometimes difficult to obtain for developing economies (for example, see Fullerton and Kapur, 1991). The ready availability of the Nigerian M2 series presents a welcome opportunity. Inflation policy debates in industrial economies in recent years have revolved about which definition of money to use when modeling price levels (for discussion, see Hallman, Porter, and Small, 1991). Given these considerations both series are utilized in the estimation and policy simulation exercises discussed below, but it should be noted that the M2 money supply series fails to pass a normality test at the 5-percent significance level.

Another important issue to consider arises from the fact that the Nigerian economy has both an official and a parallel exchange rate. There have been periods when the two currency values have differed substantially from each other. Empirical versions of Equation 8 were estimated using both exchange rates. In general, regressions incorporating the official exchange rate exhibited superior statistical traits to those utilizing the parallel rate. Similar evidence has been uncovered for other developing where parallel and official exchange rates sometimes diverge (Fullerton, 1993a, b). Estimation and simulation results reported below, therefore, utilize the official exchange rate.

To examine the issue of stationarity, augmented Dickey-Fuller tests with trend and constant terms are utilized. The sample estimation period is first quarter1970 through fourth quarter 1993. As shown in Table 2, results indicate that all of the log-transformed, first differenced series are stationary. Because Nigeria has not undergone any hyperinflationary episodes, the fact that first differencing is sufficient to remove nonstationary trends from the variables in question is not surprising. This would likely not be the case in economies where monetary policy has been managed less responsibly.

As previously noted, variant data frequencies cause dynamic theoretical equation specifications in econometrics to almost never suggest the appropriate lag lengths to be used in estimation. As a result, this dilemma can only be addressed empirically. Lag length selection in this paper was accomplished via likelihood ratio testing. In both sets of regression results, those for M1 and those for M2, the equation specification is identical. While surprising at first glance, the latter probably reflects a high degree of correlation between the two money supply series.

Equation 9 is estimated using the M1 definition of liquidity. As noted above, the sample estimation period is first quarter 1970 through fourth quarter 1993. Results are summarized here:

$$\begin{array}{llllllll}
9.\ DP_t & = & 0.019 & + & 0.101*DM1_{t-1} & + & 0.150*DM1_{t-2} & + \\
 & & (2.920) & & (2.081) & & (3.054) & \\
 & & 0.067*DM1_{t-3} & + & 0.015*DXR_{t-1} & + & 0.045*DXR_{t-4} & + \\
 & & (1.387) & & 0.454) & & (1.336) & \\
 & & 0.114*D(DP_{t-3}) & + & 0.245*D(DP_{t-4}) & + & 0.230*MA(1) & , \\
 & & (1.339) & & (2.855) & & (2.092) &
\end{array}$$

R^2	0.261	S.E.R.	0.038	Log likelihood	171.236
DW	1.996	F-stat	3.583	Prob(F-stat)	0.001 ,

where the numbers in parentheses are computed t-statistics. Lag lengths of 8 quarters were used in the initial estimates for Equation 9, but likelihood ratio tests indicated that the inflationary transmission effects occur more rapidly than that in Nigeria. The latter result comports with the earlier results reported by Gerdes (1989) for other countries in Africa. Serial correlation was present in the residuals for the initial Nigerian equation. To avoid potentially spurious estimation results (see Hamilton, 1994), a nonlinear ARMAX procedure is utilized. An MA(1) specification is used to characterize the data generating process for the residuals. After correcting for autocorrelation, several of the estimated regression coefficients are not significant at the 5-percent level. Readers should note, however, that the R^2 coefficient of determination reported above is for the dependent variable in first difference form. If the data are integrated back to level form, then the pseudo-R^2 measure for the equation exceeds 0.934. In other words, the overall fit of the model is relatively good.

As would generally be expected in an inflationary economy, the intercept in Equation 9 is positive. Because the model is estimated using differenced data, this result indicates that a systematic upward trend exists in the Nigerian consumer price index. As hypothesized by Hanson (1985), the sum of the coefficients for the lagged monetary series is significantly less than one. Similar to Kamas (1995), but unlike Fullerton (1993c, 1995), the exchange rate coefficients are not statistically significant. Only one of the parameters for the velocity of money supply circulation proxies is significant at the 5-percent level.

Despite the potential pitfalls identified in earlier sections of the paper, the empirical characteristics associated with Equation 9 are generally in line with what would be expected on the basis of the underlying theoretical model. Individually, each of the three classes of explanatory variables help explain portions of the movements in the dependent variable in statistically significant manners. That several coefficients are not statistically significant in the fully specified model may reflect multicollinearity between the regressor series. If this is the case, one possible means for accommodating it is offered by ridge regression. The latter introduces bias into the parameter estimates and may raise doubts regarding the validity of any subsequent policy simulation analyses (Hamilton, 1994). For that reason, plus the fact that multicollinearity will not decrease the extrapolation accuracy of any given equation, ridge regression estimates of Equation 8 are not incorporated into the work at hand.

Equation 10 is estimated using the M2 definition of the money supply. Inclusion of the broader liquidity measure helps insure that potential changes in the relationship between the velocity of circulation and inflation are not overlooked. Generally presumed to be a macroeconomic policy issue in OECD nations, banking sector deregulation across Africa has led to rapid financial sector diversification and raises the same question in the context of economies such as Nigeria (see Ikhide, 1993b). Results for Equation 10 over the 1970Q1 - 1993Q4 sample period are as follows:

$$\begin{aligned} 10.\quad DP_t = \; & \underset{(2.562)}{0.018} + \underset{(0.759)}{0.053 \cdot DM2_{t-1}} + \underset{(2.965)}{0.214 \cdot DM2_{t-2}} + \\ & \underset{(0.883)}{0.063 \cdot DM2_{t-3}} + \underset{(0.254)}{0.008 \cdot DXR_{t-1}} + \underset{(1.089)}{0.036 \cdot DXR_{t-4}} + \\ & \underset{(1.252)}{0.107 \cdot D(DP_{t-3})} + \underset{(2.933)}{0.251 \cdot D(DP_{t-4})} + \underset{(2.082)}{0.227 \cdot MA(1)} \;, \end{aligned}$$

R^2	0.254	S.E.R.	0.038	Log likelihood	170.784
DW	2.000	F-stat	3.446	Prob(F-stat)	0.002 ,

where M2 represents the broader money supply series used in this specification of the reduced form model. As with Equation 9, the pseudo-R^2 calculated for the dependent variable in level easily exceeds the 90 percent threshold. In combination with the other diagnostics reported above, it can be concluded that Equation 10 offers a fairly defensible characterization of consumer price movements in Nigeria.

Quantitative traits associated with Equation 10 are fairly similar to those associated with Equation 9. Given this, it is not possible to easily determine which monetary series is more appropriate for macroeconomic policy analysis. As a result, both equations are utilized in the simulation experiments discussed below. Because many of the coefficients in Equation 10 are also not significant at the 5-percent level, additional econometric research will be required in order to reach firm conclusions regarding inflationary dynamics in Nigeria. For that reason, the modeling and simulation results associated with both equations should be regarded as preliminary in nature. They do, however, provide a good starting point for illustrating how short-term African price movements and government policy objectives can be assessed within this particular modeling framework.

Cognizant of the potential model shortcomings uncovered by the regression diagnostics, three simulation experiments are conducted using both Equation 9 and Equation 10. The goal of the simulation tests is to shed light on potential impacts associated with different monetary policy stances. Similar to Ikhide (1988), this is accomplished by forecasting the endogenous variable of interest beyond the end of the sample estimation period. The maximum step-length utilized for each of the various policy experiments is 8 quarters.

The first exercise assumes that the annualized rate of growth in the money supply and the rate of currency devaluation are held constant at 40 percent over the entire simulation period. These rates are roughly in line with was observed in the Nigerian macroeconomy during the three year period from 1991-to-1993. As such, the model solutions for this scenario provide baseline forecasts to which the remaining "stabilization" policy impacts can be compared. In the baseline simulation case, if the central bank were to manage the money supply and the exchange rate with few changes relative to the recent monetary history of Nigeria, both models indicate that prices will continue to grow by roughly 22 percent per year. This corresponds to an inflationary range that other authors have discovered to contain a large inertial component (see Kamas, 1995).

The second simulation exercise examined the results associated with gradually lowering the rate of change in the money supply to 20 percent over 4-quarter phase-in period. The rate of currency depreciation is also lowered in 5 point increments from 40 percent to 20 percent over the same time frame. Irrespective of which monetary aggregate is utilized, the annual rate of inflation declines to roughly 17 percent under this set of policy assumptions. This result implies that aggregate price inertia does not represent an insurmountable problem in Nigeria.

The final scenario examines the effects associated with a conservative monetary policy stance under which the rate of expansion in overall liquidity is immediately lowered to 20 percent and held constant over the entire forecast period. The conservative experiment also assumes that the annualized rate of devaluation is held constant at 20 percent. Not surprisingly, the rate of inflation drops to below 16 percent per year no matter which equation from above is utilized. One point that should be made, however, is that under all three cases, the M2 equation forecasts a marginally lower rate of inflation. While additional analysis is required, this result provides evidence that the velocity of circulation modeling and policy debate also holds relevance with respect to developing economies.

In both the second and third latter simulation exercises, reducing the rate of money supply growth and slowing the rate of nominal currency depreciation to 20 percent over one-to-eight quarter implementation periods causes inflation to decline to less than 17.5 percent. That such progress is feasible even if the intermediate steps used to induce disinflation are introduced gradually implies that government policy credibility is not at stake to the extent it would be in economies where the price movements are less responsive to policy innovations. Given Nigeria's relatively sound monetary management practices, this implication of the empirical analysis conducted herein is in basic agreement with the historical record to date. Whether this observation holds for other economies in Africa remains an open question.

Conclusion

An empirical model of Nigerian consumer price inflation is developed and estimated by incorporating both monetary factors and import cost effects in a theoretically plausible manner. Because the model does not pose stringent data requirements, it is also applicable to other African economies with fractional reserve banking systems where questions exist regarding inflationary dynamics. While much of the research to date along these lines has been conducted with respect to Latin America, there is no compelling reason that similar efforts cannot be replicated for other developing countries in Africa and Southern Asia.

In the case of Nigeria, additional econometric testing may prove useful. Initial results obtained in this paper indicate that it may be important to determine which money definition is appropriate for analyzing the macroeconomy of this country. No matter which liquidity series is used, however, the analysis provides relatively clear evidence that Nigerian prices are at least somewhat responsive to anti-inflationary policy steps enacted by the central bank. It is worth noting that the theoretical framework developed above is flexible enough to expand the scope of the model to include additional variables such as labor costs simply by expanding the input price vector (Fullerton, 1998). While the latter does not appear to be required for parameter estimation consistency, such a step could enrich subsequent policy simulation analyses and also permit taking into account specialized factors associated with other economies in Africa.

References

Amin, Shahina, and Salim Rashid, 1994, “Testing the Monetarist-Structuralist Controversy in Bangladesh,” **Bangladesh Development Studies** 22, 99-114.

Bomberger, William A., and Gail E. Makinen, 1979, “Some Further Tests of the Harberger Inflation Model using Quarterly Data,” **Economic Development and Cultural Change** 27, 629-644.

Brajer, Victor, 1992, “Empirical Inflation Models in Developing Countries,” **Journal of Development Studies** 28, 717-729.

Engsted, Tom, 1993, “Cointegration and Cagan's Model of Hyperinflation under Rational Expectations,” **Journal of Money, Credit and Banking** 25, 350-360.

Fullerton, Thomas M., Jr., 1993a, “Un Modelo Macroeconométrico para Pronosticar la Economía Colombiana,” **Ensayos Sobre Politica Económica** 24, 101-136.

Fullerton, Thomas M., Jr., 1993b, “Un Modelo Macroeconométrico para Pronosticar la Economía Ecuatoriana,” **Cuestiones Económicas** 20, 59-100.

Fullerton, Thomas M., Jr., 1993c, “Inflationary Trends in Colombia,” **Journal of Policy Modeling** 15, 463-468.

Fullerton, Thomas M., Jr., 1995, “Short-term Price Movements in Ecuador,” **Proceedings of the American Statistical Association**, Business and Economic Statistics Section, 280-285.

Fullerton, Thomas M., Jr., 1998, “A Theoretical Model of Developing Economy Inflationary Dynamics,” **Southwestern Journal of Economics** (forthcoming).

Fullerton, Thomas M., Jr., and Eiichi Araki, 1997, “A Theoretical Model of Industrial Economy Inflationary Dynamics,” **Economic and Business Review** 39, 1-18.

Fullerton, Thomas M., Jr., Richard Hirth, and Mark Smith, 1991, “Inflationary Dynamics and the Angell-Johnson Proposals,” **Atlantic Economic Journal** 19, 1-14.

Fullerton, Thomas M., Jr., and Ajay Kapur, 1991, “Predicción de Multiplicadores Monetarios en Colombia, Ecuador, y Venezuela,” **Lecturas de Economía** 35, 53-86.

Gerdes, William D., 1989, “The Dynamics of Inflation in Eastern and Southern Africa: 1969-1985,” **Tanzania Journal of Economics** 1, 75-80.

Hallman, Jeffrey J., Richard D. Porter, and David H. Small, 1991, “Is the Price Level tied to the M2 Monetary Aggregate in the Long Run?” **American Economic Review** 81, 841-858.

Hamilton, James D., 1994, **Time Series Analysis**, Princeton, NJ: Princeton University Press.

Hanson, James A., 1985, “Inflation and Imported Input Prices in some Inflationary Latin American Economies,” **Journal of Development Economics** 18, 395-410.

Harberger, Arnold, 1963, “The Dynamics of Inflation in Chile,” in **Measurement in Economics: Studies in Mathematical Economics and Econometrics in Memory of Yehuda Grunfeld**, edited by Carl F. Christ, Stanford, CA: Stanford University Press.

Ikhide, Sylvanus I., 1988, “Simulating an Econometric Model of Nigeria's Financial Sector,” **Nigerian Journal of Economic and Social Studies** 30, 1-25.

Ikhide, Sylvanus I., 1993a, “Financial Liberalisation and the Inflationary Process: Is there a Link in Adjusting Developing Countries?” **International Review of Economics and Business** 40, 157-174.

Ikhide, Sylvanus I., 1993b, “Positive Interest Rates: Financial Deepening and the Mobilisation of Savings in Africa,” **Development Policy Review** 11, 367-382.

Kamas, Linda, 1995, “Monetary Policy and Inflation under the Crawling Peg: Some Evidence from VARs for Colombia,” **Journal of Development Economics** 46, 145-161.

Laidler, David, 1993, “Commentary on Assessing Applied Econometric Results,” Federal Reserve Bank of St. Louis **Review** 75 (March/April), 101-102.

Koch, Paul D., Jeffrey A. Rosensweig, and Joseph A. Witt, 1988, “The Dynamic Relationship between the Dollar and U.S. Prices,” **Journal of International Money and Finance** 7, 181-204.

Motley, Brian, 1993, “Inflation and Growth,” **FRBSF Weekly Letter**, 93-44 (December 31), 1-3.

Sheehey, Edmund J., 1976, “The Dynamics of Inflation in Latin America: Comment,” **American Economic Review** 66, 692-694.

Sheehey, Edmund J., 1980, “Money, Income, and Prices in Latin America,” **Journal of Development Economics** 7, 345-357.

Vogel, R C., 1974, “The Dynamics of Inflation in Latin America, 1950-1969,” **American Economic Review** 64, 102-114.

Zind, Richard G., 1993, “On Inflation and Growth in the LDCs,” **Economic Studies Quarterly** 44, 108-116.

Table 1
Sample Descriptive Statistics: 1970Q1 - 1993Q4

	CPI	M1	M2	XOF	XP
Mean	1157	39824	67277	9.929	13.056
Median	1186	28260	46826	7.922	10.275
Maximum	2002	116593	196318	22.277	30.080
Minimum	536.9	11119	23215	1.347	4.170
Std. Dev.	445.7	29321	48878	6.567	8.412
Skewness	0.139	1.057	1.245	0.842	0.849
Kurtosis	2.053	3.048	3.390	2.268	2.368
Jarque-Bera	1.219	5.584	7.938	4.213	4.100
Prob.(JB)	0.544	0.061	0.019	0.122	0.129

Table 2
Augmented Dickey-Fuller Unit Root Tests: 1970Q1 - 1993Q4

Variable	ADF Test Statistic	MacKinnon 1% Critical Value
Consumer Price Index	-7.222	-4.058
M1 Money Supply	-8.506	
M2 Money Supply	-9.078	
Official Exchange Rate	-7.073	
Parallel Exchange Rate	-8.827	