

MACRO ECONOMIC IMPACTS OF FLUCTUATIONS
IN ETHIOPIA'S COFFEE EXPORT EARNINGS

by

Dan M. Etherington (*)

Alasebu Yainshet (**)

Abstract

Coffee is the most important export commodity in Ethiopian economy. This paper shows that there are significant and positive relationships between the income terms of trade for coffee and both capital goods imports and domestic capital formation in terms of actual values and fluctuations.

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(*) Fellow NCDS, ANU.

(**) Former graduate student at the NCDS, ANU.

This paper is a sobering one: not only is Ethiopia one of the poorest countries in the world not only is it subjected to famine in times of severe draught and almost continuous warfare but its major export crop, grown in the better watered regions of the country, is subject to wide fluctuations in its earning capacity. Unfortunately these fluctuations are transmitted to the modern sector of the economy through capital goods imports and domestic capital formation.

The type of coffee that Ethiopia produces belongs to the species Arabica which is a highland crop grown at altitudes from 500 to almost 3000 meters. It is believed that by, among others, Kurian (1982) and Roden (1971) the wild trees grown in Ethiopia are the progenitors of all Arabicas grown in the world and coffee derives its name from Keffa, a region in the southern part of the country where coffee grows most extensively in the wild. Nevertheless it is only recently that improved methods of harvesting and preparation of coffee beans has been introduced.

Although the species Arabica is indigenous to Ethiopia the country produces only about 3-4% of the world's supply of all grades and 6-14% of unwashed Arabica. Among the main African producers (Ivory Coast, Ethiopia, Uganda, Kenya, Cameroon, Zaire, Malagasy Republic, Tanzania, Ghana, Brundi, Angola, Rwanda and Sierra Leone) Ethiopia is the largest producer next to Ivory Coast but is only fourth in export preceeded by Ivory Coast, Uganda and Cameroon because of the large amount of domestic consumption. In stark contrast to other exporters of coffee more than 50% of production is consumed domestically. For instance in 1984 other major coffee producing

African countries - Ivory Coast, Uganda and Kenya exported 88%, 75% and 95% of their production, respectively. Moreover, the estimated per capita consumption of coffee of about 3 kilograms per annum (FAO, 1971) is on par with high income countries (for example: U.K. 2.17, Australia 2.02, Italy 3.87, Canada 4.54 and U.S.A. 4.63 kg/capita/annum). This high coffee consumption in Ethiopia accounts for about 85% and 50% of the total coffee consumed in East Africa and whole of Africa respectively. In spite of this, coffee exports are of fundamental importance to the Ethiopian economy.

The industrial base of the country is at a rudimentary stage (16.4% of GDP) and the country imports much of its manufactures and almost all capital equipment. This equipment is paid for mainly by exports. As 60% of the export proceeds are earned by coffee the purchasing power of coffee exports are expected to have significant impact on the quantity of capital equipment imports and the level of investment as reflected in statistics on gross domestic capital formation. The level of investment is assumed to be affected by the purchasing power of coffee through capital goods imports. Love (1975), in his study of the influence of export earnings on the Ethiopian economy argues thus:

"The dependence of domestic investment on imports of capital goods requires that there should be sufficient foreign currency receipts to finance the import constituent of capital formation and the primary source of these receipts is export earnings. Accepted theory holds, however, that fluctuations in the availability of foreign exchange will cause instability in imports of capital goods and, hence, instability in domestic capital formation ... " (Love, 1975 pp. 42).

Arguments have been advanced in favour of such a relationship (Maizels, 1971), (Massell et al., 1972) and (Bilsborrow, 1977). Others would argue that 'accepted theory' suggests a less direct mechanism: that fluctuations in receipts of funds from coffee exports would have a direct effect on domestic income and hence on fluctuations in savings and thus on investment. It is possible for both the mechanisms to work in an economy. However, in the particular case of Ethiopian coffee, the more indirect mechanism is likely to be very weak. This is because coffee export earnings account only 8% of the recorded National income. Given the very low propensity to save in such a very low income country the savings out of this 8% would be negligible. Furthermore, coffee export receipts which would form a part of government savings and investment, are also very modest. They account only for about 6% of the total tax receipts. Given these facts, if there is a statistical relationship between the income terms of trade for coffee and gross domestic capital formation it is more likely to reflect the more direct relationship suggested by Love, since the less direct mechanism can only be very low. We anticipate coffee income terms of trade to affect capital goods imports with a relatively short-lag through the changes in available foreign exchange, and the level of investment with a longer lag as it takes some time in making investment decision after the foreign exchange is earned.

The hypothesized relationship between purchasing power of coffee exports and capital equipment imports assumes foreign exchange rationing which is not unusual in many less developed countries. Foreign exchange is strictly controlled and rationed in Ethiopia where

not only are all exports and imports licensed but also foreign exchange is not available for nonessential goods (IMF, 1983). In the face of such regulations imports of capital goods depend largely on capacity to import rather than being residually determined after the consumer goods imports have been fulfilled. The potential for a rather direct relationship between export earnings and imports is also likely in the Ethiopian case because of the low net capital inflow from outside. Thus in many respects Ethiopia has had 'to pay its own way' even in the short-run.

THE IMPACT OF INCOME TERMS OF TRADE FOR COFFEE ON
CAPITAL IMPORTS

The extent to which capital goods imports are influenced by the purchasing power of coffee exports is shown in Equation (1).

$$(1) \quad CI = 107 + 0.5 I_{-1} \quad \bar{R}^2 = 0.52 \quad D-W = 1.63 (*)$$

7.4 Period (1962-80)

Where CI and I stand for capital goods imports and purchasing power of coffee exports (income terms of trade), respectively.

The statistics in equation (1) suggests that 52% of the changes in capital goods imports after one year lag is explained by income terms of trade for coffee. Capital goods imports respond to income terms of trade for coffee after one year lag because some time is

(*) D-W is Durbin-Watson statistics used to measure serial correlation in the error term.

required to get the import licence and to import the capital goods after the export earnings are obtained. In particular, the results suggest that for each additional one million Birr (*) of coffee exports, there will be an increase in capital goods imports of about half-a-million Birr.

Given the significant relationship shown in Equation (1) it is worth examining whether fluctuations in the income terms of trade for coffee are likely to result in fluctuations in capital goods imports. To keep in line with previous work such as that of Love (1975), fluctuations in income terms of trade for coffee (purchasing power of coffee exports) and fluctuations of capital goods imports are computed as first differences of the actual values. In addition we shall explore the impact of the fluctuations around the linear trend in the data.

$$(2) \quad FCI = 2.5 + 1.2 FI \quad \bar{R}^2 = 0.29 \quad D-W = 2.6$$

2.4 Period (1962-80)

Where FCI and FI refer to fluctuations in capital goods imports and income terms of trade for coffee.

With the variables measured as first differences, Equation (2) remains highly significant with some 30% of the changes in the capital goods imports explained by changes in income terms of trade for coffee. The 'accelerative' slope coefficient of this equation implies that a more than proportionate effect of fluctuations in coffee export

 (*) US\$1 = 2.07 Birr

earnings influencing fluctuations in capital goods imports. In other words a one Birr increase (decrease) in the change in the value of coffee exports leads to slightly more than a Birr increase (decrease) in the change in the capital goods imports.

Taking first differences as a measure of fluctuations when there is a trend in the data may capture the constant increases or decreases in the data rather than the true fluctuations from the expected trend. It could be for this reason that a more than proportionate effect of the fluctuations in capital goods imports was obtained from the relationships of the first differences. Because of the strong trend in the data we finally come to fluctuations around the trend.

Taking fluctuations around the trend as a measure of instability assumes that the unexpected part of the fluctuation, which is explained by the deviation from the trend, is the most disturbing (Glezakos, 1973) and that would have an effect on the dependent variable.

$$(3) \quad FCI = 7.8 + 0.19 FI_{-1} \quad \bar{R}^2 = 0.15 \quad D-W = 2.3$$

2.07 Period(1962-80)

The statistical estimates in Equation (3) suggest that fluctuations in capital imports are influenced by fluctuations in income terms of trade for coffee in the same direction after one year lag. Comparing Equations (2) and (3), the influence of the trend becomes clear with the residual fluctuations only having a small impact on capital goods imports.

The major concern in fluctuations of purchasing power of coffee exports and fluctuations in capital goods imports is the extent to which negative deviations in purchasing power of coffee exports may induce capital imports to deviate negatively from their trend. Out of the nine cases during 1962-80 of negative fluctuations in purchasing power of coffee exports six are related to negative fluctuations in capital imports after one year lag.

From the foregoing discussion it could be concluded that capital goods imports are significantly influenced by purchasing power of coffee exports. Moreover, fluctuations in income terms of trade for coffee induce corresponding fluctuations in capital goods imports.

THE IMPACT OF INCOME TERMS OF TRADE FOR COFFEE ON GROSS
DOMESTIC CAPITAL FORMATION

The import component of Ethiopia's gross domestic capital formation was on the average about 33% during 1961-80 but started rising in the second-half of the 1970s reaching a maximum of 76% in 1979. Given the association between purchasing power of coffee exports and capital goods imports, and the high proportion of the import component of domestic capital formation, some influence of purchasing power of coffee exports on investment could be anticipated.

The domestic capital formation data given in the national accounts refers to only to the monetary sector. Investment decisions in this sector directly or indirectly involve public decision making, which in Ethiopia is slow. Implementaion of investment then implies a long time lag between export receipts (from coffee) and actual

investment.

Before estimating the relationships of fluctuations in income terms of trade for coffee and fluctuations in domestic capital formation the relationship between the actual values of the corresponding variables is estimated. This estimate is given in Equation (4) where a distributed lag of two and three years is used.

$$(4) \quad CF = 525 - \underset{1.3}{1.3} I_{-2} + \underset{4.0}{1.7} I_{-3} \quad \bar{R}^2 = 0.48 \quad D-W = 1.3$$

Period (1961-80)

Where CF refers to gross domestic capital formation, deflated; the subscripts (-3) and (-2) denote three year and two year lag respectively.

The statistical measure in Equation (4) suggest the existence of a significant relationship between gross domestic capital formation and purchasing power of coffee exports with a three year lag. The approximately 50% change in gross (monetary) domestic capital formation explained by coffee export earnings alone is surprisingly high.

From the foregoing discussion a relationship is anticipated between fluctuations in purchasing power of coffee exports and fluctuations in capital formation. The three year lag is retained.

For the same reason given in capital goods imports fluctuations measured as first differences in both income terms of trade for coffee and domestic capital formation are estimated in Equation (5).

$$(5) \quad FCF = -4.5 + 1.1 FI_{-3} \quad \bar{R}^2 = 0.23 \quad D-W = 2.0$$

2.3 Period (1961-80)

Where FCF refers to fluctuations in capital formation.

Equation (5) indicates that fluctuations in domestic capital formation follow fluctuations in income terms of trade for coffee after three year lag. The very small intercept term and the unitary value of the slope suggest an almost 1:1 correspondence between the respective first differences in the variables.

Fluctuations around the trend are assumed to have more important effects on the domestic economy. When current year negative deviations in domestic capital formation are associated with three-year lag deviations in purchasing power of coffee exports, 12 out of 17 observations show movement in the same direction. This suggests there is a tendency for there to be a cut in capital formation following the decline in purchasing power of coffee exports with three-year lag. This point is supported by statistical results shown in Equation (6) for fluctuations calculated from the trend.

$$(6) \quad FCF = 24 + 0.7 FI_{-3} \quad \bar{R}^2 = 0.17 \quad D-W = 1.4$$

2.1 Period (1961-80)

Once again, Equation (6) suggests a statistically significant relationship between fluctuations of income terms of trade for coffee with fluctuations in capital formation with a three year lag.

SUMMARY AND CONCLUSIONS

Capital imports are significantly and positively related to purchasing power of coffee exports after one year lag. Moreover, the fluctuations in income terms of trade for coffee exports have significant impact on fluctuations of capital goods imports after one year lag. A similar significant relationship is observed between income terms of trade for coffee and capital formation after three year lag both in actual values and fluctuations.

Given the significant effect of income terms of trade for coffee on capital goods imports and domestic capital formation an important effect on the growth of the country is also expected provided that the domestic capital formation is taking place in investments that increase output. However, to pursue the effect of income terms of trade for coffee on the growth of the economy is not made possible because of the very long time lag likely between the two variables.

The country has undergone major socio-economic changes since 1974 and there have been incidences of natural as well as man-made calamities in the same period, both of which have affected macro and micro economic variables. Though coffee earnings are vital to the economy they have, historically, been an additional fluctuating influence.

REFERENCES

- Billsborrow, R. E (1977). 'The determinants of fixed investment by manufacturing firms in a developing country', International Economic Review, vol. 18, no. 3, pp. 697-717.
- Food and Agricultural Organization (1961). Agricultural Commodity Projection 1970-1980. Rome, Italy.
- Glezakos, C. (1973). 'Export instability and economic growth: a statistical verification', Economic Development and Cultural Change vol. 21, no. 4, part 1, pp. 670-678.
- International Monetary Fund (1970). Twenty-first Annual Report on Exchange Restrictions, 1970, IMF Washington, D. C.
- (1983). 'Exchange arrangements and exchange restrictions', Annual Report, 1983.
- Kurian, G. T. (1982). Encyclopedia of the Third World, revised ed., vol. 1.
- Love, J. (1975). 'The impact of export instability on the Ethiopian Economy', Eastern Africa Economic Review, vol. 7, no. 2, pp. 35-51.
- Maizels, A. (1971). Export and Economic Growth of Developing Countries, Redwood Press ltd., Trowbridge and London.
- Massell et al (1972) 'Foreign exchange and economic development: an empirical study of selected Latin American countries', The Review of Economics and Statistics, vol. 54, no. 2, pp. 208-212.
- Roden, C. (1971). Coffee. London.