

AN EXAMINATION OF THE FEASIBILITY OF USING MONETARY DATA FOR NATIONAL INCOME ESTIMATES

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In a number of underdeveloped countries today, adequate statistics for estimating national output by traditional national accounting methods are unavailable or unreliable. However, many of these same countries do publish data on monetary variables at an early stage in their development. These data can now be used to estimate national income.

In this study the money supply was defined to include all currency in circulation, private deposits subject to check at all banks and postal systems, all government deposits, and unused overdrafts less float. The national accounts data were taken from United Nations sources and data supplied by various foreign statistical offices. To make the accounts more comparable in terms of coverage and to limit reported income to the monetized sector of the economy, non-monetary imputations were deleted.

The monetary and national accounts data were combined in a multiple, stepwise regression. National income was used as the dependent variable and money supply and other data were used as the independent variables. The final estimating equations explained about 96 per cent of the variation in income between countries. Other tests were conducted using the currency ratio, transactions velocity, population, and *per capita* consumption. However, these variables did not augment the explanatory power of the regression equations.

When the equations were used to estimate national income for twenty-two underdeveloped countries, the derived estimates showed a high degree of concordance with reported income where it existed for comparative purposes. The results indicate that monetary data can be used to estimate national income for underdeveloped countries with a relatively high degree of accuracy, between countries, and from year to year within a country.

In a number of underdeveloped countries today, adequate statistics for estimating national output by traditional national accounting methods are unavailable or unreliable. Where national accounts exist, the accounting procedures have been changed from time to time making recent time series data incompatible with earlier series and comparisons with other nations. However, many of these same countries do publish data on monetary variables at an early stage in their development which now may be used in national income estimates. This study will examine the possibility of using monetary data for constructing national output estimates for countries lacking national accounting systems. Secondly, it will examine the use of monetary data as a means of checking the reliability of national accounting estimates. And thirdly, it will show the possible use of monetary data in facilitating national income comparisons between underdeveloped nations.

Section I of this paper will discuss the theoretical relationship between money stock and nominal money income. Section II will describe the data used in deriving the income estimates. Section III presents the estimating procedure used in Section IV to estimate national income for twenty-two underdeveloped nations.

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I. MONEY STOCK AND MONEY INCOME

In a 1950 study by Ernest Doblin¹ an attempt was made to estimate currency-velocity across nations. The velocity estimates, in turn, were multiplied by the currency supply to yield national income estimates. However, the procedure used by Doblin was tested with 1960 data and failed to provide meaningful estimates. In two more recent studies by Kaarlo Larna² and Milton Friedman³ attempts were made to estimate national output from monetary data. Each study required the use of a recent national output series for a given country in order to project income back in time—a procedure inapplicable to underdeveloped nations.

These studies maintained that the level of income or economic development was related in some way to the stock and flow of money. In analyses of the demand for money, theorists have related the demand for money to real income, and it has been shown, at least in the United States and Canada, that changes in the real stock of money are highly correlated with changes in real income per capita. In the United States, for example, the correlation between the real stock of money and real income *per capita* was reported to be of the magnitude of 0.99.⁴ Additional studies have indicated that the stock of money balances held in the economy is primarily a function of past income and that changes in the stock of money are associated with changes in nominal income of the same direction and of a similar magnitude.⁵ It will be shown subsequently that the relationship holds internationally as well as nationally. Across nations, the correlation between the logarithms of money stock and money income is of the magnitude of 0.97.

There are many reasons given for the observed relationship between money stocks and money income. Traditionally, it has been explained in terms of a growing diversification and differentiation of production in association with economic development producing a greater demand for money. Secondly, the monetization of the economy together with a decrease in payments in kind and agricultural dependence increase the relative need for money balances. Thirdly, in some countries the growth of strictly financial payments has led to an increase in the demand for liquid balances. Also such factors as the lengthening of payment periods for employees and the growing synchronization of payments and

¹Ernest M. Doblin, "The Ratio of Income to Money Supply," *Review of Economics and Statistics*, Vol. 33 (August, 1951), pp. 201-213.

²Kaarlo Larna, *The Money Supply, Money Flows, and Domestic Product in Finland 1910-1956* (Helsinki: The Finnish Economic Association, 1959).

³Milton Friedman, "Monetary Data and National Income Estimates," *Economic Development and Cultural Change*, Vol. 9 (April, 1961), pp. 267-286.

⁴The real stock of money refers to the money supply deflated by the price level; see: Milton Friedman, "The Demand for Money: Some Theoretical and Empirical Results," *Journal of Political Economy*, Vol. 67 (August, 1959), p. 327.

⁵See for example Sprinkel's study in which he concludes that all important business declines since 1909 were preceded by a reduction in the rate of growth of the money supply and all recoveries were preceded by a rise in the rate of monetary growth. Beryl W. Sprinkel, "Monetary Growth as a Cyclical Predictor," *Journal of Finance*, Vol. 33 (August, 1951), pp. 201-213. Also see: George Macesich, "The Rate of Change in Money Stock as a Leading Canadian Indicator," *Canadian Journal of Economics and Political Science*, Vol. 28 (August, 1962), pp. 424-430; and Milton Friedman and Anna J. Schwartz, "Money and Business Cycles," *Review of Economics and Statistics*, Vol. 45 (Supplement: February, 1963), pp. 32-64.

expenditures have been cited as factors contributing to the changes in the demand for money.⁶ Nevertheless, the simpler, direct assumption relating the growing demand for money to the rise in money income provides satisfactory results while complying with the principle of "Occam's razor"—the simpler the assumptions underlying the theory, the less chance for error. However, there is an additional approach which is descriptive, but adds valuable information about the process of increasing demand for money in conjunction with the process of economic development. It relates to the sectoral demand for money.

In a sectoral analysis of velocity for the United States it was found that the demand for money was lower in business than in government, and lower in government than in households.⁷ In underdeveloped countries, a large portion of the money supply is in the hands of business and government. In these countries, most demand deposits are business deposits or government deposits. To this extent, it should be expected that such measures as income-velocity would be high, and that its reciprocal, the demand for money, low. However, as the economy develops, more and more financial assets are accumulated in the hands of private citizens and the demand for money subsequently rises.

For example, it has been shown that in the United States the rate of turnover for business deposits was about thirty times per year.⁸ At the same time, the percentage distribution of deposits has shifted from business to individuals. In 1939 in the United States 35 per cent of the demand deposits were held by individuals as opposed to 46 per cent in 1954. During this period, nonfinancial corporation deposits fell from 40 per cent to 32 per cent of the total demand deposits. The amount held by the government and by financial corporations fell from 25 to 22 per cent.⁹ A similar process undoubtedly has evolved as less developed economies progress towards economic maturity.

II. MONETARY AND NATIONAL ACCOUNTS DATA

In order to estimate national output from monetary data, an attempt has been made to select monetary variables which reflect changes in the aggregate economic output of the monetized sector of an economy in nominal terms. The monetary data used in the analysis were end of year data expressed in United States dollar equivalents. The variables selected for study were: (1) currency in circulation; (2) demand or sight deposits; (3) government deposits; (4) time and savings deposits; and (5) the monthly average of bank debits or clearings. In addition, three real variables were included: exports, population, and *per capita* energy consumption. The data were compiled from statistics published

⁶For a listing of at least ten possible causes of the historical reduction in income-velocity or the increase in the demand for money, see: Clark Warburton, "The Secular Trend in Monetary Velocity," *Quarterly Journal of Economics*, Vol. 63 (February, 1949), pp. 87-89.

⁷Richard T. Selden, "The Postwar Rise in the Velocity of Money: A Sectoral Analysis," *Journal of Finance*, Vol. 16 (December, 1961), p. 530.

⁸John J. McCall, "Difference Between the Personal Demand for Money and the Business Demand for Money," *Journal of Political Economy*, Vol. 68 (August, 1960), p. 361.

⁹William L. Miller, "Structural Aspects of Monetary Velocity: Comment," *Quarterly Journal of Economics*, Vol. 74 (November, 1960), p. 654.

by the International Monetary Fund, the United Nations, and data furnished by the respective nations studied.¹⁰

In the compilation of money supply data, the money supply was defined to include all financial means of payment, in non-banking hands, which could be used directly as a means of exchange. Thus the definition of money supply included: (1) bank notes and treasury currency outside of banks; (2) sight or demand deposits at any financial institution or treasury inclusive of government and official entity deposits and exclusive of interbank deposits; less (3) uncleared checks; plus (4) any form of unused, negotiated credit or overdrafts. It should be noted that the money supply defined in this manner often differs from the "money supply" reported by the International Monetary Fund.

The national accounts data used were taken from the United Nations' *Yearbook of National Accounts Statistics, 1965*,¹¹ and from data furnished to the author by the countries studied. The international data have been compiled by the United Nations Statistical Department in accordance with the procedure outlined in *A System of National Accounts and Supporting Tables*.¹² However, all of the statistics are not strictly comparable or complete. A detailed breakdown of differences in coverage and estimating procedures for sixty countries has been published by the United Nations.¹³

The standard accounts suggested by the United Nations tend to limit the coverage of economic activity to only those activities which have an unambiguous monetary value. This convention adopted by the United Nations limits the imputations contained in factor income to imputed rent on owner-occupied dwellings (excluding the subsistence sector), farmer's consumption of own product, financial imputations for services rendered by financial intermediaries, and payment in kind to employees, military, and civil servants.

In the process of deriving an estimating equation for national income across countries, it has been necessary to use existing national income data from a large number of countries. The problems which are involved in this procedure are numerous. The data may not be strictly comparable in coverage; the imputations may be made on a quite different basis; there may be consistently biased estimates of income components due to differing survey and reporting techniques; and so forth. On an *a priori* basis it seems that if national income is to be estimated on the basis of monetary variables, then national income accounts free from non-monetary imputations would give a more accurate estimation. The use of income figures free from non-monetary imputations would also eliminate one of the most controversial sections of the national accounts. Therefore, in so far as possible, nonmonetary imputations have been eliminated from the national income figures used. The results have also been compared with those obtained from the use of reported national income.

¹⁰A forty-six page Appendix on the monetary data is available, in a limited supply, from the author.

¹¹United Nations, *Yearbook of National Accounts Statistics, 1965* (New York: United Nations, 1966).

¹²United Nations, *System of National Accounts and Supporting Tables, Studies in Methods, Series F, No. 2, Rev. 2* (New York: United Nations, 1964).

¹³United Nations, *National Accounting Practices in Sixty Countries, Studies in Methods, Series F, No. 11* (New York: United Nations, 1964).

The United Nations requests each year that reporting countries list non-monetary components of private consumption expenditures, gross fixed capital formation, product in the agricultural sector, and ownership of dwellings. However, only ten countries have ever reported this information.¹⁴ In only six of these countries is the information available for ten years or more and of a nature permitting estimates of national income free of imputations. Because of the deficiency of data on imputations included in national accounts figures, letters were written to forty-six countries requesting information on these values. Data on imputations included in national income were sent to the author by the central banks and statistical offices of twenty-two of these countries. However, the coverage of these data varies greatly from country to country. Non-monetary imputations included in reported national income are shown in Appendix A for thirty-two countries for the period 1960–1964.

Of the thirty-two countries with data supplied on imputed values, monetary national income was between 90 and 95 per cent of reported national income in seventeen countries. For the other fifteen countries, monetary national income ranged between 64 and 90 per cent of reported national income. In the developed nations imputed rent on owner-occupied dwellings generally accounted for about one-half of the imputed values. For the less developed nations, farmers' consumption of own product was the most important imputation.

The data on imputations have been used as reported. No attempt has been made to add imputations for segments of the economy not specifically mentioned. The reason for this is that in some countries no imputations are directly made for some sectors of the economy.

Comparability of Accounts

While the national accounts of different countries still contain some definitional discrepancies preventing accurate comparisons on an equal basis, great progress has been made during the past twenty years. Nevertheless, despite the minimization of these differences national accounts still are not easily applied to international comparisons dealing with social welfare. In order to compare the national products of several countries, it is necessary to convert the local currency units, by means of the existing exchange rates, into some standard international currency such as the United States dollar or the pound sterling. However, this conversion process has long been criticized on the grounds that the different currencies have differing purchasing powers both in international trade and in domestic markets. The conversion distorts the comparability of social welfare or well-being, but of course does not alter the functional relationship between aggregates within a country.

In addition there are a number of fundamental statistical problems which make welfare comparisons between nations almost impossible. They result from variations in the quality of products among nations; variations in the needs of the people of a country due to weather conditions and terrain, and age and sex distributions; variations in government services and social welfare programs;

¹⁴United Nations Statistical Office, New York. Letter from P. J. Loftus, Director, September 23, 1966.

and basic cultural differences in the preferences of people. These problems of comparability are statistically insurmountable and, therefore, require that certain conventions be adopted in comparison studies. Usually, welfare comparisons are ignored while quantities, prices, and incomes are compared.

Methods of Comparison

In order to contend with the conversion problem, a number of methods have been suggested for adjusting national accounts data to provide internationally comparable figures.¹⁵ However, in all of the methods developed to date, there are still considerable statistical and theoretical problems to be solved. Many of these methods also require detailed data on domestic prices by product and quantity indices—data which are not readily available nor necessarily reliable for underdeveloped areas.

As an alternative to detailed national accounts data and as an expression of welfare, income *per capita* is a widely used measure of economic development among nations. These income *per capita* estimates, however, are usually expressed in United States dollars and are derived from other estimates such as population, the value of output in the subsistence sector, trade figures, and knowledge of local wage levels and prices. One of the fundamental sources of error in this method is the lack of reliable census data which makes it impossible to derive meaningful aggregates for the economy. Many of the underdeveloped countries have never made a census of their population and often even lack adequate data on their urban centers. For this reason and others, no attempt was made to estimate, directly, income *per capita* across nations.

Of the methods of comparison developed to date, it was felt that this study could offer little if anything to the improvement of the highly sophisticated comparisons used between developed nations. Instead, it was felt that the impetus and purpose of this study should be to provide a means of comparison of national output among underdeveloped nations, especially where national accounts data were non-existent or in their rudimentary stage of development. It was believed that, by estimating national output on the basis of a common definition of money supply derived from reasonably accurate financial data, better estimates could be established for underdeveloped countries than those presently used by the United States Agency for International Development and the United Nations. These figures, in turn, could be used for comparisons between underdeveloped countries on the common basis of money supply as well as providing some indication of change in national output from year to year.

III. METHODS USED IN ESTIMATING NATIONAL INCOME INTERNATIONALLY

Many of the statistical problems encountered with the data may be identified by examining the simple correlations between the selected monetary variables

¹⁵See the discussion of problems and methods of international comparison in Paul Studenski's, *The Income of Nations* (New York: New York University Press, 1958), pp. 224–230; and Milton Gilbert and Irving B. Kravis, *An International Comparison of National Products and the Purchasing Power of Currencies* (Paris: The Organization for European Economic Co-operation, 1954).

and national income. (See Table 1.) The resulting simple correlation coefficients between the variables and national income are extremely high for all of the monetary variables with the exception of government deposits. Of the real variables, the correlation coefficient of exports is noticeably higher than that of population or energy consumption *per capita*. However, the high correlation results from the wide variation in size of variables between countries. This geometric or exponential size variation immediately suggests that the data lends itself well to a logarithmic transformation. In addition to the problem of size with regard to the relationship between the independent and dependent variables, a size variation of this magnitude virtually assures a high correlation among the independent variables. However, this multicollinearity is greatly reduced by a logarithmic transformation.

TABLE 1
SIMPLE CORRELATION OF EIGHT VARIABLES ON NATIONAL INCOME, 1960-1964

Variable	1960	1961	1962	1963	1964
Currency	0.977	0.973	0.973	0.973	0.974
Demand deposits	0.998	0.997	0.996	1.000	0.999
Government deposits	0.562	0.593	0.590	0.596	0.602
Time and savings deposits	0.980	0.991	0.990	0.982	0.984
Monthly bank debits	0.810	0.798	0.791	0.786	0.770
Exports	0.995	0.988	0.991	0.991	0.992
Population	0.374	0.127	0.123	0.121	0.361
Energy consumption <i>per capita</i>	-0.052	-0.026	-0.018	-0.013	-0.059
Number of countries in sample	44	42	42	42	34

Source: Computed from data taken from United Nations and International Monetary Fund publications.

To provide as accurate estimates as possible, the monetary variables and three measures of output were combined in as many ways as possible. The monetary variables were combined into various definitions of money supply, liquidity, and savings, as well as into ratios such as currency to money supply, bank debits to demand deposits, and time and savings deposits to total money supply. Then the data were used in a stepwise regression to sequentially select the variables providing the greatest explanatory power.

The three national accounts variables tested were gross national product, gross domestic product, and national income. Each of the three national accounts aggregates was used as the dependent variable in the stepwise regression. In each case the independent variables selected were selected in the same order. When national income was used as the dependent variable the standard error of the regression equation was minimized and the simple correlation between money supply and national income was a maximum.

In the selection of independent variables, five definitions of money supply were tested. The best results were obtained when money supply was defined as the sum of currency in circulation, demand deposits, and government deposits.

Money supply defined inclusive of time and savings deposits at all financial institutions has a lower correlation with the level of national income than money supply defined exclusive of time and savings deposits.

In addition, when the money supply was regressed against both the logarithm of monetary national income (free of non-monetary imputations) and reported national income, it alone explained about 95 per cent of the variation of national income between countries. However, in every year, the regression of money supply against monetary national income was superior to the regression of money supply on reported national income.

In a second group of tests an attempt was made to find additional variables which would increase the predictive power of money supply in estimating national income. Regressions were run using the currency ratio, transactions velocity, exports, population, and per capita energy consumption. The results of these tests are given in Table 2. Although three of the variables have a simple correlation of 0.50 or better with national income, no variable increased the explanatory

TABLE 2
EXPLANATORY POWER OF FIVE ADDITIONAL VARIABLES, USING 1960 DATA

Variable	Simple Correlation with National Income	Coefficient of Determination ^a
Currency ratio	-0.394	0.945
Transactions velocity ^b	0.192	0.952
Exports	0.516	0.952
Population	0.751	0.948
Energy consumption <i>per capita</i>	0.629	0.946

^aThe coefficient of determination was obtained from a multiple linear regression of the money stock and the specified variable run against reported national income. The simple correlation squared between money supply and national income was 0.945.

^bBank debits divided by the average stock of demand deposits have been used for transactions velocity.

power of an equation containing money supply by more than 1 per cent. Only the logarithm of exports consistently added to the explanatory power of the equation thereby increasing the coefficient of determination slightly and reducing the standard error of the regression equation. The surrogate for transactions velocity—bank debits divided by the average stock of demand deposits—exhibited almost equal explanatory power when regressed with the money supply. However, the transactions velocity variable was less consistent on a year to year basis than exports. The currency ratio, energy consumption per capita, and population variables added very little to the explanatory power of the equations. Nevertheless, there are other variables which have not been tested which may add to the explanatory power of the equations.

The final estimating equations include only money supply and exports for both monetary national income and reported national income. The equations are given in Tables 3 and 4. In these equations it will be noted that the regression

TABLE 3
ESTIMATING EQUATIONS DERIVED FROM NATIONAL INCOME FREE OF IMPUTATIONS

Year	Equation Constant	Coefficients (Standard Error) (<i>T</i> -Value)		Coefficient of Deter- mination	Standard Error	<i>F</i> Value
		Beta ₁	Beta ₂			
1960	1.401	0.896 (0.051) (17.688)	0.061 (0.040) (1.544)	0.953 (0.976)	0.348	214.75
1961	1.470	0.907 (0.050) (18.309)	0.046 (0.039) (1.164)	0.955 (0.977)	0.345	224.03
1962	1.436	0.917 (0.049) (18.587)	0.041 (0.039) (1.047)	0.956 (0.978)	0.339	228.19
1963	1.468	0.914 (0.047) (19.645)	0.036 (0.037) (0.969)	0.962 (0.981)	0.319	252.83
1964	1.695	0.897 (0.050) (17.771)	0.031 (0.031) (0.815)	0.956 (0.978)	0.340	206.80

TABLE 4
ESTIMATING EQUATIONS DERIVED FROM REPORTED INCOME DATA

Year	Equation Constant	Coefficients (Standard Error) (<i>T</i> -Value)		Coefficient of Deter- mination	Standard Error	<i>F</i> Value
		Beta ₁	Beta ₂			
1960	1.586	0.877 (0.051) (17.317)	0.068 (0.040) (1.713)	0.952 (0.976)	0.348	208.25
1961	1.618	0.895 (0.050) (17.827)	0.052 (0.040) (1.299)	0.953 (0.976)	0.349	214.35
1962	1.585	0.905 (0.050) (18.155)	0.047 (0.039) (1.195)	0.954 (0.977)	0.343	219.70
1963	1.595	0.903 (0.048) (18.759)	0.044 (0.038) (1.163)	0.959 (0.979)	0.330	233.33
1964	1.835	0.877 (0.050) (17.460)	0.044 (0.038) (1.142)	0.955 (0.977)	0.338	203.42

coefficients for the money supply (β_1) exhibited very little change from year to year. However, the regression constants have tended to increase slightly over the five year period while the regression coefficients for exports have decreased slightly. The ratio of explained variation to unexplained, the F ratio, indicates that all of the resulting equations are significant at the 0.001 per cent level. The coefficient of determination, R^2 , indicates that the resulting equations explain from 95 to 96 per cent of the variation in national income between countries. The multiple correlation coefficients are enclosed in parentheses below the coefficient of determination. The figures enclosed in parentheses under the regression coefficients are the standard error and computed T value, respectively. The computed T value for exports was significant at the 0.10 level in only one year, 1960. The low significance attached to the export regression coefficients makes it of dubious value to include exports in the equation for a mere 3 per cent reduction in the standard error of the regression equations. In addition, the highest simple correlation between money supply and exports was 0.45 indicating a low degree of multicollinearity.

IV. NATIONAL INCOME ESTIMATES FOR SELECTED UNDERDEVELOPED COUNTRIES

The estimating equations described in Section III have been used to estimate national income for twenty-two underdeveloped countries. Of these countries, sixteen are geographically located on the continent of Africa. The monetary data used in the construction of money supply for each country are reported in Appendix B. The monetary data were compiled in accordance with the definitions outlined in Section II.

Data Problems

For the Africa countries, in particular, there are three major data problems. First of all, many of the newly independent African States were recently, or are still, part of a currency area. This factor makes it difficult to separate currency in circulation by countries. Often the currency is issued by a currency board in relation to foreign exchange earnings received by domestic banks with little regard to national boundaries. Transshipment of exports through associated, neighboring countries and the widespread use of international branch banks in these countries add to the problem. In the area formerly known as French Equatorial Africa, money supply data by country are available only since 1960. In the area formerly known as French West Africa, data on currency in circulation by country are not available for the years prior to 1963. However, these former French colonies in Africa form a unified currency area. The *Communauté Financière Africaine*, formerly known as the *Colonies Françaises d'Afrique*, all use the CFA franc and follow similar monetary and banking practices.

In the former British colonies, British banking practices and the pound sterling have shaped monetary policy until lately. In East Africa, for example, the East African Currency Board did not distinguish currency in circulation by country. To provide a basis upon which to estimate national income, the currency in circulation has been arbitrarily divided among Uganda, Kenya, and Tanzania on the basis of the ratio of demand deposits held in each country to total demand

deposits. This convention assumes that the currency ratio is the same in all three countries. To some extent the money supply, therefore, is probably understated in Uganda and Tanzania where the process of monetization and the use of bank deposits has not proceeded as far nor as rapidly as in Kenya.

A second data problem in underdeveloped countries results from their money supplies being highly dependent upon export trade and foreign exchange earnings. This factor automatically leads to a close association between money supply and export trade. During a given year, therefore, the money supply may vary by as much as 20 per cent from its seasonal trough to peak. To use end of year data may distort the true picture of the output of the economy. It would be far better to use some type of seasonally adjusted money supply if adequate data were available.¹⁶

A third problem results from the widespread use of trading currencies and foreign currencies in both urban and rural areas of some underdeveloped nations. For example, the Maria Theresa Thaler has had a long history of use as a standard means of payment in rural areas of Ethiopia, Somalia, the Sudan, Chad, Nigeria, and several other countries in Africa. To some extent, this unrecorded money in circulation is offset by the destruction, hoarding, and use of recently issued coins for ornamentation and jewelry. In Egypt, tourism and the Suez Canal bring in large quantities of foreign currencies which have a wide, but technically illegal circulation within the country. The same is true in South Viet-Nam where the U.S. dollar finds wide acceptance.

Concordance of Estimates

Understanding then, that there are numerous sources of error in the data used, the provisional income estimates for twenty-two underdeveloped countries are presented in Table 5. The estimates are given in United States Dollar equivalents for comparison purposes as well as in local currency units. The income estimates reported under method A represent national income obtained from the regression equations derived from monetary national income, free of imputations. Method B represents the results obtained from the regression equations derived from reported national income. The difference between methods A and B amounts to an average of the imputed values used in the data. This average, however, is relatively low since the original data included a number of highly developed countries for which imputations account for only a small part of total national income. Therefore, it should be expected that reported income for underdeveloped countries with national accounts data would exceed estimated national income. However, after imputations are deducted, the reported figures should approach the results derived from Method A.

The CFA franc area countries for which national income estimates were made are Cameroon, the Central African Republic, Chad, the Congo (Brazzaville), and Gabon. These five countries attained independence only as lately as 1960 and then formally linked themselves into a "Brazzaville" group. The purpose

¹⁶The author is presently engaged in the process of deseasonalizing monetary data for all countries which are members of the IMF. This data, in turn, will be used in new national income estimates.

TABLE 5
 NATIONAL INCOME ESTIMATES FOR TWENTY-TWO UNDERDEVELOPED NATIONS, 1960-1964
 (millions of currency units)

Country	Income Estimates				Reported Income	Reported Income Less Imputations
	Method A		Method B			
	U.S. Dollars	Local Currency	U.S. Dollars	Local Currency		
CAMEROON						
1960	335.6	82,843.3	398.4	98,344.1	—	—
1961	341.6	84,325.3	400.2	98,791.9	—	—
1962	400.1	98,759.8	468.2	115,573.9	—	—
1963	464.0	114,546.0	544.0	134,296.4	—	—
1964	588.0	145,140.8	695.1	171,595.6	—	—
CENTRAL AFRICAN REPUBLIC						
1960	59.0	14,562.4	71.5	17,659.7	—	—
1961	59.7	14,729.6	70.6	17,425.4	—	—
1962	68.7	16,951.9	81.2	20,034.2	—	—
1963	82.2	20,295.2	97.1	23,966.1	—	—
1964	116.8	28,832.1	140.6	34,712.0	—	—
CHAD						
1960	104.9	25,902.0	125.7	31,019.7	—	—
1961	110.5	27,273.2	130.0	32,101.1	—	—
1962	110.1	27,188.3	129.5	31,965.2	—	—
1963	136.0	33,581.8	159.7	39,410.6	—	—
1964	164.5	40,606.1	196.3	48,451.9	—	—
CONGO, BRAZZAVILLE						
1960	149.8	36,971.7	178.5	44,050.5	—	—
1961	169.4	41,809.7	198.1	48,910.3	—	—
1962	181.5	44,797.3	213.0	52,588.1	—	—
1963	160.7	39,655.6	189.2	46,693.4	—	—
1964	184.7	45,580.5	221.4	54,656.0	—	—
DOMINICAN REPUBLIC						
1960	415.0	415.0	471.6	471.6	529.1	—
1961	416.3	416.3	470.1	470.1	531.0	—
1962	483.9	483.9	546.1	546.1	628.2	—
1963	530.9	530.9	593.4	593.4	671.7	—
ETHIOPIA						
1960	399.6	992.6	454.7	1,129.3	—	—
1961	435.1	1,080.7	492.0	1,222.1	—	—
1962	475.1	1,180.0	536.8	1,333.4	—	—
1963	472.3	1,180.5	529.8	1,324.4	—	—
1964	571.4	1,428.3	635.5	1,588.6	—	—
GABON						
1960	119.3	29,442.3	143.9	35,521.5	—	—
1961	133.6	32,971.5	157.8	38,958.3	—	—
1962	139.4	34,417.6	164.8	40,686.1	—	—
1963	149.9	36,993.1	177.5	43,813.5	—	—
1964	185.8	45,856.3	224.6	55,439.6	—	—
GHANA						
1960	1,151.6	863.8	1,284.6	963.5	1,135.0	—
1961	940.0	705.1	1,054.4	790.9	1,210.0	—
1962	1,033.2	774.9	1,157.3	868.1	1,301.0	—
1963	1,071.8	803.9	1,190.3	892.8	1,428.0	—
1964	1,527.5	1,145.7	1,660.2	1,245.3	1,620.0	—

TABLE 5—continued

Country	Income Estimates				Reported Income	Reported Income Less Imputations
	Method A		Method B			
	U.S. Dollars	Local Currency	U.S. Dollars	Local Currency		
JAMAICA					GNP	
1960	435.5	115.5	490.1	175.0	227.5	—
1961	413.6	147.7	464.6	165.9	234.5	—
1962	436.8	155.9	490.4	175.1	254.2	—
1963	455.0	162.4	505.5	180.5	272.9	—
1964	554.2	197.9	607.2	216.8	294.9	—
KENYA					GDP at f.c.	
1960	576.2	205.7	642.7	229.5	225.5	175.3
1961	611.0	218.2	681.1	243.1	224.7	176.8
1962	652.4	232.9	726.8	259.5	244.1	180.9
1963	703.7	251.2	775.0	276.7	259.1	192.4
1964	827.7	295.5	894.6	319.2	277.7	209.2
MOROCCO						
1960	1,862.2	9,422.8	2,088.5	10,567.9	8,010.0	7,010.0
1961	1,873.3	9,478.8	2,109.3	10,672.9	7,840.0	6,840.0
1962	2,107.4	10,663.6	2,369.7	11,990.9	9,370.0	8,370.0
1963	2,213.9	11,202.5	2,482.6	12,562.1	10,480.0	9,480.0
1964	2,518.4	12,743.2	2,783.7	14,085.8	11,030.0	10,030.0
NICARAGUA					GNP	
1960	156.9	1,137.6	183.2	1,328.3	2,488.0	—
1961	162.3	1,184.5	186.9	1,364.2	2,650.0	—
1962	200.9	1,466.6	231.3	1,688.2	2,932.0	—
1963	233.9	1,707.1	267.5	1,952.5	3,153.0	—
1964	313.6	2,288.9	358.9	2,619.0	3,401.0	—
NIGERIA						
1960	1,253.4	447.5	1,391.3	496.7	—	—
1961	1,334.6	476.5	1,486.6	530.7	—	—
1962	1,363.8	486.9	1,518.1	541.0	—	—
1963	1,278.1	456.3	1,413.5	504.6	—	—
1964	1,576.1	562.7	1,708.5	609.9	—	—
SOMALIA						
1960	62.7	447.7	74.1	529.3	—	—
1961	81.1	579.0	93.7	669.2	—	—
1962	83.6	596.9	96.6	689.7	—	—
1963	99.1	707.7	113.4	810.1	—	—
1964	115.4	824.6	133.1	951.0	—	—
SUDAN						
1960	808.1	288.5	898.3	320.7	345.8	—
1961	831.2	296.8	925.3	330.3	395.4	—
1962	831.1	296.7	926.4	330.8	396.3	—
1963	812.1	289.9	896.3	320.0	395.0	—
1964	744.8	265.9	809.3	288.9	—	—
TANZANIA					GDP at f.c.	
1960	241.9	86.4	275.5	98.4	172.5	110.1
1961	297.8	106.3	335.5	119.8	181.1	113.8
1962	356.2	127.2	400.4	142.9	195.4	120.8
1963	376.4	134.4	418.7	149.5	217.5	141.6
1964	486.4	173.7	533.8	190.6	227.7	155.1

TABLE 5—continued

Country	Income Estimates				Reported Income	Reported Income Less Imputations
	Method A		Method B			
	U.S. Dollars	Local Currency	U.S. Dollars	Local Currency		
TUNISIA						
1960	738.5	310.2	821.0	344.8	282.8	236.4
1961	794.9	333.8	883.6	371.1	315.2	266.1
TURKEY						
1960	2,897.5	26,077.3	3,231.7	29,084.2	44,359.0	30,619.0
1961	3,008.3	27,074.0	3,379.6	30,415.5	46,538.0	32,069.0
1962	3,295.8	29,661.0	3,700.7	33,305.9	52,055.0	35,831.0
1963	3,313.7	29,822.8	3,714.4	33,428.8	59,056.0	40,840.0
1964	4,165.8	37,491.3	4,583.3	41,249.0	62,429.0	40,452.0
UGANDA						
					GDP at f.c.	
1960	154.2	55.1	177.0	63.2	152.1	110.8
1961	180.4	64.4	204.3	73.0	156.4	111.2
1962	186.9	66.7	211.5	75.5	156.7	116.0
1963	207.7	74.1	232.5	83.0	175.8	128.5
1964	291.0	103.9	322.9	115.3	203.0	148.8
UNITED ARAB REPUBLIC						
					GDP at f.c.	
1960	3,559.2	1,281.4	3,869.1	1,393.0	1,447.4	—
1961	3,915.9	1,488.2	4,300.2	1,634.2	1,516.6	—
1962	3,325.8	1,443.4	3,657.3	1,587.3	—	—
1963	3,899.5	1,692.4	4,257.8	1,847.9	—	—
1964	5,156.3	2,237.9	5,446.5	2,363.8	—	—
URUGUAY						
					GNP	
1960	905.0	9,981.6	1,028.7	11,346.3	13,544.0	—
1961	1,111.3	12,201.5	1,260.8	13,842.0	17,265.0	—
1962	1,018.0	11,177.2	1,155.4	12,685.5	18,810.0	—
1963	866.0	14,210.0	985.9	16,166.7	22,473.0	—
1964	1,223.5	22,878.6	1,382.5	25,851.3	—	—
VIET-NAM, SOUTH						
1960	1,030.6	75,744.8	1,182.2	86,881.4	81,800.0	—
1961	984.3	72,337.7	1,125.8	82,738.8	84,500.0	—
1962	1,115.8	82,006.3	1,272.6	93,528.7	93,800.0	—
1963	1,235.9	90,826.7	1,409.8	103,610.0	100,300.0	—
1964	1,586.4	116,592.1	1,783.4	131,070.6	113,500.0	—

Source: Computed from data in Appendix B. Reported income data have been taken from the United Nations, *Yearbook of National Accounts Statistics, 1965* (New York: United Nations, 1966).

of their association was to develop and maintain economic and political cooperation. One result of the association was the continuation of the use of the common monetary unit issued by one centralized currency board. The national income estimates are based on money supply data and data which have been reported under identical definitions for all five countries. On the basis of the common monetary unit and fiscal accounts, it seems that these national income estimates would provide a very useful means of comparison on an equal basis among the five countries. These income estimates also should be useful for evaluating year

APPENDIX A

TABLE 6
 REPORTED NATIONAL INCOME ESTIMATES LESS IMPUTATIONS
 (Millions of local currency units)

Country and Year	Reported National Income	Non-Monetary Imputations	Monetary National Income
AUSTRALIA			
1960	11,588.0	517.0	11,071.0
1961	11,945.0	565.0	11,380.0
1962	12,927.0	636.0	12,291.0
1963	14,428.0	715.0	13,713.0
1964	15,739.0	773.0	14,966.0
AUSTRIA			
1960	125,000.0	6,130.0	118,870.0
1961	136,700.0	6,590.0	130,110.0
1962	143,000.0	6,890.0	136,110.0
1963	152,600.0	7,640.0	144,960.0
1964	167,700.0	7,950.0	159,750.0
BELGIUM			
1960	458,300.0	35,510.0	422,790.0
1961	481,200.0	36,533.0	444,667.0
1962	514,100.0	38,267.0	475,833.0
1963	551,900.0	39,067.0	512,833.0
1964	607,900.0	42,525.0	565,375.0
CANADA			
1960	27,380.0	1,809.0	25,571.0
1961	28,161.0	1,830.0	26,331.0
1962	30,521.0	1,834.0	28,687.0
1963	32,525.0	1,957.0	30,568.0
1964	35,001.0	2,032.0	32,969.0
CEYLON			
1960	5,770.0	577.0	5,193.0
1961	5,814.0	581.0	5,233.0
1962	6,037.0	604.0	5,433.0
1963	6,171.0	617.0	5,554.0
1964	6,589.0	659.0	5,930.0
CHINA			
1960	48,008.0	10,361.0	37,647.0
1961	53,531.0	11,213.0	42,318.0
1962	58,267.0	12,142.0	46,225.0
1963	66,601.0	13,299.0	53,302.0
1964	85,265.0	15,710.0	69,555.0
DENMARK			
1960	33,092.0	1,324.0	31,768.0
1961	36,926.0	1,477.0	35,449.0
1962	41,304.0	1,642.0	39,752.0
1963	43,244.0	1,730.0	41,414.0
1964	48,588.0	1,944.0	46,644.0
FINLAND			
1960	12,448.0	1,049.0	11,399.0
1961	13,851.0	1,127.0	12,724.0
1962	14,823.0	1,199.0	13,634.0
1963	16,407.0	1,307.0	15,100.0
1964	18,826.0	1,427.0	17,399.0

estimates can be useful, when supplemented by detailed knowledge of individual countries, in assessing membership fees for international organizations; distribution of aid; and evaluating market size and industries that can be supported domestically. In short, monetary estimates may be used in evaluating and planning almost all types of international programs.

Secondly, the year to year changes in national income estimates appear to be very similar to those found through traditional national accounting means. By using monetary estimates it is possible for an underdeveloped country to evaluate quarterly or yearly the affects of government expenditure and tax policies, the impact of crop failures, national disasters or overproduction. Perhaps more importantly they would suggest to what extent growth was spontaneously taking place within the economy. However, often much of the growth in nominal income is due to price inflation. By using carefully constructed price indices, planners should be able to evaluate domestic changes in real output and income. Thus monetary estimates may also be used in all aspects of domestic planning.

Conclusions

Across countries, the level of money income and money supply are highly correlated, and the level of income appears to provide a good explanation of why people hold the nominal stock of money. It also suggests that changes in the money supply have wide repercussions on the nominal level of income. However, it should not be concluded that by simply increasing the stock of money real income will be increased. Such actions could easily lead to major distortions in prices, the growth of some sectors of the economy, and capital flight which, in turn, might lead to economic stagnation. It does, however, suggest that prudent management of the money supply, free from sharp fluctuations in the growth rate, may indeed provide a good stimulus to balanced economic development and planning.

The empirical study also showed that money substitutes—time and savings deposits at all financial institutions—did not help explain the demand for money nor the relationship between money stock and money income. The composition of the money supply and money flow data were tested and found to add very little to the explanation of variation in money income between countries. Although population, exports, and *per capita* energy consumption had relatively good, positive correlation with national income, they collectively and in conjunction with money supply added very little to the explanation of variation in income across nations.

Although the derived estimating equations are provisional and need further development, they do indicate that money income can be estimated from money stock data across countries. These equations should be applied only to underdeveloped countries as the analysis is complicated by changes in interest rates and other factors for developed countries.

to year changes in national output resulting from various governmental policies. It is interesting to note that while most of these countries enjoyed a relatively rapid rate of expansion of their monetary sector during the 1960–1964 period, Congo, Brazzaville, suffered a sharp fall in income during the turbulent fighting in adjoining Congo, Leopoldville, in 1963.

The estimates for the Dominican Republic, on the average, are about 20 per cent less than the reported national income. This difference between the two figures may be due to the amount of imputations included in the Dominican Republic's national accounts. However, perhaps more striking in this case are the very similar growth patterns of estimated national income and reported income during each of the four years. In 1960 estimated income increased by less than 1 per cent, and reported income increased by less than 1 per cent. From 1961 to 1963, estimated income increased by 27 per cent while reported income increased 26 per cent.

For Ghana, Jamaica, Nicaragua, Uruguay, and South Viet-Nam the national income estimates must be compared with gross national product estimates. Although the differences between gross national product and national income vary considerably from country to country, on the average national income is about 80 to 85 per cent of reported gross national product. This factor together with a plausible allowance for variations in imputations makes the estimates appear quite compatible with reported gross national product. However, there are some noticeable exceptions. The national income estimates for Ghana show a sizeable decline in 1961 that does not appear in the reported gross national product figures. From the estimating side, much of this decline was caused by a sharp drop in government deposits which was not offset by increased currency circulation nor demand deposits in the private sector. It suggests that either the government was repaying foreign debts or that the country had a bad export year. Nevertheless, upon examining the financial accounts of Ghana, it was noted that Ghana's international liquidity fell from 278 million U.S. dollar equivalents in 1960 to 156 million U.S. dollar equivalents in 1961.

In East Africa the national income estimates are compared with gross domestic product at factor costs. The estimates for Uganda and Tanzania are noticeably less than reported income while the national income estimates for Kenya are greater than reported income. In deriving the estimates for East Africa, it was assumed that all three countries had similar currency ratios. On this basis of division of currency between the three countries, it was expected that the estimates for Uganda and Tanzania would be understated, while the estimates for Kenya would tend to be overstated. In addition, many large farms and export-import firms may maintain offices in Nairobi, thereby leading to a concentration of deposits in Kenya even though much of the economic activity takes place in Uganda or Tanzania. Additional information supplied by local banking firms and the new central banks would probably provide monetary data much improved over that used in these estimates.

In two North African countries, Morocco and Tunisia, the national income estimates exceed reported national income in each year, although the percentage year to year change is quite similar. One possible explanation of this is that it is due to the difference between national and domestic product. The United

Nations system of accounts is on a national basis, while the French accounting system used in Morocco and Tunisia emphasized domestic product.¹⁷ Generally, the differences between the two systems can be reconciled by the United Nations Statistical Office. However, in the case of less developed nations adequate data is not always available. Alternatively, the domestic money supply may be overstated due to the inclusion of foreign deposits held in local currency units.

The estimates for Turkey, initially, were quite perplexing. The estimates are only 50 to 65 per cent of Turkey's reported national income. It was not until data on non-monetary imputations were received that the two could be reconciled. Data on imputations furnished by the Turkish State Institute of Statistics indicate that 20 to 30 per cent of reported income is of a non-monetary nature. Once these values are deducted from reported income, the concordance between estimated national income and reported national income is quite striking.

In the case of the Sudan, estimated income increased between 1960 and 1961, and then declined each year thereafter. Reported national income showed the same pattern but did not fall by as much as estimated national income. It is interesting to note that this occurred during a period of inner turmoil on the political scene. In the United Arab Republic, for which gross domestic product at factor cost estimates are available for only two years, the level of estimated national income is quite similar.

For all the underdeveloped countries for which national income was estimated, the regression equations appear to have worked reasonably well. However, it is difficult to evaluate the estimates in some cases because of the wide variation in imputation included in reported values and because of the lack of identical economic aggregates for comparison purposes. The striking advantage of the monetary estimating method is that national incomes can readily be computed and compared with other countries on the basis of money supply data. The concept of money supply used is identical from country to country although the data leave something to be desired. Method A provides an estimate free from imputations and should provide the best means of comparison.

Use of Estimates

Although these estimates need to be labeled as tentative and preliminary in nature, they do permit several observations to be made regarding their use.

First, the problems of comparing income internationally cannot readily be solved. However, the income estimates derived from monetary data for underdeveloped countries appear to be a more consistent measure for application across nations than the use of various national accounting estimates which are still in rudimentary stages of development and contain divergent non-monetary imputations. More importantly, the monetary estimates provide a measure of output for countries which do not have national accounting systems. These estimates, however, still suffer from the same basic comparison problems discussed earlier. They do not reveal anything about individual well-being or the distribution of income within a country. Nevertheless, aggregate income

¹⁷Peter Ady and Michael Courcier, *Systems of National Accounts in Africa* (Paris: Organization of European Economic Co-operation, 1960) pp. 43-63.

TABLE 6—continued

Country and Year	Reported National Income	Non-Monetary Imputations	Monetary National Income
GREECE			
1960	81,400.0	13,665.0	67,735.0
1961	93,400.0	14,528.0	78,872.0
1962	98,900.0	15,681.0	83,219.0
1963	110,200.0	16,508.0	93,692.0
1964	123,700.0	17,556.0	106,144.0
IRELAND			
1960	5,624.0	572.0	5,052.0
1961	7,179.0	626.0	6,553.0
1962	8,668.0	680.0	7,988.0
1963	10,361.0	724.0	9,637.0
1964	13,504.0	788.0	12,716.0
INDIA			
1960	141,400.0	43,770.0	97,630.0
1961	148,000.0	44,000.0	104,000.0
1962	154,800.0	44,660.0	110,120.0
1963	172,900.0	51,050.0	121,850.0
IRAN			
1960	295.0	42.8	252.2
1961	303.7	45.0	258.7
1962	309.3	46.9	262.4
1963	327.2	48.6	278.6
IRAQ			
1960	437.1	38.0	399.1
1961	484.2	45.0	439.2
1962	526.4	43.0	473.4
1963	515.4	40.0	475.4
1964	546.3	48.0	498.3
IRELAND			
1960	536.0	36.6	499.4
1961	579.8	38.0	541.8
1962	623.5	38.6	584.9
1963	658.6	38.0	620.6
1964	752.0	38.5	714.5
ISRAEL			
1960	3,475.0	483.6	2,991.4
1961	4,108.0	562.7	3,545.3
1962	4,895.0	697.9	4,197.1
1963	6,107.0	883.9	5,223.1
1964	7,074.0	1,041.3	6,032.7
JAPAN (one hundred million yen)			
1960	11,557.0	1,503.0	10,054.0
1961	13,760.0	1,717.0	12,043.0
1962	15,400.0	1,991.0	13,409.0
1963	17,703.0	2,278.0	15,425.0
1964	20,047.0	2,615.0	17,432.0
JORDAN			
1960	87.4 ^a	8.9	78.5
1961	108.8	9.3	99.5
1962	106.2	10.3	95.9
1963	115.3	11.4	103.9

TABLE 6—continued

Country and Year	Reported National Income	Non-Monetary Imputations	Monetary National Income
KENYA			
1960	225.5 ^a	50.2	175.3
1961	224.7	47.9	176.8
1962	244.1	63.2	180.9
1963	259.1	66.7	192.4
1964	277.7	68.5	209.2
KOREA			
1960	212,680.0	66,630.0	146,050.0
1961	261,390.0	87,180.0	174,210.0
1962	294,410.0	97,280.0	197,130.0
1963	416,430.0	151,610.0	264,820.0
1964	600,820.0	224,570.0	376,250.0
MALAWI			
1960	42.1 ^a	12.2	29.9
1961	43.5	12.8	30.7
1962	45.3	13.0	32.3
1963	46.7	14.4	32.3
MEXICO			
1960	139.1	6.2	132.9
1961	147.8	6.6	141.2
1962	160.5	7.1	153.4
1963	173.8	7.7	166.1
1964	203.2	9.0	194.2
MOROCCO			
1960	8,010.0	1,000.0	7,010.0
1961	7,840.0	1,000.0	6,840.0
1962	9,370.0	1,000.0	8,370.0
1963	10,480.0	1,000.0	9,480.0
1964	11,030.0	1,000.0	10,030.0
NETHERLANDS			
1960	35,149.0	848.0	34,301.0
1961	37,045.0	924.0	36,121.0
1962	39,591.0	972.0	38,619.0
1963	42,560.0	1,106.0	41,454.0
1964	49,630.0	1,248.0	48,382.0
NEW ZEALAND			
1960	1,121.0	29.0	1,092.0
1961	1,157.0	34.0	1,123.0
1962	1,253.0	44.0	1,209.0
1963	1,377.0	48.0	1,329.0
1964	1,511.0	53.0	1,458.0
PHILIPPINES			
1960	10,604.0	1,019.0	9,585.0
1961	11,737.0	1,138.0	10,599.0
1962	12,971.0	1,235.0	11,736.0
1963	14,776.0	1,412.0	13,364.0
1964	16,019.0	1,532.0	14,487.0
SOUTH AFRICA			
1960	4,282.0	401.0	3,881.0
1961	4,529.0	417.0	4,112.0
1962	4,875.0	434.0	4,441.0
1963	5,397.0	458.0	4,939.0
1964	5,962.0	486.0	5,476.0

TABLE 6—continued

Country and Year	Reported National Income	Non-Monetary Imputations	Monetary National Income
SOUTHERN RHODESIA			
1960	282.4 ^a	16.1	266.3
1961	298.4	16.3	282.1
1962	302.0	16.1	285.9
1963	309.1	19.6	289.5
1964	320.4	20.9	299.5
SWITZERLAND			
1960	31,285.0	1,594.0	29,691.0
1961	34,920.0	1,746.0	33,174.0
1962	38,780.0	1,939.0	36,841.0
1963	42,320.0	2,116.0	40,204.0
1964	46,600.0	2,330.0	44,270.0
TANZANIA			
1960	172.5	62.4	110.1
1961	181.1	67.3	113.8
1962	195.4	74.6	120.8
1963	217.5	75.9	141.6
1964	227.7	72.6	155.1
THAILAND			
1960	47,683.0	7,296.0	40,387.0
1961	50,068.0	7,882.0	42,186.0
1962	54,536.0	8,652.0	45,884.0
1963	57,863.0	9,592.0	48,271.0
TUNISIA			
1960	282.8	46.4	236.4
1961	315.2	49.1	266.1
1962	319.5	49.0	270.0
1963	337.4	50.3	287.1
1964	358.5	50.4	308.1
TURKEY			
1960	44,359.0	13,740.0	30,619.0
1961	46,538.0	14,469.0	32,069.0
1962	52,055.0	16,224.0	35,831.0
1963	59,056.0	18,216.0	40,840.0
1964	62,429.0	21,977.0	40,452.0
UGANDA			
1960	152.1 ^a	41.3	110.8
1961	156.4	45.2	111.2
1962	156.7	40.7	116.0
1963	175.8	47.3	128.5
1964	203.0	54.2	148.8
UNITED KINGDOM			
1960	20,835.0	625.0	20,210.0
1961	22,270.0	651.0	21,619.0
1962	23,211.0	703.0	22,508.0
1963	24,680.0	761.0	23,919.0
1964	26,452.0	805.0	25,647.0
UNITED STATES			
1960	414,500.0	23,600.0	390,900.0
1961	427,300.0	24,800.0	402,500.0
1962	457,700.0	26,000.0	431,700.0
1963	481,900.0	28,400.0	453,500.0
1964	517,300.0	30,500.0	486,800.0

TABLE 6—*continued*

Country and Year	Reported National Income	Non-Monetary Imputations	Monetary National Income
ZAMBIA			
1960	206.6	19.0	187.6
1961	199.7	18.8	180.9
1962	197.0	18.2	178.8
1963	206.5	21.6	184.9
1964	239.9	21.6	218.3

^aGross Domestic Product at factor cost.

NOTES TO TABLE 6—*Source, by Country*

All unadjusted national income figures are taken from the United Nations, *Yearbook of National Accounts Statistics, 1965*. New York: United Nations, 1966.

Australia

Data on non-monetary imputations were supplied by the Commonwealth Bureau of Census and Statistics, Canberra. The data include:

1. Non-monetary rent on dwellings composed of imputed estimates of gross rent less depreciation, plus depreciation of owner-occupied dwellings.
2. Farmers' consumption of own produce. Most egg sales in Australia are made through Egg Boards, but the estimate of self-supplied food includes some eggs which are sold by farmers or back-yard producers.
3. Wage estimates in the Australian accounts nominally include payments in kind, which are not separable.

Austria

Data on non-monetary imputations were supplied by the Osterreichisches Statistisches Zentralamt, Wien. The data include:

1. Imputed rents.
2. Farmers' consumption of own produce.

Belgium

Data on non-monetary imputations were supplied by the Institut National de Statistique, Brussels. The data include:

1. Total imputed gross rent on dwellings. From the Census of 1961, 49.7 per cent of the dwellings were estimated to be owner-occupied. The data has arbitrarily been divided into two equal amounts, one representing owner-occupied dwellings and the other, gross rental income. No further adjustments have been made.
2. Imputed interest allocated to households for free banking services.
3. Farmers' consumption of own produce.
4. Payments in kind were limited to coal and coke supplied to miners.
5. Imputed net rent on government buildings.

Canada

Data on non-monetary imputations were supplied by the Dominion Bureau of Statistics, Ottawa. The data include:

1. Farm consumed farm produce plus food issued to members of the armed forces and to employees in lieu of wages.
2. Imputed net residential rent and imputed residential capital consumption allowances.
3. Imputed non-residential lodging such as bunkhouses, ships, hotels, etc. furnished to employees in lieu of wages.
4. Clothing issued to armed forces, wood fuel cut and used on farms and estimated services rendered by banks without specific charges.
5. Imputed gross rent on government-owned buildings.

Ceylon

The Department of Census and Statistics, Colombo, estimated the non-monetary component of national income to be of the magnitude of 10 per cent of reported income. This figure was used in the compilation of the table.

China

Data on non-monetary imputations were furnished by the Bureau of Statistics, Directorate-General of Budgets, Accounts & Statistics, Taipei. The data include:

1. Imputed rent on owner-occupied dwellings.
2. Payments in kind to civil servants.
3. Farmers' consumption of own product was estimated to be 30 per cent of the agricultural sector. This statistic was used to compute consumption of own product for agriculture from the table—Industrial Origin of Gross Domestic Product—reported in the *Yearbook*.

Denmark

Danmarks Statistik, Copenhagen, estimated the non-monetary component of national income to be of the magnitude of 4 per cent as an annual average. This figure was used in the compilation of the table.

Finland

Data on non-monetary imputations were furnished by the Central Statistical Office of Finland, Helsinki. The data include:

1. Imputations of rent on owner-occupied dwellings.
2. Farmers' consumption of own produce.
3. Non-market logging.

Greece

Data on non-monetary imputations were compiled especially for this study by the Ministry of Coordination, National Accounts Division, Athens. The data include:

1. Imputations for self-consumption of food, wine, and firewood.
2. Imputed rent on owner-occupied dwellings.

Iceland

Data on non-market imputations were furnished by the Economic Institute (Efnahagsstofnunin), Reykjavik. The data were reported in the publication *Ur Ijóarþúskapnum* and include:

1. Percentage home ownership from which rent imputations were calculated on the basis of home ownership.
2. Imputed bank charges which were projected through 1964.
3. Milk consumption by producers.
4. Consumption of farm produce on farms.

India

Data on non-monetary imputations were supplied by the Central Statistical Organization, New Delhi. It was estimated that 57 per cent of agricultural produce is self-consumed and about 85 per cent of dwellings are owner-occupied.

Iran

Data are taken from the United Nations, *Yearbook of National Accounts Statistics, 1965*.

Iraq

Data are taken from the United Nations, *Yearbook of National Accounts Statistics, 1965*.

Ireland

Data on non-monetary imputations were furnished by the Central Statistics Office, Dublin. The data include:

1. Rent of dwellings of which 64 per cent were estimated to be owner-occupied or occupied on special terms such as caretaker, etc.
2. Farm produce and fuel consumed on farm without process of sale.

Israel

Data on non-monetary imputations were furnished by the Central Bureau of Statistics, Jerusalem. The data include:

1. Imputed ownership of dwellings.

2. Other imputations which include farmers' consumption of own produce, payments in kind to house-maids, services in Qibbuzim, and municipal expenditures of Moshavim and Qibbuzim.

Japan

The Economic Planning Agency, Tokyo, estimated that 20 per cent of personal consumption expenditure equal imputed expenditures. This estimate allows for food and fuel used in farm households, payment in kind, imputed rent on owner-occupied homes, financial imputations, medical benefits provided free of charge by social insurance, food and clothing provided members of the Self-Defence Corps, subsidies to school meal programs, etc.

Jordan

Data are taken from the United Nations, *Yearbook of National Accounts Statistics, 1965*.

Kenya

Data are taken from the United Nations, *Yearbook of National Accounts Statistics, 1965*. No imputations are made for owner-occupied dwellings in the subsistence sector.

Korea

Data on non-monetary imputations were supplied by the Bank of Korea, Seoul. The data include:

1. Farmers' consumption of own produce.
2. Imputed rent on owner-occupied dwellings.
3. Payment in kind in the sector of public administration and defense.
4. Imputed services on banking, insurance, and real estate.

Malawi

Data are taken from the United Nations, *Yearbook of National Accounts Statistics, 1965*. No imputations are made for owner-occupied dwellings in the subsistence sector.

Mexico

Banco de Mexico, Departamento de Estudios Económicos, estimated self-consumption or non-monetary transactions to be around 4 per cent of total production.

Morocco

Ministère du Développement Chargé du Plan et de la Promotion Nationale, estimated self-consumption of agricultural produce in Morocco to be in the neighborhood of one billion dirhams annually. No other imputations were made.

Netherlands

Data on non-monetary imputations were supplied by the Netherlands Central Bureau of Statistics, The Hague. The data include:

1. Non-monetary income of military and civil service personnel.
2. Imputed interest on government buildings.
3. Farmers' consumption of own produce.
4. Total rent on dwellings. Imputed rent was estimated as 30 per cent during 1960-1962, 32 per cent in 1963, and 34 per cent in 1964.

New Zealand

Data on non-monetary imputations were supplied by the Department of Statistics, Wellington. The data include:

1. Rental value of owner-occupied houses.
2. Estimates of rations and uniforms of members of the armed forces.
3. Payment in kind such as free housing or free board, lodgings and clothing.
4. Produce consumed on farms by the owner.

Philippines

The Office of Statistical Coordination and Standards estimated that the ratio of income in kind to total family income was about 23 per cent for the period under consideration. This figure has been used in compiling the table.

South Africa

Data on non-monetary imputations were supplied by the Bureau of Statistics, Pretoria. The data were adjusted by adding 10 per cent of the gross domestic product of South West Africa, Botswana, Lesotha and Swaziland to the total imputations. This altered the total of imputations by less than 5 per cent.

Southern Rhodesia

Data are taken from the United Nations, *Yearbook of National Accounts Statistics, 1965*.

Switzerland

The Bureau Fédéral de Statistique, Bern, estimated that the non-monetary component of national income was under 5 per cent of national income. This figure was used in the table.

Tanzania

Data are taken from the United Nations, *Yearbook of National Accounts Statistics, 1965*. No imputations are made for owner-occupied dwellings in the subsistence sector.

Thailand

The National Economic Development Board, Bangkok, estimated that about 19.2 per cent of the total family income was of a non-monetary nature. This figure was used in the compilation of the table.

Tunisia

Data are taken from the United Nations, *Yearbook of National Accounts Statistics, 1965*.

Turkey

Data on non-monetary imputations were supplied by the State Institute of Statistics, Ankara. The data include:

1. Farmers' consumption of own produce.
2. Data on owner-occupied dwellings.

Uganda

Data are taken from the United Nations, *Yearbook of National Accounts Statistics, 1965*. No imputations are made for owner-occupied dwellings in the subsistence sector.

United Kingdom

Data on non-monetary imputations were furnished by the Central Statistical Office, London. The data include:

1. Imputed rent on owner-occupied dwellings.
2. Income in kind included in income from employment.

United States

Data on non-monetary imputations were taken from the Department of Commerce, *The National Income and Product Accounts of the United States, 1929-1965*. Washington: Department of Commerce, 1966. The data include:

1. Wage and salary imputations.
2. Imputations for proprietors income.
3. Imputed value of rent on owner-occupied dwellings.
4. Services furnished without payment by financial intermediaries.

Zambia

Data are taken from the United Nations, *Yearbook of National Accounts Statistics, 1965*. No imputations are made for owner-occupied dwellings in the subsistence sector.

APPENDIX B

TABLE 7
MONETARY DATA FOR UNDERDEVELOPED COUNTRIES, 1960-1964
(millions of local currency units)

Year	Currency Outside Banks (1)	Demand Deposits		Time and Savings Deposits (4)	Claims on Private Sector (5)	Bank Debits (6)
		Private Sector (2)	Government Sector (3)			
CAMEROON (millions of CFA francs)						
1960	8,550	5,790	2,790	880	14,480	—
1961	8,380	6,010	3,840	930	15,600	—
1962	10,070	8,110	4,490	1,350	19,710	—
1963	11,280	7,620	8,520	2,170	23,380	—
1964	11,830	9,160	10,820	2,700	26,770	—
CENTRAL AFRICAN REPUBLIC (millions of CFA francs)						
1960	1,630	1,160	20	90	3,070	—
1961	1,590	1,330	20	110	4,050	—
1962	1,830	1,620	170	140	4,110	—
1963	2,380	1,870	160	200	4,540	—
1964	2,140	2,000	1,380	270	4,750	—
CHAD (millions of CFA francs)						
1960	4,200	1,110	50	120	2,690	—
1961	4,180	1,430	60	290	4,150	—
1962	4,390	1,440	190	410	4,030	—
1963	5,140	1,870	630	320	4,910	—
1964	5,000	1,530	1,580	270	5,370	—
CONGO, BRAZZAVILLE (millions of CFA francs)						
1960	3,080	4,270	460	790	7,180	—
1961	3,510	4,650	960	1,080	8,490	—
1962	3,240	5,050	1,750	800	8,100	—
1963	3,300	5,140	510	1,020	9,420	—
1964	3,000	4,580	1,460	1,090	10,290	—
DOMINICAN REPUBLIC (millions of pesos)						
1960	48	54	21	29	90	114
1961	52	48	19	24	80	111
1962	62	51	28	28	98	136
1963	74	56	27	42	66	170
ETHIOPIA (millions of Ethiopian dollars)						
1960	155	63	74	43	93	93
1961	166	62	78	47	99	103
1962	179	69	93	52	120	106
1963	192	68	82	47	130	124
1964	222	82	64	69	158	150
GABON (millions of CFA francs)						
1960	2,940	2,610	120	210	2,850	—
1961	3,510	2,860	290	210	4,410	—
1962	4,060	3,130	170	330	5,630	—
1963	4,580	3,380	160	480	7,670	—
1964	4,760	3,640	500	420	8,440	—

TABLE 7—continued

Year	Currency Outside Banks (1)	Demand Deposits		Time and Savings Deposits (4)	Claims on Private Sector (5)	Bank Debits (6)
		Private Sector (2)	Government Sector (3)			
JAMAICA (millions of Jamaican pounds)						
1960	8	19	23	25	39	25
1961	9	15	20	28	44	27
1962	9	22	16	33	41	24
1963	10	20	19	41	38	29
1964	11	22	20	46	52	31
KENYA (millions of East Africa pounds)						
1960	29	33	8	17	40	—
1961	28	32	9	18	36	—
1962	28	32	14	20	35	—
1963	32	32	16	21	42	—
1964	34	33	17	20	28	—
MOROCCO (millions of dirhams)						
1960	953	1,616	267	227	1,237	—
1961	956	1,725	107	221	1,497	—
1962	1,113	2,050	41	249	1,697	—
1963	1,290	2,135	23	223	1,808	—
1964	1,278	2,239	98	190	1,931	—
NICARAGUA (millions of cordobas)						
1960	135	115	35	20	361	307
1961	131	130	30	24	377	331
1962	167	164	43	25	413	416
1963	177	201	65	40	452	494
1964	185	257	87	73	559	617
NIGERIA (millions of Nigerian pounds)						
1960	79	39	33	30	55	—
1961	79	39	34	38	59	—
1962	80	39	37	43	87	25
1963	84	41	21	50	104	31
1964	99	46	19	60	124	41
SOMALIA (millions of Somali shillings)						
1960	63	43	1	12	25	—
1961	76	61	1	18	37	—
1962	80	67	1	21	71	—
1963	97	77	3	24	106	—
1964	101	72	4	28	179	—
SUDAN (millions of Sudanese pounds)						
1960	20	17	62	4	35	12
1961	24	20	51	5	39	15
1962	28	24	42	7	47	17
1963	31	25	36	8	60	20
1964	33	25	16	9	58	18
TANZANIA (millions of East African pounds)						
1960	11	12	3	7	15	—
1961	10	13	8	8	13	—
1962	10	16	12	10	18	—
1963	12	19	9	13	21	—
1964	13	17	16	11	24	—

TABLE 7—continued

Year	Currency Outside Banks (1)	Demand Deposits		Time and Savings Deposits (4)	Claims on Private Sector (5)	Bank Debits (6)
		Private Sector (2)	Government Sector (3)			
TUNISIA (millions of dinars)						
1960	37	51	19	7	68	30
1961	43	52	13	11	80	36
TURKEY (millions of liras)						
1960	3,828	1,676	2,493	4,527	13,920	1,570
1961	4,140	1,781	2,194	5,098	9,350	1,800
1962	4,526	1,818	2,668	5,690	11,690	2,180
1963	4,926	1,864	2,547	6,854	14,100	2,550
1964	5,690	2,610	2,763	7,783	15,820	2,710
UGANDA (millions of East African pounds)						
1960	7	8	1	6	14	—
1961	7	9	2	7	14	—
1962	7	9	3	7	16	—
1963	8	10	3	7	18	—
1964	8	10	8	10	22	—
UNITED ARAB REPUBLIC (millions of Egyptian pounds)						
1960	220	186	77	120	256	480
1961	256	199	76	129	262	545
1962	276	167	60	187	291	612
1963	345	171	81	232	317	778
1964	417	199	129	247	329	1,504
URUGUAY (millions of pesos)						
1960	1,235	918	653	2,874	4,592	1,804
1961	1,573	1,052	759	3,362	5,265	2,459
1962	1,792	882	476	3,708	6,078	2,847
1963	2,226	1,268	458	4,384	7,478	3,370
1964	3,084	1,932	871	5,626	11,737	3,600
VIET-NAM, SOUTH (millions of piastres)						
1960	11,230	5,540	2,770	1,270	4,340	4,100
1961	12,210	5,010	1,620	1,350	5,700	4,740
1962	13,150	6,320	2,920	1,320	6,950	4,760
1963	15,540	6,750	3,110	2,490	7,480	5,500
1964	19,000	8,420	3,420	2,910	7,620	6,110

Source: International Monetary Fund, *International Financial Statistics*, 1960-1965.

(1) Currency outside banks includes Treasury currency issues where reported. The currency circulation in East Africa has been arbitrarily divided between the three countries on the basis of their respective demand deposits.

(2) Demand deposits of private sector include Treasury demand deposits, development bank demand deposits, post office demand deposits, as well as demand deposits at the central and commercial banks.

(3) Government deposits at central, commercial and development banks are aggregated in this column.

(4) Time and savings deposits reported at all financial institutions, and including post office savings.

(5) Credit outstanding to the private sector only.

(6) Bank debits or clearings of reporting countries.

Dans beaucoup de pays sous-développés, il n'est guère possible aujourd'hui de disposer ou de se fier à des statistiques appropriées en vue d'estimer la production nationale par les méthodes traditionnelles de comptabilité nationale. Néanmoins, la plupart de ces mêmes pays publient des données sur des variables monétaires à un stade moins avancé de leur développement.

Dans cette étude, l'offre de monnaie a été défini de manière à inclure toutes les espèces de cours, les dépôts privés effectués par chèques bancaire ou postal, tous les dépôts du gouvernement et les découverts inhabituels moins les emprunts émis. Les données des comptabilités nationales ont été tirées des publications des Nations Unies et de divers bureaux statistiques étrangers. Afin de rendre les comptabilités plus comparables en termes de ce qu'elle recouvre et afin de limiter le revenu déclaré au secteur monétisé de l'économie, on a négligé les imputations non monétaires.

Les données de comptabilité nationale et monétaires ont été combinées dans une régression multiple et échelonnée. Le revenu national a été traité comme la variable dépendante et l'offre de monnaie et autres données, comme les variables indépendantes. Les équations d'estimation finales ont expliqué environ 96 pour cent de la variation du revenu entre pays. On a effectué d'autres tests en utilisant le taux de liquidité, la vitesse de transaction, la population et la consommation par habitant. Cependant, ces variables n'ont en rien accru la puissance explicatrice des équations de régression.

Quand les équations ont été utilisées pour estimer les revenus nationaux de vingt-deux pays sous-développés, les estimations ainsi obtenues ont paru concorder étroitement avec le revenu déclaré, là où il existait à des fins de comparaison. La conclusion à tirer est que les données monétaires peuvent être utilisées pour estimer le revenu national de pays sous-développés avec un assez grand degré de précision que ce soit entre pays ou entre années pour un même pays.