AN ANALYSIS OF INFLATION IN JAMAICA

A DISCUSSION PAPER

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JAMAICAN INFLATION 1959 - 1972

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INTRODUCTION:

The objective of this paper is to focus attention on one of the major problems which Jamaica faces today, that is, inflation.

Although several statements have been made in the local press and in other seminars about the high rate of inflation that has been evident in Jamaica for over the last two decades, so far few rigorous attempts had been made to identify and isolate the real causes of the inflationary spiral.(1) It has been felt by economists both in Government and University circles that the inflationary spiral in Jamaica has been caused by an increase in the money supply. An expansion in the money supply had the effect of increasing effective demand at a period when there was a relative decline in productivity in the Jamaican economy.

Other economists while not disagreeing with the preceding view felt that too great an emphasis was placed on increases in the money supply. They held the view that the inflationary spiral was due in the main to rapid increases in the cost of production which were passed on to consumers. The high incidence of cost inflation was attributed to two factors: firstly, to an ex-

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horbitant increase in the local wage bill due to vigorous trade union bargaining and secondly, to too rapid increases in the price of raw material inputs and food which were mainly imported.

A final school of economic thought in Jamaica held the view that the inflationary spiral in Jamaica has been mainly due to the structural imbalances that originated in the colonial era and still persist today. It is important to note that cost inflation is thought of as a specific form of structural inflation with the cost push being initiated in the modern sector of the Jamaican economy and later being transmitted to the traditional sector.

It is of utmost importance to determine whether or not inflation in Jamaica has been caused by the excessive wage demand of Trade Unions, or by much too rapid increases in public expenditures or by rapid price increase in metropolitan economies, in addition to the structural rigidities which are inherent in the Jamaican economy.

The focus of this paper, however, is not on the above contributory factors. Instead, attention is directed to some often neglected aspects of Caribbean inflation. To be more specific, the objective of our exercise is three-fold; firstly, to analyse the trend in consumer prices in Jamaica over the period, 1959-1972; secondly, to analyse the actual and expected rates of inflation over the same period;[2] and thirdly, to investigate the effects of inflation on money demand.

SECTION I: TREND ANALYSIS OF JAMAICA INFLATION

In order to investigate the movements in domestic consumer prices, both inter-temporarily and spatially, we decided to utilise the existing data on consumer price indices as published by the Department of Statistics. These indices pertained to both Rural and Urban Jamaica. Because a high degree of aggregation bias is likely to exist in annual data, the quarterly data series were utilised.

The analysis was then undertaken over the two time periods which we felt would capture most adequately the significant changes in prices that had occurred both in the pre-1967 and post-1967 devaluation periods. The first period extends from the first quarter 1959 to the fourth quarter 1967, while the second period commences in the first quarter 1968 and concludes in the fourth quarter, 1972. Growth rates were calculated for each of the major commodity groupings included in the consumer price index using both the linear and geometric trend approaches. The results obtained are given in Table A1 in the Appendix.

As indicated by the figures given in the Table, the rate of growth of the All Item Price Index for Kingston over the period first quarter 1959 to the fourth quarter 1972 was rapid, averaging 0.97 per cent per quarter. That this rapid increase was not due to an increase in wage rates as a consequence of aggressive trade union bargaining is evident from the fact that the rate of growth of the wage index was significantly lower than that of the All Item Urban Index, being 0.74 per cent per quarter. This is also shown on

Table A1.

While it is felt in some quarters that the rapid increase in prices in an inflationary situation is dampened by an increase in imports, this does not seem to be the case in Jamaica; instead, we feel that the rapid increases in imports as indicated by a growth rate in the quarterly import index of 0.98 per cent may have been responsible for a large proportion of the domestic price increases.

Turning now to the components of the All Item price index in the Urban Area (KMA), we see that there existed a great deal of variation between these components. In this context, it is interesting to note that the rate of growth per quarter of the various components of the All Item Index over the whole sample period were as follows:-

Food and Drink	.....	0.97%
Housing	.....	0.92%
Household Furnishing	.....	0.50%
Clothing	.....	0.77%
Personal Expenses	.....	1.37%
Transportation	.....	1.97%

Judged by the coefficient of variation, the greatest fluctuation seemed to have occurred in clothing (.019) closely followed by Housing (.015), food (.014) and fuel (.012).

With respect to the sub-period analysis of the Urban Price Index, the estimates of growth rates indicated that the prices of all of the components of the All Item Index grew at a much more rapid

rate during the period, fourth quarter 1967 - fourth quarter 1972, when compared with the earlier period, first quarter 1959 to third quarter, 1967. It is shown that while the price of food and drink in Kingston rose by only 0.57% per quarter between first quarter 1959 and fourth quarter 1967, the growth rate more than doubled between the fourth quarter of 1967 and the fourth of 1972. In the latter period, the growth rate of food and drink increased by approximately 1.95% per quarter. A tendency towards a two to fourfold increase in the rate of growth of prices as between the both periods was also evident in the cases of Fuel and Housing. In the case or Personal Expenses and Clothing the increases were not as significant varying from 1.25% to 1.32% and from 0.55% to 1.00% respectively. A notable exception to this attern, however, was the price of household furnishing whose growth rate actually fell from 1.60% in the first period to 0.85% in the post-1967 period.

To a large extent the results obtained for food, fuel and Housing was not expected since a high proportion of these commodities were imported and Jamaica had devalued in 1967. The most plausible explanation for the trend in Household Furnishing seems to be the fact that the various governments of Jamaica had been pursuing vigorous policies of industrialization since the early 1950's, and it is precisely industries such as those producing household furnishings which were mainly nurtured. The net effect of these policies then seemed to be an increase in the supply of those commodities on the domestic market and a subsequent lowering of prices.

The pattern of high rates of growth in the prices of food

and clothing which was evident in Kingston also seemed to have persisted in rural areas of Jamaica. This is shown by the figures in Table A2 of the Appendix. In this context, it is interesting to note that while the retail price index for food and fuel in the Kingston area grew at the rate of 0.98% and 0.97%, for Rural Areas, the rates of growth were 1.77% and 0.92% respectively. The rapid rate of growth in the price of fuel in Rural Areas could have been both the cause and effect of increases in the cost of transportation. However, in the case of food, inasmuch as Jamaica has always been predominantly agricultural, a large proportion of households should supply themselves with a large part of the food they consume. If so, then the impact of any increases in the prices of imported food items ought not to be felt by these households. That this was not the case seems to indicate that much of rural consumption requirements are not supplied directly from rural output.

Looking at the other components of the All Item Rural price index, we see that the rate of growth of clothing was 0.90% as compared to 0.77% in the Kingston area. For housing and household furnishing the growth rates were 0.71% and 0.65% respectively. In fact, for almost all commodity groups, except fuel and personal expenses, the rural growth rates were higher than those in Kingston. In the case of the All Item Rural index, the rate of growth (by the geometric definition) was also higher than in Kingston being 1.04% as compared to 0.97% in the latter location (KMA).

The coefficients of variation indicate that the commodity group "fuel" experienced the greatest fluctuation being followed by

"clothing" and "personal expenses", both having coefficients of variation of .0146. The coefficients of variation for the different commodities over the sub-periods again indicated that the prices of non-durables, such as food, were rather more stable than those of durables, for example, housing.

Comparing the variations in all commodity groupings over the entire period of analysis we can only conclude that their persistent variation may be nothing more than a reflection of the inherent instability of the Jamaican economic structure as well as the social system.

In terms of the intra-period growth rates our calculations indicated that the rates of growth of the All Item Price Index and its components were consistently lower in the pre-1967 devaluation period. Thus we see that while for the period first quarter 1959 to third quarter 1967, the rates of growth of food, fuel, clothing, housing and household furnishing were .014, .002, .016, .017 and .008 respectively, in the period fourth quarter, 1967 to fourth quarter, 1972, the rates of growth were 2.03, 1.77, 0.81, 1.19, 1.74 and 1.28 respectively.

So far our analysis of the trends in consumer prices in Jamaica has been based on data obtained from the various household budget surveys undertaken by the Department of Statistics. To a large extent the weights used and hence the results obtained were largely determined by the prices of the various commodities which were included in the "basket of goods" selected by the Department of Statistics as being representative of the items chosen by an

"average" Jamaican household.

An apparent shortcoming of this approach stems from the fact that in Jamaica, the practice has been to select the representative household from the lower income strata of the Jamaican society. To all intent this practice may have been valid in the pre-1950 era when incomes in the Jamaican society may have been more evenly distributed and people's tastes may not have been as sophisticated as it was over the period of our analysis. The argument is usually put forth that inasmuch as households of the lower income groups form the bulk of consumers in Jamaica any index derived from commodities purchased by these households must be truly representative. There is some merit in this argument but the major factor that militates against its unqualified acceptance is the fact that lower income consumers may indulge in forms of expenditure which may be mainly associated with people in higher income groups. To the extent that the latter type of consumer does not provide information on his expenditures to the enumerator, some commodities may be given very low weights in the construction of the price index. Thus a major limitation of the existing Jamaican consumer price indices seems to be in its exemption of certain categories of consumers, notably, consumers within high income groups.

SECTION II - THE ACTUAL AND EXPECTED RATES OF INFLATION[3]

Notwithstanding the apparent shortcoming on both the rural and urban consumer price indices we utilised the urban index for the computation of actual and expected rates of inflation over the period January 1, 1959 to December 31, 1972. For the calculation of the expected rate of inflation we made the assumption that Jamaican consumers had some notion of what future price increases would be and their ideas about future price increases were derived from their past experiences about price increases. Since the expected rate of increase in prices was not an observable variable we resorted to the use of a proxy variable[4] introduced into the literature by Fisher (5), (6), and extensively utilised by Cagan (2).

Cagan in his seminal work on hyper-inflation assumed that the expected rate of change of prices is revised per period of time in proportion to the defference beteeen the actual rate of change in prices and the rate of change that was expected. The relationship between the expected rate of change in prices andactual price can be expressed as:

$$E_t = (1 - e^{-B}) \sum_{i=o}^{\infty} C_{t-i} \; e^{-Bi} \qquad (1)$$

or

$$E_t^{(5)} = (1 - e^{-B}) \; C_t + (e^{-B}) \; E_{t-1} \qquad (2)$$

Where "E_t" represents the expected rate of inflation in any given month; "C_t", the current rate of inflation in the current month; "E_{t-i}", the expected rate of inflation in the preceding month;

'B', the coefficient of expectation and "e", the base of the natural logs.

In addition, it may be noted that 'i' the horizon is assumed to be settled in some period in the past and this facilitates setting the initial value of the expected rate of inflation to zero. Insofar as the coefficient of adjustment (B) is concerned, this is the constant of proportionality in the basic assumption. Essentially, the value of the coefficient of expectation indicates the speed with which expectation adjust to changes in the actual rate of increases in prices. From this one can also infer that the higher the coefficient of expectation the higher will be the proportion of current prices considered in the expectations formed by economic agents. It is customary when forming the expectation variable to utilise 1/B periods, but in general the coefficient of expectation must not exceed 10 for at this value the expected rate of change is equal to the actual rate of change in prices.

Because we feel that prices in the Rural Areas of Jamaica are to a large extent determined by Urban price changes, our analysis of the rates of inflation in Jamaica was based solely on the data from the Urban Price series. In order to compute the expected rate of inflation, we applied Equation 1 to the current rate of change of prices commencing in January, 1956 (that is, a horizon of three years was utilised). The derived series are given in Table 1 below.

The results indicate that the actual rate of inflation fluc-

tuated widely over the period 1959 to 1972. Nevertheless, the period 1960 to 1966, was one of marked decline in the inflationary spiral reaching an all time low of 0.035 points per month for 1965. The estimates also indicated that there was a sharp increase in the rate of inflation between 1966 and 1967 (from 0.150 to 0.241 points per month) but by 1968 this rate of increase fell by almost one half. A possible explanation may be the long delivery lags for imported goods which prevented an instantaneous adjustment of domestic prices to devaluation.

However, by 1969 the full brunt of the impact of the price increases brought about by the devaluation seemed to have been absorbed by the Jamaican economy. The net effect of this being a sharp increase in domestic price levels (.509 points per month) during the year. By 1970 the rate of inflation exhibited a fall but this was only short-lived for by 1971 it rose again to an all time high of .805 points per month. At the end of our period of analysis, that is, 1972, the rate of inflation dropped slightly from its peak of 0.805 to 0.645 points per month.

As will be observed on Table 1, there exists different values of expected rates of inflation for each of the coefficient of sdjustment chosen, hence it is difficult to ascertain which is the most appropriate expected rate of inflation for a given time period. To guide our choice of optimal expected rate of inflation, we resorted to both economic theory and statistical procedures. According to the theory of the demand for money, the expected rate of inflation is a determinant of money demands. We therefore re-

gressed the real cash balance on the expected rates of inflation associated with different coefficients of expectation, we then chose as optimal that coefficient of expectation (and hence expected rate of inflation) which gave the highest coefficient of determination (R^2).

We utilised the following functional relationship.

$$M/y = e^{-aE+b} \qquad (3)$$

Where M is real money stock,

Y is real output, and

E is the expected rate of inflation.

The above equation indicates that the demand for real cash balances per unit of real output is a function of the expected rate of change of prices per month. By a further process of linearization, that is, by taking log transforms of the basic equation, the estimating equation was then obtained as:

$$\log M/y = -a E + b \qquad (4)$$

where 'a' and 'b' are the intercept term and slope coefficient respectively.

Because different empirical definitions of the money stock may lead to different results, three definitions of money stocks (MS I, MS II, MS III)(6) were regressed on the expected rate of inflation. The three best results in term of low standard errors and high R^2, were chosen for each of the variant of money stock as well as the different values of the adjustment coefficient for real cash balances.

In order to investigate whether or not the coefficients of adjustment shifted overtime it is also necessary that we investigate the movement between the rate of inflation and real cash balances in the sub-periods. However, because we had to resort to the use of annual data, the limited number of observations at our disposal prevented such an approach.

As indicated by the results in Table 2, the first variant of the real cash balances when regressed on the various expected rates of inflation did not give a good fit as evidenced by the low R^2 and high degree of serial correlation. For example, with a coefficient of adjustment of .02 the value of the coefficient of the explanatory variable 'E' was statistically significant at the 10% level, but when we increased the coefficient of adjustment it led to a further decrease in the explanatory power of the various equations. In other words, an increase in the coefficient of adjustment from .02 to .12 and .16 led to a fall in the explanatory power of the estimated equations from 0.582 to 0.531 respectively. The poor fit between the first variant of the real cash balance and the expected rate of inflation is not too unreasonable when we consider that the coefficient of adjustment that we chose may have been significantly different from the true coefficient of expectation. On the other hand the variation may have been due to the fact that there were other variables not included in our model which affected the demand for real cash balances.

We then proceeded to use a more expansive variant of the real cash balance, that is, MS II. The results obtained from fit-

ting this variant of real cash balance to the various expected rates of inflation were better. For example, when we utilised a coefficient of expectation of .02 the expected rate of inflation explained over 90% of the variation in the real cash balance. The high explanatory power of the functional form chosen was also evident when larger coefficients of adjustments were utilised. When the coefficient of adjustment was increased from .02 to .12 and .16 then our estimated equation explains 68.4% and 74.4% of the variation in real cash balances respectively.

In the case of the third variant of real cash balances the use of a coefficient of adjustment of .02 also gave a good fit as indicated by the high values of R^2 as well as the Durbin-Watson 'D' statistic. However, the explanatory power of the estimated equations fell as the coefficients of adjustment were increased from .02 to .12 and .16. When the coefficient of adjustment was .12, the estimated equation explain only 59.0% of the variation in real cash balance; however, when the adjustment coefficient is increased to .16 the explanatory power of the equation correspondingly falls to 58.2%.

As a result of our plotting the adjusted coefficients of multiple determination against the corresponding value of the coefficient of adjustment, we decided that the optimal value of the latter coefficient exists when B = .02. In other words, our "goodness of fit" criterion indicated that the expected rate of inflation series derived by assuming B = 0.2 explain a larger proportion of the variation in the dependent variable than any other configura-

tion of the coefficient of adjustment; hence it was chosen as the best fitting series.

The magnitude of the coefficient of expectation (.02) clearly indicated that the average length of weighting patterns was a little more than four years (50 months). A comparison of the expected series generated by the above coefficient, with the actual rate of inflation series gives a rough indication of the overall effect of price expectations in the Jamaican inflationary process. Observe (Table 1) for example, that over the period of analysis the expected series was invariably greater in magnitude than the actual series; the only exception being 1968. Also, the turning points in the expected series occurred later than those in the actual series. In column II, we have reported the differences in both series. It can be observed that while both series showed considerable variation over the period of analysis, the actual rate of inflation, ranging from - .035 points to .805 points and the expected rate of inflation from -3.271 to 6.211 points, the differences were much more consistent ranging from -3.447 points to 3.258 points.

Together, the preceding factors indicated that price expectation effects did not have an instantaneous impact upon domestic price formation, but filtered its way through the economy. In addition, the above analysis indicated that the Jamaican consumer was "pessimistic" insofar as government price control policies were concerned.

SECTION III: THE VELOCITY OF MONEY AND THE RATE OF INFLATION

It has been recognised that one of the major factors influencing the rate of inflation has been the velocity of money. The relationship between these two variables can simply be described as one wherein any increases in the velocity of money lead to an acceleration in the rate of inflation, and conversely a fall in money velocity has the opposite effect.

Implicit in such a relationship, however, is the notion that small increases in prices will not effect the velocity of money appreciably. While on the other hand, significant changes in the rate of inflation can and do lead to significant changes in money and this can be measured. In a situation of rapid increases in prices it will be relatively unattractive for an individual to hold cash balances vis-a-vis assets held in other forms. However, any switch from nominal to real cash balances must of necessity lead to a bidding up of prices and a corresponding increase in the velocity of money.

So far it has not been shown whether there is a significant relationship between the velocity of money and the rates of change in prices in Jamaica. This type of analysis has been undertaken in many countries. For example, Cagan investigated the incidence of hyper-inflation in seven European countries after World War I and during World War II. His study centred on the relationship between velocity of money and the expected rate of inflation. Our aim at this point in the study will be to examine the relation-

ship for Jamaica. The discussion is based on the regression results presented in Section II, and on the data in Tables 3 and 4.

The evidence as presented in Table 4, indicates that up to 1960, the M_1/Y ratio rose quite rapidly as per capita income rose, but over the succeeding years the ratio exhibited a great deal of fluctuation despite the continuing upward trend in per capita income.

To some extent the wide fluctuation in the income velocity of circulation associated with the M_1/Y ratio, can be explained by the fact that during periods of buoyant export prices, domestic income reacted almost instantaneously, whereas the commercial banks being in the main branches of metropolitan banks, tended to be cautious and passive in their operations, in which case there was a tendency towards restrain in the use of bank money. In other words, during such periods (periods of boom in the export sector) the public demand for very active cash balances was greater than the supply, and this led to an increase in the velocity of circulation. The converse was also true.

Comparing the movement of the M_2/Y ratio or K_2 ($M_2 = M_1 + TD$)[7] with that of income per capita, it shows that M_2/Y rose, though marginally, over the first two years of the period being reviewed, but fell in the two succeeding years. The fluctuation in M_2/Y continued up to 1966, but thereafter the trend in M_2/Y was markedly upwards. Inasmuch as time deposits increased as the monetization of the economy increased, the upward trend in the M_2/Y ratio in the post 1966 era indicated not only an increase in the

holding of cash balances for transaction, but also an increase in the public holdings of time deposit as a store of value. Second, due to perturbations in the international economy and their subsequent influence on the Jamaican economy through the bauxite, tourism and banking sectors, exogenous impulses had a great impact on the level of domestic economic activity. As income fluctuated within the aforementioned sectors of the economy the importance of time deposits moved in sympathy. This meant that in certain critical years (1962 and 1967), the element of cash balance for transaction purposes within M_2/Y dominated the store of value element.

Turning now to a comparison of the M_3/Y ratio and per capita income, it can be observed in Table 4 that there was less fluctuation in this ratio when compared to M_1/Y and M_2/Y ratios as income rose. In fact, it was only over the first four years of the period being reviewed did the M_3/Y ratio exhibit a small degree of fluctuation, but in the subsequent years the series exhibited a perceptible upward trend. The upward trend in the M_3/Y ratio clearly indicate that the high deposit rate after 1965 had the stimulating effect of inducing much more positive saving habits within the Jamaican economy.

Another possible interpretation may have been the widespread and increasing tendency to hoard cash induced by the financial uncertainty that developed after 1967. Such as interpretation seems to be valid when one looks at the figures in Table 4, for the data clearly show that after 1967 there was steady fall in the velocity of circulation associated with the M_3/Y ratio. This finding

also implies that after 1967 there was a growth in the precautionary demand for money (hedging against liquidity) which prevailed over any tendency towards a movement into goods (hedging against purchasing power deterioration).

Furthermore, the trend in the M_3/Y ratio also seem to indicate that money illusion remained strong enough to preclude any development of hyper-inflation. Thus, hoarding had a stabilising effect on the monetary situation in that it dampened the effect of a rapidly rising money supply on the price level and money income. Implicitly, increased taxation of households can be seen as an attempt to forestall the inflationary threat that was being posed by the increased monetary hoards.

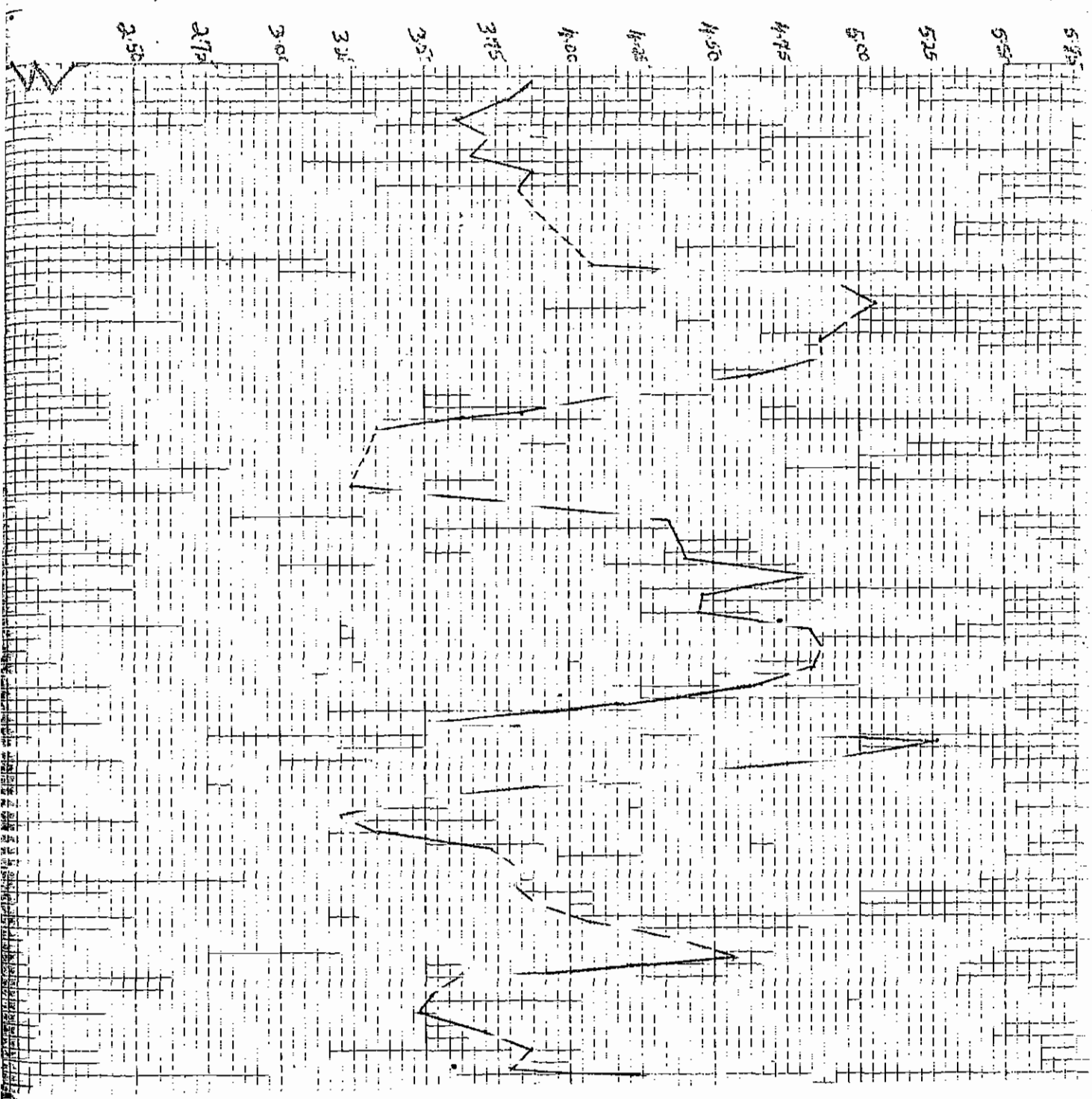
The time series of Treasury bill rates (Fig. 1) which highlight the movement of interest rates within the Jamaican money market, show that the interest rate rose rapidly up to 1962, fell in 1963-64 and fluctuated at a high level in 1965 and subsequent years. The influence of the interest rate on M_1/Y can be said to be insignificant up to 1960 because of its relatively low level. However, in the post 1960 years the increases in interest rates may have led people to hold less cash balances and so caused the M_1/Y ratio to decline.

Correspondingly, the fluctuations in the interest rate did not seem to have affected the M_2/Y ratio between 1959 and 1972; instead the Jamaican government policies, initiated after 1962, of limiting the overseas investment of institutional savers had the stimulating effect of attracting more time deposits and hence caused M_2/Y

to rise. The insignificance of the interest rate coefficients in the empirical analysis substantiated this argument.(9) While the influence of the interest rate on M_3/Y did not seem to be significant before 1965, increases in the deposit rate after that year may have been instrumental in enhancing the attractiveness of saving deposits, and this in turn may have led to an increase in the M_3/Y ratio.

There was an inflationary pressure within the Jamaican economy in the 1950's, due to rapid expansion of the mining sector. The boom in manufacturing and tourism sectors in the early 1960's accentuated the upward movement in consumer prices and prices increased further by the devaluation of sterling in 1967. From 1967 onwards, increases in prices remained virtually unchecked. Theoretically, people's expectation of rising prices may cause them to "economize" in the use of their cash balance, thus causing the M_1/Y ratio to fall. But conclusive evidence does not exist on the influence of price movements on M_1/Y. Insofar as the influence of price movements on M_2/Y and M_3/Y is concerned, the following interpretation seems tenable: the inflationary pressures within the Jamaican economy in the post 1959 era caused people to deposit less in time and savings deposits and this in turn caused M_2/Y and M_3/Y to smaller than they normally would have been.

Next, we turn to the statistical analysis of the relationship between the expected rate of inflation and the three variants of real cash balances. Recall that in Section 2 we chose as being optimal that expected rate of inflation series that had a coeffi-


% PER QUARTER
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cient of adjustment of 0.2. A careful evaluation of the empirical result obtained by regressing the most active variant of cash balance, M_1/Y, on this series clearly reveal that there occurred a shift, though not significant, from cash to real assets within the Jamaican economy over the period 1959 to 1972. The coefficient of E was statistically significant. Furthermore, as the result showed, the demand for M_1/Y with respect to the expected rate of inflation was inelastic: inelastic in the sense that a one per cent increase in the expected rate of inflation led to a 0.457 per cent increase in real cash balances. This tendency of a shift towards real assets within the Jamaican economy was further substantiated by the results obtained when we regressed the less active variants of cash balances, M_2/Y and M_3/Y, on the optimal rate of inflation. The coefficients of determination were high, being .910 and .832 respectively. While the coefficients of the expected rate of inflation were theoretically correct as well as being statistically significant, the mean expected rate of inflation of 1.409 gave elasticities of demand for real cash balances per unit of output of 1.308 and 1.405 respectively.

In the existing literature, a similar study has been undertaken by Campbell (4), using both South Korean and Brazilian data. Comparing with his results, we found that our results seem to be very reasonable. In this context, Campbell found that during the period of relatively low rates of inflation in Brazil (1948-1957), the best coefficient of expectation was 2 per cent. The elasticity of demand for the most active form of real cash balance per unit of

output (M_1/Y) with respect to the expected rate of inflation that he obtained, was slightly less than that which was derived in this study (that is, .319).

At this point it may be noted that the elasticities we estimated for the more expansive variants of real cash balance (M_2/Y and M_3/Y) seemed to be somewhat lower than expected, but we were unable to check the consistency of these estimates with Campbell's work as his analysis was confined to the most active variant of real cash balance.

For comparison, the real cash balance elasticities implied by Campbell's estimates, are presented below:-

TABLE 5

Elasticities of the Index of the Real Value of the Money Stock Per Unit of Output (M/Y) With Respect To The Mean Expected Rate of Inflation ($\bar{E}$).

SOUTH KOREA: JANUARY 1953 - JUNE 1961 (102 months) (1953 = 100)

Min.M_1/Y	Max.M_1/Y	Mean M_1/Y	Min. $\bar{E}$	Max. $\bar{E}$	Elasticity
73.2	255.2	168.0	2.77	6.88	.421

BRAZIL: JANUARY 1948 - DECEMBER 1957 (120 months) (1953 = 100)

Min.M_1/Y	Max.M_1/Y	Mean M_1/Y	Min. $\bar{E}$	Max. $\bar{E}$	Elasticity
97.3	112.0	95.2	.74%	1.04%	.319

Source: Campbell op cit.

Finally, in an attempt to guage the effect of both per capita income and the domestic rate of interest (Treasury bill rate) on real cash balances, the model was extended to include these variables.(8) Serious auto-correlation was evident in the error term of each of the equation that we estimated. Moreover, the computed coefficients of both variables were found to be insignificantly different from zero. These results seem to indicate that per capita income and domestic interest rate had a negligible influence on the income velocity of money.

SECTION IV - SUMMARY AND CONCLUDING REMARKS

Several tentative conclusions can be drawn from our analysis.

First, we have observed that the per cent rate of increase in prices within the Jamaican economy was quite rapid over the period 1959-1972, and a major contributory factor was the rapid increase in the price of imports.

Second, the disaggregated approach in analysizing the trend in prices is superior to the aggregate approach in terms of revealing the items that were mainly responsible for the increases in the cost of living.

With the disaggregated approach, we have shown that increases in the prices of transportation and personal expenses were the most rapid. Similarly, our analysis indicated that price increases was more rapid in rural areas as compared to urban areas.

Third, while Cagan pointed out the importance of price expectation in the context of hyper-inflation, we considered additionally the role of expectations during periods of modest inflation within an underdeveloped economy, namely, Jamaica. We found, that over the 14 years that were considered, the optimal rate of price expectations occurred when the coefficient of adjustment was .02 which means that the Jamaica consumer do have some notion about price increases and act accordingly. Although we do not have any measurement of the impact of the media on expectation formation, it seems reasonable to assume that the improvements in communication since the late 1950's has contributed immensely to the formation of expectations.

Fourth, the income velocity of circulations of money appeared to have fluctuated widely since 1959 and this was especially the case with the most active form of real cash balances, M_1/y. Given the upward trend in per capita income over the same period, the fluctuations in the velocity of circulation of money (narrowly defined) suggests that over time per capita income has a negligible effect on the velocity of circulation of this form of money. Our findings for money defined in the broad sense M3 (M2 + SD) lend support to Friedman's theory that 'money' is a luxury good - as real income rises, M would rise more rapidly than nominal income or M3/y would rise.

Finally, the statistical analysis of the relationship between real cash balances and the expected rate of inflation indicated that there was a movement from cash to real assets dur-

ing the period 1959-1972. It should be mentioned, moreover, that the movement seemed to be great since the price elasticity of demand for all variants of cash balances, except M1/y, was well above unity.

FOOTNOTES

[1]See for example, the earlier empirical contributions on Jamaican inflation by Brewster (1), Hall (9), and Hines (10).

[2]To be sure the earlier contributions do not analyze the implications of expectations. In other words, the basic underlying framework of the existing studies on Jamaican inflation do not give recognition to the fact that expectations may have a profound influence on the rate of inflation.

[3]While the analysis of inflation has been counted on partial equilibrium terms in this paper, it must be recognised that the analysis can be undertaken in a general equilibrium framework.

[4]For a description of various techniques of estimating expected variables, see Nerlove (11).

[5]Equation (2) is an alternative and perhaps easier way of deriving equation (1).

[6]Where MS1 = Currency plus Demand Deposits at Commercial Banks; MS11 = MS1 plus Time Deposits; MS111 = MS11 plus Savings Deposits.

[7]In the definition(s), of the more expensive variants of money supply. T.D. denotes time deposits and S.D. indicates savings deposits.

[8]Despite the fact that many studies have been undertaken on the relationship between inflation and interest rates, no single explanation has gained widespread credence. See for example, M. Friedman (7), P. Cagan and A. Gandolfi (3), W. Gibson (8), W. Yohe and D. Karnosky (12).

[9]Inasmuch as both the Treasury bill rate and per capita real income variables were statistically insignificant, the estimated equation was not presented in this paper.

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A P P E N D I X

STATISTICAL TABLE A1 (KINGSTON METROPOLITAN AREA)

FOOD & DRINK (K.M.A.) - 1st Qr. 1959-4th Qr. 1972

Linear Trend	77.2491 + 1.0976t	S.E. =	.9997
		C.V. =	.0166
Geometric Trend	80.7814 $(1.0098)^t$	S.E. =	0.8671
		C.V. =	0.0144
		G.R. =	0.98

FUEL (K.M.A.) - 1st Qr. 1959-4th Qr. 1972

Linear Trend	76.6340 + 1.0622t	S.E. =	0.9157
		C.V. =	0.0158
Geometric Trend	79.9045 $(1.0097)^t$	S.E. =	0.7951
		C.V. =	0.0137
		G.R. =	0.97

HOUSING (K.M.A.) - 1st Qr. - 4th Qr. 1972

Linear Trend	76.2485 + 0.9168t	S.E. =	0.8305
		C.V. =	0.0151
Geometric Trend	77.7742 $(1.0092)^t$	S.E. =	0.8116
		C.V. =	0.0148
		G.R. =	0.92

HOUSEHOLD FURNISHING (K.M.A.) - 1st Qr. 1959 - 4th Qr. 1972

Linear Trend	86.9094 + 0.5162t	S.E. =	.4313
		C.V. =	.0075
Geometric Trend	87.5921 $(1.0050)^t$	S.E. =	0.4158
		C.V. =	.0072
		G.R. =	0.50

CLOTHING (K.M.A.) - 1st Qr. 1959 - 4th Qr. 1972

Linear Trend	79.7751 + 0.8034t	S.E. =	1.0591
		C.V. =	0.0190
Geometric Trend	81.5929 $(1.0077)^t$	S.E. =	1.0232
		C.V. =	0.0183
		G.R. =	0.77

PERSONAL EXPENSES (K.M.A.) - 1st Qr. 1959 - 4th Qr. 1972

Linear Trend	64.4505 + 1.4007t	S.E.	= 0.5202
		C.V.	= 0.0090
Geometric Trend	68.9562 $(1.0137)^t$	S.E.	= 0.3549
		C.V.	= 0.0061
		G.R.	= 1.37

ALL ITEMS (K.M.A.) - 1st Qr. 1959 - 4th Qr. 1972

Linear Trend	76.9381 + 1.0541t	S.E.	= 0.8621
		C.V.	= 0.0145
Geometric Trend	80.0794 $(1.0097)^t$	S.E.	= 0.7459
		C.V.	= 0.0125
		G.R.	= 0.97

FOOD & DRINK (K.M.A.) - 1st Qr. 1959 - 3rd Qr. 1967

Linear Trend	85.7280 + 0.5423t	S.E.	= 0.4265
		C.V.	= 0.0132
Geometric Trend	85.9992 $(1.0057)^t$	S.E.	= 0.4233
		C.V.	= 0.0131
		G.R.	= 0.57

FOOD & DRINK (K.M.A.) - 4th Qr. 1967 - 4th Qr. 1972

Linear Trend	103.7454 + 2.4497t	S.E.	= 0.7389
		C.V.	= 0.0275
Geometric Trend	104.9248 $(1.0195)^t$	S.E.	= 0.7994
		C.V.	= 0.0297
		G.R.	= 1.95

FUEL (K.M.A.) - 1st Qr. 1959 - 3rd Qr. 1967

Linear Trend	84.3004 + 0.5655t	S.E.	= 0.4046
		C.V.	= 0.0127
Geometric Trend	84.4194 $(1.0061)^t$	S.E.	= 0.4253
		C.V.	= 0.0133
		G.R.	= 0.61

FUEL (K.M.A.) - 4th Qr. 1967 - 4th Qr. 1972

Linear Trend	101.9852 + 2.3748t	S.E.	= 0.4572
		C.V.	= 0.0182
Geometric Trend	103.3712 $(1.0190)^t$	S.E.	= 0.4199
		C.V.	= 0.0167
		G.R.	= 1.90

HOUSING (K.M.A.) - 1st Qr. 1959 - 3rd Qr. 1967

Linear Trend	78.2695 + 0.8066t	S.E.	1.1884
		C.V.	0.0530
Geometric Trend	77.9172 $(1.0093)^t$	S.E.	1.2218
		C.V.	0.0545
		G.R.	0.93

HOUSING (K.M.A.) - 4th Qr. 1967 - 4th Qr. 1972

Linear Trend	101.1060 + 1.6155t	S.E.	0.2845
		C.V.	0.0115
Geometric Trend	101.6848 $(1.0139)^t$	S.E.	0.3325
		C.V.	0.0135
		G.R.	1.39

HOUSEHOLD FURNISHING (K.M.A.) - 1st Qr. 1959 - 3rd Qr. 1967

Linear Trend	88.7733 + 0.4017t	S.E.	0.5299
		C.V.	0.0115
Geometric Trend	101.6848 $(1.0139)^t$	S.E.	0.3325
		C.V.	0.0135
		G.R.	1.39

HOUSEHOLD FURNISHING K.M.A.) - 1st Qr. 1959 - 3rd Qr. 1967

Linear Trend	88.7733 + 0.4017t	S.E.	0.5299
		C.V.	0.0158
Geometric Trend	86.7791 $(1.0042)^t$	S.E.	0.5359
		C.V.	0.0160
		G.R.	1.60

HOUSEHOLD FURNISHING (K.M.A.) - 4th Qr. 1967 - 4th Qr. 1972

Linear Trend	100.8528 + 0.9423t	S.E.	0.3569
		C.V.	0.0154
Geometric Trend	101.1481 $(1.0085)^t$	S.E.	0.3443
		C.V.	.1149
		G.R.	0.85

CLOTHING (K.M.A.) - 1st Qr. 1959 - 3rd Qr. 1967

Linear Trend	82.4085 + 0.6611t	S.E.	1.4952
		C.V.	0.0469
Geometric Trend	83.3004 $(1.0065)^t$	S.E.	1.4896
		C.V.	0.0467
		G.R.	.65

CLOTHING (K.M.A.) - 4th Qr. 1967 - 4th Qr. 1972

Linear Trend	98.2203 + 1.7355t	S.E. = 1.7737 C.V. = 0.3966
Geometric Trend	99.1251 $(1.0150)^t$	S.E. = 0.3284 C.V. = .0135 G.R. = 1.00

PERSONAL EXPENSES (K.M.A.) - 1st Qr. 1959 - 3rd Qr. 1967

Linear Trend	69.0076 + 1.0777t	S.E. = 0.4122 C.V. = .0159
Geometric Trend	70.0164 $(1.0125)^t$	S.E. = .4340 C.V. = .0166 G.R. = 1.25

PERSONAL EXPENSES (K.M.A.) - 4th Qr. 1967 - 4th Qr. 1972

Linear Trend	111.9558 + 1.7087t	S.E. = 0.4870 C.V. = 0.0180
Geometric Trend	112.7445 $(1.0132)^t$	S.E. = 0.4452 C.V. = 0.0164 G.R. = 1.32

ALL ITEMS (K.M.A.) - 1st Qr. 1959 - 3rd Qr. 1967

Linear Trend	84.0025 + 0.5574t	S.E. = 0.5521 C.V. = 0.0168
Geometric Trend	84.1179 $(1.0064)^t$	S.E. = 0.5661 C.V. = 0.0172 G.R. = 0.64

ALL ITEMS (K.M.A.) - 4th Qr. 1967 - 4th Qr. 1972

Linear Trend	103.4982 + 2.2177t	S.E. = 0.3762 C.V. = 0.0142
Geometric Trend	104.6740 $(1.0178)^t$	S.E. = 0.3639 C.V. = 0.0138 G.R. = 1.78

STATISTICAL TABLE A2 (RURAL AREAS)

FOOD & DRINK (RURAL) - 1st Qr. 1959 - 4th Qr. 1972

Linear Trend	$70.5182 + 1.2764t$	S.E. =	0.9315
		C.V. =	0.0159
Geometric Trend	$75.0275\ (1.0117)^t$	S.E. =	
		C.V. =	.0126
		G.R. =	

FUEL (RURAL) - 1st Qr. 1959 - 4th Qr. 1972

Linear Trend	$80.1973 + 1.0497t$	S.E. =	1.0830
		C.V. =	0.0189
Geometric Trend	$83.5715\ (1.0092)^t$	S.E. =	0.9593
		C.V. =	0.0168
		G.R. =	0.92

HOUSING (RURAL) - 1st Qr. 1959 - 4th Qr. 1972

Linear Trend	$82.1456 + 0.7206t$	S.E. =	0.5059
		C.V. =	0.0088
Geometric Trend	$83.3259\ (1.0071)^t$	S.E. =	0.4980
		C.V. =	0.0087
		G.R. =	0.71

HOUSING FURNISHING (RURAL) - 1st Qr. 1959 - 4th Qr. 1972

Linear Trend	$83.1306 + 0.6814t$	S.E. =	0.6100
		C.V. =	0.0107
Geometric Trend	$84.5372\ (1.0065)^t$	S.E. =	0.5587
		C.V. =	0.0098
		G.R. =	0.65

CLOTHING (RURAL) - 1st Qr. 1959 - 4th Qr. 1972

Linear Trend	$75.3398 + 0.9508t$	S.E. =	0.9172
		C.V. =	0.0161
Geometric Trend	$78.1716\ (1.0090)^t$	S.E. =	0.8296
		C.V. =	.0146
		G.R. =	0.90

PERSONAL EXPENSES (RURAL) - 1st Qr. 1959 - 4th Qr. 1972

Linear Trend	$68.8750 + 1.1372t$	S.E. = 0.8972 C.V. = 0.0163
Geometric Trend	$71.3628\ (1.0116)^t$	S.E. = 0.8024 C.V. = 0.0146 G.R. = 1.16

ALL ITEMS (RURAL) - 1st Qr. 1959 - 4th Qr. 1972

Linear Trend	$73.7958 + 1.1107t$	S.E. = 0.8387 C.V. = 0.0149
Geometric Trend	$77.2336\ (1.0104)^t$	S.E. = 0.6980 C.V. = 0.0124 G.R. = 1.04

FOOD & DRINK (RURAL) - 1st Qr. 1959 - 3rd Qr. 1967

Linear Trend	$78.4842 + 0.7577t$	S.E. = 0.3762 C.V. = 0.0142
Geometric Trend	$79.0783\ (1.0083)^t$	S.E. = 0.3639 C.V. = 0.0138 G.R. = 0.83

FOOD & DRINK (RURAL) - 4th Qr. 1967 - 4th Qr. 1972

Linear Trend	$103.4173 + 2.5963t$	S.E. = 0.6049 C.V. = 0.0234
Geometric Trend	$104.9647\ (1.0203)^t$	S.E. = 0.2947 C.V. = .0092 G.R. = 2.03

RURAL (RURAL) - 1st Qr. 1959 - 3rd Qr. 1967

Linear Trend	$90.5466 + 0.3478t$	S.E. = 0.6049 C.V. = 0.0234
Geometric Trend	$90.6505\ (1.0036)^t$	S.E. = 0.5931 C.V. = 0.0023 G.R. = 0.36

FUEL (RURAL) - 4th Qr. 1967 - 4th Qr. 1972

Linear Trend	$107.1878 + 2.2888t$	S.E. = 0.6835 C.V. = 0.0250
Geometric Trend	$108.4277\ (1.0177)^t$	S.E. = 0.6544 C.V. = 0.0239 G.R. = 1.77

HOUSING (RURAL) - 1st Qr. 1959 - 3rd Qr. 1967

Linear Trend	84.1376 + 0.5836t	S.E. = 0.4900 C.V. = 0.0153
Geometric Trend	$84.1755\ (1.0064)^{t}$	S.E. = 0.5161 C.V. = 0.016 G.R. = 0.64

HOUSING (RURAL) - 4th Qr. 1967 - 4th Qr. 1972

Linear Trend	105.8705 + 0.9267	S.E. = 0.9829 C.V. = 0.0406
Geometric Trend	$105.9600\ (1.0081)^{t}$	S.E. = 1.0000 C.V. = 0.0413 G.R. = 0.81

HOUSEHOLD FURNISHING (RURAL) 1st Qr. - 1959 - 3rd Qr. 1967

Linear Trend	87.7590 + 0.3742t	S.E. = 0.5710 C.V. = 0.0174
Geometric Trend	$87.8359\ (1.0039)^{t}$	S.E. = 0.5693 C.V. = 0.0175 G.R. = 0.39

HOUSEHOLD FURNISHING (RURAL) - 4th Qr. 1967 - 4th Qr. 1972

Linear Trend	101.2961 + 1.3489t	S.E. = 0.3042 C.V. = 0.0133
Geometric Trend	$101.8547\ (1.0117)^{t}$	S.E. = 0.2630 C.V. = 0.0115 G.R. = 1.17

CLOTHING (RURAL) - 1st Qr. 1959 - 3rd Qr. 1967

Linear Trend	81.1761 + 05822t	S.E. = 0.2483 C.V. = 0.0083
Geometric Trend	$81.5029\ (1.0064)^{t}$	S.E. = 1.5262 C.V. = 0.0082 G.R. = 0.64

CLOTHING (RURAL) - 4th Qr. 1967 - 4th Qr. 1972

Linear Trend	97.7129 + 2.1129t	S.E. = 1.5262 C.V. = 0.0558
Geometric Trend	$99.3335\ (1.0174)^{t}$	S.E. = 1.4654 C.V. = 0.0536 G.R. = 1.74

PERSONAL EXPENSES (RURAL) - 1st Qr. 1959 -Qr. 1967

Linear Trend	$71.7776 + 0.9445t$	S.E. = 1.4774 C.V. = 0.0525
Geometric Trend	$71.7990 (1.0112)^t$	S.E. = 1.4860 C.V. = 0.0528 G.R. = 1.2

PERSONAL EXPENSES (RURAL) - 4th Qr. 1967 - 4th Qr. 1972

Linear Trend	$105.1307 + 1.5545t$	S.E. = 0.3961 C.V. = 0.0164
Geometric Trend	$105.8369 (1.0128)^t$	S.E. = 0.3485 C.V. = 0.0144 G.R. = 1.28

ALL ITEMS (RURAL) 1st Qr. 1959 - 3rd Qr. 1967

Linear Trend	$80.7533 + 0.6538t$	S.E. = 0.5415 C.V. = 0.0183
Geometric Trend	$81.0724 (1.0071)^t$	S.E. = 0.5415 C.V. = .0183 G.R. = 0.71

ALL ITEMS (RURAL) - 4th Qr. 196[illegible] - 4th Qr. 1972

Linear Trend	$103.1593 + 2.1974t$	S.E. = 0.4275 C.V. = 0.0163
Geometric Trend	$104.3350 (1.0174)^t$	S.E. = 0.4059 C.V. = 0.0154 G.R. = 1.74

IMPORT INDEX - 1st Qr. 1959 - 4th Qr. 1972

Linear Trend	$75.8726 + 0.9817t$	S.E. = 1.2293 C.V. = .0184
Geometric Trend	$78.5281 (1.0098)^t$	S.E. = 1.1561 C.V. = .0121 G.R. = 0.98

Where S.E. denotes the standard error
C.V. " " coefficient of variation
G.R. " " rate of growth